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Sabloff, Jeremy Arac

Robert W. Preucel
Department of Anthropology, Brown University, Providence, RI, USA

Basic Biographical Information

Jeremy Arac Sabloff is a leading anthropological archaeologist, specializing in the comparative study of cities and urbanism with a focus on the ancient Maya. His work is characterized by an intellectual commitment to balancing science and humanism. Born in 1944, he grew up in Manhattan. He received his B.A. from the University of Pennsylvania in 1964 and his Ph.D. from Harvard University in 1969 under the direction of Gordon R. Willey. He has taught at Harvard University, the University of Utah, the University of New Mexico (where he was chair of the department), the University of Pittsburgh (where he also was chair), and the University of Pennsylvania where he was Christopher H. Browne Distinguished Professor of Anthropology. At Penn, he also served as the Williams Director of the University of Pennsylvania Museum from 1994 to 2004 and Interim Director from 2006 to 2007. He is currently the president of the Santa Fe Institute in Santa Fe, New Mexico (Fig. 1).

Sabloff has held or currently holds many influential positions in the profession. He has served as president of the Society for American Archaeology, chair of the anthropology section of the American Association for the Advancement of Science, chair of the Smithsonian Science Commission, and editor of *American Antiquity*. He is a member of the National Advisory Board of the National Museum of Natural History and the Board of Trustees of the SRI Foundation and chairs the visiting committee for the Peabody Museum at Harvard University. He is the recipient of numerous professional awards and honors. Among the most prestigious of these are his memberships or fellowships in the National Academy of Sciences, the American Philosophical Society, the American Academy of Arts and Sciences, the Society of Antiquaries of London, and the American Association for the Advancement of Science.

Major Accomplishments

Sabloff is a specialist in Maya archaeology and has made major contributions to the understanding of settlement and urbanism. As a graduate student, from 1965 to 1968, he joined Gordon Willey's project at Seibal, Guatemala. His main focus was the study of ceramics. From 1972 to 1973, he and William Rathje developed the Harvard-Arizona Cozumel Project in Quintana Roo. In the course of two field seasons, they studied approximately 30 sites in order to understand the role of long-distance trade in the development of Mesoamerican states. Although the project results did not support the port-of-trade model, the research provided an important new perspective on the Late Postclassic Period.

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Sabloff, Jeremy Arac, Fig. 1 Jeremy Arac Sabloff (InSight Foto Inc.)

From 1983 to 1988, he and Gair Tourtellot established a long-term project at the site of Sayil in Yucatan, Mexico. This project investigated for the first time the archaeology, environment, adaptation, organization, and history of an entire Maya city in the Puuc region of Yucatan.

Sabloff is equally well known for his contributions to the history of American archaeology. His overview of American archaeology, coauthored with Willey, was the first comprehensive history of the field. Significantly, they provided an intellectual genealogy for the rise of the new or processual archaeology by identifying four broad periods: Speculative (1492–1840), Classificatory-Descriptive (1840–1914), Classificatory-Historical (subdivided into Chronology (1914–1940) and Context and Function (1940–1960)), and the Explanatory (1960–present) (Willey & Sabloff 1974, 1980). Some of the important trends that they identified were the growing emphasis on evolutionary thinking, general systems theory, ecological models, and deductive reasoning in the context of making archaeology more scientific. They also argued that the new archaeology was not a revolution in the Kuhnian sense. Rather, it signaled a field in crisis yet to coalesce around a single theory. In their most recent edition (Willey & Sabloff 1993), they emphasize the importance of avoiding dogmatic thinking in method and theory and of acknowledging that the scientific and humanistic goals of the discipline are complementary rather than antithetical.

Sabloff has made numerous contributions to archaeological method and theory. He published with Willey an influential essay on the importance of history to processual explanation and argued that the Classic Lowland Maya collapse was due to an invasion of non-Maya peoples (Sabloff & Willey 1967). This essay was subsequently critiqued by Lewis Binford for not putting hypothesis testing first. In 1978, Sabloff joined the faculty of the University of New Mexico where Binford was teaching. At this time, he was focusing on the role of simulation in archaeology as a tool for understanding settlement change (Sabloff 1981). Team teaching with Binford led to an influential essay on paradigms and systematics that concluded with a plea for a "science of the archaeological record" (Binford & Sabloff 1982; Sabloff et al. 1987). Sabloff is committed to the comparative method to draw out insights about culture history and process. He coauthored a book on the rise of New and Old World civilizations with C. C. Lamberg-Karlovsky (Lamberg-Karlovsky & Sabloff 1979; also see Sabloff & Lamberg-Karlovsky 1975). A more recent example is his book on ancient cities coedited with Joyce Marcus (Marcus & Sabloff 2008).

Finally, Sabloff is an outspoken advocate of the role of archaeology in the modern world and avid proponent of science communication. As the Williams Director of the Penn Museum, he eagerly embraced the challenges of educating the public about anthropology and archaeology. He published his book *Archaeology Matters* (Sabloff 2008) to demonstrate how archaeology contributes to the understanding and amelioration of present-day problems. Using his research on ancient Maya civilization as an example, he noted that the collapse of Classic Period Maya civilization provides important insights into such contemporary issues as overpopulation, shortsighted agricultural policies, and political competition. In 2010, he delivered the distinguished lecture at the American Anthropological Association's annual meeting, encouraging anthropologists to make their work accessible to their relevant publics and cultivate a new generation of scientist communicators (Sabloff 2011).

Cross-References

- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Mesoamerica: Complex Society Development
- ▶ Science Communication in Archaeology
- ▶ Willey, Gordon Randolph

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Sacred Site Conservation and Preservation

Georgios Alexopoulos
Initiative for Heritage Conservancy, Eleusis, Greece

Introduction

Sacred sites are widely considered to be different from other forms of archaeological sites and

cultural heritage in that they represent and are imbued with sacred or spiritual values by a religion, the adherents of a specific faith, or a group of people in the past or the present. In that respect, sacred sites are among the world's most popular visitor attractions (Shackley 2001) while religious heritage in general is estimated to constitute "perhaps the largest single category of heritage property to be found in most countries around the world" (Stovel 2005: 2). Because of their tangible and intangible associations and meanings and their potential active use for religious or other purposes, sacred sites demand particular attention, and their conservation and preservation often requires special treatment and sensitivity.

Definition

The popularity of sacred sites within the wider heritage industry can threaten their physical integrity, impose changes or impact their contemporary use. At the same time, the contemporary principles of conservation and cultural resource management, that demand preservation for present and future generations, can often advocate interventions and operational strategies that may seemingly compromise the very essence of a sacred site: its sacred or living heritage value and its use by traditional custodians or the people who value it. Therefore, when dealing with this specific type of heritage, archaeologists and other heritage professionals have great responsibility in recognizing both the human dimension of the site in question and the immaterial values it holds.

Key Issues/Current Debates/Future Directions/Examples

There is a very broad range of places that can be termed sacred sites and the differences relating to the geographical location, the antiquity, the size, the cultural and social affiliation, and other special characteristics may be enormous. One common way to categorize these numerous sacred sites is by distinguishing those that are today actively used by a living religious tradition or a group of people for religious or spiritual purposes (e.g., active churches, mosques, temples, monasteries, sites constituting or associated with pilgrimage destinations) as opposed to those that were valued for their sacredness or other intangible values in the past but are not religiously active in the present (e.g., the megalithic monuments of prehistoric Europe or the temples and sanctuaries of Ancient Greece and the Roman Empire). The latter share more similarities to historical monuments or sites with primarily archaeological value. However, in countries such as Greece, it has been argued that the importance of monuments that have served in building and consolidating national consciousness and identity, such as the Parthenon temple on the Acropolis hill in Athens, is subject to a certain form of sacralization (Hamilakis & Yalouri 1999). Even sites associated with long gone cultures or civilizations that archaeologists may consider "dead" can become a contested space and may be appropriated by groups of people that claim to continue old religious traditions, as witnessed in the case of the pagan/neo-shaman worshippers (Blain & Wallis 2007). It is also important to consider, when thinking of the spectrum of examples that the term sacred sites can encompass, that for certain cultures a sacred site may be a landscape thus emphasizing the role of the natural environment in this process – with Aboriginal Australian notions with regard to living landscapes a case in point (Colley 2002). In addition, there are also places such as holocaust sites, war memorials, burial grounds, or political shrines that are vested with certain holiness and religious undertones (Shackley 2001: 155–174). These places, although secular in character, can also be viewed as sacred by specific groups of people.

What becomes evident from the aforementioned range of examples is that, whether belonging to the major world religions or to the individual sacred traditions of indigenous people and descendant communities, dealing with sacred sites also means dealing with the people who value them. Without doubt, sacred sites have always posed certain challenges and problems to archaeologists and heritage professionals that

have strived to conserve and preserve them. Indeed, approaches to the conservation of sacred sites, in order to balance both tangible and intangible values, need to carefully consider issues related to different definitions of sacredness, ownership, right to worship, public access, and the wider meanings and associations placed by stakeholders on a local, regional, national, and international level. Active sacred sites that are valued as cultural heritage present additional complexities because they carry with them the requirements of contemporary life and cooperation among heritage professionals and religious communities can become particularly complex if the worldviews and consequently the aspirations and expectations towards any given intervention are different. Such examples truly demonstrate the difficulties in bridging modern secular standards of conservation and heritage management with traditional ways of life and faith.

It has been claimed that heritage professionals often find religion too hard to tackle because the religious context is too sensitive "to treat with objectivity and fairness" (Stovel 2005: 2) or because they lack the proper approach to understand it and to adequately articulate and communicate their aims to the concerned stakeholders (McNally 2011). The challenge, from the part of the conservator or archaeologist, is finding a way to conserve and preserve sacred sites without attempting to fossilize the traditions they represent and the religious groups that actively use them. On the other hand, custodians of sacred sites usually regard themselves predominantly as "facilitators of worship" and may have very different views on how the elusive spiritual quality of a sacred place may be preserved without serious compromises (Shackley 2001, xv–xvi). As a result, traditional ways of dealing with sacred sites do not often conform to conventional standards of heritage management practice. Furthermore, the way archaeologists and their institutions are perceived can hinder mutual trust and collaboration. For example, archaeologists are often not viewed in a positive light by indigenous communities because they are seen to intrude through excavation on sensitive sacred space and to provide interpretations that are sometimes not valid to local sacred beliefs (Layton 1989; Carmichael et al. 1994). Tensions and conflicts can arise particularly when heritage professionals are acting as an authority that dominates decision-making and excludes alternative voices. The case of the Orthodox monastic community of Mount Athos, a World Heritage Site located in Northern Greece, illustrates the difficulties of achieving mutual understanding and essential cooperation among the national archaeological authorities and the monastic authorities – the area being a self-governed part of the Greek state ruled by century-old customary traditions and laws (Alexopoulos 2010). In order to empower the Athonite monasteries in decision-making about the conservation and preservation of their own area, a special agency has been established (KEDAK = Centre for the Preservation of Athonite Heritage) with an administrative council that consists of representatives of several disciplines (e.g., archaeologists, architects, engineers), practitioners, academics, state officials (politicians), and, most importantly, members of the monastic community.

A very common source of tension and conflict between religious communities and heritage professionals is the adherence of the latter to principles and standards of practice that advocate the preservation of original material fabric and minimal intervention. When these principles dictate that a site should not be used for religious purposes and to accommodate worshippers, for example, for fear of physical degradation, they may clash with the worldview of a group of people that see preservation of continuity and use as primary objectives. In some cases, such as the active Buddhist temples of Sri Lanka (Wijesuriya 2005), authorities responsible for heritage conservation have taken into consideration the requests of the religious communities by offering alternative options to intervention without preventing contemporary use and the accommodation of religious practices. In a very different context, the conservation of ecclesiastical buildings in the United Kingdom has pursued to keep these places primarily in use for worship but often balancing preservation costs by also accepting an alternative or subsidiary purpose (Derrick 2004).

Some religious communities struggle to face the changes of the modern globalized world and are resistant to its extensively secularized societies and the rapid modernization that is fueled by the advances of the information technology. At the same time, reconciling the potential of sacred sites as a financial resource with the widely held view that such places are a priceless public good (Shackley 2001, 80) is not always feasible. Many pilgrimage destinations – such as the sacred sites of the Holy Land for Christians, Mecca and Medina for Muslims, and the Char Dham circuit for Hindus – account for a massive movement of people and are supported by a large industry that is responsible for catering for transport, accommodation, etc. Consequently, another potential obstacle in the smooth cooperation between experts and nonexperts is the impact of mass tourism and the issue of visitor access on the nonmaterial qualities of sacred sites. Particularly challenging is to achieve a balance in relation to the common fear towards the perceived deconsecration of sacred heritage places by touristification or museumification (Alexopoulos 2010). When a sacred site becomes a tourist attraction, not all of the visitors can be expected to be adherents of the faith in question, but nonetheless, custodians and managers have the responsibility to accommodate accessibility, contemporary use, and any conservation interventions with respect towards the people who value the religious or spiritual values. Concerns over the carrying capacity of sacred sites in combination with a tendency to keep religious communities and worshippers uncontaminated by secular tourists often dictate measures for controlling and restricting visitor numbers, dress and behavior, and levels of accessibility (Shackley 2001). The visitor management strategies designed to cope with these problems, when formulated by the religious communities themselves, may often establish rules that exclude large sections of the wider public and limit the right of access to culture. The monasteries of Mount Athos, for example, ban female visitors from accessing the area and operate with a strict visitor quota that favors adherents of the Orthodox Christian faith. However, this measure, respected and not interfered with by-the-state heritage agencies, is deemed as vital for the raison d'être of the community of monasteries (Alexopoulos 2010).

The preservation of sacred cultural heritage has often also been jeopardized by conflicts among coexisting faiths. In the case of Jerusalem, a holy city for the monotheistic religions of Judaism, Christianity, and Islam, the challenge of preserving the several major religious sites existing within its Old City in a manner that supports tolerance and respect to all faiths can be difficult, particularly considering the tensions generated by current politics (Guinn 2006). In several other cases, religious monuments have been targeted for destruction on sectarian and ethnic grounds or as a consequence of religious fundamentalism as witnessed in the case of the Babri Masjid mosque in Ayodhya, India, or during the war that followed the breakdown of Yugoslavia and the creation of separate nation-states (Layton & Thomas 2001). Such deliberate destruction demonstrates the importance that sacred sites can have, as well as their subsequent vulnerability, as symbols of national or ethnic identity and as markers of multiculturalism and religious diversity.

Individual approaches to the treatment of sacred sites benefit from a consideration of archaeological practice and heritage conservation in a more global context. The trend towards recognizing the importance of sacred values attached to cultural heritage and dealing with the implications for the conservation and preservation of sacred sites can be traced in the postwar period. The original impetus for addressing relevant issues was provided by debates over architectural conservation, the desirable limits to restoration interventions, and the much disputed concept of authenticity. However, among the most influential developments underpinning the so-called values-based heritage management has been the Burra Charter (Australia ICOMOS Charter for Places of Cultural Significance), a policy document drafted in 1979 and revised considerably in 1999. This charter – and particularly its complementary guidelines (Australian Heritage Commission 2002) – constituted an important effort to address the notions of sacredness,

Sacred Site Conservation and Preservation, Fig. 1 A view of the Orthodox monastery of Iviron on Mount Athos, Greece – an important sacred site that constitutes a major pilgrimage destination, a World Heritage Site, and is host to a thriving self-governed monastic community with twenty ruling monasteries (Photograph by Georgios Alexopoulos 23.08.2005)

spirituality, and continued traditional use by taking into consideration the associations, meanings, and heritage values of the indigenous Australian Aboriginal people.

Overall, the practice of archaeological heritage management in North America and Australia has paved the way towards an international heritage discourse that emphasized the recognition of indigenous heritage and has advocated the participation and engagement of a wider public in the conservation process. Within this context, the conservation and management of sacred sites has gradually featured in several specialized research programs and workshops of international organizations such as UNESCO (United Nations Educational, Scientific and Cultural Organization) and ICOMOS (International Council on Monuments and Sites). In recent years, ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property) in particular has been actively promoting the conservation of living religious heritage by focusing on integrated approaches and community involvement. One of the most important developments, with potential future implications for sacred sites, is the special emphasis afforded to the notion of intangible heritage, as adopted by UNESCO's Convention for the Safeguarding of the Intangible Cultural Heritage (Ahmad 2006). Despite the criticism addressed towards the tendency to separate tangible and intangible heritage values, the convention itself has underlined the importance of various manifestations (e.g., oral traditions and expressions; performing arts; social practices, rituals, and festive events; knowledge and practices concerning nature and the universe; traditional craftsmanship) that resonate with many sacred sites.

To conclude, the conservation and preservation of sacred sites has never been an easy task for archaeologists and heritage professionals, especially when faced with the task to reconcile the standards and principles of contemporary practice (advocated by the experts) with the values and perceptions of religious communities and traditional custodians (the nonexperts). However, the tensions and conflicts often generated by different stakeholders over the preeminence of tangible or intangible heritage values can be overcome through tolerance, the development and fostering of mutual respect, the ability to formulate compromising solutions, and the recognition that conservation and sacredness can coexist. Archaeologists, in particular, can gain immensely from a better awareness of and a "more refined understanding of the workings and diversity of religious practices and beliefs" (McNally 2011: 172) (Fig. 1).

Cross-References

- Authenticity in Archaeological Conservation and Preservation
- Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- Conservation and Management of Archaeological Sites
- Conservation and Preservation in Archaeology in the Twenty-First Century
- Convention for the Safeguarding of Intangible Cultural Heritage (2003)
- Intangible Cultural Heritage
- Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- Sacred Sites in Indigenous Archaeology
- Stakeholders and Community Participation
- Uses of Heritage

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Sacred Sites in Indigenous Archaeology

Ken Mulvaney
Rio Tinto, Dampier, WA, Australia
Centre for Rock Art Research + Management, University of Western Australia, Perth, WA, Australia

Brief Definition of the Topic

Australian indigenous sacred sites are both a place associated with customary practices and beliefs and a legal entity, identified and protected under Australian laws. It is a site in the landscape that is of specific cultural and social custom, a place of significance according to Aboriginal laws and traditions. Sacred sites are tied into the creation myths, song lines, personal histories, and events of the indigenous peoples. They connect individuals, both as traditional owners and custodians of the present with that of the Dreaming and map a totemic geography across the landscape, anchoring spiritual and kinship relationships to

the land (see Elkin 1933; Berndt 1970; Strehlow 1971; Mountford 1976).

The Dreaming is a word to describe the creation time, its associated stories, and sacred sites, when the ancestor beings interacted with the land, created all living things, and formed natural features. Different Australian indigenous groups have their own word and understanding of this concept, like Tjukurrpa for the Arrernte of central Australia or the Pilbara Guruma word Yulurngulurngkamu. Indigenous Australian beliefs link the Dreaming, ancestor beings, sacred sites, and present-day actions into an integrated relational concept.

Sacred sites, although spiritually derived, have a physical manifestation, being natural features like rock outcrops, trees, water holes, or coral reefs or culturally marked places like stone arrangements and rock art. They can range in size and configuration from a single stone to a mountain range and embody both natural and culturally constructed markers. For indigenous Australians, the sacred is manifest in all aspects of nature and the landscape. Knowledge of sacred sites is learned through ritual attendance, initiation, and explanation of traditional law and lore. Singing the country and hearing and participating in the songs are ways of leaning about both the sacred sites and associated traditional knowledge. The act of singing and ritual renews and invigorates the spiritual essence of the land; it keeps the country alive (see Bradley 2010).

Protection of sacred sites is fundamental in ensuring the well-being of the country and people. Aspects of sacred sites may document historical happenings, inform on behavioral dictates and cultural values, and demonstrate personal links to ancestor, both Dreaming and genealogical. Places and knowledge may be restricted to gender, age, and initiation status. Locations and the mythological association of the place may be benevolent or contain great power which can destroy. Some places require the enactment of rituals and songs for the maintenance of species (see Daniel 1990). Other locations necessitate specific customary behavior to placate residing spirits or ensure illness does overcome the visitors.

The patterns of sacred sites weave a tapestry of resource access and control, land ownership, and traveling pathways. Areas and features are natural reference points throughout the landscape, many the physical manifestations of actions and marks created by the ancestor beings in the Dreaming. Some, like the Wandjina figures in the Kimberley rock art, are the shades of the Dreaming spirits (Crawford 1968; see also Lewis & Rose 1988). With these Wandjina figures, as with other sacred places, contain a dormant power that can be access through song and ritual performance.

The current social, educational, and traditional knowledge and land association of the indigenous people across Australia are variable, this often reflecting the timing, extent, and actions of white Australian occupation. Laws enacted for the protection and management of Australia's cultural heritage reflect this situation and what is important to the lawmakers. The *Northern Territory Aboriginal Sacred Sites Act* is undoubtedly the strongest in terms of protection and providing Aboriginal control in the process. Other states place more emphasis on archaeological rather than sacred sites, although, in cases, there are archaeological components to a sacred site. In the situation of the *Queensland Heritage Act 1992*, it specifically excludes places which would be regarded as sacred site but do not have material cultural evidence.

Cross-References

- ▶ Sacred Site Conservation and Preservation
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts
- ▶ Silbury Hill: Environmental Archaeology

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Sacred Traditions and "Art" in Hunter-Gatherer Contexts

Douglas H. MacDonald
Department of Anthropology, University of Montana, Missoula, MT, USA

Introduction

Prehistoric hunter-gatherers produced art and practiced sacred traditions, very often in tandem, leaving associated debris at archaeological sites across the world. This section of the encyclopedia provides a summary of aesthetics and sacred concepts in prehistoric hunter-gatherer contexts, as viewed from artifacts and archaeological sites. I define terms and provide a historical background, beginning with the origins of symbolism and language (Lieberman 1998) and progressing to the historical origins of hunter-gatherer art (Lewis Williams 2002; Mithen 2006; Clottes 2008). I then provide a summary of key issues and current debates on prehistoric hunter-gatherer art studies, including method, theory, and interpretation, concluding with four international case studies. Finally, I identify several outstanding contributions to this field which provide further information for the interested reader.

Definition

Art is defined as the production of various modes of expression – music, paintings, sculpture, and literature – that influence human senses, emotions, and thought. Art is very often a reflection of sacred tradition, defined as the transcendence from the human realm to the spiritual one. All human cultures have a conception of what is sacred to their world, usually encompassing beliefs in their origins, morals, and reasons for existence (Bellah 2011). Some anthropologists have proposed that the capacity for religion and sacred belief is an evolved characteristic of the human mind, an adaptive strategy for survival (Mithen 1996; Lewis-Williams 2002).

Art is often used to express such beliefs, but should not be thought to exclusively reflect that spiritual realm (Whitley 2011). Just as humans in the current age, hunter-gatherers in prehistory used art to express a much wider variety of experiences beyond the sacred, including subsistence practices (hunting, gathering, fishing, etc.), various material aspects of their world (animals, people, plants, etc.), historical events (battles, hunting scenes, etc.), and social life (dancing, ritual, etc.). While anthropologists have established the complex nature of both music and literature in contemporary hunter-gatherer society (Patel 2007), no material remains – in the form of sound recordings or books – exist for these forms of art in archaeological contexts. Archaeologists attempt to understand prehistoric music by the study of the few musical instrument artifacts found at archaeological sites (Mithen 2006), while literature study is restricted to the interpretation of rock art panels to gain insight into myths and stories of prehistoric hunter-gatherers.

As such, without music and literature, archaeologists are left to study art of prehistoric hunter-gatherers through objects, paintings, and sculpture found at archaeological sites. Namely, archaeologists study two types of artifacts: (1) art material culture (manufactured objects, sculptures, or portable objects) and (2) rock art (also referred to as parietal art). Art material culture is found as various forms of sculpture, using a variety of mediums, including ceramics, rock modification, plants (e.g., twig figurines), and other physical objects (Fig. 1).

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 1 Human face effigy recovered at Ghost Cave, Montana, United States (Courtesy Montana Fish, Wildlife, and Parks)

For example, this small palm-sized river cobble found at Ghost Cave in Montana was transformed into a human face effigy; it is a good example of art material culture, or portable art. Rock art is identified at archaeological sites in the form of pictographs, or painted images (Fig. 2), and petroglyphs, or pecked images (Fig. 3) on rockshelters, cliff faces, large boulders, and other similar lithic landscapes. Using these two types of art, archaeologists study hunter-gatherer aesthetics in the past. This image shows a human (anthropomorph) and associated animal pictographs painted in red ocher on a cliff face in central Montana, while this petroglyph shows etched human figures engaged in a gun fight on a rock wall in southern Alberta, Canada.

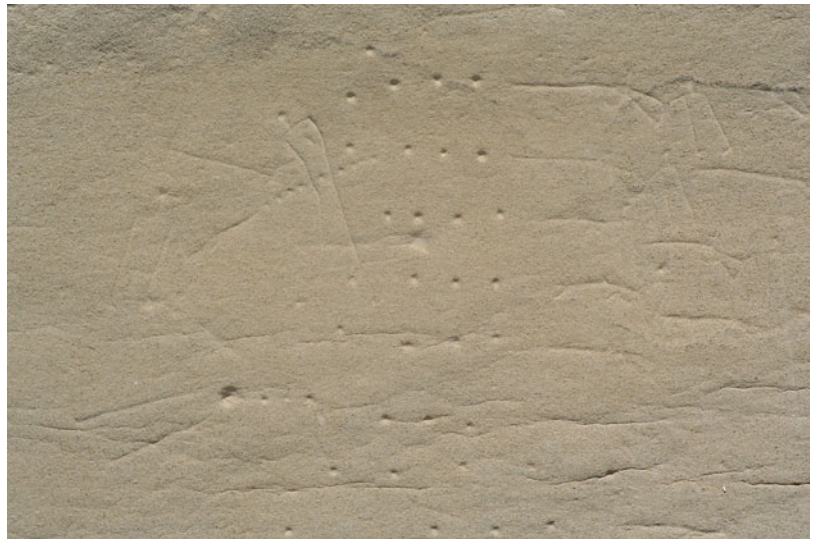
Archaeologists often study art to understand the second topic of this encyclopedia entry, sacred tradition. Art often is produced for, or is at least inspired by, human beliefs in the sacred (Lewis-Williams 2002). For archaeologists who study hunter-gatherers, art is the only means by which we can study ancient religion and spiritual beliefs. Hunter-gatherers, because of the mobile nature of their world, generally did not produce religious architecture, such as kivas used by the Anasazi (see Archaeology of Chaco, this volume). Hunter-gatherers also did not leave behind literature and music, as discussed above, although they surely had myths, stories, and music about these important aspects of their lives (Mithen 2006).

Thus, for purposes of this entry, sacred tradition is reflected in archaeological sites only through art material culture and rock art. For example, Fig. 4 below of a Dinwoody figure in Wyoming is thought by archaeologists to reflect Shoshone Native American vision quest practices, an important aspect of their sacred traditions. Based on ethnographic studies of Shoshone Native Americans, Francis and Loendorf (2002: 110) explain that, "Engravings and paintings were created the morning after a vision was received in order to preserve it, as forgetting the details of the vision could result in death or illness." Hunter-gatherers, thus, often represented their sacred traditions in art, either as portable objects, non-portable sculptures, or rock art, that archaeologists can study to understand human prehistory.

Historical Background

Archaeological sites throughout the world are filled with an enormous wealth of information regarding sacred traditions and art used by hunter-gatherers in prehistory. For at least 100,000 years, people have produced art as a means of social interaction, to form alliances, to establish territories, to express themselves, to practice their religions, and to broadcast important information (Bahn & Vertut 1997; Lewis-Williams 2002; Clottes 2008; Fagan 2010). While subsistence, economy, technology, and settlement systems are thought of as the key points of study for hunter-gatherer archaeology (see "▶ Hunter-Gatherers, Archaeology of" and "▶ Hunter-Gatherer Settlement and Mobility," this volume), the study of aesthetics and religious beliefs is also important. Due in part to the comparatively large size and organizational complexity of our brains, humans are alone in the animal kingdom in having evolved the

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 2 24JF695 Foothills-Abstract rock art showing a human and turtle painted in *red ochre*, Montana, United States (Courtesy of Mavis and John Greer)



Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 3 Battle scene pictograph, Writing-On-Stone Provincial Park, Alberta, Canada

capacity for complex thought (Mithen 1996). With this complex thought, humans evolved the origins of symbolism – the representation of one thing as another – which has also led us to a capacity for three additional uniquely human innovations: (1) language, (2) beliefs in the sacred, and (3) aesthetics (art). As Philip Lieberman (1998: xiii-xiv) states in his study of the evolution of human language, "horses run faster, gorillas are stronger, bacteria adapt faster to different environments. Speech, language, and thought differentiate humans from other species."

The prehistory of early art has long been controversial and, thus, is a fairly well-studied topic. Lewis-Williams (2002), among others (Whitley 2011), provides excellent overviews of the history of study of hunter-gatherer art. Among the early scholars instrumental in the study of prehistoric hunter-gatherer art include

Sacred Traditions and "Art" in Hunter-Gatherer Contexts,
Fig. 4 Dinwoody rock art, Legend Rock, Wyoming, United States

the Abbe Henri Breuil. Breuil's studies of early cave sites such as Altamira in Spain were critical in establishing the antiquity of art into the Upper Paleolithic period. Since then, numerous archaeologists have studied prehistoric hunter-gatherer art, including Andre Leroi-Gourhan and Champion (1982), Paul Bahn and Jean Vertut (1997), and Jean Clottes (2008) in Europe; David Lewis-Williams (2002) in South Africa; David Whitley (2011) and Keyser & Klassen (2001) in North America; and Ronald Berndt (Berndt et al. 1992) and Geoffrey Bardon (Bardon & Bardon 2004) in Australia.

One of the main foci of study of these hunter-gatherer art researchers is the origins of early art in their respective regions of study. Bahn and Vertut (1997) provide a summary of the origins of art that place the production of art material culture (art objects) back to more than 100,000 years ago in both Africa and Europe. Such art consists of ornamental jewelry, including incised bones and other human-modified natural objects (e.g., shells with bored holes) presumed to have been used in decoration/jewelry. In 2011, Henshilwood and colleagues reported in the journal *Science* on a 100,000-year-old red ochre-processing site – Blombos Cave – in South Africa which is the earliest evidence for the sophisticated and organized production of material used in modern human art production (likely used in the painting of objects, rock art, or bodies). Also in 2011 in *Science*, Henshilwood and his colleagues also recorded the earliest production of ornamentation – a string of perforated shell beads – at the same site, dating back to some 77,000 years ago. Finally, in 2002, these same archaeologists recovered a polished red ochre fragment with a motif of three parallel lines and patterned crosshatches that date to approximately 75,000 years ago (Clottes 2008).

Whether ornamental objects and incised rocks, such as those recovered at Blombos Cave, should be considered art is a key research question in dispute by archaeologists and art historians alike; without question, ornamental objects and incised or etched objects represent the earliest examples of human symbolic capacity associated with the origins of the uniquely human mind (Mithen 1996). Along with this, some also propose that this period – c. 100,000 years ago – likely marks the origins of human language, a similarly symbolic, uniquely human invention (Lieberman 1998).

Today, archaeological evidence for the earliest human art – that goes beyond ornamentation and incised tablets – is found at archaeological sites in Eurasia and Africa dating to approximately 30–40,000 uncalibrated years ago (Bahn & Vertut 1997). This marks the important event known as the Middle to Upper Paleolithic

transition in which modern humans emerged in the Old World and migrated out of Africa into Europe, Asia, and Australia. With those major migrations, humans transported their art and sacred traditions, transforming them within their new environments, wherever they decided to settle down and make their home.

In Africa, we commented above on the important work of Henshilwood and his colleagues at Blombos Cave, South Africa, pushing the origins of symbolic thought and art-like objects back to between 75 and 100,000 years ago. The earliest well-dated art objects (not ornamentation) in Africa are from Apollo 11 Cave in Namibia and include several animal figures painted on stone plaques that date to approximately 26,000 years ago (Lewis-Williams 1984: 230).

In Europe, art objects and parietal art date to approximately 30–35,000 years ago, with the earliest being a group of 17 ivory figurines from three caves in Germany; one of these from Hohlenstein-Stadel depicts a transformative figure of a human with a lion's head (Mithen 1996). The earliest painted parietal art in Europe is from Grotte Chauvet in France, at 32,000 years ago. Discovered in 1994, Grotte Chauvet remains the earliest well-dated European rock art site and is the oldest painted cave in the world (Clottes 2008). Its sophistication is unparalleled in Upper Paleolithic rock art; as such, it is assumed by most archaeologists and art historians that art was produced prior to this time but remains undiscovered at Old World archaeological sites.

While Europe has been the major focus of early rock art researchers, Bahn and Vertut (1997: 31–34) provide a summary of the earliest indisputable art in other regions of the world. In Asia, an archaeological site in Shanxi province, China, yielded a perforated stone ornamental disc dated to c. 28,000 years ago. Australia's earliest art sites include Koonalda Cave which contains human-produced striations in the cave walls that are dated to between 15 and 30,000 years ago. Finally, in the Americas, early rock art has been identified in Texas at the Gault Site, with incised bone objects dating to greater than 11,000 uncalibrated years ago. Overall, the earliest examples of art are of a similar age to the first presence of modern humans in those regions, implicating art as a uniquely human endeavor that was carried with humans as they migrated across the continents.

Key Issues/Current Debates

What Is Art?

In addition to studying the history and origins of hunter-gatherer art, the definition of art is another research issue for prehistorians. Some believe that ornamental objects such as those from Blombos Cave should be considered evidence of true art, while still others believe that the definition should be restricted to actual art material culture (portable art), sculpture, and/or paintings, as we have defined here. We leave that debate open for future archaeologists of hunter-gatherers to resolve (see Mithen 1996: 154–163).

Dating of Art

The dating of art is another major focus of archaeologists interested in the study of hunter-gatherer aesthetic and sacred traditions (Keyser & Klassen 2001; Whitley 2011). Dating art can often be quite difficult, but recent methodological advances in dating methods are allowing us to date art in innovative ways. Art of hunter-gatherers can be dated by four main methods: (1) association with dated archaeological sites or objects, (2) datable subject matter, (3) superimposition of designs, and (4) chronometric dates on the art itself. The first method – association with dated archaeological sites or objects – associates the age of an art object to a well-dated archaeological deposit from the site of the art itself or an associated one.

Second, the subject matter of the art might give its age away. In the Late Pleistocene, mammoths and mastodons and other now-extinct animals are pictured in art; we know that these animals went extinct at the end of the last ice age, so therefore we also know that any depiction of these animals predates the end of the ice age, c. 11,000 years ago. In the Americas, the depiction of the horse in Native American hunter-gatherer art means it must postdate 1,600 or so,

the time after the introduction of the horse by the Spanish. Also, the representation of large, full-body shields in prehistoric Native American art of Montana and Wyoming implies that it dates before the introduction of the horse, since such full shields were deemed impractical for riding. Many other similar subject matter interpretations are often used to date rock art.

Superimposition of designs – the third major dating method – is a very common means of dating art, one pioneered by the earliest art researchers. This method is mainly for rock art, with a series of art images painted or pecked atop one another, allowing the researcher to understand the sequence of image formation and, thus, attain a relative dating sequence.

Finally, innovations in chronometric dating are leading to a revolution in the absolute dating of art. Advances in radiocarbon dating by accelerator mass spectrometry (AMS) have allowed researchers to sample minute (less than a gram) portions of organic rock art objects and/or organic materials (e.g., charcoal) in rock art panels. It is by this means that the Grotte Chauvet rock art panels in France have been so well dated. Similarly, the lion figure from Hohlenstein-Stadel in Germany was also dated by AMS.

Another chronometric method of dating gaining some popularity is cation-ratio dating. This method measures leaching of potassium and calcium out of rock varnish in comparison to ratios to titanium in the rock (which does not leach). The Legend Rock site in western Wyoming has been subjected to cation-ratio dating to some success (Francis & Loendorf 2002); however, the method requires initial dating of the art by AMS or other methods to measure the rate of leaching within the rock in the microenvironment of the site. So, this method is untenable if one does not previously know the absolute dates of some art at the site (e.g., AMS). At this time, thus, cation-ratio dating is not considered to be as accurate as AMS or standard radiocarbon dating.

Art Interpretation and Sacred Tradition

Study of the interpretation, or meaning, of art has become a major field of study, with a suite of specialized terms used by scholars, defined well by Keyser and Klassen (2001) in their study of Plains Indian rock art of western North America. We summarize some of their key terms here to facilitate an explanation of rock art research and interpretation. Most of the world's hunter-gatherer art is either representational or nonrepresentational. Geometric designs – in the form of circles, lines, or other shapes – are examples of nonrepresentational art, or images of objects that do not occur in nature. Representational art takes the form of either anthropomorphic (humanlike) or zoomorphic (animallike) images but can depict any real object. Often, representational and nonrepresentational images are superimposed upon each other or used in tandem to form the overall composition. In this vein, art often can be depicted in naturalistic, or lifelike (realistic), form or can be abstract (nonrealistic/nonrepresentational) art that lacks obvious interpretation.

For example, Fig. 3 of a petroglyph in Alberta, Canada, is considered to be a naturalistic, representational image of humans (stick figure anthropomorphs) in combat using guns; bullets are represented in animated form by the lines of dots. Somewhat in contrast, the other image from Wyoming (Fig. 4) shows an anthropomorphic zoomorph, a combination often interpreted to represent spiritual transformation of the individual. For hunter-gatherers, this art very often shows an elongated anthropomorph becoming an animal (zoomorph) and/or attached to an animal with a line (here, a turtle), representative of a spiritual transformation. The integrated nature of both compositions contributes to the overall interpretation. Rather than being solitary images or even juxtaposed (a series of isolated, individual, unrelated images on an art object or panel), these particular works of art are coherent compositions with individual attributes that combine to form a larger meaning. In the former image, the meaning is explicit and biographic in its depiction of a battle scene, while the latter image has implicit meaning due to its largely spiritual content; we may never know this latter image's true meaning, other than to say it represents an individual's transformation from human to sacred. We understand the

basic principle of the transformation, but not the precise meaning of its experience to the hunter-gatherer artist.

While these terms help us to uniformly describe hunter-gatherer art, whether it be portable material culture, sculpture, or rock art, interpreting rock art is extremely complicated and subjective to the researchers' theoretical, cultural, and historical background. Ethnographic analogy is a key method of rock art interpretation. In this method, study of contemporary hunter-gatherers provides concepts useful in the interpretation of art produced by hunter-gatherers in prehistory. David Lewis-Williams' (2002) various books and articles on South Africa rock art have been instrumental in the understanding of the spiritual nature of much of the world's hunter-gatherer art. His methods of study have been adopted by many researchers in other areas of the world as well, namely, that much art reflects sacred traditions of hunter-gatherers, especially the concept of self-transformation that often accompanies the human quest for spiritual guidance, as shown above.

Ethnographic analogy contributes to understanding of various possible means of interpreting rock art (Whitley 2011), whether it be art produced for hunting magic (sympathetic magic) to facilitate success in the hunt, to reflect spiritual transformation through a religious experience (transformational magic), or whether the art is simply representational in an art-for-art's sake sense. The major impact of rock art research was to establish the role of symbolic imagery in art, usually through abstract symbols in combination with representational, naturalistic images of animals and/or humans. Through research of hunter-gatherer art, most archaeologists realize that there is probably more than meets the eye in art interpretation. While the image may appear to be representational and mainly naturalistic, its depiction could have hidden, implicit meaning unfathomable to the archaeologist studying the art.

In his study of trance-induced hallucinations among contemporary hunter-gatherers, Lewis-Williams (1984, 2002) identifies several art images that represent events of hunter-gatherer sacred transformation, at least among the San of South Africa. Hunter-gatherer depiction of such spiritual events often shows death (e.g., hunting scenes or bleeding life-forms), mystical flight (e.g., birds or other images of flight), drowning (to reflect the weightlessness of the spiritual experience), or sexual arousal (e.g., erect phallic representation). He argues that these images in combination with more obvious signs of transformation (combination human-animal forms) connected with lines to other animals and abstract forms likely reflect spiritual activity of the individuals. As we have discussed in this section, such images are present in even the oldest examples of hunter-gatherer art, meaning that the representation of this transformative experience (e.g., from human to animal to spirit) is among the most fundamental of human experiences that dates back to our earliest ancestors 30–40,000 years ago. It is this connection between art and sacred tradition that defines our symbolic ability as humans, which defines us as such and which is visible in the archaeological record of hunter-gatherer cultures throughout the world.

International Perspectives

This final section briefly summarizes four aesthetic systems which show the diversity of hunter-gatherer art and sacred traditions found at world archaeological sites, including Northwest Coast Native American art, Upper Paleolithic Europe portable and parietal art, South African San parietal art, and aboriginal art of the western and northern territories of Australia.

Northwest Coast North American Art

In the annals of world prehistory, many hunter-gatherer cultures exhibit characteristics of generalized foragers, including egalitarianism, high mobility, and risk minimization through expansive kinship networks. Hunter-gatherers of the Northwest Coast of North America lived in semisedentary villages of hunter-gatherer-fishers, exhibiting a complex ranked form of social organization, using storage to offset

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 5 She Who Watches, the Dalles, Oregon, United States

long-term resource stress. Northwest Coast art reflects the hierarchical and organizational complexity of their society (Holm 1965). Northwest Coast art includes a wide variety of mediums, styles, and produced objects. Black, red, and blue/green are the primary, secondary, and tertiary colors, with formlines and ovoids used to represent zoomorphic and anthropomorphic images, often splitting and reshaping the art forms to fit within the space of the produced object (e.g., a wood box). Among the most commonly produced art mediums are blankets, masks, boxes/chests, bowls, rattles, jewelry, and totem poles (MacDonald 1983; Wright 2011).

Totem poles were (and still are) handcrafted by wood-working specialists, carving household crests, representations of characters in stories, and/or household histories into a tree to be placed in front of houses and ceremonial structures. Production of Northwest Coast art dates back at least 3,000 years, with objects of the tradition recovered at sites like Ozette, Hoko River, and Tse Whit Zen in coastal Washington State (Kirk & Daugherty 2007). At the site of Ozette on the northernmost Washington Coast, archaeologists and local Makah unburied a 300–500-year-old village, including thousands of well-preserved art objects in the Northwest Coast style (Kirk & Daugherty 2007: 106).

Portable art objects and sculptures dominate the aesthetic traditions of Northwest Coast, but rock art was produced as well, including the famous image of Tsagaglalal, or She Who Watches, from the Dalles in Washington State (Fig. 5). The complexity of art produced by Northwest Coast Native Americans reflects the organizational complexity of their society, with hierarchical social organization and craft specialization, rare among hunter-gatherers in prehistory.

Upper Paleolithic Europe Portable and Parietal Art

The Upper Paleolithic period of Europe persisted from c. 40,000 to 10,000 uncalibrated years ago. As introduced above, Upper Paleolithic hunter-gatherers of Europe produced some of the most sophisticated examples of portable and parietal art in prehistory (Leroi-Gourhan & Champion 1982; Conkey 1984). The earliest dated examples – Grotte Chauvet, France (parietal art) and Hohlenstein-Stadel Germany (portable art) – are among the most artistically advanced as well. As described by Jean Clottes in his wonderful book *Cave Art* (2008), Grotte Chauvet contains hundreds of painted and pecked images, including mammoth, bison, lion, rhinoceros, horse, bear, and humans. One painting called the "Sorcerer" depicts a human with a bison

Sacred Traditions and "Art" in Hunter-Gatherer Contexts, Fig. 6 South African San dancers. Courtesy of Jack Fisher

head in a transformative composition. Other important parietal art sites in Europe include Lascaux, Altamira, Niaux, Cosquer, Peche Merle, Trois-Freres, and Le Tuc d'Audoubert, all of which are in France or Spain, the heart of this tradition. Portable art is characterized by the famous Venus figurines found throughout sites in Germany, Italy, Spain, and France. Numerous other art objects and sculptures have been recovered and identified at archaeological sites in Europe that date to the Upper Paleolithic period, making it one of the oldest and best studied prehistoric hunter-gatherer art traditions in the world (Mithen 1996; Bahn & Vertut 1997).

South African San Parietal Art

As reviewed briefly above, David Lewis-Williams pioneered the study of South African San art, especially their parietal art. As shown by the finds at Blombos Cave, art in South Africa is among the earliest in the world. The early innovation of art facilitated a rich prehistory of traditions. The parietal art is particularly wonderful, depicting pictographic and petrographic images of elongated anthromorphs and zoomorphs participating in a wide range of activities, including the sacred trance dance tradition (Fig. 6), hunting practices, and other transformative religious experiences. The eland is the most commonly depicted animal in this tradition, as shown here. Transformative anthropomorphs and zoomorphs in combination with abstract geometric designs and connecting lines denote the spiritual connectedness and compositional nature of many of the murals. Lewis-Williams (1984) argues for the great (Paleolithic) antiquity of this tradition, linking it to early portable art objects that date back 15,000 years. However, he states that the best preserved and most well-dated objects that can securely date the San art tradition are 2,200 years old from Klasies River Mouth (Lewis-Williams 1984: 235).

Australian Aboriginal Art, Western and Northern Territories, Australia

The parietal and portable art of the aborigines of the western and northern territories of Australia is truly unique among world hunter-gatherer traditions (Bardon & Bardon 2004). The art is produced to reflect aboriginal views of the sacred world (Caruana 1993). Visions of the dreamtime are often depicted in aboriginal art, usually accompanied by oral narratives that describe the stories and myths and travels of mythical individuals on their dreamtime journeys through the environment and the sacred world. The mediums

for Australian aboriginal art include rock walls and similar lithic landscapes but also include bark paintings and other portable objects. The earliest examples of aboriginal art occur in northwestern Australia. There, Bradshaw figures – small, pictographic, animated anthropomorphic images – are present on lithic landscapes and date to a minimum of 3,000 years ago (Caruana 1993: 157) to as old as the Late Pleistocene (>10,000 years ago). More recently, within the last few hundred years, this region has witnessed the proliferation of wandjina images, an aboriginal term used to describe pictographic anthropomorphic figures that are associated with the sky and water.

These traditions continue into the ethnographic present, with the art and dreamtime tradition remaining important to Australian aborigines. As with South Africa and the Northwest Coast of North America, the continuation of production of these art traditions into the modern era allowed for a better understanding of the prehistoric art's meaning and aesthetic purpose associated with the sacred beliefs of its producers. The art and sacred traditions of hunter-gatherers are often inseparable, since aesthetic values commonly reflect spiritual and cosmological beliefs of hunter-gatherer individuals in prehistory. Several important volumes are available to better understand these topics.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Australian Rock Art
- ▶ Chaco Canyon, Archaeology of
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Europe: Paleolithic Art
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ North American Rock Art
- ▶ South Africa: Heritage Management
- ▶ Style: Its Role in the Archaeology of Art

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SAFE/Saving Antiquities for Everyone

Cindy Ho
SAFE/Saving Antiquities for Everyone,
New York, NY, USA

Introduction

When properly excavated, documented, and studied, antiquities can tell us how our ancestors lived, and enrich our understanding of our lives today. This information is forever lost when archaeological sites are plundered and artifacts are ripped out of the ground by looters to feed the black market antiquities trade. This is a societal problem that concerns us all.

SAFE/Saving Antiquities for Everyone, a 501(c)(3) nonprofit organization, was founded to educate the public about this problem. By raising awareness, SAFE gives voice to people of all walks of life, and provides a platform to express concern and advocate for change. As the environmental movement has done, SAFE seeks to change minds and attitudes so that behaviors will change (Figs. 1–7).

Definition

SAFE is a coalition of professionals in communications, media, and advertising working alongside experts in the academic, legal and law enforcement communities to make the public aware of the vulnerability of ancient sites, monuments and artifacts, and to take action to ensure the preservation of cultural heritage.

While many organizations focus on on-site preservation and academic research, SAFE centers on public awareness. By creating educational programs and media campaigns, SAFE encourages lawful and ethical behavior to stop the trade in illicit antiquities from destroying the history that belongs to us all. By using traditional advertising and marketing techniques to "sell" cultural heritage preservation, SAFE creates a public dialogue to drive this issue into the mainstream. As a group of concerned citizens, SAFE has no political, economic, career, or academic interests or agendas; unlike private collectors, museums, and academics.

With a positive and forward-thinking approach, SAFE educates people on why preserving culture is essential, relevant, and urgent. We offer *concrete* ways to invest in the preservation of everyone's past. Using classic advertising and communications techniques in combination with educational and academic expertise, SAFE also employs grassroots techniques to engage the public in active participation. Our multi-faceted programs deliver the simple, enduring message that we all share responsibility for protecting cultural heritage. They include:

- *SAFE web site (savingantiquities.org)*, a destination portal for related information, news and events, resources.
- *Awareness materials* such as posters, brochures, postcards, "message" products via an online store.
- *SAFE Tours* guided by art historians, archaeologists, museum specialists and journalists which provide an "insider's look" at museum collections.
- *Podcast interviews* with experts in the field to inform and inspire.
- *Events* such as lectures, panel discussions, and book events designed to reach the general public and offer an opportunity to meet experts in the field.
- *Social media outreach* using simple grassroots tools and open-source communication to bring public awareness about complex issues via Facebook, Twitter, Flickr, YouTube, Ammado, Ning, etc.
- *SAFECONNECT*: *The Cultural Heritage Network*, (safeconnect.org) the online community for like-minded organizations and individuals.
- *E-newsletters* to inform members of the community.
- *Academic outreach* at conferences and in presentations.
- *Educational projects* including the "Give History a Future" program which consists of

SAFE/Saving Antiquities for Everyone, Fig. 1 SAFE logo

"The World's Ancient Cultures in Danger "Map and other teaching tools, school presentations, student competitions, and internship programs.

- *Global awareness campaign* – The Donny George Candlelight Vigil for Global Heritage (formerly Global Candlelight Vigil for the Iraq Museum).
- *SAFE Beacon Awards* to recognize outstanding achievements in our mission.
- *Question of the month survey* is an informal poll to gauge public opinion.

Historical Background

The plundering of ancient cultures is not a new practice. As early as the Roman Empire, objects were looted from conquered lands such as Egypt, Greece, and the Middle East. The Renaissance witnessed the rediscovery of classical antiquity, followed by rampant looting across Italy. During the seventeenth and eighteenth centuries, gentlemen seeking to complete their education toured southern Europe and the Middle East, bringing back with them antiquities as mementos of the ancient world. During the nineteenth century the race to populate museums with encyclopedic collections in Europe and the US began to accelerate. As more countries tried to establish their rights to cultural patrimony, the black market flourished. Although archaeologists have known about the problem for a long time, the public is generally unaware. Thriving on this relative secrecy, the illicit antiquities trade flourishes and remains one of the largest illegal markets in the world.

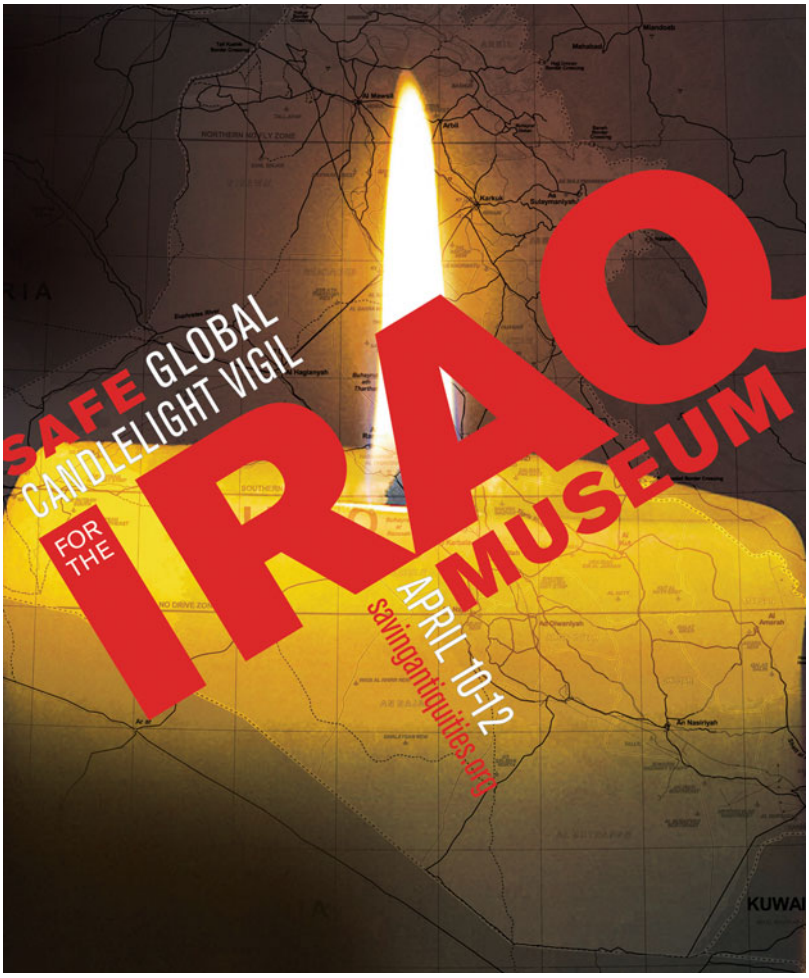
SAFE was founded in response to the looting of the Iraq Museum in April 2003 and the cataclysmic destruction of countless Iraqi archaeological sites in its aftermath. The SAFE web site, www.savingantiquities.org, debuted in June of 2004 as a content-driven destination portal providing news, educational information and communications materials to raise awareness about not only the destruction done in Iraq, but the plunder of cultural heritage globally. Since its inception, SAFE has gained the approval and confidence of some of the world's top experts in the field of cultural heritage preservation.

Key Issues

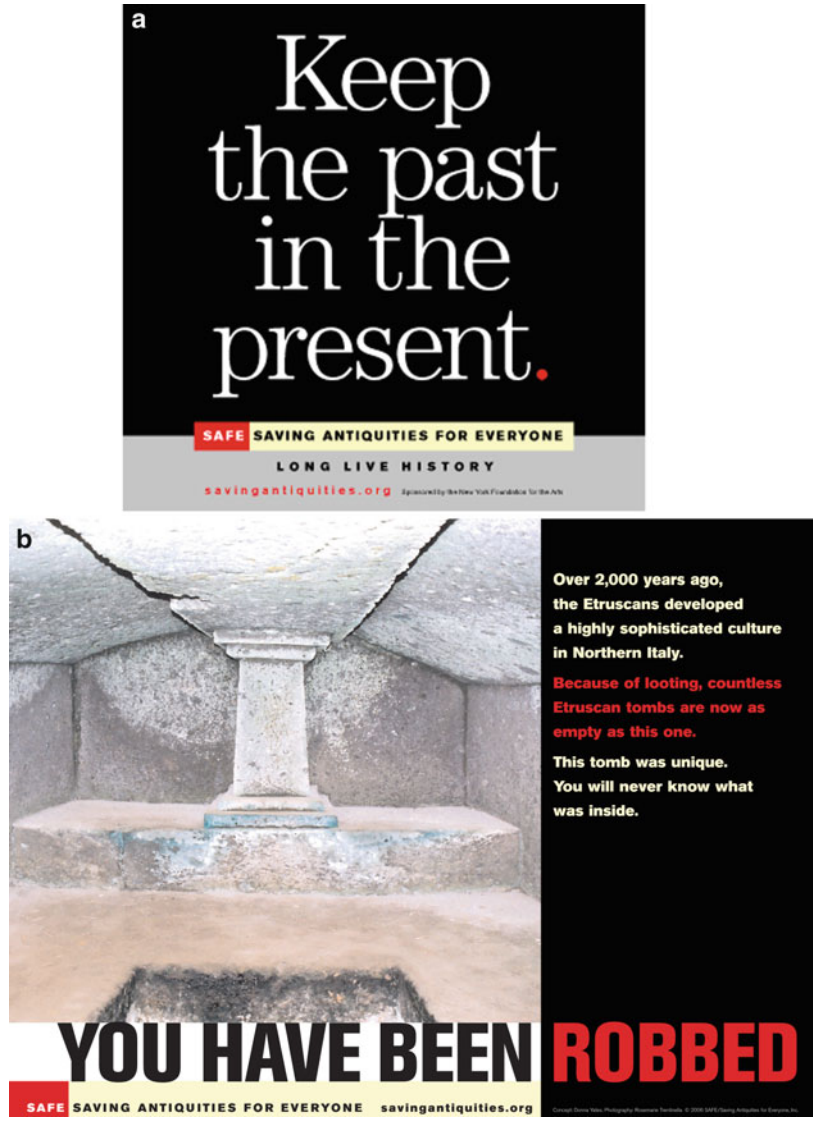
Everyday, somewhere in the world, looters are busy destroying archaeological sites and ancient monuments large and small, both famous and undiscovered, in search of marketable artifacts that are smuggled from their country of origin so they can be purchased by antiquities dealers, private collectors and museums. Even though the practice of looting and trading in looted antiquities is almost as old as history itself, modern-day looting, aided by high-tech methods, heavy machinery and sophisticated transportation networks, has reached epidemic proportions and become a serious challenge to law enforcement. Countries least able to protect their cultural resources are often the primary victims of this illicit activity. The looting of ancient sites will only stop when collectors and museums refuse to acquire ancient objects that have no provenance (history of prior ownership) or provenience (the find-spot or *in situ* location where something is first discovered). Only then can communities where plunder occurs adopt economically sustainable strategies (such as cultural tourism) that preserve their cultural heritage.

SAFE/Saving Antiquities for Everyone, Fig. 2 The World's Ancient Cultures in Danger Map. Educational tool designed to educate students of all ages about the most endangered sites and cultures around the world

SAFE/Saving Antiquities for Everyone, Fig. 3 SAFE Tour with Dr. Oscar Muscarella. An insider's look through the Ancient Near Eastern Galleries at the Metropolitan Museum of Art discusses how the objects got there



SAFE/Saving Antiquities for Everyone, Fig. 4 Poster. Global Candlelight Vigil for the Iraq Museum to commemorate the anniversary of the tragic looting of the Iraq Museum



SAFE/Saving Antiquities for Everyone, Fig. 5 Public service announcements

Current Debates

While no one would disagree that the destruction of cultural heritage should end, there is much debate over how this might be accomplished. Often presented with elaborate complexity, the historical, ethical, political and economic aspects of the cultural property preservation debate tends to obscure the most important fact: that the looting of ancient sites and artifacts is illegal in every country where they are found, including the United States. While some stakeholders – such as those who advocate for the unregulated acquisition and trade of cultural property – may question the validity of other countries' cultural patrimony laws and criticize the effectiveness of their enforcement, no meaningful alternative to the 1970 UNESCO Convention, now ratified by more than 120 countries around the world, has been proposed.

With the widely publicized repatriation of antiquities and a general increase in public awareness surrounding these issues, failure to respect national and international laws makes the acquisition of dubious artifacts a high-risk venture. This fact, plus the increasing willingness

SAFE/Saving Antiquities for Everyone, Fig. 6 Candlelight Vigil for the Iraq Museum (renamed the Donny George Candlelight Vigil for Global Heritage in 2011). Individuals and organizations light a candle around the world to commemorate the loss and to acknowledge that we are all responsible for the protection of our shared global cultural heritage

of source countries to sign long-term reciprocal loan agreements with foreign museums, are bringing decades of pushback to an end. Criticism of source countries as "retentionist"; legal actions to impede the implementation of the 1970 UNESCO Convention in the United States by CPAC; calls for fewer restraints on the importation of artifacts to benefit "hobbyist" collectors and "world museums" to stock their galleries with "artistic creations that transcend national boundaries" are being replaced by a new question in the cultural property debate. The question today is: how to reconcile the growing claims made by source countries in Asia, Africa, South America and the Middle East, on cultural property in museum collections outside the countries of origin?

In an era of heightened scrutiny, where facts can be revealed with just a few keystrokes of a computer, the debate about the future of our shared cultural heritage is no longer the exclusive domain of academics, museum professionals, dealers and collectors. Members of the general public are becoming aware. They also demand to be heard. The accessibility of social media virtually anywhere in the world allows this to happen freely and instantaneously.

Along with the global economic shift away from the West (traditionally market countries are) to emerging economies (typically source countries) is a rise in cultural pride in those parts of the world. In the case of China, for instance, the feverish "buying back" of cultural property that had been plundered in an era when the country was less able to protect itself is

a **MUSEUM RECORD (KABUL MUSEUM, AFGHANISTAN)**

ACCESSION NUMBER / NOMBRE DE REGISTRATION	OBJECT TYPE AND DATE / OBJET TYPE ET DATE
Unknown	Bas-relief sculpture 2nd - 5th c. AD
DIMENSIONS / DIMENSION	**MATERIALS / MATERIEL DE CONSTRUCTION**
H: 33 in.(83.82 cm); W: 14-3/4 in (37.47 cm); D: 6-1/4 in.(15.875 cm)	Grey schist

PROVENANCE

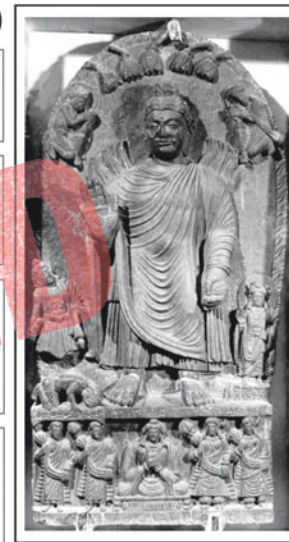
Discovered during the excavation of the Buddhist monastery at Shotorak by the Delégation Archaeologique Française en Afghanistan, 1939. Transferred to Musée de Kabul, 1940

LOOTED

COMMENTS / COMMENTAIRE

The Buddha Dipankara, surrounded by holy disciples, raises his right hand in Abhaya Mudra pose. At his feet, the hermit Sumegha (Sumedha) spreads his hair across the ground to protect the Buddha's feet from the mud. This relief was one of the first masterpieces stolen from the Kabul Museum. It disappeared during the spring of 1992.

Every day other precious antiquities are looted from archeological sites for sale on the black market, robbing us of our cultural heritage.



ACCESSION DATE / DATE D'ACQUISITION

20 February 1940

Photograph taken in 1970. Photo © John C. and Susan L. Huntington / Huntington Archive 2004

THIS IS A FACSIMILE

b

History is an original. Protect it.

Every day, the plundering of cultural heritage continues all over the world to feed the international market for illicit antiquities. As a result, an incalculable amount of information about the history of mankind is lost, forever.

The public is still generally unaware of what is at stake, which is why we need to raise public awareness. SAFE/Saving Antiquities for Everyone is a non-profit organization that creates educational and public programs about the importance of preserving cultural heritage worldwide.

Join us.

Become a member. Be part of our global network of students, professionals, experts, concerned individuals and novices, working with archaeologists, educators, law enforcement and journalists to change the public opinion about ethical behavior in regards to cultural heritage preservation. You can change things when are passionate and ready to take action.

Join us, and help make a difference in the preservation of your past, everyone's past.

Visit us at savingantiquities.org and learn how to become a member.

SAFE SAVING ANTIQUITIES FOR EVERYONE

SAFE/Saving Antiquities for Everyone, Fig. 7 "LOOTED" cards. These facsimiles of museum catalog cards raise awareness about objects that are missing from museums

widely publicized. Turkey's demands for repatriation are heard the world over.

While SAFE takes no overarching position on repatriation, believing that situations should be assessed on a case-by-case basis, the arguments that favor repatriation will inform the next phase of the decades-long cultural property debate.

With the economic shift, many source countries are also becoming market countries. Still, in SAFE's view, the issue is not who owns cultural property and where it can be traded, but what we are able to learn from these relics of our shared global heritage – and what we are willing to do to protect it. Whether antiquities are bought and sold in or out of their countries of origin, archaeological record is irreparably destroyed if they are looted.

International Perspectives

The plunder of the world cultural heritage is a global concern. Across the world, law enforcement works with governmental, non-governmental and intergovernmental agencies to address this problem.

There are national laws and international treaties, which aim to protect archaeological and historic sites. In 1970, international communities came together and took action in the UNESCO Convention on the Means of Prohibiting and Preventing the Illicit Import, Export and Transfer of Ownership of Cultural Property. Other international treaties include the Convention for the Protection of Cultural Property in the Event of Armed Conflict (The Hague 1954) the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (UNESCO 1972), and the UNIDROIT Convention on Stolen or Illegally Exported Cultural Objects (UNIDROIT 1995).

SAFE's first project in 2003 was an outreach program consisting of a "Poster Hanging Day," brochure and postcard and a letter writing campaign to legislators in support of the Iraq Cultural Heritage Protection Act.

SAFE has supported restrictions in the importation of antiquities under the Cultural Property Implementation Act, the US enabling legislation under Article 9 of the 1970 UNESCO Convention, as an effective deterrent to the flow of illicit antiquities. SAFE has launched "Say NO To Plunder, YES To Bilateral Agreements" campaigns to rally public support for the signing and renewal of Memoranda of Understanding (MoU) between the U.S. and other parties to the UNESCO Convention, including China, Italy, Mali, Guatemala, Greece and Cyprus. These campaigns provide materials to alert and educate members of the public about the treaties and legislation, and the reasons to support importation restrictions of antiquities. SAFE members have also testified and represented public support for MoUs before the Cultural Property Advisory Committee's public hearings at the US State Department.

SAFE continues to create outreach nation-specific Facebook campaigns such as *Say YES to Egypt*, *Say YES to Cambodia*, *Say YES to Italy*, *Say YES to Greece*, and *Save Old Kashgar, China*. After the 2011 uprising, SAFE launched *Say YES to Egypt* on Facebook, and distributed *Say YES To Egypt's Heritage* buttons to individuals and institutions around the world wishing to show support for the people of Egypt. In response to the 2010 earthquake, SAFE created a photo group on Flickr, entitled *Haiti: Look Back to Look Ahead* designed to collect images that document Haiti's cultural heritage before the earthquake.

The SAFE web site's "Legal mechanisms" and "Situations across the globe" reference sections provide information about the international situation.

Future Directions

SAFE envisions a world in which looting and the destruction of cultural heritage sites and the marketing and collecting of undocumented artifacts would be unthinkable. The current global economic shift could become an unprecedented opportunity to curtail – if not completely eradicate – the destruction of cultural heritage. First, we must increase public awareness.

As the purchase of artifacts without provenance by museums and private collectors diminishes, and law enforcement (national and international) steps up its efforts to pursue looters and smugglers; the time is now to educate everyone that plunder of such material (the ultimately nonrenewable resource) is an inherently self-defeating practice. We must drive home the message that the preservation of cultural property is a much more sustainable, and profitable, alternative.

SAFE will adhere to its core belief that information about the past belongs to us all, and commit to the preservation and protection of this information.

Cross-References

- ▶ Cultural Heritage Objects and their Contexts
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Vandalism and Looting (Ethics)

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Sagalassos, Archaeology of

Marc Waelkens
Sagalassos Archaeological Research Project, Katholieke Universiteit Leuven, Leuven, Belgium

Introduction and Definition

The Pisidian city of Sagalassos is located 109 km north of Antalya (Southwest Turkey) near the town of Ağlasun (Burdur Province). The ruins are located on the southern slopes of the Ağlasun Dağları in the Western Taurus range at an altitude of 1,450–1,700 m. Although discovered in 1706 by P. Lucas, it was only in 1824 that F. V. J. Arundell identified these ruins as Sagalassos. A detailed study of Sagalassos'

ruins and inscriptions was only enacted in 1884–1885 by a team led by Count K. Lanckoroński. Neglected and forgotten during the following century, Sagalassos was included in the British "Pisidia Project" of S. Mitchell, who surveyed and mapped it in 1986–1988. Following a small-scale excavation in 1989 supervised by the Burdur Museum, in 1990, M. Waelkens (KU Leuven, Belgium) obtained full excavation rights (Waelkens 1993: 37–41). Since then, the site and its 1,200-km^2 territory (Vanhaverbeke & Waelkens 2003) have become the study object of one of the largest multidisciplinary archaeological projects in the Mediterranean (Waelkens 2008).

Key Issues/Current Debates

As indicated by surface finds and Hittite sources from the middle of the fourteenth century BCE that mention a site called Salawassa in this region, Sagalassos could already have been occupied during the Late Bronze Age. During this period, the region experienced integration into one of the Luwian kingdoms or pressure from the competing Hittite empire. After the collapse of both the Hittite empire and the Luwian states (twelfth century BCE), the Western Taurus range was settled by a tribe called the Pisidians. Sagalassos was one of their major and most warlike settlements, permanently occupied since the fifth century BCE at the latest. According to Greek sources, from the early fifth century BCE onward, many Pisidians served as "mercenaries" for the Persian Great Kings or their adversaries. This may have brought them into direct contact with the Greek colonies in Asia Minor, from which the Pisidians adopted Hellenizing influences. After the death of Alexander the Great, who captured Sagalassos and conquered Pisidia in 333 BCE(?), Pisidians served for nearly two centuries in his successors' armies. This may be why Sagalassos was governed as a Greek autonomous city-state as early as 300 BCE and had adopted a "Hellenized" material culture sharply contrasting with that of the much larger site of Düzen Tepe, which coexisted nearby and remained virtually unchanged until its late second-century BCE abandonment (Waelkens 2011: 34–36; Waelkens & Poblome 2011: 33–56). The rash adoption and sometimes adaptation of innovations (particularly architectural) would characterize all further developments of Sagalassos' material culture (Waelkens 2002). Already c. 300 BCE, the inhabitants of Sagalassos erected monuments made of large ashlars (Fig. 3, no. 1); around 300–280 BCE, an inscription with a new law issued after an internal strife, written in impeccable Greek, the new *lingua franca*, mentioned elected, rotating magistrates and referred to a still older legislature (Vandorpe 2000; Vandorpe & Waelkens 2007). Before the century's end, the city also produced pottery now inspired by shapes fashionable in Seleucid and Aegean circles (Waelkens 2011: 34–39; Waelkens et al. 2011).

In Hellenistic times (Waelkens 2004), Sagalassos eventually entered the realm of the Seleucids, who possibly established Macedonian colonists in its territory. Because it had refused to receive a Roman consul after the Seleucids' defeat at Rome's hands in 189–188 BCE, the Romans imposed an enormous penalty (Livy XXXVIII. 15; Weissenborn & Mueller 1972; Polybius, *Historiae* XXI.36.3-4; Buettner-Wobst 1957) that halted public construction for nearly a century. But in the first decades of Roman Republican rule (129–39 BCE), Sagalassos enjoyed the construction, around 100 BCE, of a bouleuterion (council house) of pure Hellenistic type seating 220 elected members (Fig. 1, no. 2). Despite the ruthless extortions of Roman tax collectors (*publicani*), regional wars, and piracy on the Mediterranean, Sagalassos' built-up area expanded toward the east, beyond its fortifications, after Pompey the Great's reorganization of Anatolia (mid-first century BCE). Shortly after that, during a short period under the rule of the Galatian king Amyntas (39–25 BCE), a fountain house of the "Greek" type protecting the drinking water from pollution and heat (a U-shaped Doric *stoa*) was built. A Doric temple (probably dedicated to Zeus) may date to the same period (Fig. 1, no. 3).

Sagalassos, Archaeology of, Fig. 1 Aerial view from the south of the upper city with: in the center, the Upper Agora (no. 1), the late Hellenistic bouleuterion (no. 2), the Doric temple of Zeus (no. 3), the restored Augustan NW Heroon (no. 4), the mid-Antonine nymphaeum (no. 5), and the macellum of the Emperor Commodus (CE 180–191) (no. 6). © Sagalassos Project

During the reign of the Roman Emperor Augustus (BCE 27–CE 14), who in 25 BCE incorporated Pisidia into the Roman Empire, Sagalassos underwent a complete metamorphosis (Waelkens 2002; Waelkens & Poblome 2011: 57–98). Augustus' foundation of seven new colonies and settlement of other veterans in four existing cities – all located within a radius of 100 km around Sagalassos – expanded the potential market for Sagalassos' farming or craft produce with nearly 80,000 colonists (from southern Gaul and central Italy). Already under Emperor Augustus, Sagalassians, aware that local Italian colonists used fine, red-slipped tableware, turned an already existing local craft tradition of red-burned pottery into an industrial production of "eastern *sigillata*." This "Sagalassos red slip ware" served Pisidia and western Anatolia for more than six centuries and reached eastern and central Mediterranean markets as far as Ostia and Carthage (Poblome 1999; Waelkens & Poblome 2011: 59–63). The construction in 6 BCE of the *Via Sebaste*, a road connecting the major colonies with the Pamphylian ports and managed by Sagalassos for over 42 miles, offered the city a direct access to the Mediterranean. Furthermore, Sagalassos' elite invested massively in agriculture; they burned down large stretches of forest and, with former grazing land, transformed them into fields mainly for growing cash crops such as grain and olives. Thanks to a climatic optimum starting with Augustus' reign and lasting several centuries, olive yards (now confined to 900 m) grew to altitudes of c. 1,400 m. Heavy-metal trace elements found in consumed animal bones indicate that the city's subsistence requirements for its 3,500–4,000 inhabitants could be largely met by the production capacity of its immediate vicinity, one highly polluted by craft activities (Vanhaverbeke et al. 2011). During most of the Imperial period, the output of the large territory of Sagalassos may have greatly

Sagalassos, Archaeology of, Fig. 2 Aerial view from the northeast of the middle city with: the "Imperial Baths" (no. 2), the Augustan layout of the Lower Agora (no. 1) extended south (left) by a 290-m-long and 9.80-m-wide colonnaded street (no. 3). Also Augustan are the shrine of Apollo Klarios (and since Vespasian the "urban" imperial cult) (no. 4) and the start of the construction of the odeon (no. 5). The latter building adjoined the late Hadrianic nymphaeum (no. 7) located above and immediately north of three nymphaea (original construction Trajanic, but already rebuilt by the reign of Hadrian; ultimately renovated in the Severan period: no. 6) along the north side of the agora. © Sagalassos Project

exceeded the subsistence needs of the rural population, estimated at c. 13,000. Owners could thus devote surplus production not used for paying taxes in kind (*annona*) to trade. This explains the numerous mausoleums and very expensive sarcophagi found throughout the countryside, in which the landed gentry were buried near their estates.

Under Augustus and his dynasty (the Julio-Claudians), the city more than tripled in size and eventually covered c. 42 ha. One of Anatolia's oldest and widest colonnaded streets – a purely pedestrian way (Fig. 2, no. 3) – was completed. It connected the city's Lower Agora (Fig. 2, no. 1) with the South Gate. Most other streets were also paved during this period, covering a very dense network of water supply that could even accommodate rich houses. In addition to arranging the city's street and water infrastructure, the Augustan period also saw the erection of early Imperial monumental buildings, including a shrine dedicated to Apollo Klarios (Fig. 2, no. 4). The Sagalassians may have worshipped through him the living emperor Augustus, who had adopted Apollo as his patron. Recently, below the second-century CE "Imperial Baths" (Fig. 2, no. 2), the thus far oldest Roman bath complex of Anatolia was discovered. Most likely, the central Italian origin of many veterans in the region explains why this building – already in use before CE 10–30 – seems to follow Campanian prototypes. The construction of an odeon (Fig. 2, no. 5), only finished two centuries later and eventually displacing the old council hall,

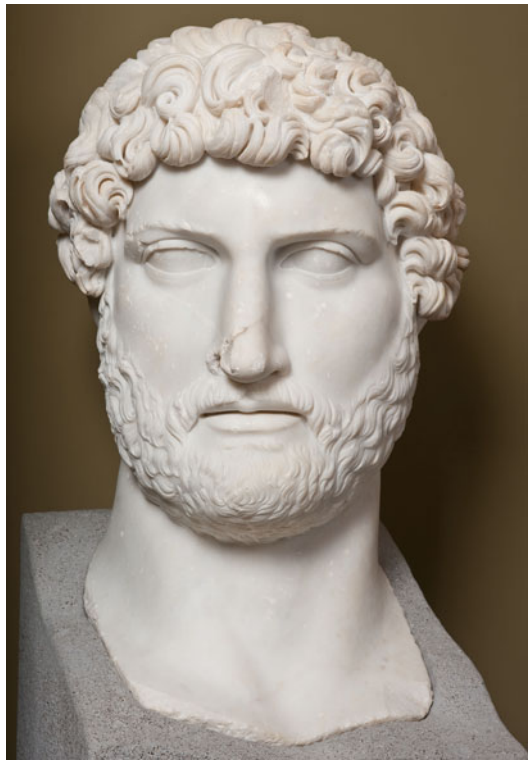
Sagalassos, Archaeology of, Fig. 3 The mid-Antonine nymphaeum c. CE 160–180 built along the north side of the Upper Agora (no. 3). Restored and put back into work in 2010, the monument currently displays copies of original (both corner "tabernacles") and recycled statues of Olympian gods placed in it during the fourth to fifth century, but smashed into pieces during the latter century. Adjoining the fountain to the right, the terrace wall of a storage facility built c. BCE 300 and pierced by a vaulted opening giving access to a postern running below the city's northern fortification (no. 1); on the left, on a higher terrace, the restored Augustan NW Heroon (no. 2). © Sagalassos Project

completed these Augustan building programs, which most likely still were financed by the city proper. After Augustus implemented just tax reforms based on a *census* (population count) system, which placed many revenues in the imperial treasury but not municipal ones, the wealthy elite used its resources to embellish the city, often while carrying out urban magistracies. In return, the city honored them by raising dozens of statues, which eventually filled both city squares or aligned the colonnaded street. The Upper Agora (Fig. 1, no. 1) was thus (re)arranged and paved under Augustus by an aristocratic family, and at this time, the urban elite still erected elaborate monuments, such as the NW Heroon (Fig. 1, no. 4), for members of its own class. After Augustus' death, the elite switched its building policies toward purely honorific monuments (mainly arches, gates) dedicated to the emperors and their family. These served both as an instrument for local self-advertisement and as a means of acquiring Roman citizenship and eventually knighthood. Under the Flavian emperors (CE 69–96), an elite family obtained Roman citizenship, after one of its members had introduced a municipal cult for the Flavian imperial house, albeit in connection with that of Apollo Klarios and housed in his shrine. Amid this trend, T. Flavius Severianus Neon, whose family possessed Roman knighthood, became the greatest benefactor in the city's history, starting his "career" with the construction in 120–125 CE of a public library that simultaneously was a dynastic monument and ending it, perhaps posthumously, with that of the mid-Antonine nymphaeum (see Fig. 3, no. 3).

Sagalassos, Archaeology of, Fig. 4 Aerial view from the south of the auditorium of the theater. The construction of this theater, recycling the seats of an older and smaller predecessor as supports for the new seats, must have started after Hadrian's decision to make Sagalassos the center of the "Pisidian" emperor cult. Most likely due to a lack of funding, it was never completely finished. © Sagalassos Project

The reign of Trajan (CE 98–117) initiated a new century-long building boom that peaked during the reigns of Hadrian, Antoninus Pius, and Marcus Aurelius. Henceforth, local aristocrats still financed the construction of monuments dedicated to the emperors, but now these structures also usually fulfilled a "utilitarian" function for the urban community. These included no less than five monumental fountains – four of which were nymphaea of the so-called tabernacle type (Fig. 1, no. 5; Fig. 2, no. 6–7; Fig. 3, no. 30) – and a macellum or food market (Fig. 1, no. 6). Urban elites especially opted to fund the "tabernacle" type of nymphaea, as the niches in their back wall alternated with projecting columnar "tabernacles" or *aediculae* in ways that offered the possibility to represent their founders and family members next to statues of emperors and Olympians. During the 120 s, Hadrian transferred Pisidia to the province of *Lycia et Pamphylia*, and he selected Sagalassos as the *neokoros* or officially recognized center of the imperial cult to be practiced by all of Pisidia, and granted it the honorific title of "*first city of Pisidia*, *friend and ally of the Romans*" that it proudly carried until the later fifth century. As Pisidia's imperial cult center, Sagalassos hosted festivals and games and attracted yearly visitors and delegations from all over Pisidia. This brought the city additional income and required the construction of buildings, the size of which far surpassed local needs. Thus, this period witnessed the construction of a new imperial cult temple. The "Imperial Baths" (covering more than 6,500 m^2) were built on top of the filled-in Augustan "Old Baths" that enlarged the largely artificial terrace upon which the new bath arose and were most likely inaugurated by CE 165 (Fig. 2, no. 2). A new theater, eventually seating 9,000 (Fig. 4), was completed during the later second century. Because Hadrian (Fig. 5) and his successors Antoninus Pius and Marcus Aurelius had increased Sagalassos' prosperity, six nearly 5-m-tall acrolithic statues representing them, together with their respective spouses, were perhaps erected in the "marble room" of the new bath complex. This highly representative room may have been the space where prior to the event, athletes participating in the Klareia, games associated with the cult of Apollo and that of the emperors, received the oil to cover their bodes and where the victors afterwards were given their prizes.

Although the urban elite still invested in new games that carried their names (e.g., Vareia, Tertulla, Kallipianea) and were connected with the *Klareia* and the imperial cult, public building activities halted at Sagalassos between the reigns of Alexander Severus (ending in 235) and Theodosius I (starting in 379). Not only was the city saturated with all potential urban amenities,



Sagalassos, Archaeology of, Fig. 5 Colossal portrait head, belonging to an acrolithic statue of the emperor Hadrian, sculpted c. CE 120–125 and at that time so perhaps displayed in the "marble room" of the "Imperial Baths." © Sagalassos Project

but a certain stagnation also may have occurred due to shrinking markets, some of which were affected by this century's civil instability and invasions (Goths, Persians). During the later fourth century, public and private constructions resumed. Around CE 400, a new city wall was built to protect only one-third of the city, as it adopted the circuit of the early Hellenistic fortifications. Despite the use of *spolia*, its carefully built walls, especially near gates, do not suggest a hasty construction caused by a specific threat, but rather reflect a new civic pride. During the reign of the Theodosii (CE 379–450), the bath complex also underwent a massive and still lavish renovation, changing the function of many rooms. During this intervention, the "marble room" became a room for hot water bathing (*caldarium*), whereas its colossal, acrolithic imperial statues were dismantled and moved to the southern undressing rooms of the original *frigidarium* (cold space) for men. A mosaic inscription, laid when this room's floor was repaired after an earthquake around CE 500, clarifies that this room henceforth was a multi-functional public hall, also used for communal dining. At first, common meals may still have been organized here to honor the emperors, after distributions of meat of sacrificed animals ceased amid the abolishment of festivals in which the imperial house was explicitly worshipped. In fact, it is likely that the space was rapidly usurped for organizing public meals at the occasion of Christian feasts and as part of Christian charity. During the same period, an older peristyle villa became the nucleus of an enormous urban palace including newly built public and private wings. It may have been the residence of an aristocrat belonging to a newly emerging super-elite. Whereas city councillors and mere municipal magistrates still had to carry all financial responsibilities of their office, which by now were very burdensome, members of this new top class earned exemption from taxation by serving in the imperial administration of the province(s), where they had acquired large landholdings beyond their cities of origin. Although extremely rich, they no longer invested their wealth in their home cities for other than private structures, such as the luxurious urban mansion at Sagalassos (which, however, may also have been the residence of Sagalassos' bishops, first documented as attending the Council of Constantinople in CE 381).

Christianity only gradually became the predominant religion of Sagalassos (Waelkens et al. 2006; Waelkens & Poblome 2011: 131–52), whose elite still sympathized with paganism and "classical" culture deep into the sixth century. By the early fifth century, dilapidated monuments of the "pagan" past, such as the Hellenistic bouleuterion and the abandoned shrine of Apollo Klarios, were transformed into the city's first Christian basilicas. However, these transformations should not be interpreted as symbols of the victory of the new religion; they rather reflect a continuing concern to maintain the

city's aesthetic appearance, as both structures had become eyesores in the cityscape because of their highly visible location. Christian symbols would only appear on locally produced pottery around the middle of the century, at first still competing with Dionysian motifs. Overall, the introduction of Christianity at Sagalassos seemingly coincided with urban tensions expressed by Christian rioting in the late fourth century, antagonism between Arianism and Catholicism in the 370s–380s, and internal strife between two factions during the fifth to sixth centuries, with worshippers of St. Michael (*Michaelitai*) as the ultimate victors.

Between the middle of the fifth and middle of the sixth centuries, many structures were almost entirely rebuilt on a monumental scale. Many of these renovations affected both the urban infrastructure (e.g., the colonnaded street and the adjoining part of the Lower Agora) and public monuments. During the renovation of the colonnaded street, the erection of two completely new monuments – one carrying newly displayed pagan statuary and another one honoring Julian the Apostate (CE 361–364) – testifies to the perseverance of symbols of the old "pagan" culture among some of the decision makers in the city. The CE 525–550 date of many of these renovations suggests repairs after some catastrophic event, most likely the earthquake in the meantime known to have required extensive repairs in the baths shortly after CE 500. However, all these activities ended abruptly, when in CE 541–42, the intermittently recurring bubonic plague (as elsewhere in Anatolia) probably killed one-third of the urban and rural population. Many, if not most, members of the super-elite who survived the disease likely lost their fortunes, as people working their land had either died or fled. After this catastrophe, Sagalassos gradually lost its urban appearance and eventually gave up all municipal services (such as organized waste collection). This coincided with increasing impoverishment and stress on urban subsistence, as farming activities now also happened inside the city proper (Waelkens et al. 2006; Waelkens & Poblome 2011: 153–58).

When a major earthquake occurred in CE 602–620, initial plans for rebuilding were abandoned. Yet, during the course of the seventh century, the city possessed dispersed habitation, and an impressive wall with two towers, perhaps associated with the Arab invasions, closed off the southern extremity of the colonnaded street and the promontory that once housed the shrine of the Pisidian emperor cult. By the end of the century, occupation at Sagalassos disintegrated into at least two isolated hamlets, and this promontory would hold the larger of the two. Protected by a fortification of its own, it was continuously inhabited until the later eleventh century, at which point this site was abandoned.

A mid-Byzantine fortress on the so-called Alexander Hill most likely was destroyed by the Seljuks in CE 1204. However, a cemetery associated with another, not yet identified habitation nucleus, remained in use until the later thirteenth century.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Aesthetics in Archaeology
- ▶ Agora in the Greek World
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Architecture, Roman
- ▶ Baths and Bathing, Roman
- ▶ Bone Chemistry and Ancient Diet
- ▶ Buildings, Archaeological Study of
- ▶ Burial Practices and Tombs in the Roman World
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Ceramics: Scientific Analysis
- ▶ Chemical Survey of Archaeological Sites
- ▶ Classical (Greek) Archaeology

- ▶ Cross-Cultural Interaction in the Greek World: Culture Contact Issues and Theories
- ▶ Culture in Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Domestic Architecture, Roman
- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Economy, Roman
- ▶ Geoarchaeology
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Iconography in the Roman World
- ▶ Imperial Cult, Roman
- ▶ Indigenous Archaeologies
- ▶ Infrastructure in the Roman World: Roads and Aqueducts
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Late Antique Anatolia, Archaeology of
- ▶ Material Culture and Education in Archaeology
- ▶ Olives: Origins and Development
- ▶ Polis
- ▶ Religion, Italo-Roman, Archaeology of
- ▶ Romanization
- ▶ Social Archaeology
- ▶ Social Identity in Historical Archaeology
- ▶ Stoa
- ▶ Survey Archaeology in the Greek Aegean World
- ▶ Survey Archaeology in the Roman World
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Urban Archaeology
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Sahara, Makoto

Naoko Matsumoto
Okayama University, Okayama, Japan

Basic Biographical Information

Makoto Sahara (1932–2002) (Fig. 1) is a Japanese archaeologist. He was born in Osaka, Japan, in 1932. He picked up a piece of pottery in the park when he was a kindergarten child and decided to become an archaeologist. He participated in an anthropology class for junior high school students organized by the Japanese Anthropological Society and was impressed by Sugao Yamanouchi who founded Jomon studies in 1947. He started visiting Yamanouchi at the University of Tokyo to take private lessons and became absorbed in study of the decoration of Jomon pottery. After graduating from the Department of German at the Osaka University of Foreign Studies, Sahara obtained a doctoral degree in archaeology from Kyoto University. After this, he joined the Nara National Research Institute for Cultural Properties in Nara and took part in excavations of the Heijo Palace site in 1964. He became the Head of the Center in 1992 at the age of 60 and an Assistant Director of the National Museum of Japanese History in 1993. He was Director of this museum from1997 until he retired in 2001. He died in 2002.

Sahara, Makoto, Fig. 1 Makoto Sahara (Photo courtesy of Shin'ichiro Fujio)

Major Accomplishments

Although the Yayoi period was the focus of Makoto Sahara's study, the range of his interests was wide and included the origin and lifestyle of Japanese people. The title of his graduate thesis was "The application of the question of handedness to archaeology." Among his unique works is a comparative analysis of prehistoric pictures on the bronze bells from the Yayoi period with children's pictures, undertaken from the viewpoint of art history and psychology. The archaeology of the Wei-zhi was his last work. He used to comment that he leaned the method of fine observation from Sugao Yamanouchi and how to construct theory from Yukio Kobayashi.

Makoto Sahara strongly insisted that archaeology should not be for a limited number of specialists but for the public. He advocated an accessible and interesting archaeology. He tried to use simple, plain words instead of academic jargon in his writing and suggested that other archaeologists to do the same. In order to make archaeological data and interpretations available

to the public, he worked hard to establish and/or empower museums and to protect and preserve archaeological sites, such as the Yayoi settlement site of Yoshinogari, Saga prefecture. When he retired in 2001, Sahara donated about 7,000 of his own books to the library of Chatan town in Okinawa prefecture.

Makoto Sahara's research into the origin of warfare had implications in terms of contemporary warfare. His analysis of stone arrowheads from the Yayoi period concluded that arrowheads as weapons developed during the Yayoi period as evidence of weapons for killing people did not exist in the preceding period. Based on this data – and with potential lessons for modern warfares in mind – Sahara insisted that we should be able to stop warfare because human beings lived without it until recently (in terms of an archaeological time frame).

After Makoto Sahara's death, a collection of his works was assembled by Hiroshi Kanaseki and Hideji Harunari and published in six volumes in 2005 as *The works of Makoto Sahara*.

Cross-References

► Kanaseki, Hiroshi
► Yamanouchi, Sugao

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Saito, Tadashi

Makoto Tomii
Centre for Cultural Heritage of Kyoto University, Kyoto, Japan

Basic Biographical Information

Saito Tadashi is a Japanese archaeologist and an Emeritus Professor of Taisho University. He was born in Hokkaido in 1908 and has lived to be over 100 years old. When he was one year old, his parents moved to Sendai in the northeast part of Japan. In 1921, Saito Tadashi entered junior high school (in the old system of education, almost equal to the high school in the present educational system), and during his junior high school days, he loved to walk around watching the local customs and manners and sometimes collecting artifacts on the Daigi-gakoi shell midden of Jomon period. In 1926, he entered Second High School (in the old system of education, equal to the half stage of an undergraduate degree in the present educational system) in Sendai. There, he organized a studying club for students who were interested in field surveys, with Nobuo Ito, who would later become the first professor of archaeology in Tohoku University. As a member of the club, he took part in the excavations of Daigi-gakoi shell middens by Sugao Yamanouchi in 1927, and in 1929 he learned from Dr. Yamanouchi about how the cord-mark decoration had been made on Jomon pottery. Saito Tadashi's first paper was published in 1927 as a report on that shell midden. He subsequently wrote papers on folklore for the journal edited by the great folklorist, Kunio Yanagita.

Following Yanagita's advice, Professor Saito chose to study at the Department of Japanese History of The University of Tokyo in 1929. He also attended various lectures in different faculties such as anthropology, prehistory, and architectural history. During this period, he helped to edit the archaeological journal issued by The Imperial Museum, *Kokogaku Zasshi* (*The Journal of the Archaeological Society of Nippon*), which led him to have broad knowledge and a large network of contacts. In 1932, he wrote his bachelor dissertation on Japanese ancient mortuary practices. He then went to Kyoto University to learn archaeology from Kosaku Hamada, who made him a junior assistant (1932–1935). From 1933 to 1940, he undertook many excavations and surveys in and around Korean Peninsula. He served as a curator of the museum in Gyeongseong in the second half of his overseas mission. This experience would come to fruition in 1955 in his doctoral thesis on the Silla culture.

After returning to Japan, Professor Saito worked in the Ministry of Education and Culture for more than a quarter century (1940–1966), travelling throughout the Japanese Archipelago to conduct cultural heritage management by inspecting archaeological sites. This included his contribution as a governmental officer to facilitating the excavation of Toro in 1948 in which an interdisciplinary team systematically investigated a prehistoric paddy field for the first time, and through which establishment of the Japanese Archaeological Association was promoted. In 1955, Professor Saito received a doctorate from The University of Tokyo, and he started to give lectures there in 1962. He then became a professor of the Faculty of Letters at the university, 1 year before he left the Ministry of Education and Culture. In 1969, he left the university on reaching retirement age and was invited as a lecturer to Taisho University. In the next year, he became a professor, and in 1983 he became an Emeritus Professor of the university.

Major Accomplishments

Professor Saito wrote a large number of books, ranging from the history of archaeology, through Buddhism archaeology and archaeological methodology, to paleology. In his work he placed importance on the following: (a) making full lists of archaeological sites; (b) making a reference list of archaeological books, papers, and other writings; and (c) making comprehensive collections of the information, drawings, and photos of archaeological objects. He has never shirked such basic works and regarded them as essential to the discipline. One of his conspicuous accomplishments is thorough and comprehensive research on the history of archaeology. He once said that he had a sense of mission in studying the history of archaeology because he had graduated from a Department of Japanese History (1997b).

Professor Saito had made every effort to preserve archaeological sites during the decades of his career when he was with the Ministry of Education and Culture. His outstanding contribution to cultural heritage management was to protect significant national heritage sites from military, political, and economic pressure even during and immediately after World War II. It included the development of a Navy military base planned on the location of a shell midden, the construction of a railroad besides a castle for military use, and manganese mining by the local conglomerate planned below a tumulus. These episodes demonstrate his strong sense of responsibility for archaeological materials.

Professor Saito published a textbook on archaeology, *Koko-gaku no Kekyu-ho* (*Methods in Archaeology*), in 1950. A considerable amount of data had been collected since the first textbook of archaeology in Japan was written by Kosaku Hamada in 1922, but a systematic introductory book of archaeology had not been produced for decades. Saito's textbook followed the style of his master of archaeology, Hamada, and looked like a revised edition of Hamada's book, *Tsuron Koko-gaku*, together with upgraded appendix such as a full glossary, comprehensive references, and extracts of relating laws. Saito's

practical experience in the Korean Peninsula and his broad purview on ancient remains obtained as an officer of the Ministry of Education and Culture possibly enabled him to produce this significant book for beginners in archaeology, not later than five years after the defeat of the WWII.

In practical archaeology, Professor Saito takes a comparative approach to study of the ancient East Asian cultures based on his broad knowledge and experience of archaeology there, accumulated since the 1930s. The products of his work include several books on ancient Korean culture, including his doctoral thesis. His interest in burials and temples was combined with knowledge of historiography and paleology, making him a prominent figure in historical archaeology. Above all, his achievements in the archaeology of Buddhism are unparalleled.

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- ▶ Periodization in Japanese Prehistoric Archaeology
- ▶ Yamanouchi, Sugao

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Salazar, Noel B.

Noel B. Salazar
Cultural Mobilities Research, University of Leuven, Leuven, Belgium

Basic Biographical Information

Noel B. Salazar received his Ph.D. in Anthropology from the University of Pennsylvania (USA). He is currently Research Professor at the Faculty of Social Sciences of the University of Leuven (Belgium), where he founded the research cluster Cultural Mobilities Research (CuMoRe). He teaches in the anthropology program and the interdisciplinary heritage management module. In addition, he is Senior Researcher of the Research Foundation Flanders (FWO) and Visiting Professor at the Faculty of Foreign Languages and Literatures of the University of Bergamo (Italy).

Major Accomplishments

While at the University of Pennsylvania, Dr. Salazar experienced firsthand the benefits of transdisciplinary research. His involvement within the Department of Anthropology's "Public Interest Anthropology" taught him the necessity of bridging the divide between academia and the wider public. Together with archaeologist Benjamin W. Porter, now Professor at the

Near Eastern Studies Department, University of California at Berkeley, he applied the public interest perspective to heritage tourism. For this work, he was awarded with a Student Achievement Award from the National Association for the Practice of Anthropology. Understanding the changing meaning and value of (intangible) cultural heritage is still high on his research agenda. This forms part of Salazar's broader work within the emerging field of critical heritage studies.

Dr. Salazar's research interests include anthropologies of mobility and travel, the local-to-global nexus, discourses and imaginaries of Otherness, heritage interpretation, cultural brokering, and cosmopolitanism. He has conducted fieldwork at world heritage sites in Indonesia and Tanzania. His anthropological work synthesizes ethnographic findings with conceptual frameworks developed within anthropology, sociology, geography, cultural studies, tourism studies, philosophy, and psychology.

Dr. Salazar has won numerous grants for his innovative research projects, including from the National Science Foundation, the European Commission, and the Research Foundation Flanders. He was involved as expert collaborator in the first UNWTO study on tourism and intangible cultural heritage and the World Heritage Tourism Research Network international survey on the heritage of the Great War, 1914–1918.

Internationally, Dr. Salazar serves as President (and, previously, Executive Committee Member) of the European Association of Social Anthropologists, National Delegate of the Permanent Council of the International Union of Anthropological and Ethnological Sciences, and Chairman of the IUAES Anthropology of Tourism Commission. In addition, he is on UNESCO's and UNWTO's official roster of consultants, an expert member of the ICOMOS International Cultural Tourism Committee and the UNESCO-UNITWIN Network "Culture, Tourism and Development", and an expert panel member of the National Geographic Society's Center for Sustainable Destinations. In Belgium, Dr. Salazar is member of the National Consultation Panel of the European Commission's Joint Programming Initiative on Cultural Heritage and steering group member of the University of Leuven's interdisciplinary Cultural Heritage Task Force.

Dr. Salazar is the author of several books and numerous peer-reviewed articles and book chapters on the anthropology of heritage tourism. He sits on the editorial boards of *Social Anthropology*, *Annals of Tourism Research*, *Journal of Heritage Tourism*, *International Journal of Tourism Anthropology*, and *AIBR – Revista de Antropología Iberoamericana*.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Indonesia's World Heritage
- ▶ Intangible Cultural Heritage
- ▶ Journal of Heritage Tourism
- ▶ Sustainability and Cultural Heritage
- ▶ Sustainable Cultural Tourism Policies: Overview
- ▶ Tanzania's History and Heritage

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Saleh, Fathi

Fathi Saleh
Department of Computer Engineering, Cairo University, Cairo, Egypt
CULTNAT Center for Documentation of Cultural and Natural Heritage, Giza, Egypt

Basic Biographical Information

Dr. Saleh graduated from the Faculty of Engineering of Cairo University and received his Ph.D. from the University of Paris, France. His main interest is the application of the new technologies in the different fields of cultural and natural Heritage. He is currently professor of computer engineering at Cairo University. From 1995 to 1997, Dr. Saleh occupied the position of cultural councilor at the embassy of Egypt in Paris, and from 1997 to 1999, he was Egypt's ambassador to UNESCO.

Major Accomplishments

Dr. Saleh is also the president of Herimed (Association for the Documentation, Preservation and Valorization of Euro-Mediterranean Cultural Heritage). He is a member of the Supreme Council of Culture and of the Board of the Director of the Supreme Council of Antiquities, as well as a member of "Institut d'Egypte."

Dr. Saleh founded the Center for Documentation of Cultural and Natural Heritage (CULTNAT) in 2000 as a national center for documentation of different aspects of cultural and natural heritage of Egypt. CULTNAT is part of Bibliotheca Alexandrina and is supported by the Ministry of Communications and Information Technology. Dr. Saleh currently holds the position of CULTNAT's founder and emeritus director.

In the field of cultural heritage, CULTNAT has documented different aspects of tangible and intangible heritage. One of the major projects in tangible heritage has been building the Archaeological Map of Egypt for which the center has won the Stockholm Chalange Award in 2004. CULTNAT has a series of publications in every field of heritage such as atlases for every region in Egypt with all archaeological sites included, works of the Egyptian musicians, contribution of Arab Civilization in sciences through old manuscripts, the presidential palaces, etc.

A major study was carried by the center and headed by Dr. Saleh entitled "A strategic approach to Egypt's Cultural Heritage." This study was done upon request from UNESCO. The study shows the different steps to be followed in order to properly manage Egypt's cultural heritage.

Dr. Saleh also managed to establish a masters degree in cultural heritage management (CHM) in association with the French University in Cairo.

Dr. Saleh has won several international awards. In Qatar, in 2010, he received the "Information Systems Expert First Award" from the Arab Towns Organization. In 2010, he won the award of ARCHAEOLOGICAL 2.0 from the "Il Congreso Internacional de Arqueologia et Informatica Grafica, Patremonio e Innovacion" held in Seville, Spain, for his work on "Virtual Representation of Egyptian Cultural Heritage."

Besides these awards, he won the World Summit Awards for different heritage contributions three times. The first was in Geneva in 2003, the second was in Tunisia in 2005, and the third was in Abu Dhabi in 2010.

Cross-References

▶ Heritage Areas
▶ UNESCO World Heritage Convention (1972)

► UNESCO's World Heritage List Process
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Sambaquis Shell Mounds, Archaeology of

Maria Dulce Gaspar
Departamento de Antropologia, MUSEU NACIONAL / UFRJ, Rio de Janeiro, Brazil

Introduction

The Brazilian coast was settled by groups of fisher-gatherers who built mounds known as *sambaquis*. These mounds (Fig. 1) are the main archaeological evidence of these groups, known as *sambaquieiros* or shell mound people. *Sambaqui* is a word of Tupi etymology, the language spoken by farmers and ceramic-making groups that occupied the Brazilian territory when Europeans arrived. *Tamba* means shell, and *ki* means mound, which are the most important visual features of these sites.

The oldest dates indicate that some areas of the coast were already occupied around 7,000 years ago, and the territory was intensively populated by mound-building groups between 4 and 3000 years BP. These fisher-gatherers dominated the Brazilian coast until 2000 BP, when ceramic-making groups originating from central South America and Amazonia began to occupy coastal areas and destabilized the *sambaquieiros* way of life.

Definition

Sambaquis are typically characterized by rounded, elevated structures in southern Brazil; some sites reached 65 m in height, although the sites are usually not higher than 5 m in other areas. The archaeological deposits that compose these sites primarily include mollusk shells and bones of fish, birds, and mammals. A variety of stone and bone artifacts, postholes, and hearths have also been identified, often resulting in an intricate stratigraphic record. The most noticeable remains in the composition of these sites are the shells from *Anomalocardia brasiliana*, *Lucina pectinata* and several mussel species. Burials of men, women, and children of different ages have been recovered from the most *sambaquis*, and the skeletons are usually articulated. These sites are a distinct space that becomes conspicuous on the landscape because of their sheer volume and the topographic nature of the coastal plain. They served as the final destination of the deceased, particular places, in which concentration of shells neutralized soil acidity and created conditions conducive to the preservation of human bone.

The prehistoric occupation of the Brazilian coast caught the attention of researchers long ago, and scientific interest in this type of archaeological site has been significant since the second half of the nineteenth century. Initially, the issue that dominated the studies concerned natural versus anthropic origins of the sites. The "naturalist" school argued that *sambaquis* were the result of receding sea levels and the resulting effects of wind upon shells on the beach. The presence of human remains was commonly attributed to shipwrecks. In contrast, scientists that believed in an anthropogenic origin asserted that the sites were the results of human action and proposed multiple explanations for the accumulations of faunal remains.

Sambaquis Shell Mounds, Archaeology of, Fig. 1 Santa Marta Sambaqui, Santa Catarina, Brazil

The advancement of research at several sites and findings of indisputable evidence of human activities made the naturalistic movement lose its followers. However, the origins of *sambaquis* were discussed until the 1940s by some researchers who argued that the sites were created by a combination of natural and anthropic elements. This perspective became known as the "mixed" theory.

Since the nineteenth century, the proponents of anthropogenic origins of *sambaquis* are divided among two distinct views that continue to influence current research. On one hand, *sambaquis* are considered to be the results of casual accumulation of food refuse because of the large quantity of faunal remains found at the sites. The other perspective argues that the sites are mortuary monuments because of the presence of burials (Wiener 1876). These distinct perspectives emphasize different functions of the settlements: the first model suggests that *sambaquis* were habitation sites, while the second supposes that they were cemeteries.

Although the focus of early debate was the origins of *sambaqui* formation, some important contributions were made at the end of the nineteenth century, including observations about formation processes, landscape, composition, chronology, subsistence, and the physical characteristics of the populations. Some of these topics remain current and more fully developed, while others have been dismissed. One of the main issues that dominated the social sciences in Brazil between the end of the Empire and the First World War (1889–1914) was the diversity of the human species and the notion of race, later rejected as a scientific category. Skeletons, especially skulls, were favored by researchers, often to the detriment of other materials, and they were used extensively in the first works of Brazilian anthropology, dating from 1860. These studies were influenced of French and German authors and were strongly affected by deterministic, racial theories (Seyferth 1985). These investigations resulted in extremely descriptive research, focused on characterizing human "types."

Although eventually dismissed, the naturalistic theory resulted in an important contribution to the understanding of *sambaquis*. Some researchers explored the idea that rather than being the result of natural forces, *sambaquis* mark natural processes, and they can be good indicators of sea level variation. For example, Krone (1908) believed that older *sambaquis*, composed predominantly by oysters, were farther away from the modern coast, while more recent sites would be located close to the sea and composed of *A. brasiliana* shells. These studies were significantly developed from the 1970s onward with research focused on comprehending coastal evolution.

Some geomorphologists, considering that the basis of sambaquieiros' diet came from the sea, believed that the groups lived closed to the coastline. For these researchers, a site's spatial proximity to the sea was used to make inferences about coastal dynamics (Martin & Suguio 1976). Despite being considered questionable evidence for some (Scheel-Ybert et al. 2009a), spatial distribution research yielded important results. Recent coastal evolution analyses resulted in indispensable paleoenvironmental reconstructions, allowing the characterization of locales chosen by *sambaquieiros* to erect their settlements, as well as an understanding of the criteria that guided site selection.

Until the 1950s, *sambaqui* studies were focused on individual sites, hindering the broader understanding of coastal occupation. In this same decade, the first systematic works were completed, and radiocarbon dates were recovered. French and North American archaeologists, including Annette and Joseph Emperaire, Alan Bryan, and Wesley Hurt, went to Brazil to study two eminent topics of the country's archaeology: monumental *sambaquis* and the hunter-gatherers of Lagoa Santa, Minas Gerais. At the same time, Brazilian intellectuals, led by Castro Faria, Paulo Duarte, and Loureiro Fernandes, initiated an intense movement aimed at the protection of the sambaquis, which had been continuously destructed for large-scale lime production since the sixteenth century.

Slowly, the number of studied sites increased, along with the breadth of the research questions being addressed. The noteworthy accumulation of knowledge that occurred from 1965 helped to renew the discipline. Two large projects had great repercussions in the way archaeology was carried out in Brazil, leaving strong impressions upon the predominant theoretical and methodological perspectives among Brazilian archaeologists: the National Program for Archaeological Research (Pronapa) was initiated in 1965 and coordinated by Clifford Evans and Betty Meggers, while the French-Brazilian Mission was created in 1973 and coordinated by Annette Laming-Emperaire.

The major concern of Brazilian archaeology until the end of the 1980s had been the investigation on cultural change through time. The discipline was marked by the creation of various phases and traditions used to define economic transformations deemed important. This system prevailed for more than two decades; the site-based approach and the interpretative scheme became practically synonymous with archaeology in the country. Conversely, some isolated studies started to investigate the spatial organization of *sambaquis*' internal features. The distribution of hearths, house outlines, and burials were studied using teachings from French archaeology to understand their complex arrangement (Kneip 1976). One notable exception is Prous (1974), who detected great similarities in the representations of animals in bone and lithic sculptures and suggested the possibility of some form of ideological unity shared by *sambaquieiros* from the southern and southeastern coasts.

Scholars who considered *sambaquis* as deposits of food refuse were particularly interested in investigating faunal remains. At first, this line of research focused exclusively on the identification of animal remains, resulting in long species lists. Later, the lists were supplemented by quantification of the identified elements, and researchers tried to infer the dominant economic activities. Finally, bones and shells were counted, and correlations were made between the remains and the quantity of food they represented. This was a significant advancement, as the visual prominence of the shells was overcome. Shell valves tend to preserve well in the archaeological matrix and are obviously notable because of their color and volume. These characteristics give the impression that collection of shellfish was the primary activity that sustained the population. The goal of investigators was to characterize the diet, treating the sites individually without advancing in the delineation of social relationships of an economy based on aquatic resources.

Systematic studies of food remains were linked to Pronapa's perspective, and this context helped to elaborate a reference model that persisted until the beginning of the 1990s. The model asserted that the sites' different layers were the remains of successive settlement episodes by bands of nomadic gatherers, and

mollusks were the basis of the diet. Environmental alterations related to sea level changes and/or mollusk bed overexploitation were believed to have led the *sambaquieiros* builders to change their economic basis, transforming them into fishers. The location of the sites in relation to the coast was frequently cited as evidence in support of this hypothesis.

The 1990s brought renewed interest in sambaquis, and the representation of these groups changed. They were no longer perceived as bands of nomadic mollusk gatherers searching for food. Researchers began to discuss social organization, site formation processes, and the elaborate funerary ritual, and the grandeur of the sites was now seen as the outcome of more complex social interactions. The paradigm was forever changed, usurping the preconceived notions that had lingered since the nineteenth century, equating the *sambaquieiros* to "primitive" people.

Key Issues/Current Debates/Future Directions

Recently, archaeologists have pursued the idea that *sambaquis* themselves are artifacts, constructed according to social rules making it possible to study not only their content but also their form, function, and settlement implications. As a consequence of their visibility in the coastal plain environments, *sambaquis* are considered landscape markers, further transforming approaches to this type of site.

In the first decade of the twenty-first century, different scales of observation were articulated to build interpretations about the lifeways of *sambaquieiros*. On one extreme, a broad perspective investigates satellite images to study site distribution and function and settlement patterns. On the opposite end, some scholars use a focused approach, employing microscopes to examine evidence like dental calculus, joint conditions, and wood fragments, providing information about some of the more particular habits of coastal groups.

Research focusing on groups of sites attempts to understand the relationships among the units and their characteristics. Since *sambaquis* have different dimensions, the hierarchical relationships among settlements are discussed, and since many neighboring sites were simultaneously occupied, scholars also explore their complementary roles. It has been argued that isolated sites did not have sociological significance and that a set of *sambaquis* is the minimum unit of occupation. It has also been established that *sambaquis* occur in all regions of the Brazilian coast and are concentrated in areas where the coast is interrupted by rivers, estuaries, and lagoons. Some scholars argue that, despite regional and temporal specificities, *sambaqui* builders had a "collective individuality," in the sense proposed by Marcel Mauss (1979). Comparison with other types of sites located in Brazil indicates that the custom of building mounds in the coastal plain through accumulation of faunal materials and interring the dead in these spaces is a custom exclusive to the *sambaqui* population.

Systematic studies interested in landscape use and the spatial distribution of *sambaquis* use an approach that involves detailed knowledge of coastal evolution, site dimensions, site function, and formation processes. Research at Santa Marta paleolagoon, in Santa Catarina state, confirmed an ample territorial overlapping, as in other areas, clearly indicating patterns of community interaction surrounding the lagoon. Lagoons were the epicenter of these groups' social and economic universe. The spatial configuration of sites, along with analysis of several radiocarbon dates, demonstrates that some sambaquis were active for more than eight centuries. Analysis of the visibility of large sites, almost always central within each site cluster, indicates the existence of sedentary communities that grew in the surroundings of the lagoon (DeBlasis et al. 2007). Demographic parameters suggest impressive concentration of people in some areas of the Brazilian coast (Fish et al. 2000).

A fundamental interpretive change occurred regarding *sambaquis*' formation processes: faunal remains cease to be seen solely as indicators of diet, but also as building materials. These changes refer specifically to the shells, since

Sambaquis Shell Mounds, Archaeology of, Fig. 2 Jabuticabeira II Sambaqui, Santa Catarina, Brazil

isotopic studies indicate mollusks did not make a significant contribution to the diet of *sambaquieiros* (De Masi 1999; Klokler 2008). In fact, new zooarchaeological methods and analyses demonstrate that fishing was always an important subsistence activity of these coastal groups (Figuti 1993). Moreover, paleobotanical studies and analyses of plant remains recovered from dental calculus and lithic artifacts show a more diverse diet than previously thought. The diet included a great variety of wild plants, and probably some cultivated species as well, which possibly included some cariogenic species. An incipient form of tending and harvesting (horticulture) of tubers and fruit trees is suggested in many sites located in the southeastern region and at least in some sites of the Brazilian south (Scheel-Ybert et al. 2009b).

Concerning the funerary realm, *sambaquieiros* use of mollusk valves to build their cemeteries assured the preservation of human skeletons. This preservation, associated with the visibility of the dead, who controlled the *sambaquieiros*' territory from the top of the sites, resulted in a particular funerary program. Everything within a *sambaqui* seems to have followed the logic of increasing the height of the monument while at the same time guaranteeing better visibility for the dead.

Studies of several meters of profiles from the site Jabuticabeira II, in Santa Catarina (Fig. 2), indicate that its volume, 320,000 cubic meters, is primarily a consequence of activities related to funerary ritual. The ritual involved the deposition of the body in the top of the mound, inclusion of large quantities of offerings, and long-term maintenance of hearths, resulting in thick deposits of ash.

Hyperflexed bodies were deposited close to each other, delineating funerary areas within the large site. Shallow graves were delimited by posts, occasionally made with hardwood (Bianchini et al. 2007). After the deposition of many burials, the areas were closed with the deposition of successive lenses composed predominantly by shells or fish bones, charcoal, and sand, resulting in an intricate stratigraphic sequence (Fish et al. 2000; Klokler 2008).

Studies of archaeofacies propose that the materials were processed in spaces outside the site and had different treatment before being deposited within the *sambaqui*. In this way, the body and its associated offerings comprise a primary deposit, and the materials covering the funerary areas were secondary or tertiary deposits. The materials that cover the funerary areas may have been accumulated in small *sambaquis* located nearby, whose archaeological layers rarely surpass 40 cm in thickness (Villagran et al. 2010).

The repetition of funerary ceremonies throughout more than eight centuries created a monumental element in the landscape that, due to its size and configuration, perpetuates a message that its builders wanted to transmit (Fish et al. 2000). The successive events, directly related to the process of site growth, inform visitors to the coast that the area is the *sambaquieiros* domain where they interred their dead. In this way, *sambaquis* are the result of intense social processes that resulted in a highly domesticated landscape, marked by sentimental and emotional references.

Cross-References

- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Mesoamerica: Subsistence Strategies by Region

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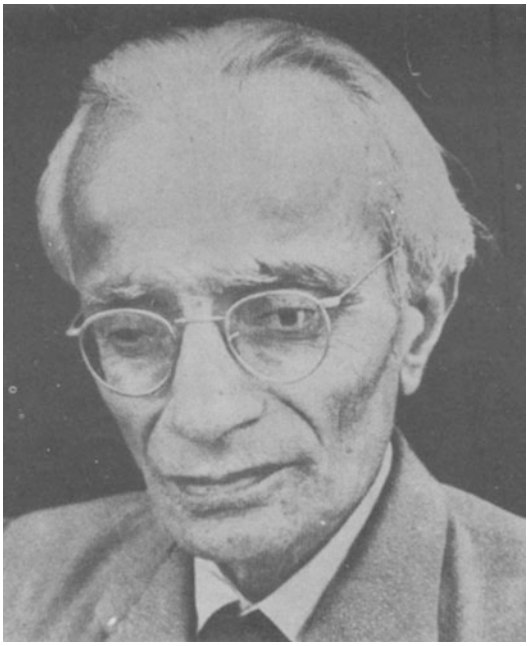
Sankalia, Hasmukh Dhirajlal

Manoj Kumar Singh
Department of Anthropology, University of Delhi, Delhi, India

Basic Biographical Information

Hasmukh Dhirajlal Sankalia (Figs. 1 and 2) was born in Bombay on 10 December 1908 into an

Sankalia, Hasmukh Dhirajlal, Fig. 1 Young Sankalia



Sankalia, Hasmukh Dhirajlal, Fig. 2 Old Sankalia

upper-middle-class Gujarati family for solicitors. He was born underweight and retained a frail constitution all through his life. Sankalia was dead in 28 January 1989. In 1959, Uma Vasudev, a journalist writing in the *Illustrated Weekly of India*, described Sankalia "as fragile as the pot-sherds he mends." Sankalia passed his matriculation examination in 1925, securing the highest marks in Sanskrit for which he won the Chimanlal Ranglal Prize of Shri Surti Dasha Porwad Hitechhu Sabha. His father and uncle wanted him to follow the family profession of law, but he joined St. Xavier's College to pursue the study of Sanskrit and History. Sankalia studied Sanskrit for his B.A. and History for his M.A. Sankalia passed his M.A. examination in 1933 with a first class and won the Pandit Bhagwanlal Indraji Prize of Bombay University. The thesis was published in 1934 as a book. Simultaneously with his M.A. degree, Sankalia also passed his LL.B. examination to satisfy the wishes of his father and uncle.

In 1934, Sankalia joined London University to do his Ph.D. in ancient Indian History. It was the influence of his teachers in England that eventually turned Sankalia's interest in Archaeology. He wrote his Ph.D. thesis on the Archaeology of Gujarat. This was the study of historical period comprising art, architecture, epigraphy, and numismatics and was based on both field work and library sources. Sankalia got his Ph.D. degree in 1936. The thesis was published as a book in 1941 with financial assistance from London University (Sankalia 1941).

Sankalia was a life member of the Asiatic Society of Bombay; Bhandarkar Oriental Research Institute, Pune; Linguistic Society of India, Pune; and Indian Archaeological Society, New Delhi. He was the founder Chairman of the Indian Archaeological Society and continued in this position until he voluntarily resigned it in 1980 much against the wishes of the society's members. He was a member of the Permanent Council of the International Union of Prehistoric and Protohistoric Sciences from 1961 and Honorary Member of the Instituto Italiano di Prehistoria e Protohistoria, Italy, from 1962. He was a member of the following Advisory Boards

of Archaeology: Government of India (1955–1975), Government of Maharashtra (1955–1974), Government of Gujarat (1964–1980), Government of Madhya Pradesh (1966–1974), and Government of Uttar Pradesh (1969–1978).

Sankalia was selected as a professor of Pro-Indian and Ancient Indian History in 1939 at the Deccan College Post-Graduate and Research Institute, Pune. This was Sankalia's first and last job.

Major Accomplishments

For his academic achievements Sankalia received numerous honors from professional organizations, the central and state governments, and the public at large in the form of fellowships, memberships of academic organizations, prizes, medals, nominations to prestigious bodies, invitations to deliver lectures and preside over conferences and seminars, felicitations by public bodies, etc. Sankalia received the Explorer's Medal from the Explorers Club, New York, in 1984. He was among the first batch of scholars to be awarded the Jawaharlal Nehru Memorial Fellowship in 1968. The President of India in 1974 conferred on him the title of *Padma Bhushan* in recognition of his enormous contribution to archaeological studies.

The citizens of Maheshwar in Madhya Pradesh presented him a manapatra (citation) in 1954 in appreciation of his excavations at Maheshwar. The Municipality of Ahmednagar in Maharashtra presented him a manapatra and a shawl in 1973 "for bringing light in the history of Ahmednagar district form the dim past by excavation and exploration at and around Nevasa." Less than 2 weeks before his death, the Aitihasik Vastu Sangrahalaya of Ahmednagar presented him the Late Principal Naralkar Learning Prize at a function held at Deccan College.

Sankalia's first enterprise in prehistoric research was the expedition that he led to Gujarat at the instance of Rao Bahadur K.N. Dikshit, the then Director General of Archaeological Survey of India, in 1941–1942 to explore Stone Age remains, following the clues provided by the work of Robert Bruce Foote more than six decades earlier. In this expedition he included a geologist, a paleontologist, and a surveyor-draftsman. Sankalia located several new Paleolithic and Mesolithic sites in the Sabarmati valley in Mehsana district. One of the important Mesolithic sites was Langhnaj where Sankalia carried out several seasons of excavation jointly with his anthropologist colleague, Irawati Karve. Langhnaj was the first Mesolithic site to be excavated in India as also the first Stone Age site to yield physical remains of man. With this work Sankalia opened up a new and dynamic phase of research in prehistory. Sankalia published the results of his work both as a monograph entitled *Investigations into the Prehistoric Archaeology of Gujarat, Being the Official Report of the First Gujarat Prehistoric Expedition 1941-42* (1946) and in article in several journals (Sankalia 1942, 1955, 1956; Sankalia & Karve 1945, 1949).

The significance of Sankalia's work at Nevasa and particularly the discovery of a distinct Middle Paleolithic phase were recognized by the prestigious American journal *Science* when it invited him to contribute a paper on the Middle Paleolithic of India and Pakistan (Sankalia 1964).

The Government of India nominated him as a member of the archaeological delegation to the USSR in 1963–1964, cultural delegation to Yugoslavia in 1966, delegation to the International Congress of Orientalists at Ann Arbor, Michigan, USA, in 1967, and again at Paris in 1973.

Sankalia was elected Honorary Fellow or Member of the Ethnographic and Folk Culture Society, Lucknow (1974); Indo-Pacific Prehistoric Association, Canberra, Australia (1976); the Heras Institute of Indian History and Culture, Bombay (1977); and the British Academy, London (1986). He was nominated as a member of the Editorial Board of the prestigious British journal World Archaeology from its inception in 1969 and continued in this position until 1987. He was the Honorary Tagore Professor of Indian History and Culture at the M.S. University of Baroda from 1960 to 1965.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Environmental Archaeology and Conservation
- ▶ Historical Archaeology
- ▶ Spatial Analysis in Field Archaeology
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Sanogo, Kléna

Daouda Keita
Département d'Histoire et d'Archéologie, l'Université des Sciences Sociales et de Gestion de Bamako, Bamako, Mali

Basic Biographical Information

Kléna Sanogo (Figs. 1 and 2) is the Director of the Institut des Sciences Humaines, in Bamako, Mali. He is one of the country's leading figures, who has worked throughout his career for the protection and safeguarding of Mali's cultural heritage.

Born in 1948 in Doumanaba (Sikasso), Kléna Sanogo undertook his graduate studies at Voronezh, where he obtained a Masters in History from Voronezh State University (former USSR). He then worked at the Institut des Sciences Humaines as a Research Fellow from 1973 to 1974. This allowed him to participate in a number of archaeological excavations in Dogo (Bougouni) and to participate in archaeological research at Doupwill and Galia (Mopti) in Mali. Kléna Sanogo became the first Malian professional archaeologist. He was Director of the National Museum of Mali from 1974 to 1978. In 1980, he obtained the title of Doctor of Archaeology from Voronezh State University. In his role as Director of the Institut des Sciences Humaines since 1987, Kléna Sanogo has been instrumental in the implementation of numerous national programs of archaeological research.

Kléna Sanogo is an active member of several national, sub-regional and international professional associations and organisations; among these are the International Council of Museums (ICOM), the International Council on Monuments and Sites (ICOMOS), the West African Association of Archaeology (AOAA) of which he was President from 1996 to 1998, the PanAfrican Association of Prehistory and Related Studies (PANAF), and the Society of Africanist Archaeologists (SAFA).

Major Accomplishments

Kléna Sanogo has worked extensively towards the revitalization of archaeological research in Mali and the promotion of Malian archaeological heritage. He took an active part in the development of legislation and regulations on cultural heritage. In his role as Director of the National Museum of Mali in the 1970s, Kléna Sanogo was one of the key figures to set up a national Heritage Day in Mali. He also took an active part in the development of a new museum policy that led to

the construction and inauguration of the National Museum of Mali in 1982. Kléna Sanogo also contributed to a large extent to the design and organization of exhibitions of national and international scope, most notably the exhibitions on the Tellem and on the Vallées du Niger (1993). From 1985 to 1987, Kléna Sanogo led the archaeological components of the first the environmental impact studies in Mali in the reservoir area of the Manantali Dam and the gold mining area of Syama (Kadiolo).

Sanogo, Kléna, Fig. 1 Kléna Sanogo

The establishment in the 1980s of an inventory of archaeological sites in the region of the lakes and the inland delta of the Niger river gave a new impetus to archaeological research in Mali. Kléna Sanogo was one of the major players in the development and implementation of this project, which established the Institut des Sciences Humaines as the center of archaeological research at a national level. Moreover, this project allowed the training of a new generation of archaeologists. The results of this ambitious project were published in 1991 under the supervision of Michel Raimbault and Kléna Sanogo in Recherches archéologiques au Mali: prospections et inventaire, fouilles et études analytiques en Zone lacustre (Raimbault & Sanogo 1991).

Further of work conducted under his supervision includes archaeological research in Nioro du Sahel (1990–1995) and the pursuit of archaeological excavations at stone circle sites in Banamba, Nioro du Sahel, and Koulikoro (from 2003).

Since the early 1990s Mali has witnessed a revival in collaborations with overseas institutions and the implementation of new research projects, including the Togué project

Sanogo, Kléna, Fig. 2 Kléna Sanogo at an excavation site

(an inventory of archaeological sites in the Inner Niger Delta) (1989–1992), the international archaeological excavations at Dia (1998–2002), the findings of which led to the publication "Recherches archéologiques à Dia dans le Delta intérieur du Niger" (Bedaux et al. 2005) and the program "Peuplement Humain et Paléoenvironnement en Afrique de l'Ouest" (Ounjougou) (1998–2010). This period is also marked by the organization of numerous African and international archaeological meetings in Mali. These include the meeting of the West African Association of Archaeology (AOAA) in Bamako in 1978 and at Djenne in 1999 and the 11th Congress of the PanAfrican Association of Prehistory and Related Studies (PANAF) in Bamako in 2001, which led to the publication of the proceedings under the direction of Klena Sanogo and Téréba Togola (Sanogo & Togola 2004).

Cross-References

- ▶ International Council of Museums (ICOM)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ Togola, Téréba

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Santoro, Calogero M.

Calogero M. Santoro
Instituto de Alta Investigación, Centro de Investigaciones del Hombre en el Desierto, Universidad de Tarapacá, Arica, Chile

Basic Biographical Information

Calogero M. Santoro (Fig. 1) was born in 1953 in the hyperarid Pacific coastal city of Antofagasta in the Atacama Desert along northern Chile in South America. When he was a teenager, his family moved to live in Calama, in the arid core of the Atacama Desert, with its harsh hyperarid climate.

Santoro, Calogero M., Fig. 1 Calogero M. Santoro at the National Museum of Australia, Canberra, 2007 (Photo courtesy of George Serras)

This experience sparked his interest in archaeology. In Calama he attended public elementary and high school, where he experienced the Atacameño millennial cultural tradition. In 1972 he enrolled in the undergraduate program at the Universidad del Norte in Antofagasta, and two years later he participated as student on the Orongo archaeological field project in Easter Island, led by the late William Mulloy. This superb experience at 20 years of age helped him to discover his passion for archaeology.

Calogero M. Santoro obtained his bachelor's degree in 1980. His master's thesis was advised by Tom Lynch, and he wrote and completed this work while at Cornell University in 1987 on a Fulbright fellowship and the amusement of two delightful and keen daughters. Between 1987 and 1991, with the support of FONDECYT (a program of the Chilean National Science Foundation), Santoro expanded the scope of his research on hunting and gathering societies by collaborating with specialists in paleoecology and botany and participating in Marvin Allison's paleopathology studies. This experience proved to be fundamental to the research undertaken in his doctoral studies at the University of Pittsburgh, funded by the Heinz Foundation and the advisement of Marc Bermann.

Calogero Santoro has been a faculty member at the Universidad de Tarapacá since 1976, and today he is full professor of the Instituto de Alta Investigación. Since 1989 he has been the editor of Chungara Revista de Antropología Chilena, a peer review journal published by this university, which is recognized in the most important index and bibliographic directory such as the Thomson-Reuter in the Social Sciences Citation Index and Current Contents/Social and Behavioral Sciences, Web of Science. From 2002 to 2011, Professor Santoro was the scientific director of the Center for Desert Research (Centro de Investigaciones del Hombre en el Desierto, CIHDE) in Arica, Chile.

Major Accomplishments

At the time that Santoro obtained his bachelor's degree, he also completed a long-term study of an ancient pre-Columbian funerary site with more than 400 burials, with the support of a National Geographic grant led by Marvin Allison. The results were summarized in three journal papers and several presentations in national and international conferences (Santoro 1981). Simultaneously, Santoro initiated exploration in the high Andes of northernmost Chile, with a focus on hunters and gatherers and rock art (Santoro & Dauelsberg 1985).

Santoro has conducted several interdisciplinary archaeological studies in the Atacama Desert, focusing on late prehistoric farming societies and Inca state-related groups, as well as the long-term cultural process of hunting and gathering societies, and recently, with his partner Daniela Valenzuela, on rock art supported by grants from National Geographic, FONDECYT, the Wenner Gren Foundation, PAGES (Past Global Chances), Fundación Andes, CONICYT (the Chilean National Science Foundation), FONDART (National Art Foundation), and Mecesup (Education Ministry of Chile). He has also received fellowship from Fulbright; Heinz Foundation; National Museum of Natural History, Washington DC; American Museum of Natural History, New York; and Dumbarton Oaks, Endeavour award from Australia, and the *Chaire des Amériques* of L'université Rennes 2, France.

Calogero Santoro has a strong commitment to sharing archaeological knowledge with the wider population. He teaches courses on the prehistory of the Andes for the general public, archaeological tour guides, elementary school and high school students, and local community and ethnic leaders to popularize the knowledge on the history of the Atacama Desert. He occasionally contributes to local and national newspapers and radios. He has helped television programs such as the Discovery Channel, Archaeology of National Geographic, BBC, La Tierra en que Vivimos, Al Sur del Mundo, and Catalyst of Australia, among others, which have been instrumental in highlighting Arica and Parinacota provinces as places with long-term unparallel prehistory that includes the world's oldest archaeological evidence of human artificial mummification, the Chinchorro culture.

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► Inca State and Empire Formation

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Sarianidi, Victor I.

Vladimir I. Ionesov
Department of Theory and History of Culture, Samara State Academy of Culture and Arts, Samara, Russia

Basic Biographical Information

Victor Ivanovich Sarianidi is a famous Soviet and Russian archaeologist. He was born in September 1929 in Tashkent. In 1952, he graduated from the department of history of the Tashkent State University. For more than 50 years, Victor Sarianidi worked at the Institute of Archaeology in the Academy of Sciences.

The archaeological activities of V.I. Sarianidi started from participation in the excavation of the observatory of Ulugbek in Samarkand (Uzbekistan) in 1948, which was his first field expedition. Since then his life has been devoted to studying Central Asia.

In 1949, still being the student, V.I. Sarianidi started to work in Turkmenistan. As a graduate student, he was already taking part in archaeological expeditions in Uzbekistan and Turkmenistan. Later, he participated in the excavation of such monuments that are known nowadays as Togolok, Takhirbay, and Yaz Dep (1955–1956). In 1959, he joined the Institute of Archaeology in the Academy of Sciences of the USSR in Moscow.

From 1969 to 1979, V.I. Sarianidi participated as a leader (together with I.T. Kruglikova) in archaeological excavations in Northern Afghanistan. There he discovered monuments of the Bronze Age for the first time.

In 1975, V.I. Sarianidi defended his doctoral thesis on the topic of "Afghanistan in Bronze and Iron Ages" and was granted the full degree of Doctor of Historical Sciences.

From 1980 to the present, he has conducted very fruitful archaeological works in Turkmenistan on settlements and burial grounds of Togolok, Gonur-depe, and other objects.

Major Accomplishments

Thanks to V.I. Sarianidi's excavations (1969–1979) on the early urban settlements and burial grounds (archaeological group of Dashli monuments), the new center of agricultural civilization was revealed in Bactria.

He discovered the remains of a Bronze Age culture in the Karakum Desert in 1976. The culture came to be known as the Bactria-Margiana Archaeological Complex.

From 1978, under his supervisor, he organized the archaeological expedition excavating the royal necropolis Tillya Tepe of the early Kushan period. More than 20,000 golden objects were found in this necropolis. He also discovered six undisturbed tombs at Tillya Tepe, dating to the first century BCE. The deceased were richly equipped with the so-called Bactrian Gold.

By 1990 in the ancient delta of the Murghab River, he opened no less than 200 separate settlements of an Epoch of Bronze and the Early Iron Age – so-called the country Margush. Since 1974, V.I. Sarianidi has continued to carry out excavation of the capital city of this country Gonur-depe.

Sarianidi has also been excavating Margiana (Turkmenistan) since 1972. There he found a previously unknown civilization of the late Bronze Age. During the many years, his expedition's works have been concentrated on the urban necropolis Gonur. For 10 years from 1996, V.I. Sarianidi excavated the Gonur's Big Necropolis, where almost 3,000 burials and thousands of valuable artifacts were discovered.

Victor Sarianidi is a Doctor of Historical Sciences at the Institute of Archaeology in Moscow and an honorary member of the Greek Anthropological Society. He is the author of more than 20 books and 200 articles published both in Russia and abroad.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Early Regional Centers: Evolution and Organization
- ▶ Fortifications, Archaeology of
- ▶ Masson, Vadim M.
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts

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Sasanian Empire, Archaeology of the

Alan Farahani
Ancient History and Mediterranean Archaeology, University of California, Berkeley, CA, USA

Introduction

The Sasanian Empire was the last polity headed by an Iranian dynasty to rule from the geographic entity known as Iran before the advent of Islam, from 224 CE to 651 CE. At its height under Khosrow II in the early seventh century CE, its territorial extent encompassed many of the countries of the Middle East, Central Asia, and the Eastern Mediterranean. Over these 400 years, the political, ethnic, and religious composition of the empire changed continuously, and partly as a consequence of its location, the Sasanian Empire was involved in successive military confrontations with the Roman Empire on its western border, as well as with seminomadic peoples in various locations, including the Caucasus, Central Asia, and the Arabian Peninsula. Notwithstanding this sporadic but ever-present pattern of conflict, this period also witnessed the acceleration of a trend of interregional economic connectivity, especially between Chinese polities to the east and the Roman and then Byzantine Empire to the west. While this complex economic network often tends to be described in simplified terms as trade across a single "Silk Road," it underscores, in fact, a legacy of economic connectivity that intensified during this period.

Compared to its peer western and eastern polities, archaeology has played a relatively minor role in the interpretation of the Sasanian world. Literary sources in Greek, Latin, Middle Persian, Arabic, Syriac, and Armenian continue to inform a chiefly philological (and less often, historical) perspective. A significant portion of prior archaeological research focused on the analysis of monumental architecture, epigraphy, rock reliefs, and elite art objects. While noticeable advances in each of these areas have formed a more nuanced understanding of Sasanian royal culture and history, archaeological excavation has not enjoyed the same level of influence in reconstructing the daily lives of the majority of the empire's inhabitants. In addition, excavations of Sasanian sites in the early twentieth century did not employ contemporary scientific methods (cf. Huff 1987), which has hindered to some extent the reanalysis of material remains of Sasanian date. The sheer size of the empire, stretching across the boundaries of many separate modern countries, has also done much to complicate detailed investigation. Prominent in this regard is the continued

limited accessibility of "core" territories to nonlocal archaeologists.

Despite these challenges, archaeological research has provided an unparalleled glimpse into many aspects of Sasanian imperial and domestic life that have often escaped notice in the literary record. These include the physical conditions of cities, agricultural intensification, variability in religious practice and ideology, and details of the governing imperial bureaucracy. Ongoing and new archaeological research in the "periphery," such as in Central Asia, Arabia, and the Caucasus, has shed light on the social and ecological complexities of life on the frontier. The main contribution of more than a century of archaeological research has been recognition of the material heterogeneity of the empire. This extends to a wide variety of objects such as ceramic vessels, seals, coins, and textiles. Indeed, as many historical assessments of the Sasanian world emphasize a high degree of centralized political authority that was undoubtedly present, archaeological research may be said to have revealed a dynamic dialogue between local and external influences.

Definition

The political history of the Sasanian Empire begins with Ardashir I (224–241 CE), a vassal of the Parthian king Artabanus IV (216–224 CE), who rose in rebellion in the region of Fars in southwestern Iran. Ardashir marched against the Parthian monarch and defeated his army in the Hormozgan plain, an event that symbolized the toppling of the Parthian dynasty that had stood for close to four centuries (see Daryaee 2009 for a detailed social and political history). The victory was at once commemorated on a large rock relief at near Firuzabad, in which he and his son Shapur are shown unhorsing their Parthian opponents. In another investiture scene at Naqsh-i Rostam, famous for its monumental Achaemenian tombs, Ardashir is shown mounted and trampling on Artabanus. In the same relief, he receives the symbol of legitimate royal power, the *kydaris*, from Ahura Mazda, the supreme deity of Zoroastrianism, who himself is trampling Angra Mainyu.

The tradition of commemorating major political events on large rock reliefs and transmitting royal ideologies through them is a defining aspect of imperial practice for the first 100 years of the empire's existence. After Ardashir, the monarchs Shapur I (241–271 CE), Bahram I (271–274 CE), Bahram II (274–292 CE), Narseh (293–301), and possibly Ardashir II (379–383 CE) all commissioned rock reliefs whose meaning, content, and composition have been widely discussed. The construction of cities also became an enduring tradition, beginning with Ardashir's creation of a circular city named Ardashir Xwarrah (or "the glory of Ardashir") in Fars. Newly founded cities acted as spaces where Sasanian elites could create distinct imperial, urban traditions while engaging with perceptions of their own past (Canepa 2010).

In addition to rock reliefs, the early empire is marked by a large number of native Middle Persian inscriptions, especially by Shapur I, the son of Ardashir I, most notable for his success in a series of conflicts with the Roman Empire. In his third campaign, the Roman Emperor Valerian was captured, and this event was enshrined in rock reliefs at Naqsh-i Rostam and Bishapur, in Fars. Shapur I recorded these events in an inscription at Naqsh-i Rostam known as the "ŠKZ," or the Shapur inscription on the Ka'ba-ye Zardosht, a monument whose initial function is still debated. The inscription in question has been a key focus of scholarship for assembling a view of social and elite relations seen through the eyes of the imperial court. In particular, the hereditary, patrilineal nature of the monarchical system is stressed, though with significant acknowledgement of the elites of the empire. The dynamic relationship between regional elites and the monarch had significant long-term repercussions for the stability of the Sasanian polity as there were frequent struggles and negotiations between these two groups over political decision-making – to the extent that some monarchs were deposed by elite collusion and some elite social and political power was curbed by monarchical action. Other important epigraphic sources

for this period include the Zoroastrian *mowbed* Kirdir's inscription at Naqsh-i Rostam and Narseh's (293–301 CE) inscription at Paikuli.

After the reign of Shapur II (309–379 CE), noticeable changes in imperial ideology are visible, especially through royal titles on coins. Yazdegerd I (399–420 CE) began to employ the title *ramshahr*, or "peace in dominion," perhaps to emphasize the end of recurrent military engagements with the Roman Empire. It is during the reign of Peroz (459–484 CE) that new large-scale constructions appear in the archaeological landscape. It is argued that the construction of massive defense systems in the northwest and northeast might have begun in this period due to conflicts with seminomadic peoples. Under Kavad (488–531 CE), adjustments to the imperial bureaucracy continued, as are visible in offices with new seals, changes in coinage, and military positions. For instance, the internal division of the Sasanian Empire initially seems to have been organized around provinces encircling a provincial capital, perhaps from the reign of Kavad, the empire seems to have been quadripartitioned with an elaborate political apparatus established to oversee the fiscal and political governance of these areas (Gyselen 2001).

By the mid-sixth century, military conflict with the Byzantine Empire flared, although defenses against different groups passing through the Caucasus, were sometimes maintained with economic assistance from the Byzantine state. Under Khosrow I (531–579 CE) and especially Khosrow II (590–628 CE), the empire reached its territorial zenith through a series of initially successful, but ultimately ineffective, military campaigns that led the Sasanians to dominate the Eastern Mediterranean and Egypt for over a decade in the early seventh century CE. Architectural evidence such as that supplied by the palace at Taq-i Kisra near Ctesiphon and the rock relief grotto in Taq-i Bostan marks this political ascendancy. The empire began its collapse under Yazdegerd III (632–651), who fled in the face of encroaching, victorious Arab armies until he was eventually murdered in Merv. Although the empire ended as an autonomous political entity, the imprint of its ideologically imbued material trappings reverberated for centuries in the region, above all in its agricultural technologies, architecture, art, coinage, and everyday goods.

Key Issues/Current Debates

Agricultural Intensification

Most of the available archaeological evidence collected over the past 100 years points to a substantive trend of agricultural intensification during the Sasanian period. In some areas it represents the apogee of premodern intensive land use. Physical evidence for the maximization of agricultural output is provided by irrigation canals, dams, and weirs. Differentiating early Sasanian (third to fourth century CE) from late Sasanian (fourth to seventh century CE) irrigation canals remains, however, a problem exacerbated by the frequent reuse of these structures well into the Islamic period. Nevertheless, massive canals, such as the Nahrawan canal that diverted water from the Tigris River, attest to the impact of Sasanian imperial initiatives on the landscape. Initial and influential research in the Diyala region locating its dense, crisscrossing canals has shown that during the late Sasanian period, almost all of the cultivable land on the Lower Diyala was exploited. Improved imaging technologies and resolution have permitted identification of the density of these irrigation networks. CORONA satellite imagery has revealed a complex network of feeder canals and rectangular fortified sites in the Mughan Steppe in Azarbaijan (Alizadeh & Ur 2007). Elsewhere in Mesopotamia, shuttle radar topography has further elucidated the complications that beset Sasanian-period engineers who had to enlarge existing canals and build new ones in a landscape that had been irrigated since the third millennium BCE (Hritz & Wilkinson 2006).

A sophisticated series of drop-mill towers positioned at regular intervals at the edge of a rocky piedmont in the Deh Luran plain in south-west Iran illustrates the technological changes that accompanied new production initiatives (Neely 2011). Nearby, a dam bridge across

the Karun river in Shushtar (Khuzestan), attributed to the early Sasanian period, was constructed to feed two major canal systems. Careful management of hydrological resources is evident at urban sites such as Gondeshapur and in military settings, where soldiers manning the Gorgan Wall maximized their ability to draw water from the Gorgan river in order to build canals for irrigation or to support construction projects. Settlement surveys in core political territories of the empire (discussed below) illustrate a marked quantitative increase of settlements during periods of Sasanian intervention, especially in the late Sasanian period. Pollen cores have provided direct evidence for vegetative transformation in the landscape with significant increases in the cultivation of *Vitis* (grape), *Olea* (olive), *Juglans* (walnut), and other economic species (Djamali et al. 2009). Archaeobotanical reports from Merv from late Sasanian levels also indicate the cultivation of cotton (*Gossypium* sp.), a key for trade in textiles. A late Sasanian burial repository found in Shahr-i Qumis reflects these changes in burial practices, as the bones of an individual were interred with an entire pomegranate, almonds, and patterned cotton textiles.

The degree to which this intensification of production was overseen by the Sasanian state or initiated by local communities has yet to be resolved. There are some indications that the Sasanian state directly oversaw and stimulated the intensification process. For instance, a clay bulla from Veh-Ardashir yields an inscription stating it to be "the king's canal of Valashabad. . .of Veh Ardashir," and another bulla of the late Sasanian period mentions a "chief of the cultivators." These objects hint at the involvement of state authorities in the construction of new irrigation structures and in wide-scale agricultural production.

Economic Intensification

To a large extent, the trend of agricultural intensification was part of a larger process of interregional economic intensification. The archaeological data for Sasanian economic intensification can be divided into two categories: coinage and durable media. The main proxy for identifying trade during this period is the geographic distribution of Sasanian objects, especially coins, far outside the limits of their constituent territories. Researchers in China have documented almost 2,000 (on some counts) Sasanian silver coins at sites throughout China, with western China (Dunhuang, Chang'an) prominent. The contexts in which these coins are found include coin hoards, burials, and even decoration on furniture (Li 2004). The distribution, the eastern origin of the mints, and the appearance of these coins beginning with Shapur II onward (c. 300–650 CE) point to the eastward economic networks that developed in the early Sasanian period and which became more established with time. The distribution of glass goods is also correlated with coinage both spatially and temporally – glass objects of Sasanian manufacture found at Chinese sites appear in fourth century contexts and are found in greater concentration thereafter. An indication of imperial concern for the glass trade is validated by chemical composition studies of glass from Veh-Ardashir in Mesopotamia which illustrate differing sand types utilized after the fourth century CE to increase the quality of the glass.

It is important to note that the Sasanians were probably not directly engaged in this easterly trade in most instances. Excavations at archaeological sites in Central Asia, aided by the discovery of documents known as the "ancient letters," have shown the importance of the Sogdians, an Iranian-speaking people of western Central Asia, as traders and trade intermediaries within these economic networks (de la Vassiere 2005). At Merv, a sixth- to seventh-century CE structure was found containing Bactrian, Sogdian, and Middle Persian ostraca, a testament to the heterogeneous multilingual and multiethnic trading world of Central Asia of which the Sogdians and Sasanians were a part. Nevertheless, there were also direct contacts with Persian merchants, especially in later periods. A bilingual Chinese–Middle Persian inscription in Chang'an, China commemorating the burial of a Sasanian elite represents the outcome of already long-standing contact.

Overland routes were complemented by sea trade that originated in the Persian Gulf.

Both ceramic and numismatic evidence attest to increased trade with South Asia, perhaps in direct competition with Roman trade emanating from the Red Sea. Ceramic vessels such as "torpedo jars" found in Pattanam in southern India, along with Roman and Sasanian coins, reveal a brisk exchange that began in the late fourth century and continued until the seventh (Tomber 2007). The analysis of bitumen-coated vessels from nearby Sri Lanka has been able to identify the source of the bitumen; vessels dating from the third to ninth century appear to have originated near Susa in south-west Iran. The circumscribed nature of this resource pool indicates probable imperial involvement or craft communities in long-distance trade ventures.

Toward the west, Sasanian coins have been found in Roman and Byzantine contexts, even in more "remote" areas such as the Southern Levant. A coin hoard found in Humayma in Jordan contains potentially Byzantine counterfeit and Sasanian coin types. Based on the mark of the official Susa mint, the excavators concluded that the individual(s) carrying these coins and jewelry probably originated outside the limits of the Byzantine Empire (and perhaps within the Sasanian Empire). Other evidence in the Southern Levant points both to the paucity of objects of Sasanian manufacture in the Byzantine world and also the late date at which they begin to appear. In general, trade with the Roman and Byzantine empires has been less visible and less discussed. Apart from literary references to specific trade points such as Nisibis after its incorporation into the empire by Shapur II in 364 CE, Roman coins found as far east as Merv, and Byzantine coins found distributed throughout China, undoubtedly show that the Sasanian world acted as an economic intermediary and that frequent nonimperial economic transactions between these two polities were not an irregular phenomenon.

Border Defense

A complex system of border defense, especially in the northern boundaries of the empire, was initiated in the latter part of the Sasanian period. The longest extension of these structures stretches in an arc from the west to the east of the Caspian Sea. Construction of these massive walls seems to have been due to pressure from both sedentary and seminomadic people to the north, as well as the economic and ideological ambitions of the Sasanian imperial elite in these areas. The Derbent Wall is a massive fortification complex that is 50 km in length and stretches from the western littoral of the Caspian Sea westward through the central mountain range ("Dag Bary") of Dagestan, Russia. In some places the fortress walls in the city of Derbent reach 18 m in height. Middle Persian inscriptions on the walls of the fortress have formed the main criterion for dating its construction, which range from the fifth to the seventh century CE. An earlier mud-brick wall immediately to the south in Northern Azarbaijan known as Ghilghilchay ("clay wall") has been recently identified, perhaps dating to the sixth century, and itself stretches 60 km in length from the Caspian to the Caucasian interior.

To the east of the Caspian Sea, archaeological research has confirmed the presence of a formidable wall which was thought to date to the Parthian period, if not before (reflected in its Persian name, Sadd-i Iskandar, or "Alexander's Barrier"). A nearly 200-km-long wall, around 2 m in width, stretches from the Caspian Sea to the foothills of the Elburz in the east (Rekavandi et al. 2008). Recent studies of the Gorgan Wall have revealed a microcosm of Sasanian military life on the frontier as a series of forts, almost 40 in number, span the entirety of the wall, alongside barracks that may have housed as many as 20,000 soldiers. Numerous brick kilns point to the way in which Sasanian soldiers used available resources, especially local hydrology, in site maintenance on the frontiers. Radiocarbon and OSL dating indicate construction took place between the fifth and sixth centuries CE, which corresponds, in part, to literary sources that link its construction to the Emperor Peroz's (459–84 CE) conflicts with the Hephthalites. Other fortified structures such as the fortress at Turang Tepe and a fortified farmstead at Geotchick Tepe argue for the importance of the protection of this frontier zone.

Non-frontier fortresses imply that the Sasanian state was highly involved in maintaining control in the interior as well as along its borders. Ardashir and Shapur constructed numerous fortifications, in order to secure strategic positions in political centers both before and after full independence from their Parthian overlords. Other sites with notable fortifications include the port city of Siraf, where a large Sasanian-era barracks was identified in the early 1970s. The capital city Ctesiphon was also well fortified with massive walls 10 m wide. Despite literary references to a wall built in the southwest corner of the empire meant to deter Arab tribes, no traces of such a constrution have yet been observed on the ground.

Urbanization

An explosion of urban and village construction occurred during the Sasanian period. The factors that led to this quantitative increase are still debated, but both ideological and environmental hypotheses are suggested. Settlement data from archaeological surveys have revealed how densely settled the empire was; it has been calculated that 75 % of the Lower Diyala in Mesopotamia was occupied by urban sites larger than 10 ha (Adams 1981). Yet this phenomenon seems to have been regionalized, as surveys in other areas, such as near Susa, show a contraction of the total area occupied by settlements in the Early Sasanian Period (Wenke 1975–6), while the Bushehr region near the Persian Gulf shows a marked density of Sasanian-period settlements.

Royal patronage of urban construction is visible in the names of many of the cities themselves. Veh-Andiyok-Shapur, later Gondeshapur, is named after Shapur I's successful capture of the Roman city of Antioch, and excavations have revealed that its foundations are not preceded by prior settlement. Numerous new large cities dotted the landscape, above all in the region of Fars and to some extent in southern Mesopotamia. Cities such as Ctesiphon were expanded by the Sasanians, and in the case of Veh-Ardashir, new settlements were constructed adjacent to cities established in the preceding Seleucid and Parthian periods. Seals and bullae also reflect administrative changes that came with new urban priorities, such as specific offices for cities and territories like the *amargar* ("accountant"), who seemed to oversee financial transactions in them.

Less intensively studied have been the ramifications of life within and outside urban spaces in this period (Simpson 2008). Excavations in the 1960s and 1970s in Ctesiphon yielded a complex system of alleys, domestic structures, and activity areas. Ovens and querns are present in some rooms, and one excavated quarter of Ctesiphon yielded evidence of concentrated artistic production. Many alleyways were covered by a combination of clay and bitumen, making drainage of seasonal rainfall difficult. Using comparative evidence from Merv, it has been argued that this may have caused significant urban pollution in the form of runoff. In Merv, no door hinges were found (unlike in Ctesiphon), implying that the denizens of Merv during the Sasanian period covered their doorways with soft material. The material conditions of these cities should be contrasted with royal centers such as Bishapur, Firuzabad, and Istakhr, where evidence for domestic, nonelite life is less pronounced. Even in Fars, a considerable degree of heterogeneity is encountered in elite residential structures, such as can be seen in the mid-fourth-century-CE manor house at Hajiabad, where elaborate idiosyncratic stucco decorations point to negotiations of the ruling elite with individual expression (Azarnoush 1994).

The Impact of the Sasanian State on the "Periphery"

Identifying the material impact of the Sasanian state on areas beyond its nominal core, namely, Fars and Khuzestan, continues to be an area of debate for archaeologists and historians. In northern Mesopotamia, despite the presence of a large number of ceramic vessels (themselves diverse in style and decoration) from a range of archaeological sites, architectural evidence for an imperial presence is still lacking. In southern Iraq, excavations at Hira in the early 1930s revealed the center of the important sixth- and seventh-century CE client kingdom of the Lakhmids,

who were formally incorporated into the empire by Khosrow II. Yet the excavators were unable to locate any diagnostically Sasanian objects or stratigraphic levels and tentatively associated the earliest Sasanian intervention to the latter half of the empire's history (sixth to seventh century). This is compounded by the continued lack of a formal ceramic typology from the "core" Sasanian territories and regional affinities in ceramic styles. The debate concerning the timing and intensity of the Sasanian presence in Arabia (Eastern Saudi Arabia, Bahrain, and the UAE) continues, with scholars arguing that despite Sasanian epigraphic claims to early control over this area, archaeological evidence is lacking.

In the north, aside from the impressive fortifications of Derbent with unequivocal attachment to the Sasanian state, evidence for changes in daily life is more difficult to detect. A decade of excavation at the site of Dvin, Armenia, has yielded a large number of Sasanian artifacts, many of them dating to the *Marzpanate* period of Shapur II. One church that can be dated by excavations to the late fourth/early fifth century indicates that the local Christian identity was never wholly supplanted despite frequent Sasanian attempts to persuade the population of Armenia of this date to "return to" some form of Zoroastrian practice.

The eastern frontier of the Sasanian Empire has yielded evidence for the presence of imperial officials and their active involvement in daily life in these territories. The decipherment of Bactrian and the discovery of a trove of "Bactrian letters" have provided insight into the administration of an area where excavations have not been able to provide extensive archaeological data. An unambiguous reference to a Sasanian official in these letters dates to the late fourth century, where a nonofficial refers to a "satrap," or governor of Bactria, which is in agreement with a bulla bearing the title of a "satrap" of Balkh in Bactrian and Middle Persian. Another letter refers to a "fortress commander," emphasizing the commercial and military interventions brought about by Sasanian involvement. A recently discovered monumental rock carving at Rag-i Bibi in Afghanistan, Sasanian in style but with local Kushan themes and fauna (such as the royal hunt of a rhinoceros), demonstrates the diverse potentials for imperial and local interaction.

Religious Pluralities and Identities

Throughout the history of the Sasanian Empire, diversity between and within religions was markedly pronounced. Zoroastrianism was not alone, however, Christianity, Manichaeism, Mazdakism, Mandaeanism, Buddhism, and Judaism all had adherents at different times and places within areas of Sasanian political control. A host of other undocumented local traditions, beliefs, and practices probably existed alongside these traditions as well. Archaeological evidence for the development, presence, and variability in religious practice is seen in architecture, epigraphic remains, and domestic objects. The remains of fire temples, places of worship for Zoroastrian adherents, are found throughout the entirety of the Sasanian world. Architectural changes seem correlated to larger political changes, such as the *chahar taq*, or four-arch construction, which only appears during the Sasanian period. At Kuh-i Kwaja in Seistan, Sasanian builders added a *chahar taq* to the temple not long after their political ascendancy.

In addition to large Zoroastrian religious centers such as that at Takht-i Suleiman in Azarbaijan and a more modest temple at Turang Tepe near the Gorgan Wall, recently discovered fire temples contribute additional knowledge of Sasanian Zoroastrian practices. At Mele Hairam in southwest Turkmenistan, a fire temple with Sasanian occupation levels contains a fire altar whose enclosing room displays the floor plan of a *chahar taq* (Kaim 2004). The site of Bandiyan in Khorasan also possesses a fire altar housed inside a cross-shaped room (Rahbar 2008). Elaborate stucco reliefs depicting elite individuals are accompanied by inscriptions in Middle Persian. The extent to which the site of Bandiyan is a religious complex rather than a manor with religious edifices attached is still debated. The site, according to the excavators, was not sponsored by the ruling imperial authorities but instead looked to local architectural styles. The debate reflects a more generalized discussion

concerning the precise function of reticular rooms in particular temples and whether fire altars can be connected to Zoroastrian rituals known from literary texts.

Royal patronage of many of these structures is nevertheless clear. Shapur I records his dedication to the maintenance of official fires in his ŠKZ inscription. Fire altars and their attendees are also prominently depicted on the obverse of Sasanian coins. Bullae record imperial offices such as the *mowbed mowbedan* ("priest of priests"), who seem to be standard functionaries in the provinces. Officials called *driyošan jadaggov ud dadvar*, or "judges and protectors of the poor," have titles directly derived from the *Avesta*, the key religious text of the Zoroastrian community. These artifacts illustrate the entanglement of administration, ideology, and ethnoreligious rule throughout the Sasanian period.

Epigraphic information also shows that early Sasanian officials already had knowledge of some of the beliefs and practices of non-Zoroastrian adherents. The third-century inscription of Kirdir, the "court priest," beneath the ŠKZ, describes how he suppressed "Jews, Buddhists, Hindus, Nazarenes, Christians, Mandaeans, and Manichaeans." It is an explicit indication of the presence, or the perception of a presence, of these groups within the empire. An inscription written in Roman Dura Europos by a scribe of the invading Sasanian army records how he recognized in one of the synagogue paintings the "god of god of the Jews." Numerous personal seals of individuals with either traditionally Jewish names written in Hebrew, or with scenes from the Hebrew Bible, have been found at sites in Mesopotamia. Aramaic "incantation bowls" also found at a number of sites in Mesopotamia, decorated on the interior and lined with text written in Aramaic, Mandaic, Syriac, and Middle Persian, request physical outcomes in the secular world using a wide array of religious language (Morony 2007).

The existence of a Christian community in the Sasanian world increasingly became an ethnopolitical issue, to the extent that conflict with the Roman and Byzantine empires later involved the role of religion after the conversion of the Emperor Constantine I. Nestorian churches have been found both within Sasanian territory and within its sphere of influence, such as in Northern Iraq (Khirbet Deir Situn) and in the capital, Ctesiphon. Some seals display Christian names or portray Christian themes. In Merv a coin displays an image of the Emperor Yazdegerd I flanked by a cross and crescent with flying ribbons (Herrmann & Kurbansakhatov 1995). This underscores the fluid nature of royal involvement with religious communities and their self-representation. This became especially important as native Persians began to convert to Christianity – a Psalter written in Middle Persian found in the Turpan oasis in China is indicative not only of the routes through which religious communication flourished but also of a burgeoning need to communicate religious texts in local languages.

Future Directions

Archaeological research has enriched the perception of the Sasanian world and complicated attempts to portray it as a homogeneous whole. Many archaeologists have sensed a missed opportunity in terms of careful, scientific excavation that incorporates the full panoply of modern archaeological methods. The addition of environmental archaeological analysis, such as zooarchaeology and paleoethnobotany, in recent excavations has revealed important patterns in production and consumption during these periods of economic intensification. This coincides with a need for more excavation of domestic structures and residential sites, of which very little is known outside of scant remarks in literary sources. A strong theoretical framework for these inquiries could help generate hypotheses or provide the lenses through which more could be explored concerning gender, agency, and identity, especially the ways in which individuals or communities in this period negotiated the impact of Sasanian imperial interventions.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Dura-Europos, Archaeology of
- ▶ Economy, Roman
- ▶ Empire in the Ancient Near East, Archaeology of
- ▶ Excavation Methods in Archaeology
- ▶ Households in the Ancient Near East, Archaeology of
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Surface Survey: Method and Strategies

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Scandinavia and the Baltic Sea Region: Medieval Archaeology

Shane McLeod
The University of Western Australia,
Centre for Medieval and Early Modern Studies,
Perth, WA, Australia

Introduction

Scandinavia and the Baltic experienced significant change during the medieval period, including its perception by other European peoples. At the beginning of the period, it was a region largely unknown to the literate societies

in the west. By the end of the medieval era, it was a known entity that had been largely integrated into the west European system both culturally and economically. This change occurred during three major periods of trade, cultural exchange, and armed conflict: the so-called Viking Age, which was centered in Scandinavia but also impacted upon other areas of the Baltic, the Northern Crusades, and the formation of the Hanseatic League.

Definition

The Middle Ages is a particularly problematic term for Scandinavia and the Baltic as both its beginning and end are traditionally dated to events that occurred beyond this region. If the medieval period is considered to have started when the Western Roman Empire collapsed during the fifth century, then choosing a starting date for the Middle Ages in Scandinavia and the Baltic is highly problematic. Although items from the Empire reached northern Europe and occasionally men from Scandinavia and the Baltic served Rome as mercenaries, the region was never part of the Empire so there is no convenient starting date for the Middle Ages. However, the fifth-century migration period, during which groups described in classical sources as *gens* moved south, is often used. Many of these groups, including the Goths, Jutes, Angles, and Burgundians, traced their roots to Scandinavia (Hedeager 1992). The problem is compounded in the southern Baltic where the material culture of the Slavic people is trans-regional, making it difficult to break the early medieval era into periods (Urbańczyk 2008). Attempts at periodization are complicated further by the convention in Scandinavian scholarship for the Middle Ages to start at the end of the Viking Age, at around 1000 CE, when the kingdoms of Denmark, Norway, and Sweden (began to be) unified, Christianity made serious in-roads, and Scandinavia began to have its own, non-runic, written history. The end of the Middle Ages is equally problematic, as conventionally it ends with the start of the Renaissance, a cultural movement which arguably did not directly influence all areas of Scandinavia and the Baltic. For the sake of convenience, the Middle Ages will be taken as ending in c. 1500. Between these two end points, the medieval period up to c.1000 in Scandinavia and Poland and as late as 1200 elsewhere in the Baltic is divided into various sub pre- and protohistoric periods which are often named after developments further west. These terms often vary according to the country and include the Merovinger/Merovingian Period, Vendel Period, Iron Age, Germanic Iron Age, Late Roman Iron Age, Middle Iron Age, and Viking Age. As noted above, the chronologies of these sub-periods are not always well defined, but there is general agreement for the start of the Viking Age. Its traditional historical start is the Norse raid on Lindisfarne, England, in 793, although there is also a possible raid in Dorset, England, recorded in 787. Art historians concur, with the early Viking Age having a native animal ornament style (style E) that appeared from the late eighth century, at roughly the same time as the first raids. Individual sites, particularly those of the earlier period, are often difficult to date precisely unless dendrochronology is available, although the importation of such items as glass beakers, pottery, and especially coins do help in establishing a terminus post quem.

For this entry, Scandinavia comprises the three current day nations of Denmark, Norway, and Sweden. The Baltic Sea ends at the Kattegat (the waterway between Jutland and Sweden) and, in addition to Denmark and Sweden, has shores on the current day nations of Finland, Russia, Estonia, Latvia, Lithuania, Poland, and Germany. Discussion of Russia is generally excluded from this entry and can be found elsewhere in this volume. In terms of cultural groups, "Norse" is used for those speaking Old Norse and excludes the Sámi living across northern Norway and Sweden, as well as northern Finland and the Kola Peninsula in Russia. Outside of Scandinavia, cultural and/or genetic groups are often difficult to locate, and there is uncertainty over the reliability of the tribal names provided by outsiders such as the "Bavarian Geographer" and Tacitus. Finno-Ugric speaking peoples

occupied the south of Finland. Baltic Russia came to be controlled by the Rus, a mixed group of Slavs and Norse. Elsewhere along the Baltic rim, there appears to have been populations of Slavs, Finno-Ugrians, and Balts, and the populations moved and mixed over time.

Historical Background

Written sources provide, at best, tantalizing glimpses into those peoples occupying Scandinavia and the Baltic during the early medieval period. Prior to the Viking Age (c. 780–1000) our knowledge is based almost entirely on material evidence, supplemented by the reports of foreigners, later legendary material including the poem *Beowulf* and post-1100 sagas, and the few characteristically short runic (the alphabet used in Scandinavia) inscriptions (Fig. 1). There were no written sources produced by those living elsewhere around the Baltic Sea, nor by the Sámi living in the north of Scandinavia and Finland. Although the Viking Age is characterized as a time in which speakers of Old Norse ventured from Scandinavia in large numbers and had an impact on many other parts of Europe, the majority of our written information about them comes from non-Scandinavian sources. For those living elsewhere around the Baltic rim, there is hardly any written information available at all, perhaps in part as those living there were not involved in activities away from home that attracted comment. It has been noted that the first consistent and relatively comprehensive account of the peoples living in Scandinavia and around the Baltic did not occur until the 1070s with the work of Adam of Bremen (Blomkvist 2004), which was partly based on information obtained during a stay at the court of the Danish king Svend Estridson. Before this, the most detailed accounts were the travel narratives of the Norwegian Ohthere and Wulfstan, possibly an Anglo-Saxon, recorded in southern England in the late ninth century. They report on sailing journeys that stretched from the White Sea (Russia), around the coast of Norway and into the southern Baltic via Hedeby to Truso (Poland). These presumably first-hand accounts provide information on sailing routes, trading places, and the location of different peoples. Recent multidisciplinary publications have done much to enhance our understanding of these voyages, including the archaeology of the regions in c. 900 (Bately & Englert 2007; Englert & Trakadas 2009). The travel reports make plain the ease of water travel within the Baltic and around the coast of Scandinavia during the Viking Age and the subsequent interactions between different peoples.

This dearth of written material for the first half of the medieval period makes archaeology essential to the study of virtually all aspects of the region, which has resulted in a great deal of inter- and multidisciplinary work. Fortunately, the number of sites available has been steadily increasing in recent decades. Important sites of the pre- and Viking Age period include furnished burials, both inhumations and cremation, such as those at Jelling, Hedeby/Haithabu (Denmark), Gamla Uppsala, Vendel, Valsgärde (Sweden), Oseberg, Gokstad, Borre, Tune (Norway), Truso (Poland), Ėgliškiai (Lithuania), and Grobiņa (Latvia); trading sites and central places, often including a cult site, such as Lundeborg/Gudme, Hedeby, Ribe, Aarhus (Denmark), Helgö, Birka, Uppåkra (Sweden), Kaupang (Norway), Grobiņa (Latvia), Reric, Usedom (Germany), Truso, Wolin, Gdańsk (Poland), and Palanga and Žardė (Lithuania); the chieftains farms at Borg in Lofoten (Norway); and fortifications at Trelleborg, Fyrkat (Denmark), and Daugmale (Latvia). Materials recovered from these sites includes weapons, jewelry, coins, and ceramics, both of local manufacture and imports, and buildings, defenses, particularly the 30-km-long earthwork Danevirke across the Jutland that was built in three phases between 737 and 968, sleds, wagons, and items associated with craft production. The site of Borg in Lofoten is an important reminder of how well connected Scandinavia and the Baltic were to other parts of Europe during this pre-/protohistoric period. Although Borg is the most northerly known Norse settlement in Scandinavia and the furthest north that subsistence farming was possible, the finds included

Scandinavia and the Baltic Sea Region: Medieval Archaeology, Fig. 1 Scandinavia and the Baltic in the medieval period up to 1000 CE (Map drawn by Aurore McLeod)

a number of prestige objects from the sixth to tenth centuries from southern Scandinavia, England, the Celtic world, and western and eastern Europe (Näsman & Roesdahl 2003). As one would expect, underwater archaeology makes a significant contribution to our understanding, and a number of harbors, jetties, and defensive structures have been uncovered throughout Scandinavia and the Baltic. Of particular note is the Viking Ship Museum in Roskilde, Denmark, which includes local discoveries of Viking Age warships, cargo ships, and a fishing vessel; reconstructed medieval ships from throughout the Baltic Sea; and recently recovered vessels being preserved at the Archaeological Workshop.

The contact between those living in Scandinavia and those living across the Baltic Sea reported by the travel account of Wulfstan is attested in the archaeological record. Material evidence for Norse involvement in the southern Baltic stretches back to at least 650 and the establishment of a Norse population in Grobiņa (Valk 2009).

During the Viking Age, Norse involvement elsewhere along the Baltic rim increased dramatically, although in many instances those often referred to as "Rus" or "Varangians" in written sources were simply passing through to reach the eastern trade routes to the Black and Caspian Seas. The routes connected Scandinavia, especially Gotland and Birka in Sweden, with Constantinople and Arabia, often via Staraya Ladoga in Russia. The most tangible evidence of these trade routes is the large numbers of silver dirhams (Arabic coins) found around the Baltic, both in hoards and as single finds, with a concentration of coins on Gotland and mainland Sweden. One anomaly is Lithuania, which has little evidence of Norse trade during the Viking Age (Valk 2009). Some finds, in particular burials with close affinities to some found in Scandinavia, suggest that there were resident communities of Norse in many of the trading centers in the south of the Baltic, such as Truso and Grobiņa (Jagodziński 2009), while Norse mercenaries may have been living in Poland in the late tenth century (Urbańczyk 2008). The island of Åland and possibly the west coasts of Finland and Estonia had a large number of permanent immigrants from Sweden from at least the Viking Age, and these areas were culturally Norse to varying degrees (Markus 2004; Edgren 2009). Meanwhile, there is written and archaeological evidence, in the form of burials, for a resident Slavic population in Hedeby, and it has been noted that there was a "Widespread maritime Baltic Sea culture linked by the water and similar subsistence strategies and lifestyles" (Markus 2004). There are written accounts of intermarriage between royal families in Scandinavia and elsewhere around the Baltic, and such relations are likely to have occurred at other levels of society. Relations between the different communities settled in trade centers appear to have been cordial, but there are instances of Norse attacks on Baltic trade centers. The troubled times on both sides of the Baltic are attested by many initially unfortified trading centers either being fortified or abandoned for fortified ones during the ninth and tenth centuries, such as Wolin, Usedom, and Hedeby (Jöns 2009). Similarly, Viking Age and post-Viking Age settlements in Estonia were inland, probably due to the dangers presented by the Norse sailing along the coast (Valk 2009).

The period immediately following the Viking Age was in many respects a continuation from the earlier period: Norse fleets dominated the Baltic, allowing them to control trade and attack trade centers. The most dramatic example of the latter is probably the attack by the Norwegian King Magnus the Good against Wolin in 1043 which indirectly, in conjunction with the degradation of the local environment, led to the demise of what had probably been the largest trade center in the Baltic Sea (Broich 2001). But in other respects, it was a period characterized by religious change and state formation, although both of these also had their roots in the Viking Age, especially in Norse Scandinavia. Following centuries of influence, evidenced by some Christian objects being found in burials, and some unsuccessful missionary attempts, Christianity had a significant impact from the late tenth century, beginning in the western Baltic and spreading east. The Danish king Harald Bluetooth converted in c. 965 and convinced or forced his people to follow, as he proudly proclaims on his runestone at Jelling, and the Polish king Mieszko I was baptized in c. 966, although pagan practices among the populace continued for some time. Norway converted in the early eleventh century, while Sweden had a Christian king at the same time, but Christianity and Paganism probably coexisted for at least another century. Poland was the only area along the south Baltic to convert to Christianity without a foreign invasion. The archaeological evidence for conversion and Christianization is most readily seen in changing burial customs and the building of churches. The conversion of Scandinavia also had an impact on the non-Christian parts of the Baltic as Norse kings began to focus their attention on the Baltic instead of the west. For example, the Danish king Svend Estridson involved himself in the Lutici (Polabian Slavs in Baltic Germany) civil war in 1057, and Swedes conquered much of Finland during the twelfth and thirteenth century. Yet at the same time,

some Slavic people appear to have migrated to Denmark, as suggested by the appearance of Slavic pottery from the eleventh century and some Slavic place-names (Naum 2012).

The conversion of those living in Scandinavia and the Baltic (predominantly) by the Latin Church has been termed "Europeanization" and involved the imposition of the Catholic World system in the region (Blomkvist 2004). Material evidence for the various pre-Christian religious beliefs is best attested through burials and pendants, including Thor's hammers for the Norse, but temples/cult sites and statues of gods are also known, including at Jaromarsburg on the Baltic island of Rügen (Germany) and on the west bank of Lake Tissø (Denmark) and a possible open-air sacrificial site at Frösö (Sweden). Following largely unsuccessful missionary efforts to covert Balts and Slavs, crusades were launched by the Teutonic Order from Germany during the thirteenth century against various pagan peoples around the Baltic including the Slavs of Prussia and the Lithuanians, with the latter crusade being particularly drawn out and bloody and ultimately unsuccessful. The crusaders also came into conflict with Christian Poland. Earlier, Danes, Germans, and Poles had been involved in the Wendish Crusade against the Plobian Slavs in 1147, and Germans and Danes participated in the Livonian (modern-day Latvia and Estonia) Crusade which began in 1198. The crusades were often accompanied by a colonization effort, particularly in Prussia where the Teutonic Order created around 100 cities and 1,400 villages, resulting in a great amount of material culture (Ekdahl 2005). These foreign invasions effectively made indigenous state formation like that experienced in Scandinavia and Poland (intermittently) all but impossible, although Lithuania managed to survive intact and actually expanded during the crusade (Blomkvist 2004). Important archaeological sites include crusader castles at Karksi, Viljandi (Estonia), Grudziądz and Malbork/Marienburg (Poland), and Pöide church (Estonia). A new development has been an investigation of the ecological impact of these castles and how the crusaders and those who followed transformed the surrounding landscapes.

A major development as part of the Europeanization process was the establishment of the Hanseatic League, a trade network centered on Lübeck (Baltic Germany), by German merchants collaborating with the missionary effort (Blomkvist 2004). The league was involved in armed conflict with trade rivals. This led to the domination of the Baltic trade by German merchants from the thirteenth century to the end of the medieval period and also saw German migrants settling in cities along the east Baltic coast. Material evidence for the Hanseatic League consists of surviving gabled architecture in member cities such as Lübeck, Riga (Latvia), and Reval (present-day Tallinn in Estonia) and shipwrecks of Cogs, a distinctive type of ship only found in areas controlled by the League or under its influence (Smith 2010).

From the period around 1000, an increase in trade led to the formation of new trade centers (Fig. 2), while some earlier Scandinavian centers, including Hedeby, Birka, Uppåkra, and Kaupang, were abandoned and were effectively replaced by the new nearby towns of Schleswig, Sigtuna, Lund, and possibly Tønsberg, respectively. Other important new towns, or those that grew from humbler settlements, post-1000 not mentioned above include Oslo, Bergen, Trondheim (Norway), Stockholm, Visby (Sweden), Copenhagen (Denmark), Kiel, Stralow/Stralsund, Rostock (Germany), Memel/Klaipēda (Lithuania), Turku (Finland), Ventspils (Latvia), Königsberg/Kaliningrad, and Beryozovskoye/Primorsk (Russia). As all of these cities still exist, the opportunity for extensive excavation is necessarily limited.

Key Issues/Current Debates

Ethnicity and the associated territorial identification is a particular problem, and classic methods of identifying territory in terms of material culture are often difficult to apply. Of course, this method itself is a continuing source of debate among archaeologists (Jones 1997). In the southern Baltic, the material culture of the Slavic people in the early medieval period was

Scandinavia and the Baltic Sea Region: Medieval Archaeology, Fig. 2 Scandinavia and the Baltic: new foundations after c. 1000 CE (Map drawn by Aurore McLeod)

trans-regional, making it difficult to break the early medieval era into periods, and it has been suggested that many archaeologists use the term "tribal" uncritically (Urbańczyk 2008). In Scandinavia, there are often significant regional differences in such things as the use of runestones and other aspects of material culture, and in some regions both cremation and inhumation burials were occurring at the same time, suggesting different regional identities if not ethnicities (Svanberg 2003a; Sindbæk 2008). Yet at the same time, there appears to have been a pan-Scandinavian use of material culture among the Norse elite and an acknowledgement of supra-regional identities (Svanberg 2003b; Sindbæk 2008).

A key barrier to our understanding of Scandinavia and the Baltic during the medieval

period is that many of the excavations are in the form of rescue archaeology, and there are large areas with little economic development that remain largely unexcavated. Other finds that may occur are those made by metal detectorists, although the legal requirements differ between the countries. Metal-detecting is effectively banned in Sweden, legally difficult in Denmark and Norway, and a license is required in Poland and Germany. Elsewhere in the Baltic, metal-detecting is easier, leading to enthusiasts from elsewhere visiting those regions. Along with other issues involving metal-detecting, such as a loss of context and find location, this raises the issue of items not being reported and ending up on the black market. As a maritime region, the lack of excavations is compounded by the difficulties involved in locating new underwater sites. A powerful reminder of the gaps in our knowledge is the failure thus far to locate with certainty the trading center of Vineta/Wineta that is thought to have been on the Baltic coast in either Germany or Poland. The descriptions of the port in medieval written sources suggest that it may have been the largest urban center in the Baltic, if not Europe, in c. 1000.

Future Directions

The issue of personal and group identity has been mentioned above, but throughout the medieval period in Scandinavia and the Baltic, it must also be considered in light of the material and written evidence for migration, both between and within Scandinavia and the Baltic, and from further afield, especially of German merchants and Crusaders. How these peoples interacted and what new identities may have been created is a fruitful area for future research. So too are the interactions between the Sámi and their neighbors in Scandinavia, Finland, and Russia. The use of migration theory, which suggests such things as motivations for migration, information networks, and duration, is also likely to lead to new avenues of research.

A field that is likely to revolutionize our understanding of migrant populations at different times is that of genetics. Previously, there have been difficulties in obtaining uncontaminated samples from ancient skeletons, leading to samples from modern-day populations being used and scholars projecting back. However, it now appears that usable genetic samples from ancient skeletons can be obtained (Töpf et al. 2006). Such samples could be used in conjunction with stable strontium and oxygen isotope analysis from ancient teeth (which allows the location/s of a person during childhood to be determined) and the associated material finds, to provide a more detailed understanding of migrant populations and the creation of group and individual identity. The initial challenge will be to obtain a quantifiable sample of ancient skeletons from new excavations.

Significant improvements in our understanding of the eastern Baltic have occurred since the fragmentation of the Soviet Union, which has allowed scholars in the former Soviet states to investigate their past without political "supervision." The political changes have also facilitated the exchange of research and ideas with colleagues from other countries. This is likely to continue as cultural and linguistic barriers are broken down (Ekdahl 2005). An example of these new possibilities is the Institute of Baltic Sea Region History and Archaeology which has existed since 2003 and is based at Klaipēda University in Lithuania. Collaborators include scholars and institutions from Lithuania, Poland, Germany, Sweden, Russia, Latvia, and Denmark.

Cross-References

- ▶ Burial Mound Dissection in Sweden
- ▶ Cremation in Archaeological Contexts
- ▶ Dating Methods in Historical Archaeology
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ DNA Interpretation Constraints in Archaeology

- ▶ Early Regional Centers: Evolution and Organization
- ▶ Ethnic Identity and Archaeology
- ▶ Europe Incastellated: Medieval Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Hanse Archaeology
- ▶ Islamic and Crusader Archaeologies
- ▶ Medieval Archaeology
- ▶ Medieval Russia (Rus'), Archaeology of
- ▶ Medieval Urbanism
- ▶ Metal Detecting in Archaeology
- ▶ Scandinavia: Field Methods
- ▶ Scandinavia/Northern Europe: Historical Archaeology
- ▶ Ship Archaeology

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Scandinavia/Northern Europe: Historical Archaeology

Vesa-Pekka Herva
University of Helsinki, Helsinki, Finland

Introduction

The regional term Scandinavia/Northern Europe can be defined in different ways but is used here to refer to the present-day Nordic countries which include the Scandinavian states of Denmark, Norway, and Sweden, along with Iceland and Finland. The Faroe Islands and Greenland are autonomous parts of the Danish realm, whereas the Åland Islands in the Baltic Sea comprise an autonomous province of Finland.

The beginning of the historical period in the Nordic world is conventionally set around the turn of the second millennium CE. However, the number of Scandinavian written documents is rather limited especially before the fourteenth century, and many regions – as well as many aspects of culture and society – are poorly known from documentary sources well into the late medieval and even postmedieval period. The famous medieval sagas of Iceland represent an early development of historical narrative in the Nordic world.

The transition to the historical period in the Nordic world was associated with Christianization and the formation of the Scandinavian kingdoms of Denmark, Norway, and Sweden. Southern parts of Scandinavia became urbanized and integrated into wider European economic, social, and cultural networks by the fourteenth century, whereas traditional ways of life and thought persisted in more peripheral regions. While Denmark was the dominant Scandinavian power especially in the medieval period, Sweden established itself as a great power in the seventeenth century. Sweden acquired new provinces in addition to its old province of Finland and came to dominate the Baltic Sea region after its successful intervention in the Thirty Years' War (1618–1648), but the Swedish empire collapsed at the beginning of the eighteenth century.

Archaeological research into the historical period Nordic world began in the nineteenth century, and large-scale (rescue) excavations have been conducted since the mid-twentieth century, especially in association with urban redevelopment in historic towns. While the initial interest in churches, palaces, and other high-status or special sites continues, the scope of research has broadened to include all kinds of sites from medieval hamlets to modern ruins, and research topics and approaches have similarly diversified. Traditional descriptive and cultural-historical approaches are still in evidence, but theoretical perspectives have been combined with empirical research increasingly since the 1990s.

Definition

Historical archaeology can be defined in several slightly different ways. In the most general sense, historical archaeology refers to the archaeological study of the historical period which began around CE 1000 in Scandinavia and slightly later in Finland. Historical archaeology can also be understood in methodological terms as a form of archaeology which employs literary and documentary sources (e.g., written narratives, tax records, probate inventories, maps) together with archaeological data. Thus conceived, Nordic historical archaeology includes also the study of Iron Age societies with the help of later documentary sources. The term historical archaeology may also be associated, due to US influence, with the global archaeology of the post-Columbian world, though such usage is not common in the Nordic countries.

Rather than a unified field of study, historical archaeology in the Nordic countries is divided into several chronological and thematic subfields. As elsewhere in Europe, the study of the medieval period has dominated historical archaeology, whereas postmedieval archaeology is a somewhat less established field, albeit of growing interest. On the other hand, the conventional chronological boundaries between the Iron Age and Middle Ages and the medieval and early modern period are also being increasingly ignored in current research.

Thematic specialisms are plentiful in Nordic historical archaeology and include, for example, urban, rural, and maritime archaeology as well as church, industrial, and conflict archaeology. General texts on historical archaeology in the Nordic countries are not available, which in part probably reflects the compartmentalized or dispersed character of the field. Thematic surveys of narrower topics, such as urban archaeology, have been published, but those also vary in scope and geographical and chronological coverage. Although studies in Nordic historical archaeology have tended to have a regional focus and/or concentrate on particular (types of) sites or classes of material culture, broader perspectives and theoretically informed approaches have been increasingly emerging over the last two or so decades.

While medieval sites are considered protected heritage in the Nordic countries, the heritage status of postmedieval sites is more problematic and subject to discussion and debate. Teaching is given and research conducted in historical archaeology at archaeology departments around the Nordic countries. Additionally, Lund University in Sweden has a chair in medieval archaeology and Aarhus University in Denmark a section for medieval and Renaissance archaeology. There is, at present, little unity in Nordic historical archaeology with regard to research topics or the methodologies and theoretical frameworks employed.

Key Issues and Current Debates

Three broad themes are considered below which illuminate various aspects of historical archaeology in the Nordic countries. A brief survey is necessarily selective and a number of other topics could also be considered central to Nordic historical archaeology. For example, Christianization and the archaeology of churches and other ecclesiastical sites have been of much interest and caused debate for over a century. Maritime archaeology with its many dimensions, from the excavation of shipwrecks to the study of coastal landscapes, could similarly be identified as a key issue, although it is referred to only in passing below.

Urban Archaeology

Urban archaeology is one of the main fields of historical archaeology in the Nordic countries. The interest in urban sites reflects, first, the significance of towns in large-scale transformations of Nordic societies from the early medieval to the industrial period, that is, the Europeanization and modernization of the Nordic world. Second, urban sites have been subject to extensive fieldwork due to urban redevelopment since mid-twentieth century, which has produced rich and large assemblages of archaeological data. Important excavations have been conducted in,

for example, Lund in Sweden, Trondheim in Norway, and Turku (Åbo) in Finland.

There were a few urban-like central places in Scandinavia during the Viking Age, but urbanization really began with state formation early in the second millennium CE. There were some 175 towns in the Nordic world in the Middle Ages, concentrated mainly in Denmark and southern Sweden. There were important towns also in Norway, a few in the Swedish province of Finland, and none in Iceland. All medieval towns were located in southern parts of Scandinavia, that is, south of the Trondheim-Gävle-Ulvila (Ulfsby) line (see further, e.g., Andrén 1989).

Archaeological interest has traditionally focused on earlier phases of towns, and the research has sought, for example, to reconstruct changes in urban space in relation to broader economic, political, and other historical developments. In addition to conventional cultural-historical approaches, theoretically aware interpretive approaches to built environments have been adopted since the 1990s especially in Sweden but also in other Nordic countries (e.g., see various papers in Ersgård et al. 1992; Andersson et al. 1997; Immonen et al. 2007). Such studies have often focused on social and power relations and how they were expressed in urban or other built environments. For example, the research on the extensively excavated Archbishop's Palace in Trondheim, Norway, has provided insights into the relationship between monumental architecture and power from the late medieval period to the Reformation. The research has explored how changes in the organization and structure of the palace, and craft production within it, were dynamically linked to historical processes and how the architecture of the palace mediated broader social and cultural transformations in the turbulent times of the medieval-early modern transition (Saunders 2002).

Hanseatic trade and German influence on Scandinavia have attracted much interest in Nordic medieval archaeology. German merchants controlled trade in the Baltic Sea and arguably had a major impact on the development of Nordic urban culture (see, e.g., Gaimster 2005). The intensification of trade and German influence is in evidence not only in towns but also in more peripheral regions beyond the urban zone, as manifested in, for example, increased coin finds and emergence of market places in the northernmost coastal region of the Baltic Sea.

Early modern towns are also being archaeologically studied, especially in Sweden and Finland. The seventeenth century was a time of urban development in the kingdom of Sweden. A number of new towns were founded by the Crown in previously nonurban regions, and old towns were reorganized in grid plan, following Renaissance ideals of urban planning. Research has been done, for example, in Göteborg in southwestern Sweden and the small town of Tornio (Torneå) in northern Finland. Archaeological study of postmedieval towns is very limited in Denmark and Norway, but some research has recently been conducted on eighteenth-century deposits in Copenhagen harbor (Høst-Madsen 2005). Some research has also been undertaken in the capital of Iceland, Reykjavik, founded in the late eighteenth century.

Colonization and Colonialism

Although the historical core areas of the Nordic world are located in the southern and western parts of Scandinavia, the north and its resources attracted increasing interest since the early medieval period. Farming settlement spread toward the north from the early second millennium onward. The medieval expansion of farming settlement into northern parts of Sweden and Finland is poorly known archaeologically, although some important sites have been studied. For example, the site of Kainuunkylä-Hietaniemi just south of the Arctic Circle on the Swedish-Finnish border has produced evidence of an early phase of the southern colonization of the north. There was also a market place and non-Christian burials at the site (Wallerström 1995).

Although the northern periphery lacked actual towns, there were market places across the northern fringe of Europe. Archaeological research has been conducted at, for example, Gásir in Eyjafjörður (Iceland), Vågan in Lofoten (Norway), and Haminasaari in Kemi (Finland).

Recent research on the so-called multiroom houses in northernmost Arctic Norway has also produced interesting results on economic intensification and intercultural contacts in northernmost Europe during the medieval period (Olsen et al. 2011).

In addition to fish and fur, northern mineral resources were also of interest to the Scandinavian states. The great mine of Kopparberg in Falun, south-central Sweden, is a particularly famous medieval and early modern mining complex, and today a UNESCO World Heritage site, but mines and forges were also established in the northern fringes of the Swedish realm, and the sites of Silbojokk and Kvikkjokk in Swedish Lapland have also been archaeologically studied. Archaeological research has also been undertaken on later mining communities elsewhere in Sweden (e.g., Svensson et al. 2009).

Archaeology of the Modern World

The transitional period between the medieval and early modern period, from the fifteenth to seventeenth century, is today an accepted part of Nordic historical archaeology as something of a chronological extension to medieval archaeology. Fieldwork at urban and other multi-period sites, for example, has produced archaeological material also from later historical periods which has so far been little studied, although there are important exceptions (e.g., Rosén 2004; Lucas 2009). Archaeological research focusing specifically on the postmedieval processes of modernization and modernity is relatively scanty but attracting increasing interest (e.g., Lihammer & Nordin 2010).

Although the modern world has until recently received limited attention within Nordic historical archaeology, younger industrial and military sites in particular have been documented and excavated for some time. In Finland, for instance, the national heritage agency has documented WWI fortifications around the Finnish capital, Helsinki, and fieldwork has occasionally been conducted also at WWII sites. Although the fieldwork at modern sites has often been motivated by cultural heritage management, academic research is now also engaging with twentieth-century military sites. For example, some research has recently been done on the landscapes, materiality, and archaeology of WWII German sites in Finland and Norway (e.g., Seitsonen & Herva 2011). Likewise, the study of modern ruins from an archaeological perspective has recently begun in Norway and Iceland.

Future Directions

Future challenges in Nordic urban archaeology will include, for example, understanding how changes in urban environments were linked to broader transformations in ways of life and thought in early modern towns. The local character and diversity of urban life also remain to be properly appreciated; urban experience in southern urban centers was presumably quite different from small peripheral towns (cf. Herva 2010).

While aspects of trade have been central to Nordic urban and historical archaeology, consumption studies have also emerged since the 1990s. The consumption models initially adopted from Anglo-American historical archaeology may not be directly applicable to the early modern Nordic world, and especially its more peripheral regions. The importance of the local cultural background and context of consumption is being increasingly appreciated today, as indicated, for instance, by recent research on artifact biographies in the seventeenth-eighteenth-century town of Tornio (Herva & Nurmi 2009) or the ceramic revolution in nineteenth-century Iceland (Lucas 2010).

Equally, although Sámi archaeology is an established field of study in Norway, Sweden, and Finland, researchers have yet to truly engage with the Sámi past in terms of colonialism, and within the framework of the archaeology of colonialism, which has emerged as a key topic in current world historical archaeology. Specifically, the expansion of farming settlement and the exploitation of northern resources resulted in increased contacts with the indigenous Sámi who inhabited northern parts of Fennoscandia and became subject to Scandinavian colonialism. The southern colonization and colonialism of northern Fennoscandia came to have

a long-standing impact on the Sámi which is still felt today in many ways, including a continuing debate on land ownership in traditional Sámi homelands and the repatriation of Sámi cultural heritage (e.g., Mulk 2009). Much more research on the archaeology of these processes is needed, however.

Sweden and Denmark engaged also in global colonial pursuits, albeit in small scale. Denmark came to dominate Iceland and Greenland and established colonies also in Africa and the Caribbean, whereas the most well-known (albeit short-lived) Swedish colony was established in Delaware. Limited archaeological research has been done on Scandinavian overseas colonies, but they have recently become of increased interest among Nordic archaeologists (e.g., Immonen 2012; Nordin 2012).

Finally, the archaeology of the contemporary and recent past is a new branch of study in Nordic historical archaeology, but a Swedish language introduction to the field has recently been published (Burström 2007). Although still a contested field, the increasing archaeological study of the later historical times suggests a degree of liberation from the so-called tyranny of historical sources which has always overshadowed historical archaeology in the Nordic countries and beyond. Theoretical advances in archaeology and material culture studies have provided historical archaeology with new perspectives and approaches for addressing issues which are pertinent to the emergence and development of the modern world in the last half-millennium. In all these areas, the historical archaeology of the Nordic countries can offer "a view from the periphery" on modernization and its archaeological study.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Contemporary Past, Archaeology of the
- ▶ Hanse Archaeology
- ▶ Scandinavia and the Baltic Sea Region: Medieval Archaeology
- ▶ Sweden: Cultural Heritage Management

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Scandinavia: Field Methods

Stefan Larsson
Swedish National Heritage Board, Lund, Sweden

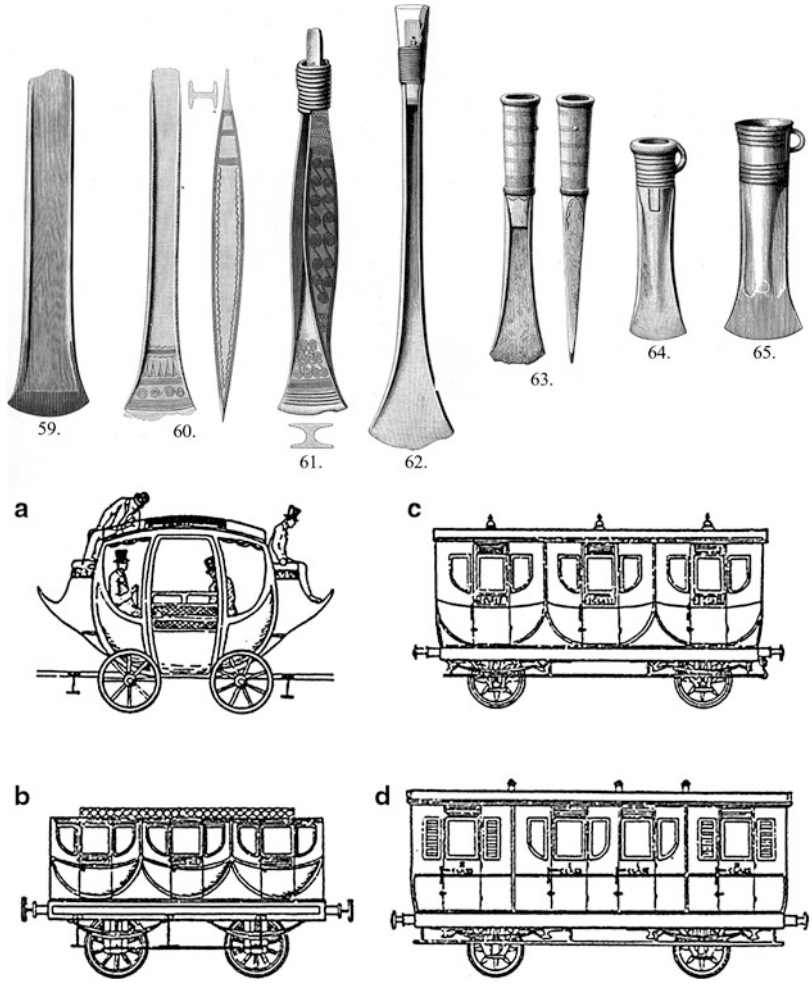
Introduction

Scandinavian archaeology has been influenced by three important factors: its embrace by the state, its terrain, and its methodological innovations. The position of Scandinavian archaeology within the state administration descends from the frequent, long, and bloody conflicts between Denmark-Norway and Sweden-Finland. The number of monuments that could be claimed was instrumental in the diplomatic game of the day: the most venerable history gave a higher ranking at peace negotiations. In short, Scandinavian archaeology is the offspring of an "antiquarian arms race." The Danish legal tradition goes back as far as medieval times: all "treasure" found is the property of the King, while in the Swedish tradition, which has been a reference for both the Norwegian and Finnish legislation, sites and monuments belong to the state. Sites and monuments are to be protected or, if this not being possible, recorded professionally, thus making it a public responsibility to maintain a body of archaeologists. The overwhelming majority of excavations are performed within this legal administration, resulting in large-scale archaeological projects, today aided by digital recording (Fig. 1).

Key Issues/Current Debates/Future Directions/Examples

Archaeological deposits in Scandinavia vary from Paleolithic deposits and large Mesolithic dwelling sites of the Ertebølle culture, to the heaped clay Bronze Age burial mounds of Jutland ("the mound people," Glob 1974), to large-scale settlements, votive deposits in bogs, ship burials, shipwrecks, and large-scale central places of the Iron Age to early trading and manufacturing

Scandinavia: Field Methods, Fig. 1 A large-scale excavation of the medieval village of Örja, just outside Landskrona, Sweden (Photo by Thomas Hansson, Swedish National Heritage Board)



Scandinavia: Field Methods, Fig. 2 Oscar Montelius (1843–1921) used the evolution of carriages, from horse drawn to railway, to illustrate how artifacts develop through time. The method allows an artifact type, and assemblages of artifacts, to be assigned to a particular period

centers of the Viking Age. In upland areas, settlements and burial mounds remain visible above ground level. In lowland areas, they have been located by intensive surveys (Welinder 2009).

Scandinavian innovations include the development of typology, large-scale survey, and different approaches to excavation. Typology became something of a Scandinavian speciality, starting with C.J. Thomsen's (1788–1865) presentation of the "three-age system," i.e., the division of prehistory into the Stone, Bronze, and Iron Ages, which was developed indirectly from the taxonomy developed by C. Linnaeus and his disciples. The system was gradually refined during the course of the nineteenth century by, among others, J.J Worsaæ (1821–1885), S. Müller (1846–1934), and B.E. Hildebrand (1806–1884). Particularly influential was the concept of chronological evolution to explain the changing forms of artifacts by O. Montelius (1843–1921) (Fig. 2).

Since all archaeological remains were (and are) regarded as the cultural property of the state, large-scale surveys pursued the goal of total record. This has empowered geographical methods of historical analysis, such as Bjørn Myhre's early medieval kingdoms in Norway, drawn by Thiessen polygons from hierarchies of burials, ship-sheds, and hill forts (1987), and Åke Hyenstrand's use of Sweden's Ancient Monuments Register for tracing regions and socioeconomical systems (Hyenstrand 1984).

In excavation, Scandinavian archaeologists have been influenced by both the German approach, which divides a deposit into horizontal and vertical slices ("schnitt"), and the British, which gives primacy to the stratification. However, it was the pioneering work of Gudmund Hatt and C.J. Becker in the 1930s and 1940s that led to the development of large-scale open area excavations. These were applied in particular to prehistoric and medieval settlements where survival may be little more than postholes and ribbons of small stones left by turf and timber buildings. These techniques were taken up in Britain and spread widely in Europe. On site pioneering methodologies by Scandinavian archaeologists include the excavation of huge preserved timber ships and their contents from mounds at Gokstad and Oseberg (see Gansum 2004), the recovery and analysis of bog bodies (Asingh & Lynnerup 2007), and the lifting of an entire *burial chamber* at Medelpad, Sweden, in 1952. Modern pioneers have been contributing in particular to the development of methods of electronic *remote mapping*.

Cross-References

- ▶ Burial Mound Dissection in Sweden
- ▶ Nondestructive Subsurface Mapping in Field Archaeology

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Scanning Electron Microscopy (SEM): Applications in Archaeology

Ellery Frahm
Department of Archaeology, University of Sheffield, Sheffield, South Yorkshire, UK

Introduction

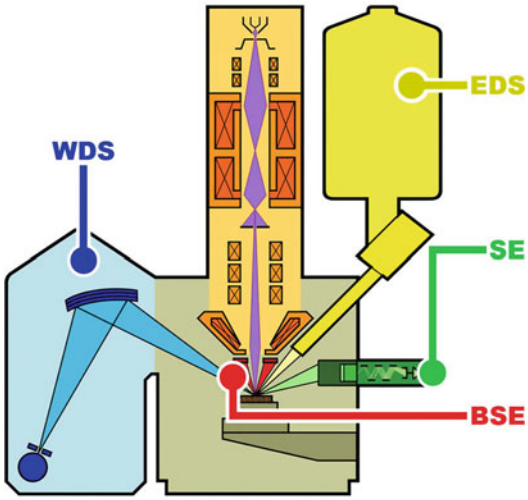
Scanning electron microscopy (SEM; this acronym is used for both the instrument itself and the technique) has been broadly used in archaeology for over four decades. The SEM is capable of two basic functions: imaging and providing compositional information. Consequently, it has been utilized for nearly every archaeological application in which one wishes to examine magnified images of a specimen and/or determine its composition on a microscopic scale, everything from determining the raw-material sources of stone tools to examining the five-millennia-old skin of Ötzi the Iceman.

All SEMs permit one to acquire highly magnified images of a specimen. The range of magnifications possible is much greater with SEM than with visible-light microscopy (VLM). Depending on the instrument, the magnification can be adjusted as low as 5X (equivalent to a hand lens) and as high as 200,000X (roughly 100 times better than a powerful VLM) or more. SEM also offers a much greater depth of field than VLM (roughly 300 times better), meaning that more of the specimen will appear in focus.

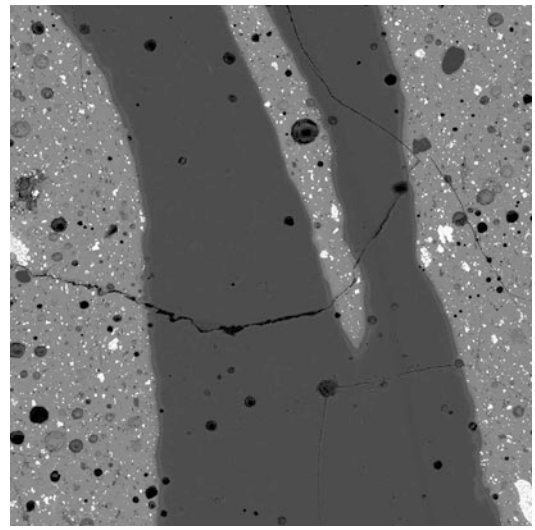
Most contemporary SEMs are also outfitted to measure the elemental composition of the specimen based on the X-rays emitted under electron bombardment. A closely related technique, which developed alongside SEM, is electron microprobe analysis (EMPA; this acronym is also used for the instrument). Figure 1 illustrates the major systems of SEM and EMPA.

Definition

At the top of the SEM is an "electron gun," which produces a beam of electrons and accelerates



Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 1 Simplified schematic of a typical SEM and EMPA. The beam (*purple*) is generated in the electron column (*orange*) and focused onto a specimen (*brown*) in the chamber (*tan*). The secondary-electron (SE) detector is *green*, and the backscattered-electron (BSE) detector is red. X-rays from a specimen are measured by an energy-dispersive spectrometer (EDS; *yellow*) and, in the EMPA, wavelength-dispersive spectrometers (WDSs; *blue*) (Image by Ellery Frahm)



Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 2 A BSE image shows the interfaces between two distinct glasses used to manufacture an East Java mosaic bead. The glass that contains lead oxide as an opacifier appears lighter in this image. The field of view is 2 mm across (Image by Ellery Frahm)

them toward a specimen. The electron beam is focused onto a specimen by a series of apertures and electromagnetic lenses. The beam rasters across the specimen to produce an image, much like a CRT-based television set. This process ordinarily occurs under a high vacuum to avoid beam scattering by air molecules and other effects.

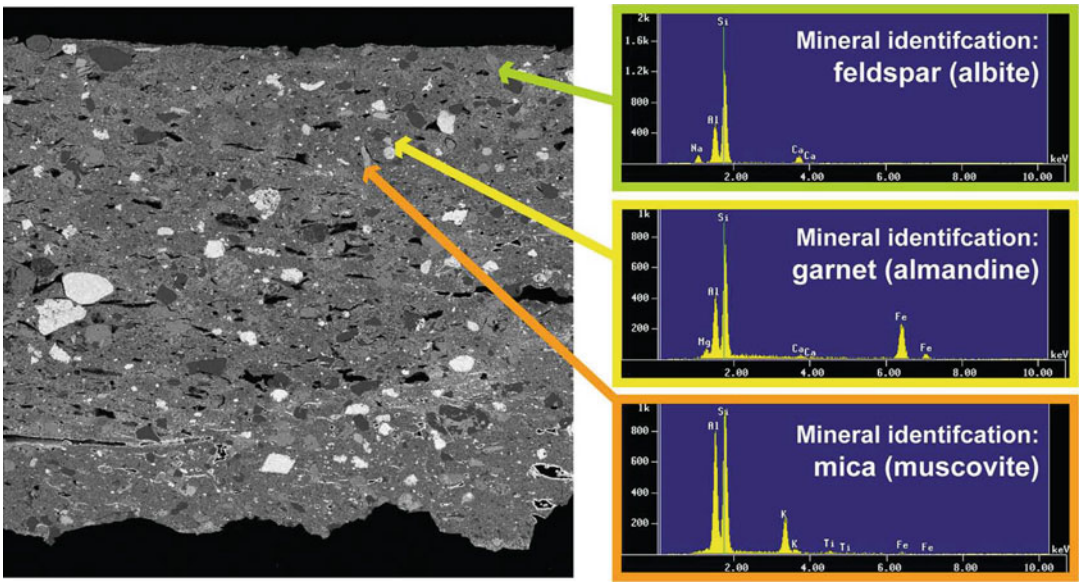
When the electrons strike a specimen, a wide variety of information-bearing signals is produced. Some of these signals are useful for imaging. Others may be used for compositional or microstructural analysis, provided the appropriate detectors are present.

One imaging signal is the emission of secondary electrons (SEs). SEs have low energies, so only those emitted within nanometers of the specimen surface can escape. Therefore, SEs are sensitive to the specimen's topography and are useful for imaging surface details. Many people have seen examples of these images: microscopists frequently use SE images of spiders, table salt crystals, or pollen as examples of SEM images.

Backscattered electrons (BSEs) offer another way to image a specimen. BSEs are beam electrons that have "ricocheted" out of the specimen. They have much higher energies than SEs and are less affected by topography. Instead, BSEs are strongly affected by the atomic number of the elements in a specimen. The dependence on atomic number is used to produce images that show compositional contrast (although there is also a topographic component to BSE images for non-flat specimens). BSE images have bright areas where the mean atomic number is higher and dark areas where it is lower (Fig. 2).

Contrast in BSE images, though, reveals only relative differences in composition. The elements present cannot be identified without measuring their X-ray emissions. Characteristic X-rays have wavelengths and energies unique to the elements from which they are emitted, and they are measured using X-ray spectrometers to determine a specimen's elemental composition.

Modern SEMs are commonly outfitted with energy-dispersive spectrometers (EDS) to



Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 3 A BSE image of a ceramic sherd (Khabur ware from Tell Mozan, Syria) and the EDS spectra of three mineral inclusions. The field of view is 8 mm across (Image by Ellery Frahm)

measure such X-rays (Fig. 3). EDS is also sometimes abbreviated as EDX, EDXA, or the trade name EDAX. In SEM-EDS, one searches for and measures the intensity of characteristic X-rays at energies which correspond to elements within a specimen. EDS spectra, though, suffer from overlapping X-ray peaks for some elements, and the system is usually not sensitive enough to measure the tiny signals produced by trace elements.

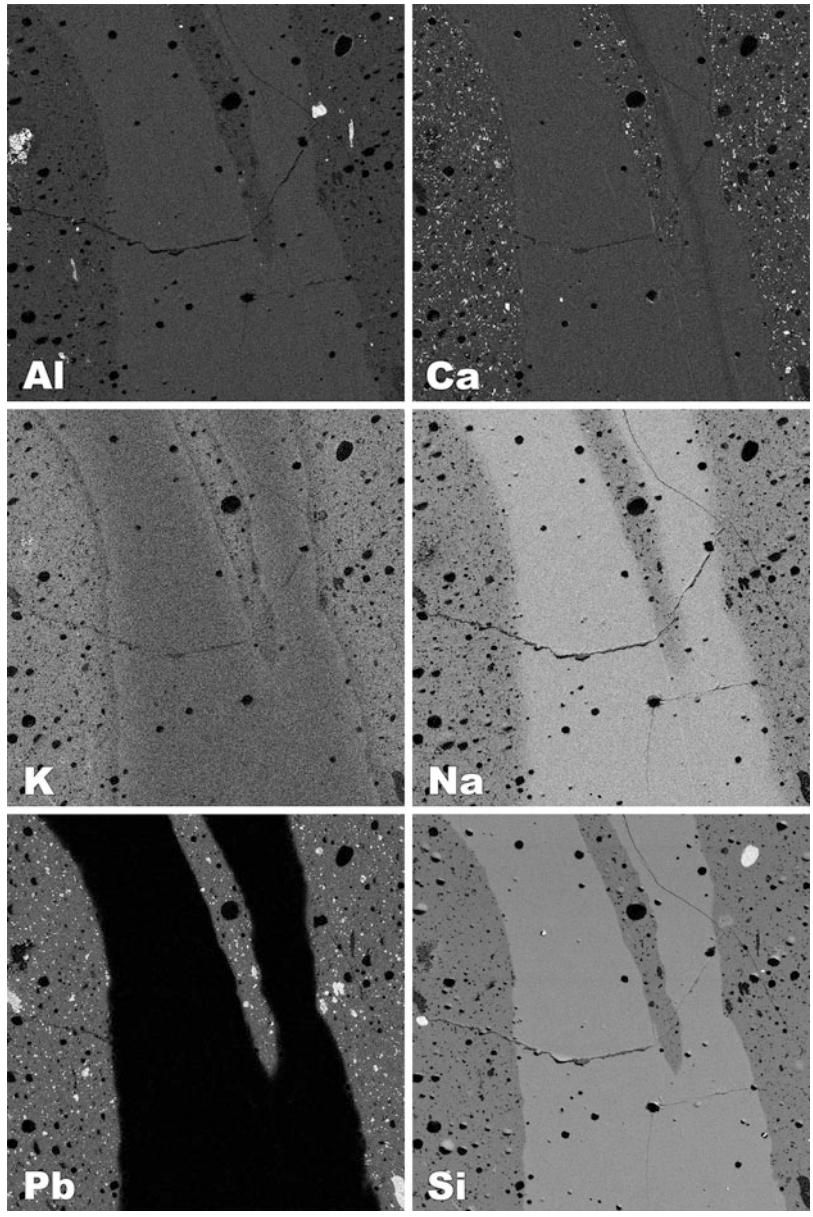
Characteristic X-rays are measured differently in electron microprobe analysis (EMPA). An electron microprobe is outfitted with several wavelength-dispersive spectrometers (WDS). EMPA-WDS differentiates X-rays by wavelength, rather than energy, for more precise measurements. Like an SEM, a microprobe has also EDS, and it can acquire highly magnified images of a specimen.

SEM-EDS and EMPA-WDS are both spot techniques, meaning the electron beam is focused on a spot and elemental composition is measured for only a small volume, just a few cubic micrometers, not the full specimen. This permits one to obtain highly localized data and to analyze specimens so small that they cannot be studied using other techniques. It also permits one to measure the elemental variation across a specimen surface. Thus, SEM-EDS and EMPA-WDS are well suited to study mixtures, that is, specimens with mixed components (e.g., ceramics, glasses, rocks, slags). Element distributions can be mapped using SEM-EDS or EMPA-WDS, yielding an image constructed from a grid of X-ray measurements (Figs. 4, 5, 6).

Nonconductive specimens (i.e., nonmetals) must be coated with an ultrathin layer (about 100 Å) of a conductive material, normally gold or carbon, to prevent an electric charge from building up on the specimen surface. This coat can be later removed from many specimens.

Historical Background

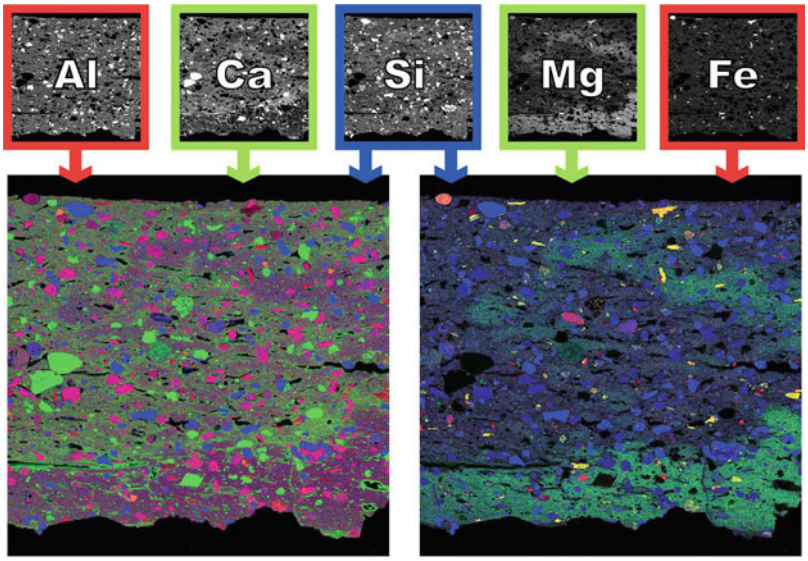
The earliest commercial SEM model, the Stereoscan, was developed at Cambridge University and sold by Cambridge Scientific Instrument Company. The first batch in 1965 consisted of five instruments. Within 3 years, 100 SEMs were sold each year. It was at this



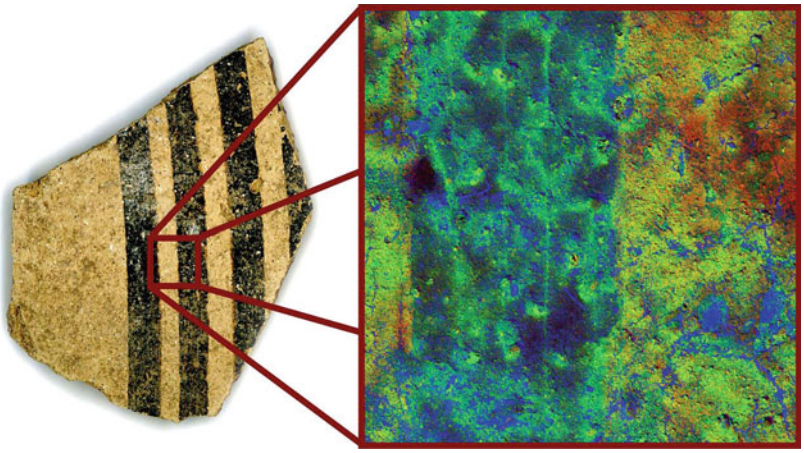
Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 4 Element maps of the same area as Fig. 2. These maps show how the two glasses differ in the concentrations and spatial distributions of six elements. The lighter areas have a higher concentration of the element than the darker areas. It is clear that one of these glasses contains lead oxide as an opacifier, whereas the other glass does not (Images by Ellery Frahm)

time that paleoecologist Jonathan Pilcher (1968) published one of the first papers to apply the technique to archaeology. In particular, he used SEM to observe and identify pollen as a means of ecological reconstruction. The next year, archaeologist Don Brothwell (1969) at the British Museum discussed the advantages of SEM for examining such archaeological materials as ancient bone and teeth, fibers, botanical remains, and lithics.

By 1985, about 13,000 SEMs had been sold worldwide, and the technique was frequently used to observe the archaeological materials discussed by Brothwell. A year later, the "Scanning Electron Microscopy in Archaeology" conference was held at the University of London, and the proceedings were published in a book edited by Sandra Olsen (1988). Due to advancements in SEM over the last two and a half decades, particularly regarding hardware and



Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 5 An example of how element maps can be combined into red-green-blue (RGB) maps to highlight compositional differences in a specimen. The sherd and area shown are the same as Fig. 3. When overlaid, these maps show the abundance, variety, and distributions of different minerals as well as elemental variations within the clay itself (Image by Ellery Frahm)



Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 6 An RGB element map shows the compositional differences between the slip and paint on this sherd (the same ware as Figs. 3 and 5). The map also reveals a series of incised lines not apparent to the naked eye (Images by Ellery Frahm)

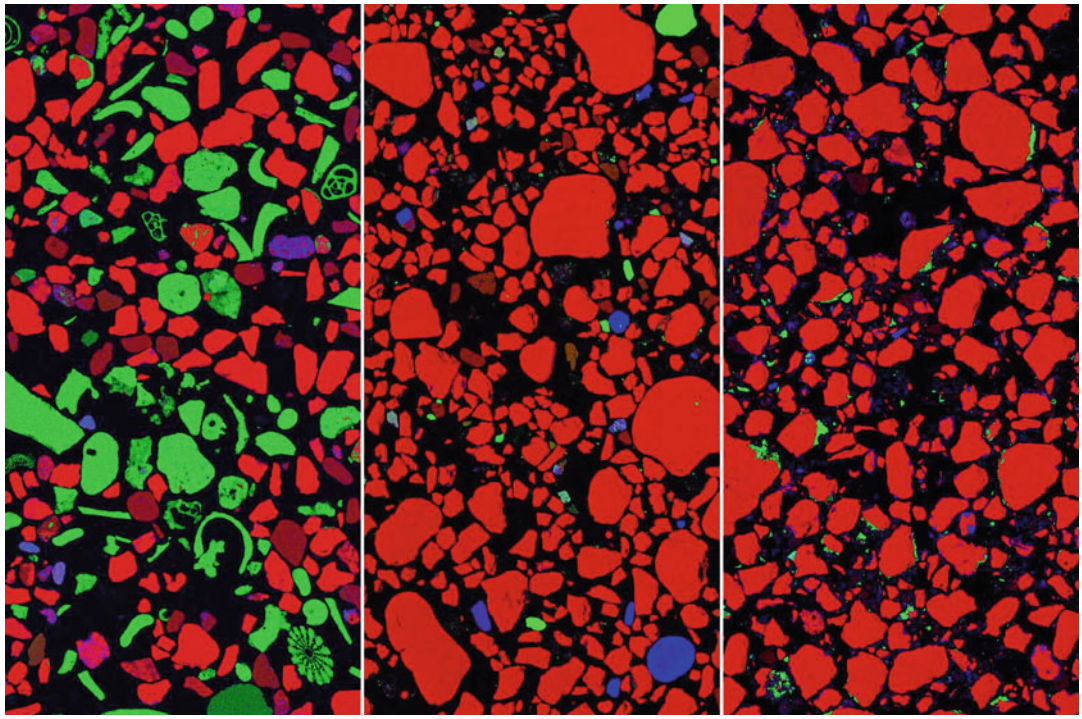
performance as well as data processing, these 1986-era papers are showing their age and nearing obsolescence.

Key Issues

Recent Developments

The instruments discussed at the 1986 London conference date to the 1970s and early 1980s, and SEMs have advanced considerably since the publication of Olsen (1988). For example, most of the backscattered-electron (BSE) detectors in that volume are now obsolete. In a modern SEM, there is a newer type of dedicated BSE detector that offers images superior to those one will see in older publications. Secondary-electron (SE) imaging has improved due to the development and popularity of a new type of electron gun. This new electron gun, known as a field-emission gun (FEG), enables higher-resolution imaging due to an even smaller beam diameter. As a result, the resolution in a modern research-grade SEM is about 2 nm, an order of magnitude better than two decades ago.

Digital imaging is another major advancement. In earlier decades, photographs were taken of high-resolution CRT screens. Now



Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 7 RGB element maps of sand from Bahrain, Giza, and Petra. Silicon is *red*, calcium is *green*, and iron is *blue*. Examination in the SEM or EMPA reveals differences in the sediment composition, sorting, and roundness (Image by Ellery Frahm)

images are captured, stored, and processed digitally.

Another recent development is imaging at reduced vacuums (i.e., closer to atmospheric pressures), called environmental SEM (ESEM; also sometimes called variable-pressure SEM). Additional air within the specimen chamber reduces the electrical charging of nonconductive specimens so that coating with carbon or gold is often unneeded.

The last few years have seen the introduction by several manufacturers of so-called "tabletop" SEMs. These instruments currently are not what microscopists would consider "research grade," but their lower purchase and maintenance costs as well as their smaller sizes and relative portability are quite attractive for archaeological applications. As a trade-off, their capabilities are limited (e.g., magnification) and highly variable from model to model. Only a few tabletop SEMs have EDS systems.

In addition, SEM-EDS is often used today in conjunction with other analytical techniques not readily available to archaeologists in 1986. SEM-EDS (and EMPA-WDS) data, for example, are often used to calibrate LA-ICP-MS measurements.

Current Applications

SEM-EDS is one of the most versatile analytical techniques in archaeology, applicable to the study of a wide range of inorganic and organic artifacts and archaeological materials. Only a very few of these applications can be considered here.

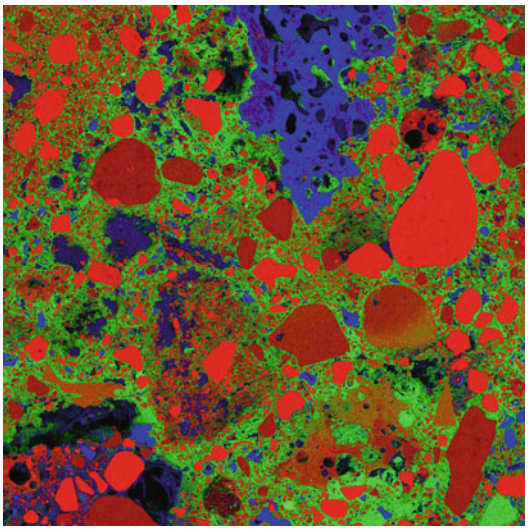
SEM imaging and analysis is experiencing a renaissance in all fields of archaeological obsidian studies. Geochronologists often use SEM-EDS and EMPA-WDS to analyze volcanic glass shards and chemically match them to a specific volcanic eruption. This dating procedure, called tephrachronology, is quite

similar to obsidian sourcing, so it is not surprising that SEM-EDS can also be useful for analyzing obsidian. After brief experiments with mixed results during the 1980s, archaeologists have recently returned to SEM-EDS as an obsidian sourcing technique. Due to advancements over the last two decades, the results have been promising, especially in the Western Mediterranean (Le Bourdonnec et al. 2006). SEM has been suggested as a way to improve obsidian hydration dating by eliminating the problematic reliance on VLM (Kayani & McDonnell 2008). It has also been utilized for use-wear analyses of Mexican obsidian scrapers (Mandujano et al. 2002).

Artificial glasses, which are typically mixtures, are also well studied by SEM-EDS. For example, Heck and Hoffmann (2000) used this technique to analyze the glass matrix and identify the colorants and opacifiers of Merovingian beads. Bronk and Freestone (2001) took advantage of this spot-analytical technique to analyze submillimeter-sized fragments sampled from glass artifacts with only minimal damage. Weathering and corrosion of Sassanian glass artifacts from Iraq have also been investigated using SEM-EDS (Gulmini et al. 2009).

As mixtures, ceramics are well suited to characterization using SEM-EDS. For instance, SEM-EDS allows tempering materials, such as sands, to be characterized (Fig. 7). Ownby and her colleagues analyzed schist temper in Hohokam ceramic wares and distinguished between schist that naturally occurs in sand and clay versus crushed schist deliberately added as a temper (Ownby et al. 2004). Thin pottery glazes can be studied, and their components, such as opacifiers and colorants, can be identified (Charalambous et al. 2010). Wolf (2002) used SEM-EDS to investigate the production technology of medieval Swiss bricks through examination of their microstructure and mineralogy.

Metallurgy is also well studied by SEM. For example, Giumlia-Mair and her colleagues investigated the Bronze Age metallurgical traditions of the al-Midamman culture in Yemen and contrasted them with Near Eastern traditions (Giumlia-Mair et al. 2000). Experimental alloys, designed to mimic ancient metals, have been examined (Constantinides et al. 2001). Slags can also be characterized by SEM-EDS and the metallurgical processes that produced them identified (Fig. 8), and the analysis of metal ores can complete the picture.



Scanning Electron Microscopy (SEM): Applications in Archaeology, Fig. 8 Excavation of a historic site near downtown Minneapolis turned up slag specimens, which came as a surprise because maps indicate the area was a residential neighborhood during the nineteenth century. Analyses revealed that it was slag from a puddling furnace. Puddling removes excess carbon, silicon, and other impurities from pig iron to make wrought iron. This causes loss of iron to the slag, so the glassy matrix of the slag is iron rich. Iron is *green*, carbon is *blue*, and silicon is *red*. The field of view is 500 μm across (Image by Ellery Frahm)

Rocks, minerals, and their products, such as lithics and pigments, can also be studied using SEM. Bustillo and her colleagues used BSE imaging and EDS analysis to classify cherts used in Neolithic Iberia (Bustillo et al. 2009). The imaging capabilities of SEM have been used to study use-wear traces and also investigate lithic reduction techniques. For example, traces of a copper-based point used for pressure flaking have been found on chert blades in the Indus Valley (Méry et al. 2007). Layers of mineral-based pigments and plasters can also be studied with an electron beam that can be focused to microscopic sizes (Damiani et al. 2003).

A wide variety of biological materials, too many to list, can also be studied using SEM. Identifying pollen was one of the earliest archaeological uses (Pilcher 1968). This continues to be a popular application, especially when combined with charcoals and other microbotanical evidence to reconstruct the vegetation history and thus paleoclimate of a region. Teeth and bone are frequently examined by SEM to study diagenesis, pathologies, and other phenomena. Coppa and his colleagues identified in vivo drilling of human teeth using flint tools in Neolithic Pakistan (Coppa et al. 2006). SEM examination of eggshell fragments can permit species identification, and using this technique, Beachan and Durand (2007) found evidence of turkey husbandry over eight centuries ago in the American Southwest.

Future Directions

The future of SEM in archaeology will most likely involve (1) the availability of new detector systems to investigate new problems and (2) advances in "tabletop" SEMs. Regarding the first issue, a system already available on certain SEMs detects the beam electrons that diffract out of a specimen due to its crystalline structure. This phenomenon is known as electron backscatter diffraction (EBSD), and it is just now starting to be applied to archaeological specimens (Peruzzo et al. 2011). Its clearest advantage for archaeologists is being able to distinguish in situ minerals with the same elemental composition but different structures and origins, for example, calcite from limestone or aragonite from shell, both $CaCO_3$ and indistinguishable using EDS in isolation. It is possible that in the future new detectors will be developed that combine the speed of EDS with the precision of WDS.

Regarding the second issue, future "tabletop" SEMs will have fewer limitations than current models and will become even more portable. SEM-EDS and EMPA-WDS were developed during the 1970s, in part, as a way to nondestructively analyze lunar rocks, and new instruments will likely take advantage of research to miniaturize SEMs for future Mars rovers. Just as it seems more practical for NASA to send an SEM to Mars than to bring specimens back to Earth, it will eventually be more practical for archaeologists to bring portable SEMs into the field rather than export artifacts to a laboratory halfway around the world.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Imaging Techniques in Bone Analysis
- ▶ Pigment Analysis in Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Stone Tool Usewear and Residue Analysis
- ▶ Technological Studies in Archaeological Science
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Schávelzon, Daniel

Victoria Pedrotta
CONICET/ Facultad de Ciencias Sociales - Universidad del Centro de la Provincia de Buenos Aires y Fundacion Felix de Azara, Departamento de Ciencias Naturales y Antropología - Universidad Maimónides, Buenos Aires, Argentina

Basic Biographical Information

Born in Buenos Aires, Argentina in 1950, Daniel Schávelzon earned a degree in architecture in the Faculty of Architecture and Urbanism of the Buenos Aires University (1975). He earned a Master (1981) and Doctorate in Architecture (1984) at the National Autonomous University of Mexico (UNAM). Back in Argentina since 1984, currently, he is principal investigator at the National Council for Scientific and Technological Research (CONICET), Professor at Museo Social Argentino University, and at the Faculty of Architecture, Design and Urbanism of Buenos Aires University, where he is the head of the Center of Urban Archaeology. Schávelzon is the director of the Area of Urban Archaeology of the Buenos Aires City Government, emeritus historical adviser of the National Commission of Historical Museums, Monuments and Places, member of the Academy of History of Buenos Aires and of the ICOMOS Argentine Committee.

He teaches graduate courses and conducts seminars in Argentina and other Latin America universities, and frequently serves as mentor, as well as undergraduate and graduate advisor. He has presented more than 180 papers in scientific meetings and gave nearly 170 lectures.

Schávelzon is the author of about 40 books, 200 scientific and divulgation articles, tens of pamphlets and exhibition guides, as well as innumerable mass media articles. His scientific production and his contribution to the preservation of the cultural heritage have received distinctions, scholarships, and prizes both in Argentina and abroad.

Major Accomplishments

The initial years of Daniel Schávelzon´s career were dedicated to the study of Mesoamerican pre-Hispanic architecture, mainly in Mexico on subjects of conservation and restoration. After his return to Argentina, after the military dictatorship ruling the country between 1976 and 1983 was overthrown, Schávelzon´s research focused on a new and until then practically unexplored area: Urban Archaeology. In 1986, he founded the current Center of Urban Archaeology in the Faculty of Architecture, Design and Urbanism of Buenos Aires University, leading an interdisciplinary group of specialists that has carried out archaeological investigations not only in Buenos Aires city and its vicinity, but also in other Argentine cities, with the subsequent study of the archaeological collections. Among others, the Ezcurra House, the Coni Printing House, the Convent of Santa Catalina, 3 de Febrero Park, the Government House and the Town Hall, several tunnels and underground constructions in Buenos Aires city should be mentioned. Other relevant investigations include the areas of the early foundation of the cities of Mendoza and Puerto Deseado.

Schávelzon has been a precursor in the conservation and analysis and of artifacts (ceramics, clay pipes, glasses, metals, etc.) from post-Hispanic archaeological contexts (sixteenth to twentieth century). His publications represent important contributions and his catalogs are remarkable references.

Schávelzon has stimulated the collaboration with research centers of several Argentine provinces and has promoted the formation of local research teams, inspiring the growth and diversification of Historical Archaeology in Argentina and its relations with other Latin American countries. His assiduous activities in favor of scientific divulgation in newspapers, radio, television, and more recently internet contribute to increase both general knowledge and public interest about Urban and Historical Archaeology.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Ceramics: Majolica in Colonial Latin America
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Clay Pipes in Historical Archaeology
- ▶ Hispanic South America: Historical Archaeology
- ▶ Historical Archaeology
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ Modern World: Historical Archaeology
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Urban Archaeology

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Schiffer, Michael Brian (Modern World)

Michael Brian Schiffer
School of Anthropology, University of Arizona, Tucson, AZ, USA

Basic Biographical Information

I was born in Winnipeg, Manitoba, Canada, on October 4, 1947, to Louie and Frances-Fera Schiffer. In 1953 we moved to Los Angeles, where I grew up. My parents enjoyed a happy marriage for 63 years and provided a loving home. Neither parent had finished high school, but both were avid readers and instilled in me a love of learning and the expectation that I would attend UCLA.

At UCLA I took classes from Sally and Lewis Binford, James Hill, and James Sackett. During the summer of 1968, prior to my senior year, I attended Paul Martin's summer program at Vernon, Arizona, whose staff included Fred Plog, Mark Leone, and Ezra Zubrow. These undergraduate experiences familiarized me with processual archaeology, which I expected to practice in graduate school. On December 22, 1968, I married Annette Leve, who remains my lover and best friend. Annette and I have two sons, Adam Joseph and Jeremy Alan, of whom we are very proud.

Turning down generous fellowships at Michigan and UCLA, I attended graduate school at the University of Arizona. During graduate studies, I became disenchanted with the processual approach to inference and, especially, its inept handling of the formation processes of the archaeological record. Also while a graduate student, I collaborated with J. Jefferson Reid and William Rathje to create the research program known as behavioral archaeology, which privileges the study of relationships between human behavior and material culture in all times and all places. These emphases resulted in a Ph.D. dissertation (1973) that became, after much revision, *Behavioral Archaeology* (Schiffer 1976).

In my first job, with the Arkansas Archaeological Survey, I learned about Cultural Resource Management (CRM) from Charles McGimsey and Hester Davis. This experience eventuated in a monograph (Schiffer & House 1975) and book (Schiffer & Gumerman 1977). Some say that these works had a salutary effect on CRM projects in the United States by demonstrating the necessity of conducting cutting-edge research in a management context.

In 1975 I returned to the University of Arizona as assistant professor. Among my first projects was an overview, with Randall McGuire, of the prehistory of southwestern Arizona (Hohokam & Patayan, 1982) and a study of reuse processes in modern Tucson; I also became interested in experimental archaeology and ethnoarchaeology and continued work on formation processes.

Major Accomplishments

One of my proudest accomplishments was editing, beginning in 1978, 23 annual volumes of archaeological method and theory stretching over three series and three publishers: *Advances in Archaeological Method and Theory*, *Archaeological Method and Theory*, and *Journal of Archaeological Method and Theory*.

I was promoted to associate professor in 1979 and 3 years later to professor. In 1983 James Skibo and I built the Laboratory of Traditional Technology, dedicated to experimental studies and equipped with tools for making pottery. Our experiments led to more than a dozen publications (e.g., Schiffer & Skibo 1987) and decisively turned my research interests toward technological change. The publication of *Formation Processes of the Archaeological Record* (Schiffer 1987) closed that chapter of my career.

During the mid-1980s a hobby – collecting portable radios – turned into a study of that artifact's history, which furnished insights into social, economic, and technological change (Schiffer 1991). Next was an early history of the electric automobile (Schiffer et al. 1994). The radio and automobile studies addressed, respectively, then-current issues in American society: the hollowing out of manufacturing and a possible electric car revival.

During the 1980s, postprocessual archaeology stridently attacked processual and behavioral archaeologies. Beyond criticizing the antiscience, intellectual relativism of early postprocessual statements, I encouraged students to engage from a behavioral standpoint the postprocessual research topics such as ritual and religion, symbolism, and social power. My own response was to fashion an artifact-based theory of communication (Schiffer & Miller 1999) and with William Walker an artifact-acquisition perspective on social power.

Curious about the earliest electrical technologies, I first tackled the eighteenth century (*Draw the Lightning Down: Benjamin Franklin and Electrical Technology in the Age of Enlightenment*, *2003*) then the nineteenth (*Power Struggles: Scientific Authority and the Creation of Practical Electricity Before Edison*, *2008*). Both books, which exemplify my best scholarship, challenged from a behavioral standpoint many interpretations crafted by historians. Although the subjects of these books may seem distant from the concerns of prehistoric and even most historical archaeologists, the projects were an opportunity to conduct a kind of ethnoarchaeology that employs historical evidence. Given the copious documentary and published materials available on both the technologies and their behavioral contexts, I fashioned widely applicable generalizations about technological change, which I aimed at archaeologists in a half dozen articles and a book (2011). Drawing on my studies of technology and more traditional topics, I also wrote a "Reader's Digest" version of behavioral archaeology (Schiffer 2010).

In 2004 my colleagues elected me the fourth Fred A. Riecker Distinguished Professor of Anthropology.

Cross-References

- ▶ Behavioral Archaeology
- ▶ Ethnoarchaeology
- ▶ Experimental Maritime Archaeology
- ▶ Journal of Archaeological Method and Theory
- ▶ Modern Material Culture Studies
- ▶ Processualism in Archaeological Theory
- ▶ Rathje, William Laurens
- ▶ Site Formation Processes

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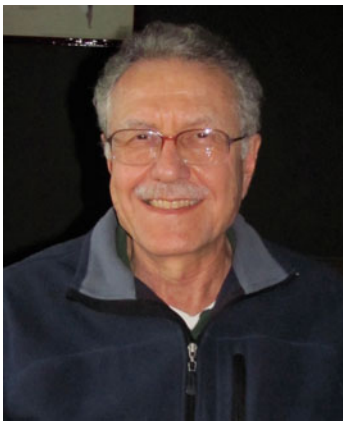
Schiffer, Michael Brian (Theory)

William H. Walker
Department of Anthropology, New Mexico State University, Las Cruces, NM, USA



Schiffer, Michael Brian (Theory), Fig. 1 Michael Brian Schiffer in 2012 (Photo by Annette Schiffer)

Basic Biographical Information

Michael Brian Schiffer (Fig. 1) was born on a small farm in Winnipeg, Manitoba, Canada, on October 4, 1947. He moved with his family in the early 1950s to California growing up in the Crenshaw district of south-central Los Angeles. As an undergraduate, he attended the University of California at Los Angeles. Initially he majored in chemistry but changed to anthropology in his sophomore year. He graduated with a B.A. in Anthropology in 1969. As an undergraduate, he was steeped in New Archaeology; his professors included James N. Hill, James Sackett, Lewis R. Binford, and Sally R. Binford. In the summer of 1968, he joined the Chicago Field Museum of Natural History's Southwest Expedition to east-central Arizona directed by Paul Sidney Martin and assisted by Fred Plog, Mark Leone, and Ezra Zubrow.

Schiffer entered the doctoral program in Anthropology at the University of Arizona in 1969 and conducted his dissertation work at the Joint Site in the Mogollon Rim country. He received an M.A. in 1972 and Ph.D. in 1973. His doctoral dissertation, entitled *Cultural Formation Processes of the Archaeological Record: Applications at the Joint Site, East-Central Arizona*, laid the foundation for his subsequent scholarship as a behavioral archaeologist. Upon graduation, he took a job with the Arkansas Archaeological Survey for two years. In 1975, he returned to the University of Arizona as an Assistant Professor of Anthropology. He was promoted to Associate Professor in 1979 and Full Professor in 1982. Upon William A. Longacre's retirement in 2004, he was elected Fred A. Riecker Distinguished Professor of Anthropology.

In 1983, Schiffer and his graduate student, James M. Skibo, established the Laboratory of Traditional Technology at the University of Arizona. This facility is dedicated to studying experimentally the effects of technical choices on the performance characteristics of artifacts, especially ceramic artifacts. Some of their most important collaborations include their article "Theory and Experiment in the Study of Technological Change" (Schiffer & Skibo 1987).

Major Accomplishments

Michael Schiffer is one the founders of Behavioral Archaeology, a social science research program that defines human behavior as interaction between people and objects (artifacts, architecture, and other people). In the beginning of his

career (Schiffer 1976, 1987), Schiffer focused on developing behavioral method and theory to describe and explain archaeological patterning. This included creation of behavioral chain analysis and a synthetic model of inference (Schiffer 1975). As one of the cofounders of the subdiscipline of behavioral archaeology, along with William Rathje and J. Jefferson Reid, Schiffer has consistently developed method and theory that places material objects at the center of behavioral studies of human activity (Reid et al. 1975).

Building on the basic definition of human behavior, Schiffer developed a synthetic model of inference (Schiffer 1976) that takes into account the behavioral and natural processes that create the archaeological record. The synthetic model of inference drew together various sources of actualistic knowledge, including ethnography, ethnoarchaeology, history, and experiments, to create generalizations that could be used in inferences about unknown relationships between past peoples and objects. Such a model necessarily assumes continuities between past and present relationships: (1) the sequential nature of behaviors forming objects' histories, (2) the causal contribution objects make to behaviors that propel the forward motion of activities in life histories, and (3) four kinds of measurement that make possible the empirical study of object performances and life histories (Schiffer 1987).

To call attention to the generalizations concerning artifact disposal activities and subsequent archaeological patterning, Schiffer (1976) coined the terms n- and c-transforms, which denote the effects that natural and human (or cultural) processes have on the formation of archaeological deposits. Correlates, another kind of behavioral generalization, pair dimensions of measurable artifact variability (frequency, formal properties of materials, locations in three-dimensional space, and associations in space between objects) to the organization of behaviors (people-object interactions).

As his career has progressed, he has extended behavioral method and theory across a range of disciplines and has extensively explored human-object interactions in the history of technology, modeling of behavioral processes involved in the invention, development, manufacture, and adoption of technologies (Schiffer 2010, 2011). Several models and constructs have been critical to this endeavor, including the analysis of performance characteristics and performance matrices, which were developed in collaboration with James M. Skibo (e.g., Schiffer & Skibo 1987; Skibo & Schiffer 2008). Performance characteristics, such as heating effectiveness in cooking pots, are capabilities or competences that objects bring to interactions that allow them to take place (cooking) and facilitate the forward motion (feasting) of behavioral events. The rise and spread of new technologies often involves competitions among performance characteristics in different stages (e.g., manufacture, use) in the life histories of artifacts comprising technologies. Use of performance matrices enabled Schiffer to explore the electric automobile in the late nineteenth and early twentieth centuries as well as the history of electric lighthouses (Schiffer et al. 1994; Schiffer 2008). More recently, he completed two studies of the history of electrical science and technology spanning the eighteenth and nineteenth centuries (Schiffer 2008; Schiffer et al. 2003).

Finally, the placement of artifacts at the center of behavioral study has allowed Schiffer to ground seemingly immaterial topics in material-behavioral perspectives. One of the most interesting such treatments has been Schiffer and Miller's (1999) artifact-focused approach to human communication. Inspired by the process of information transmission implicit in the synthetic model of archaeological inference, Schiffer and Miller retasked this model for the behavioral study of communication. Their approach differs from more traditional ones by highlighting the important roles artifacts play in the process and by reversing the analytical emphasis from senders of information to receivers.

Cross-References

▶ Archaeological Record
▶ Archaeological Theory: Paradigm Shift

- ▶ Behavioral Archaeology
- ▶ Binford, Lewis R. (Theory)
- ▶ Ceramics: Scientific Analysis
- ▶ Leone, Mark P. (Theory)
- ▶ Material Culture and Education in Archaeology
- ▶ Modern Material Culture Studies
- ▶ Processualism in Archaeological Theory
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Site Formation Processes

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Schliemann, Heinrich

Stefanie A. H. Kennell
Vancouver, BC, Canada

Basic Biographical Information

International entrepreneur and self-taught archaeologist Heinrich Schliemann (1822–1890), whose excavations are widely credited with discovering the Greek Bronze Age, was born in Neubukow (Mecklenburg, Germany). The son of a clergyman who lost his rural parish for immorality (1831) (Traill 1995), Schliemann attended the Neustrelitz *Realschule* (1833–1836) before becoming a grocer's apprentice (1836–1841) and studying bookkeeping. Shipwrecked off Holland while en route to Venezuela (late 1841), he found work in the import–export business in Amsterdam and began to learn foreign languages. Employment with B.H. Schröder & Co. in 1844 inspired him to learn Russian. In early 1846, he moved to St. Petersburg as agent for several firms, soon founding his own company to sell commodities such as indigo, cotton, coffee, and sugar. In 1850, his brother's death took him to California, where he made large sums buying gold dust. Back in St. Petersburg in 1852, he married Ekaterina

Petrovna Lyshin, a lawyer's daughter by whom he had a son and two daughters. His wealth grew during the Crimean War (1853–1856) as he imported commodities like sulfur, saltpeter, and lead. From 1856, Schliemann turned to banking and the study of the ancient world. He toured Europe, Egypt, the Levant, and Athens (1858–1859) and traded in tea (1862–1864) before exchanging commerce for round-the-world travel. In 1866, Schliemann attended a variety of scholarly lectures in Paris, returned briefly to Russia, and settled in Paris by year's end to enjoy literary-intellectual pursuits funded by investment income. In 1867–1868, he traveled to North America and Cuba, Italy, Greece, and the Troad. In 1869, he published his first archaeological book, inspired by fieldwork in Greece and Turkey, received a Ph.D. from the University of Rostock, obtained US citizenship and a divorce, and married the 17-year-old Athenian Sophia Engastromenos, who bore him a son and a daughter. Concern for Sophia's well-being caused his permanent move to Greece in 1871. Schliemann died in Naples, Italy, on 26 December 1890 of complications from ear surgery.

Schliemann, Heinrich, Fig. 1 Schliemann in 1883 (Courtesy of the American School of Classical Studies at Athens, Gennadius Library Archives, Heinrich Schliemann Papers)

Major Accomplishments

At Troy, Mycenae, Orchomenos, and Tiryns, Schliemann discovered remains of a prehistoric civilization, which he dubbed "Mycenaean" after Homeric epic (Calder & Cobet 1990). During campaigns at Troy between 1870 and 1890, he evolved from novice excavator to experienced scholar. At Mycenae (1876), Schliemann and his wife excavated several tholos tombs, including the "Treasury of Atreus," and Grave Circle A's famous shaft graves. At Orchomenos (1880, 1881), Schliemann cleared the ruined "Treasury of Minyas," noting the distinctive pottery now called Gray Minyan Ware. Excavations at Tiryns (1876, 1884, 1885) uncovered Cyclopean walls and a palace complex featuring frescoes and a bathroom.

Despite the famous treasures of Troy and Mycenae, Schliemann preferred artifacts that led to substantive scientific results; his awareness of stratigraphic method and materials analysis antedates his collaboration with Wilhelm Dörpfeld. His choice of photographs to illustrate the Troy finds was innovative though unsuccessful, his multilingual excavation publications exemplary. With prehistoric archaeology in its infancy, identification and dating errors were inevitable, but his expertise grew through experience and consultation (Kennell 2010).

Relations with officialdom were often strained. His removal of artifacts led to a lawsuit by the Turkish state (1874–1875), and he resisted supervision by the Greek Archaeological Service at Mycenae. His funding of the demolition of the Frankish Tower on the Athenian

Schliemann, Heinrich, Fig. 2 Schliemann and the 1890 Troy Conference participants (Courtesy of the American School of Classical Studies at Athens, Gennadius Library Archives, Heinrich Schliemann Papers)

Acropolis also sparked controversy. After the Turkish lawsuit was settled, Schliemann traveled around Europe seeking comparative material in museums and investigated other sites in Greece (Levadia, Marathon, Ithaka, Kythera) and Italy (Albano, Motya). On the strength of his work at Troy and Mycenae (Fig. 1), Oxford University awarded Schliemann an honorary doctorate in 1883. In Crete, he vainly tried to obtain land at Knossos and a permit to excavate (1884–1889). He toured Egypt twice, visiting Flinders Petrie. Schliemann collaborated with other scholars and organized international conferences at Troy (1889, 1890) (Fig. 2). He left three monuments in Athens: his house, the Iliou Melathron; the German Archaeological Institute building; and his own mausoleum in the First Cemetery. Over decades, he archived tens of thousands of letters from hundreds of correspondents that significantly complement his publications and diaries (Kennell 2007; *Heinrich Schliemann* papers n.d.).

Schliemann's publications excited scholarly interest and impressed the general public, not least because of his personal voice as entrepreneur, writer, and excavator. Academics and amateurs disparaged his reliance on Homer and Pausanias, along with his chronology and interpretations (Zavadil 2009). Even today, his greatest fame comes from his discoveries at Troy and Mycenae, regardless of the nature and circumstances of his results. With his forceful personality and scientific bent, this ex-businessman redefined archaeology, formerly the purview of academic admirers of Classical aesthetics, as the comprehensive study of the material remains of past civilizations (Herrmann 1992). He combined literary zeal with practical skill to organize, finance, run, and publicize large-scale excavations that initiated the rediscovery of the Aegean Bronze Age. In an age when imperialism was often expressed by nationally funded archaeology, Schliemann's projects were as exceptional in being self-funded, broadly promoted, and internationally disseminated as in their tangible finds (Runnels 2007).

Cross-References

- ▶ Baths and Bathing, Greek
- ▶ Oral Tradition: Ancient Greece

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Schmidt, Peter R.

Jonathan R. Walz
Department of Anthropology and Archaeology Program, Rollins College, Winter Park, FL, USA

Basic Biographical Information

Peter Schmidt's impacts on archaeology and African history are theoretical, substantive, and pragmatic. Since the 1970s, his initiatives in Africa have fostered research, institution building, and heritage advocacy. Trained as an archaeologist and historian, Schmidt's approach to archaeology is inclusive, methodologically sophisticated, grounded in structural and symbolic theory, and politically aware (Schmidt 1978, 1983a, b, 1997, 2010; Schmidt & Patterson 1995). His scholarship makes informed representations of Africa and Africans. He highlights the long-term pasts of eastern Africa by integrating material, ethnographic, oral historical, documentary, and environmental sources (Schmidt 1978, 1983a, 1997; for conspectus, see Schmidt 2006).

Born in 1942, Schmidt grew up in northern California and graduated from Stanford University in 1965. He completed his masters degree in African History at UCLA and studied at Makerere University in Uganda with Merrick Posnansky. In 1974, he earned a Ph.D. at Northwestern University, at the time a leading institution of African Studies. Since 1971, Schmidt has been a professor of Anthropology in the United States, including at Brown University (1971–1988) and, his current position, at the University of Florida. His dissertation interpreted Haya kingdoms and the long-term history - technological and otherwise - of northwestern Tanzania using a structural approach to the historical sources of the region. Schmidt's historical archaeology integrated and valorized oral historiographies (Schmidt 1978, 1997, 2006). Thereafter, he worked for a time as the state archaeologist of Idaho, in between his African research and teaching at Brown University. Throughout this period, he continued to practice ethnoarchaeology and experimental ethnoarchaeology as well as to investigate the complex symbol systems of African iron technology. Schmidt's scholarship challenged preconceived notions about African technological inferiority and suggested an independent origin for iron technology on the continent (Schmidt 1997). For popular audiences, *The Tree of Iron*, an award-winning film, recounts the principal findings.

Schmidt's prominence in African Studies and anthropological archaeology expanded during the middle 1980s, when he founded and led the Archaeology Unit at the University of Dar es Salaam in Tanzania (1985–1987). Subsequently, Schmidt spearheaded efforts to establish a human rights center in Uganda and his research on iron technology expanded to Gabon and Cameroon. In 1988, Schmidt joined the University of Florida, serving as director of the Center of African Studies until 1995. As early as 1998, Schmidt began to develop a new stream of research in Eritrea. While in Eritrea, Schmidt served as Dean of the College of Arts and Social Sciences at the University Asmara and as Chief Curator of Archaeology at the National Museum of Eritrea. Based on detailed archaeological survey and excavations in the vicinity of Asmara, he and his team concluded that the Aksumite Empire developed out of the indigenous Ona culture in the first millennium BCE, rather than arising exclusively or primarily from South Arabian influences (Schmidt et al. 2007).

Major Accomplishments

Throughout his career, Schmidt has worked effectively to overcome the conventional separation of history and "prehistory" to examine historical representations and social memory in Africa (Schmidt 2006). More recently, his interests turned to the play of tropes in archaeological interpretations, the anthropology of time and time concepts, community approaches to heritage in Africa, and the postcolonial integration of archaeology and African history into university pedagogy as an act of political liberation. Schmidt's research, teaching, and publications continue to shape and promote informed historical representations of Africa, Africans, and their pasts.

Cross-References

- ▶ Critical Theory in Archaeology
- ▶ Ethnoarchaeology
- ▶ Historical Archaeology
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Oral Sources and Oral History

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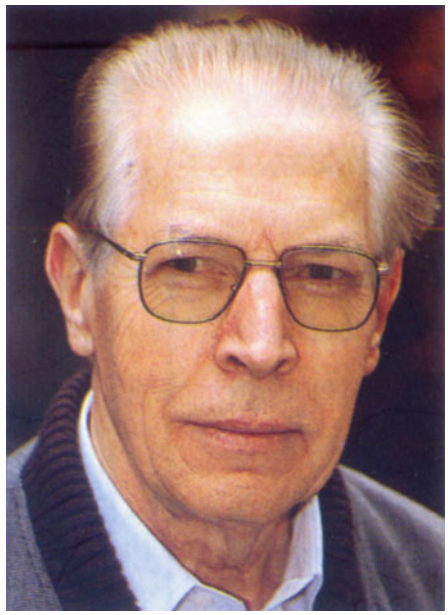
Schmitz, Pedro Ignacio

Jorge Eremites de Oliveira
Universidade Federal de Pelotas, Pelotas, Rio Grande do Sul, Brazil

Basic Biographical Information

Pedro Ignacio Schmitz (Fig. 1), priest of the Society of Jesus, is one of the oldest, most renowned, and most awarded Brazilian archaeologists still at work. He was born on the 30th of August 1929, in the city of Bom Princípio, state of Rio Grande do Sul, Brazil, descending from a family of small farmers of European origin and Catholic formation (Magalhães 2011). He thought about becoming a historian at the beginning of his career, but under the guidance of the anthropologist, botanist, and geographer Balduíno Rambo (1906–1961), also a Jesuit, Schmitz chose the Archaeology as his main field of work (Teixeira et al. 2002; Teixeira 2006; Schmitz 2007; Martins & Rogge 2012).

He holds degrees of Philosophy (1952–1954, from Faculdade de Filosofia Cristo Rei), History and Geography (1955–1958, from Universidade Federal do Rio Grande do Sul – UFRGS), and Theology (1959–1963, from Pontifícia Faculdade de Filosofia e Teologia de Cristo Rei).



Schmitz, Pedro Ignacio, Fig. 1 Pedro Ignacio Schmitz, picture displayed in his *Curriculum Vitae* (Available at http://to.plugin.com.br/jag-part-inschmitz.htm (accessed 16 September 2012))

He concluded his doctorate degree in History and Geography in 1976 from Pontifícia Universidade Católica do Rio Grande do Sul (PUCRS) with the thesis entitled *Sítios de pesca lacustre em Rio Grande, RS, Brasil* ("Archaeological Sites of Lake Fishing in Rio Grande, Rio Grande do Sul, Brazil"), recently republished (Schmitz 2011), study that earned him the title of full professor at that same university (vide Curriculum Vitae at http://lattes.cnpq.br/1125239815915680).

He received training in archaeology in Brazil and several other countries in the Americas and Europe and participated in courses taught by José Loureiro Fernandes (1903–1977) and Annette Laming-Emperaire (1917–1977), among other renowned archaeologists. Betty J. Meggers (1921–2012) and Clifford Evans (1912–1985) invited him to participate in the "Programa Nacional de Pesquisas Arqueológicas" (PRONAPA –acronym in Portuguese for "National Program for Archaeological Research"), developed in Brazil between 1965 and 1970, but he declined the offer. Nevertheless, he adopted the culture-historical proposal of the project, accepted sponsorship from the couple of American archaeologists from 1965 on, and continued developing archaeological research in several Brazilian states: Bahia, Goiás, Mato Grosso do Sul, Pernambuco, Rio Grande do Sul, Santa Catarina, and Tocantins. He also developed archaeological research in Uruguay and published studies on prehistoric Argentina (Schmitz 2006b; Schmitz 2007; Eremites de Oliveira 2008; Martins & Rogge 2012). His scientific production is very significant quantitatively and qualitatively. Beginning in the 1950s, it comprises hundreds of works, mostly published in Portuguese by the Instituto Anchietano de Pesquisas (IAP), one of the major Brazilian institutions of archaeological research, created in 1956 and currently connected to the Universidade do Vale do Rio dos Sinos (UNISINOS), in São Leopoldo, Rio Grande do Sul, for which Schmitz has long been its greatest name. Among many other studies concluded throughout his academic life, it is worth noting his studies on Guarani language in Paraguay, in 1958, as well as his internship in Archaeology at Universidad Nacional de La Plata, Argentina, between 1970 and 1971. He is thus a pioneer archaeologist of holistic formation, within and beyond the four fields of the boasian lineage, with an intellectual production marked mainly by experiences in the subfield of Prehistoric Archaeology in Brazil. He identifies himself as an archaeologist "of historical and multilinear evolutionist trend" linked to American Cultural Anthropology (Teixeira et al. 2002; Schmitz 2007: 3) (Fig. 2).

He was a professor of anthropology at UFRGS from 1958 to 1985, since the days of the former University of Porto Alegre, institution for which he worked part-time and where he retired. He was also a director of IAP from 1966 to 2009, where he continues with his research, coordinates the area of Archaeology since 1962, and is the editor of the *Pesquisas* journal, established in 1957(Schmitz 2006a) (Fig. 3).

He was one of the founders of UNISINOS in 1969, with which he collaborated since 1963, when he began teaching at the former Faculdade de Filosofia, Ciências e Letras, that originated the

Schmitz, Pedro Ignacio, Fig. 2 Pedro Ignacio Schmitz, the first on the left with glasses, during the 3 ° Simpósio de Arqueologia da Área do Prata ("3rd Symposium of Archaeology of the Areaof Prata"), held at the Instituto Anchietano de Pesquisas, in São Leopoldo, Rio Grande do Sul, in 1969 (Martins & Rogge 2012: 258)

Schmitz, Pedro Ignacio, Fig. 3 Areas where Pedro Ignacio Schmitz coordinated programs of archaeological research in Brazil (Martins & Rogge 2012: 265)

university. Since then, he has taught the disciplines of Anthropology and Archaeology in undergraduate courses, and since 1987, he has composed of the Post Graduation Program in History (M.A. and Ph.D.).

Since 1969, he is a researcher of the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq – acronym in Portuguese for "National Council for Scientific and Technological Development"). Nowadays, he is as representative before government agencies such as CNPq, Instituto do Patrimônio Histórico e Artístico Nacional (IPHAN – acronym in Portuguese for "Institute of National Historical and Artistic Heritage") and the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES – acronym in Portuguese for "Coordination for the Improvement of Higher Education").

Major Accomplishments

The major contribution of Pedro Ignacio Schmitz to archaeology is linked to research conducted in various regions of Brazil, besides the institutionalization, development, and popularization of the archaeological science; the instruction of several generations of archaeologists, sociocultural anthropologists, and ethnohistorians; and the preservation and appreciation of the national archaeological heritage.

Schmitz was one of the founders of the Sociedade de Arqueologia Brasileira (SAB – acronym in Portuguese for "Society of Brazilian Archaeology"), established in 1980, an entity that he not only came to preside during several periods (1980–1981; 1981–1983; 1989–1991) but also took part in its board of directors in other moments. He also occupied important spaces in public agencies charged of the promotion, support, and authorization of archaeological research in Brazil. Many archaeologists worked under his direct influence in the beginning of their careers: Adriana Schmidt Dias, Altair Sales Barbosa, Ana Luiza Vietti Bitencourt, André Luiz Jacobus, Arno Alvarez Kern, Fabíola Andréia Silva, Irmhild Wüst, José Luis dos Santos Peixoto, Marco Aurélio Nadal De Masi, Maribel Girelli, Pedro Augusto Mentz Ribeiro (1936–2006), Rodrigo Lavina, Sílvia Moeleck Copé, and others who, like me, had a passage at the IAP at the beginning of their professional careers (Eremites de Oliveira 2008). Some other colleagues, as André Osorio Rosa, Ítala Irene Basile Becker, Ivone Verardi, Jairo Henrique Rogge, and Marcus Vinicius Beber, either worked or still work under his coordination in the institution. All these people received certain influence from the epistemological model of PRONAPA. Schmitz has also been keeping himself up to date, by following the new contributions registered in World Archaeology, which can be noticed in his most recent works.

Cross-References

- ▶ Brazil: Cultural Heritage Management Education
- ▶ Brazil: Historical Archaeology
- ▶ Laming-Emperaire, Annette
- ▶ Meggers, Betty Jane

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Schuyler, Robert L.

Deborah I. Olszewski
Department of Anthropology, University of Pennsylvania, Penn Museum, Philadelphia, PA, USA

Basic Biographical Information

Born in 1941, Robert L. Schuyler is Associate Professor in the Department of Anthropology (University of Pennsylvania) and Associate Curator-in-Charge of the Historical Archaeology Section (University of Pennsylvania Museum of Archaeology and Anthropology). He received his B.A. in Anthropology from the University

Schuyler, Robert L., Fig. 1 Robert L. Schuyler (Photo credit: University of Pennsylvania Museum of Archaeology and Anthropology, photographer Lauren Hansen-Flaschen)

of Arizona and his M.A. and Ph.D. in Anthropology from the University of California-Santa Barbara (Fig. 1).

Schuyler has directed several fieldwork projects, including investigations of Potomac River Native American sites from the Contact period (seventeenth to eighteenth centuries); the Sandy Ground, Staten Island, nineteenth–twentieth-century African-American oystering community; the boarding houses of female factory workers in the town of Lowell, Massachusetts, which was one of the first large cities in America to undergo industrialization in the early nineteenth century; and the short-lived silver mining town of Silver Reef, Utah (c. 1877–1887).

His current fieldwork research is the South Jersey Project, which is developing the story of Vineland, New Jersey, from the 1860s to the present, in partnership with the Vineland Historical and Antiquarian Society. His innovative approach in this project is historical ethnography, which combines archaeology, archival documents, oral histories, and the study of living communities; it is a framework for historical archaeology that he describes as "the only archaeology in which the subject matter is still forming." The South Jersey Project is part of a new research domain, the archaeology of the twentieth century, and Schuyler's particular interests are in understanding the processes underlying how an agricultural center of the mid- to late 1800s came to have the largest municipal boundaries in present-day New Jersey.

Major Accomplishments

Schuyler is a founding member of the Australasian Society for Historical Archaeology, the Society for Commercial Archaeology, the Society for Post-Medieval Archaeology, and the Society for Industrial Archaeology, among others. He also is a member of the Society for Historical Archaeology (President 1982), the Council for Northeast Historical Archaeology (President 1980–1981), the American Anthropological Association, the Society for American Archaeology, and numerous other national, regional, state, and local organizations.

After arriving at the University of Pennsylvania, he developed a Ph.D. program in historical archaeology based on historical ethnography (see above).

In 2009, he received the J.C. Harrington Medal in Historical Archaeology from the Society for Historical Archaeology for his scholarly, educational, and professional activities in the discipline.

Cross-References

- ▶ Archaeology as Anthropology
- ▶ Archaeology: Definition
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Australasian Historical Archaeology
- ▶ Dating Methods in Historical Archaeology
- ▶ Historical Archaeology

- ▶ History and Archaeology: Relationship Over Time (US Perspective)
- ▶ Industrial Archaeology
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Modern World: Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ North America During the European Contact Period
- ▶ Postcolonial Archaeologies
- ▶ Post-Medieval Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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Science Communication in Archaeology

Alison Melville
Anthropology, University of Connecticut, Storrs, CT, USA

Introduction

Archaeology is uniquely positioned among the sciences to communicate socially relevant scientific content. Through the interpretation of cultural artifacts and human behavior, archaeology can communicate the human story that lies behind the scientific data. Commitment to public communication by archaeologists brings benefits to both society and the discipline. New communication opportunities that challenge traditional knowledge hierarchies have developed from web-2.0 innovations, post-processual thinking, and changes within academia and mass media. Communicating archaeology to nonscientists requires a flexible approach which emphasizes the relevance of research to contemporary issues. Although public communication is considered important, (it rarely features in the day-to-day work of archaeologists), archaeologists are not typically trained in public engagement techniques and they can find it difficult to transition between academic and public communication platforms.

Definition

Presenting archaeology to nonscientists traditionally means disseminating research produced exclusively by experts to a largely uniformed public. Contemporary ideas of communication, however, focus on how information is received and understood by multiple audiences using dialogue, engagement, and participation. Archaeological communication across print, television, exhibitions, and the web can be educational, public relations, or democratic. Engaging with public audiences is increasingly a core part of an archaeologist's role and involves engaging with challenges, tensions, and differing perspectives.

Key Issues/Current Debates/Future Directions/Examples

Archaeology has always generated fascination outside of academia. As a result, archaeologists encounter media communication issues more frequently than researchers in many other sciences. Successful communication requires archaeology to be *received* and *understood* by the intended

recipients, in addition to the information being disseminated. Communicating archaeology to nonspecialists has become synonymous with wider debates about public engagement in science. Under an engagement model, two-way dialogue and participation are as important as education (Clack & Brittain 2007; Holtorf 2007).

Science communication has benefits for both society and archaeology. Public outreach builds support for research projects and can positively influence archaeological funding. Since1997, the USA's National Science Foundation has required explicit consideration of the broader impacts of research in every funding proposal. Enthusiasm and fascination for archaeology presented in the mass media inspires future generations of archaeologists. Engaging with communities can smooth excavation processes, build positive indigenous relationships, reduce illegal artifact trading and the looting of archaeological sites, and even lead to new research questions and directions. A more informed public can help combat scientific misinformation on issues such as evolution, climate change, environmental degradation, and cultural and genetic diversity. Communities working in partnership with archaeologists also benefit from group participation that enrich shared identities or reduce community divisions (Simpson & Williams 2008; Byrne 2012). The benefits of communication are therefore widely recognized, but knowing how to begin in nonacademic communication is less widely understood (Harding & Vencolvá 2007).

There are many models for communicating archaeological knowledge. Holtorf (2007) outlined three models – the educational, public relations, and the democratic – that address differing objectives of communication. The education model is based on a unidirectional and hierarchical flow of information from knowledge-keeping experts to uninformed nonspecialists. In the public relations model, archaeology is a brand aimed at fostering a positive public image to provide benefits in terms of funding and public support. In the early twentieth century, Mortimer Wheeler was adept at using the mass media to obtain financial support for his excavations (Clack & Brittain 2007). The third model, the democratic model, is directed at the needs of the nonacademic community. From this perspective, communication is equal, participatory, and conducted in partnership. All three models are complementary in addressing different communication needs in archaeology.

Communication is essential to archaeology, but is it the responsibility of the journalist or archaeologist? Increasingly, it is viewed as a core part of an archaeologist's job, but as a time-intensive activity, it requires goodwill as well as skill to be done well. Archaeologists are not formally rewarded for participating in communication activities, and they have to justify time spent away from research to their institutions and colleagues. Although scientists have the ingredients – knowledge and enthusiasm – for successful communication, scientific training does not reflect this growing expectations of archaeologists. Academic communication styles and specialist terms must be abandoned to avoid constructing boundaries with audiences (Harding & Venclová 2007). There is no room for jargon and minute detail in public communication, but these are the standard tools of academic writing.

Confusion about how to communicate, the amount of time to dedicate to it, and who the audience is means archaeologists continue to rely on mass media to communicate the impact of their research. Over the last few decades, changes in both academic and journalistic professions have resulted in both sectors re-prioritizing their relationship to one another. This closer working relationship has required archaeologists and journalists to change their perceptions of each other (Clack & Brittain 2007). Archaeologists understandably fear misrepresentation in the media and are concerned with journalistic appreciations of accuracy, detail, and uncertainty. However, archaeologists often mistake the role of the media as serving the needs of academic publishing. Journalists can, and often do, produce balanced and informative archaeological stories with mass appeal that connect to wider issues despite using completely different rules of communication (Scherzler 2007). Many archaeologists (Brian Fagan, Paul Bahn, Francis Pryor,

and Simon James come easily to mind) have skillfully communicated archaeological messages through online sites and in popular books, radio, and television. Rathje and Murphy's (1992) study of urban rubbish illustrates how seemingly pointless trash can become a hot media story when connected to contemporary social, political, and environmental issues.

Television is the most influential medium for cultivating public perceptions of archaeology to mass audiences (Holtorf 2007). Visual storytelling is far removed from academic communication styles and herein lies much of the tension with archaeology on television and archaeology in academia. Archaeologists have bemoaned the trivialization of complex topics and archaeological stereotypes perpetuated by archaeological programming. On the other hand, such programming has increased fascination and interest in archaeology and can counteract nonacademic and fantasy representations of archaeology (Holtorf 2007). Thoughtful archaeological programming, such as the United Kingdom's *Time Team* or *Britain AD*, can bridge the gulf between popular culture and informative entertainment (Clack & Brittain 2007). The prominence of archaeological programming since the early days of television demonstrates and nourishes the public demand for archaeology. In the 1950s, Mortimer Wheeler and Glyn Daniel were named British Television Personality of the Year for their roles in the archaeological shows *Animal, Vegetable, Mineral* and *Buried Treasure* (Clack & Brittain 2007). *Time Team*, the longest running archaeological series in the history of television, broadcasts its final and 20th season in 2013. This series, along with the "Indian Jones effect", is often held responsible for the increase in British university archaeology applications since the 1990s.

The internet and digital multimedia are increasingly encroaching on the supremacy of television as a medium for communication. Web 2.0 and user-generated content has democratized communication. Consumers of culture are now the producers of culture, and so, the separation of archaeologists and the public in generating knowledge has become blurred. Archaeology is now communicated and accessible 24/7. Conversations and opinions from both experts and the public can happen in real time. While archaeological misinformation abounds on the internet, there is also a wealth of informed and reliable online journals, blogs, websites, and video lectures. Unlike print or television, digital media permits communication to be layered and self-exploratory. Deeper levels of a website can contain research details without cluttering the engaging and interactive content on the upper pages of navigation. *Archaeology Magazine's* interactive dig is a layered online experience that allows audiences to explore the processes of excavation along multiple pathways. In this evolving communication forum, archaeologists must be flexible in their communication approaches and consider how to tease apart their message at differing levels of detail.

Museums are well-established forums for archaeological education and debate and have been embarking upon informal, self-directed, and flexible communication experiences for even longer than digital media. Museum exhibits allow archaeological knowledge to be actively interpreted through individual readings of the past and can challenge traditional communication hierarchies between expert and nonspecialist (Barker 2010). The Darwin Centre at the Natural History Museum London is a revolutionary space that breaks down the physical barrier between curators, objects, and visitors and in which learning is focused on interaction and participation. Museum exhibitions also illustrate the popular appeal of archaeology. For example, international touring Terracotta Army exhibit between 2008/2009 generated vast media coverage worldwide and caused ticket sell-outs and long queues in every country it visited.

The most direct and democratic communication that archaeologists are likely to have with nonspecialists is through public archaeology initiatives. Public archaeology is a diverse enterprise centered on public service through awareness of and engagement with the public in archaeological work. Beyond educational aims, it also encompasses public values, ideas, and

participation (Simpson & Williams 2008). Community archaeology, which emerged out of public archaeology, is specifically designed for, and substantially involves, local communities in research. Community-led communication and dialogue has been popular in historic and battlefield archaeology, postcolonial indigenous archaeology, and urban archaeology projects which have clearly identifiable stakeholder communities. Community archaeology is redefining how archaeologists value and use community knowledge. Rather than archaeologists seeking to impose their own knowledge on the communities with whom they work, communities contribute their own knowledge to the research exercise and in doing so shape and inform developing research questions (Byrne 2012).

Archaeological communication impacts political, ethical, and civic thinking. Communicating archaeology brings a range of benefits for academia, society, and local communities. While the media will always fixate on sensational discoveries of popular interest, such as the discoveries of Lucy (Johanson & Edey 1981) and Otzi (Bortenschlager & Oeggl 2000), much of archaeology is suited to mass communication if connections to contemporary issues are made clear. On local scales, open community dialogue involves cooperation and two-way information flow. Yet, archaeologists face some communication challenges. They must find a way to both conduct and communicate research as part of their daily roles. Communication styles must be designed for each medium and for different audiences. As communication is ever more directed by the recipient rather than the producer, archaeologists must also reorientate themselves as knowledge facilitators rather than knowledge guardians.

The future of archaeological communication is positive. Public appetite for archaeology remains strong, and the diversification of communication channels offers greater opportunities to reach wider audiences. Communicating archaeology in the mass media has, and will continue to have, an influential role on the perception and understanding of archaeology.

Cross-References

- ▶ Activism and Archaeology
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Outreach
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ Heritage Values, Communication of
- ▶ Heritage: Public Perceptions
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Internet, Archaeology of the
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Material Culture and Education in Archaeology
- ▶ Media and Archaeology
- ▶ Popular Culture and Archaeology
- ▶ Preserving Heritage: The Role of the Media
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Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia

Manuel San Román
Centro de Estudios del Hombre Austral, Instituto de la Patagonia, Universidad de Magallanes, Punta Arenas, Chile

Introduction

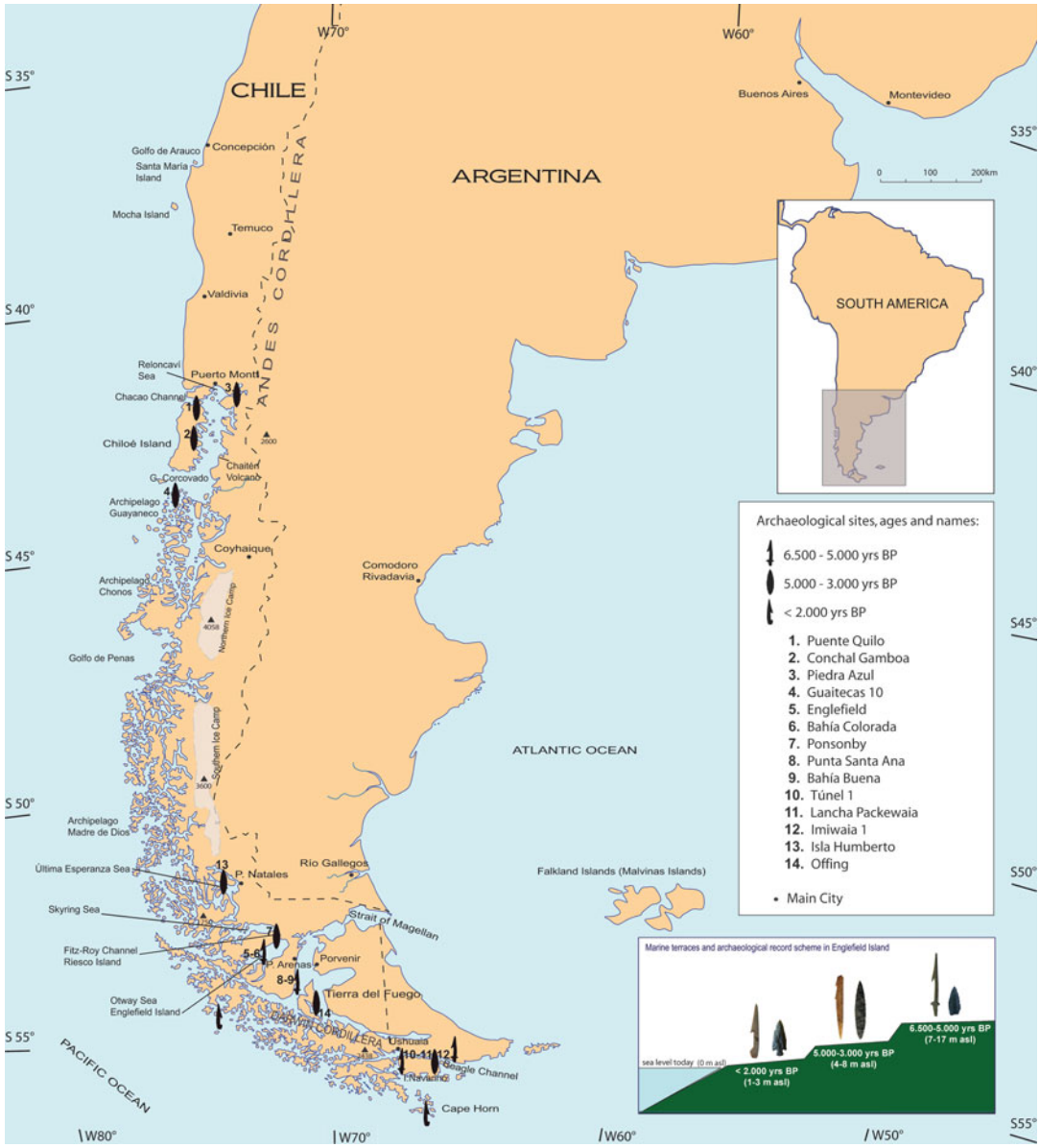
Patagonia is the southernmost tip of South America and in general terms is constituted by two sharply contrasting territories. The first corresponds with the eastern slopes of the Andes Cordillera and is characterized by plains and plateaus, a semidesert climate and steppe and shrub vegetation, extending to the Atlantic coast. This part was occupied by land hunter-gatherers from the late Pleistocene to the early twentieth century. The second belt characterized by a vast archipelago occupies the western slope of the Andes from the Chacao Channel (46° south latitude) to Cape Horn (56° south latitude). In this region, ethnographic and historical information describes three ethnic groups, which include from north to south: Chonos, between Chiloé Island and Tres Montes peninsula; Alacalufes or Kawésqar, from the Gulf of Penas to Brecknock channel; and Yamana or Yagan, who lived from Brecknock to Cape Horn (Fig. 1). The three groups shared livelihoods based on hunting, gathering, and fishing of marine species and the use of navigation technologies basically canoes built with sewn planks (Chonos) or bark (Alacalufes and Yamana) (Bird 1946; Cooper 1946; Gusinde1986[1937], 1991 [1974]; Emperaire 2002 [1963] Lothrop 2002 [1928]). From a linguistic point of view, these ethnic groups shared a common trunk that diverged about five millennia ago (Viegas Barros 2005). Archaeological data establishes that the oldest sites of marine hunters for the southern cone of South America are concentrated in the south and reach 6,500 years BP. This period overlaps with the pick of the worldwide mid-Holocene marine transgression and with a general temperature and moisture increase associated with a major outbreak of forest cover. The origin of these adaptations is still under discussion, as well as the colonization of this vast coastal region.

Following, the main geographical features of the archipelagic region, the implications of different geological processes in sea-level changes and coastal evolution, and the main features of early Patagonian marine hunters are considered. Then, after outlining the history of archaeological research in these topics, we will present a brief summary of key issues under discussion for this subject, considering the origins of these adaptations and cultural evolution of marine hunter settlement in the southern cone of South America.

Definition

Environmental Characteristics of the Southernmost South American Pacific Coast

An intricate archipelago develops south of Chacao Channel (46°South Latitude) up to Cape Horn (56° South Latitude); it describes an arc approximately 1,800 km long, with an average width of 120 km from the Pacific coast to the foothills of the Andes Cordillera. The Patagonian archipelago has an estimated length of over 19,000 km of coastline (Bird 1988). The main factor that shaped the topography of this region corresponds to the erosive action of Quaternary glaciations that carved an intricate system of valleys, later flooded during the Holocene rise of



Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 1 Localization map with main marine hunter archaeological sites from Patagonia

global sea level. The central zone between the Gulf of Corcovado (43°50′ South Latitude) and Última Esperanza Sea (51°50′ South Latitude) presents two continental ice fields and major mountain ranges that significantly limit pathways between the Pacific and Atlantic basins. In addition, the circulation is severely restricted due to steep coastlines and the presence of many front glaciers that divide the continental shore.

Dominated by a humid climate, with rainfall averaging 5,000 mm per year in the western band, this region is dominated by dense forest and peat

bogs. The marine fauna is rich and varied. The most abundant marine mammals are pinnipeds (*Arctocephalus australis*, fur seal, and *Otaria flavescens*, sea lion), and whales and dolphins are also frequently recorded. Terrestrial fauna is much more limited and includes two species of deer (*Hippocamelus Bisulcus* and *Pudu puda*) and a camelid (*Lama guanicoe*), although the latter is recorded only in the extreme northeast and southeast of the area. Edible vegetables are rare and had a minor role in the human diet.

Coastline Evolution

Since the late Pleistocene period, much of the extensive coastline and mountains were covered by great ice masses, and during the Late Glacial Maximum (LGM), the sea level was about 120 m below the current level. In this period, the Pacific coast was located further to the west of its current position, and large basins and fjords were occupied by ice or proglacial lakes. Hereafter, with glacier retreat and gradual rise in sea level starts a process of maritization, a quick shoreline modification which along the Holocene will shape the archipelago as we know it today. For example, toward 8,000 years BP, Tierra del Fuego Island is separated by the opening of the Strait of Magellan and the same applies to Navarino Island with the formation of the Beagle Channel, in the far south. This process of sea-level rise reaches its peak some 6,000 years ago, and sea reached current levels around 500 years ago. As for the specific case of the central part of the Strait of Magellan, between continental Patagonia and Tierra del Fuego, the marine transgression reached an elevation of about 3.5 masl near 6,000 years BP. Because of isostatic rebound, marine terraces have decreasing elevations from west to east between 10 and 3 masl, as the western areas covered by ice during the last glacial advance have increased isostatic rise, compared to the eastern portion that was ice-free during this period (Porter et al. 1984; McCulloch et al. 2005).

Changes in sea level combined with tectonic and isostatic processes acted differentially in coastal evolution of Patagonian archipelago shorelines. From the Gulf of Penas northward starts tectonic plate contact which stretches for thousands of miles along the Pacific coast of South America, between the Nazca and South American plates. This conjunction gives origin to an important tectonic activity associated with plate subduction, resulting in an intense process of sinking and/or uprising, periodically triggering large-scale seismic activity that often is associated with the generation of tsunamis. There are few measurements for central and northern Patagonian archipelago coastal evolution. However, it has been established that during the mega-earthquake of Valdivia (1960, 9.5 MW), a band between the Chacao Channel zone and Gulf of Penas would have sunk up to 2.4 m while some islands located west of the area rose to 5.7 masl (Plafker & Savage 1970). South of the Gulf of Penas, tectonic activity is less intense and is controlled by other factors. For example, in the east-central part of the Strait of Magellan, Holocene marine terraces of different ages are observed, while in the western portion, these terraces are absent. This is due to tectonic activity associated with a fault system that would have caused vertical movements of the crust in this specific area (McCulloch et al. 2005; Cisternas & Vera 2008).

Early Marine Hunters from Patagonia, Archaeological Assemblages

The available information is concentrated in the southern and northern ends of the archipelago, because archaeological research has focused in these areas. At the moment, the vast central archipelagic zone record is limited to late Holocene sites.

In the southern zone, we find the oldest records of marine hunter-gatherers with navigation media, at sites located within the Otway Sea-Strait of Magellan and Beagle Channel-Navarino Island localities. The archaeological sites have been dated between 6,500 and 5,000 years BP and are located at altitudes between 7 and 17 m, usually associated with ancient Middle Holocene marine land forms. The most important traits of material culture are present on bone tools as detachable harpoon points with one or two barbs and cruciform base, multi-denticulate harpoons,

chisels on pinniped ulnas, cruciform base stemmed wedges on whalebone, and ornament artifacts as pendants on drilled or grooved pinniped incisors. Lithic artifacts are characterized by subtriangular projectile points, knives, other instruments with elongated edges, and fishing-line weights with grooves and/or side notches. We highlight the use of a volcanic rock, a green obsidian whose source is unknown at present and that is recorded in the vast majority of archaeological sites in the southern region. The faunal assemblages are dominated by fur seals, birds, and fish, and shell middens are described as characteristic features. The presence of sites on islands confirms the existence of well-developed navigation technologies. This assemblage has been defined as a cultural tradition called *Englefield* (Fig. 2).

In the same area, between 5,000 and 3,000 years BP, cultural evidence showing technological changes is recorded in archaeological sites including the presence of large lithic lanceolate projectile points, in concordance with less frequent bone harpoon points and the virtual abandonment of green obsidian use (Fig. 3). The quantifications of exploited fauna indicate an increase in guanaco hunting. The sites are located between 4 and 8 masl, associated with sea-level regression and coastline retraction during this period.

The northern end of the archipelago earliest archaeological records are somewhat less antique, spanning from 5,500 to 4,000 years BP, and include sites emplaced between Reloncaví Sea and Gulf of Corcovado (Guayaneco Archipelago). Artifact assemblages are characterized by lanceolate projectile points carved bifacially and fishing-line weights with side notches, among other tools (Fig. 4). Exploited fauna consisted mainly of sea lions, fish, and seabirds, with important shell midden accumulations. The location of sites varies between 0 and 10 m, elevation differences related to local variations in sinking and/or uplifting tectonic processes in this area. Interaction between groups in this area is attested by the presence of obsidian artifacts from a rock source located at Chaitén Volcano.

Historical Background

Research in the pacific southern coast began with ethnological work in the far south, associated with the description of the last Yamana (Gusinde 1986[1937]; Lothrop 2002 [1928]; Martial et al. 2007 [1888]) and Alacaluf ethnic groups (Gusinde 1991 [1974]; Emperaire 2002 [1963]). Nevertheless, the first archaeological excavations go back to the 1870s in Isabel Island, in the central part of the Strait of Magellan (Borrero et al. n.d.). Later, ethnological work led to initial questioning of the antiquity of marine hunter population, and estimates based on observations of shell deposit accumulation rates, elevation of sites above sea level, and isostatic lifting rates calculated for that epoch were made in the decades of 1920 and 1930 (Bird 1946; Lothrop 2002 [1928]). They reached pioneer dates with a maximum around 2,500–5,000 years BP. In this period, Junius Bird carried out test pit excavations in different areas of the archipelago, developing an initial cultural outline and periodification for the southernmost area, but details were never published.

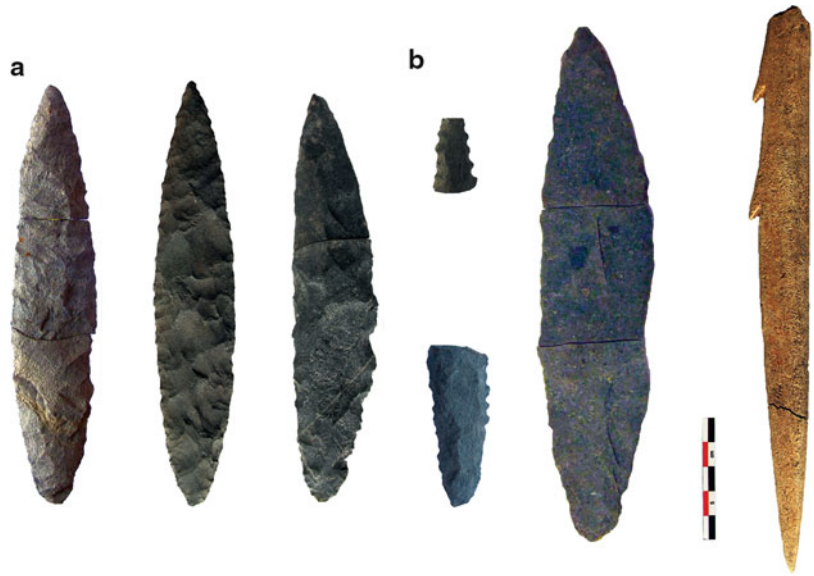
Systematic archaeological excavations would begin in the southern end between the 1950s and 1960s, conducted by the French ethnologist and prehistorian Joseph Emperaire within the Otway Sea. His excavations at Englefield, located on an ancient marine terrace on the homonymous island, led to the first characterization of an early marine hunter group in Patagonia. Another relevant site excavated by Emperaire, called Ponsonby, is located along the Fitz-Roy Channel. The locus offered the first description of an assemblage dominated by lanceolate projectile points and other bone and lithic artifacts that markedly differed from those recorded in Englefield. The site survey was interrupted by the tragic death of Emperaire who died buried by sediments during his excavation work.

During the first half of the 1970s, the work of Chilean archaeologist Omar Ortiz-Troncoso allowed discovering two new sites on the Strait of Magellan shoreline, with a similar assemblage to those described in Englefield Island.

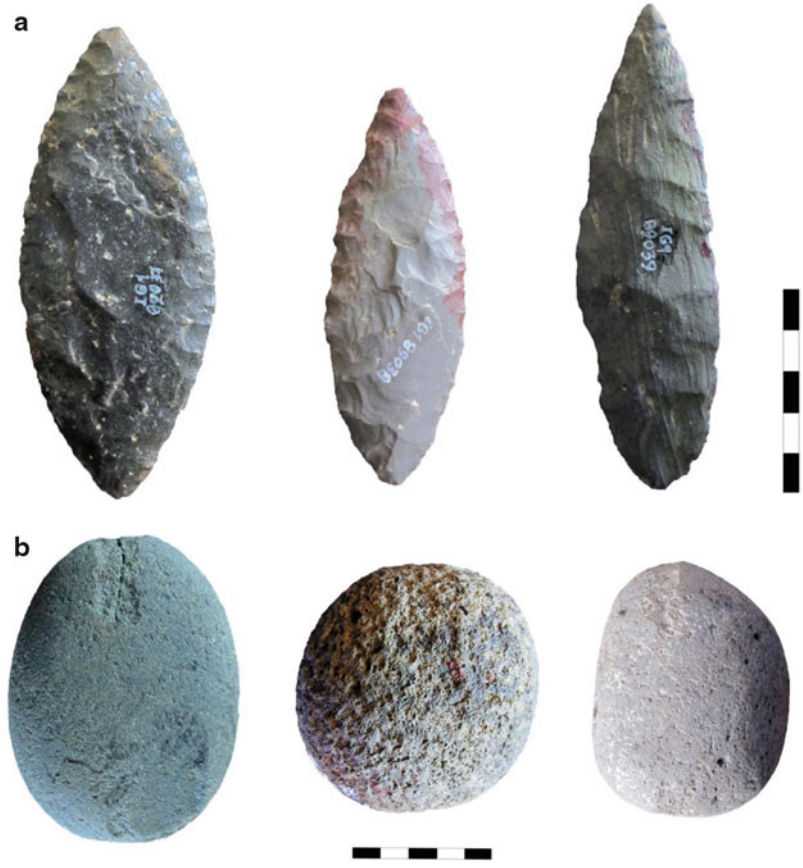
Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 2 Lithic and bone artifact assemblage from early marine hunters, Englefield Tradition: (**a**) harpoon points with one and two barbs and cruciform base, (**b**) chisels made on pinniped ulnas, (**c**) pendants on pinniped perforated teeth, (**d**) green obsidian bifacial-knife instruments, (**e**) fishing-line weights and (**f**) subtriangular projectile points (green obsidian)

Excavations at sites Punta Santa Ana and Bahia Buena confirmed the technological and economic relationship, integrating them as a cultural tradition with a 1,500-year phase. The dates obtained in the Strait of Magellan were located in a range between 6,400 and 5,200 years BP.

At the southernmost end of the archipelago, specifically on the north shore of Beagle Channel, archaeological research started in the mid-1970s led by Argentinean archaeologists Luis Abel Orquera and Ernesto Piana. Their research developed and characterized an archaeological



Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 3 (**a**) Large lanceolate lithic projectile points and (**b**) harpoon point from sites in Southernmost Patagonia dated between 5.000 and 3.000 years BP



Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 4 Lithic artifact instruments from early marine hunters of northern Patagonian archipelago, spanning between 5.500 and 4.000 years BP: (**a**) lanceolate lithic projectile points and (**b**) fishing-line weights

sequence for the settlement of marine hunters in this zone. Excavations at Tunel 1, Imiwaia, and Lancha Packewaia sites, located on the southern coast of Tierra del Fuego Island, allowed recording a peopling sequence spanning the last 7,000 years BP. The earliest evidences, with dates around 7,850 years BP in the layer S of Imiwaia and 6,800 years in the first component of Tunel, were interpreted as brief occupations generated by terrestrial hunters and with no ties to later assemblages of marine adaptation groups. Following the stratigraphic sequence, further above in the second component of the Tunel I site and Imiwaia are dated between 6,400 and 4,300 years BP, the sites render another assemblage. The material cultural verifies an association with the bone and lithic industry described in Englefield, highlighting the same detachable harpoon points with cruciform base, multi-denticulate harpoons, chisels on pinniped ulna, and cetacean bone wedges. Outstanding decoration is invested on bone tools, and various ornament artifacts, including pendants on pinniped incisors, are recorded. A peculiarity of Beagle Channel assemblages is related to morphological variations in harpoon points with cruciform base. The stone tools are similar, stressing the rare but regular record of green obsidian artifacts that attest interaction between early human groups settled in the Beagle Channel and the Strait of Magellan-Otway Sea. In relation to Lancha Packewaia site, there are two stratigraphic assemblages, an old component dated near 4,200 years BP and another recent group of artifacts dated after 1,600 years BP. The former component is noted because of its striking similarities with Ponsonby site, dominated by big lanceolate lithic projectile points and fauna records that attest an important role of guanacos in the diet (Orquera & Piana 1999, 2009; Orquera et al. 2012).

During the 1980s, the French Archaeological Missions in southern Patagonian archipelagos are restarted by Dominique Legoupil. The excavation of Bahia Colorada site, located on a high terrace in the eastern coast of Englefield Island, allowed her to characterize in great detail this assemblage, defined thereon as Englefield cultural tradition. Another landmark was the reassessment of the Ponsonby site, describing an occupational sequence of seven millennia. The earlier component has a chronology in the order of 7,000 years BP, but few materials, of little diagnostic value, were found in association with faunal remains of guanaco. This archaeological level was interpreted as the result of ephemeral terrestrial hunter campsite activities at a time prior to the opening of the Fitz-Roy Channel and Riesco Island. Further up, the main component of Ponsonby site is associated with a rich lithic industry characterized by large lanceolate projectile points and the predominance of guanaco consumption, with dates between 5,000 and 3,000 years BP. This assemblage shows remarkable similarities with the Lancha Packewaia site oldest component and corresponds to a second cultural tradition for southern Patagonian marine hunters.

Research in the northern archipelago started later, noting at the beginning of the 1970s the publication of Chilean archaeologists Cristian Diaz and Marcelo Garretón informing about the systematic excavation of Conchal Gamboa site, a big shell midden located on the eastern coast of Chiloé Island. This work is the first description of marine hunter-gatherers context. From the collection, we can note the lithic lanceolate projectile points and some decorative elements made on bones and shells (Diaz & Garretón 1972–73). This site was not radiocarbon dated and remained an isolated reference to early canoe groups in the area until the late1980s, when researcher Charles Porter discovered and characterized the site Guaitecas 10, located immediately south of the Gulf of Corcovado and dated around 5,000 years BP. Porter's work was pioneer in highlighting the impact of tectonic subsidence phenomena and its relevance in differential preservation of archaeological evidence in the northern Patagonian area (Porter 1993). After the 1990s, new evidence of early settlement of hunter-gatherers resulted from the excavations conducted by archaeologists Carlos Ocampo, Pilar Rivas, and Eugenio Aspillaga at Puente Quilo site, north of Chiloé Island (Ocampo & Rivas 2004), and Nelson Gaete rescue excavation in Piedra Azul site, recovered on the shore of Reloncaví Sea (Gaete et al. 2004). These sites

correspond to shell middens with stratigraphic sequences of occupation ranging from 5,500 years BP until at least the first millennium AD. In general, the assemblages are associated with early industry markers: big lanceolate lithic projectile points carved bifacially, fishing-line weights, and some contexts also include multi-denticulate bone harpoons.

Key Issues and Current Debates

Origin of Maritime Adaptations for the Southern Pacific Coast of South America

One of the main questions of the prehistory of the Patagonian archipelago is the origin of marine adaptations. The explanation of the peopling process is held by two main hypotheses. The first supports a local origin from pedestrian hunter groups that would have developed specialized technologies for the exploitation of marine resources (harpoons, fishing techniques) and a transport media – canoe – which would have allowed colonizing this region. Two likely areas for the development of this process have been indicated: the northern archipelago, which includes the Reloncaví Sea and Chiloé Island (Ocampo & Rivas 2004), associated with a lanceolate projectile point tradition and the southern archipelago, near the Strait of Magellan and/or Beagle Channel, linked to the development of the Englefield cultural tradition (Legoupil & Fontugne 1997; Orquera 2005; Orquera & Piana 2009).

The second hypothesis bases its explication on migration of hunter-gatherer groups equipped with water transport, canoeists which would have arrived in the archipelagic region from the north, along a Pacific coastal route.

Among arguments pro or against the hypothesis of the origins of these prehistoric human adaptations, we must note that older ages for sites in the southern end suggest a local source. But in return, the early records show a high degree of technological specialization (harpoons, deep-sea fishing, navigation aids). A reasonable expectative that could support local origin as explanation of this maritime adaptations would be to find older evidences and cultural traits of evolving local development describing different stages of experimentation and adaptation to marine environments. Nevertheless, this evidence has not been recorded for the area. Furthermore, the second hypothesis of migration of populations from the Pacific coast is not supported by existing data, as the northern coast sites from Chacao Channel upward possess ages considerably lower than early sites from the southern end.

A core issue to verify any of the alternatives for the origins of maritime settlement in Patagonia lies on the scarcity of coastal sites that predate the Holocene marine transgression. This fact could be explained because the shorelines would have been submerged and/or eroded during this period of marine transgression. The only sites currently registered that correspond are Ponsonby – initial occupation – in Fitz-Roy Channel and Tunnel I first component and Imiwaia I ancient occupation in southern Tierra del Fuego. Nevertheless, these assemblages have been interpreted as a result of the occupation of terrestrial hunters (Legoupil 2003; Orquera et al. 2012).

Cultural Trajectories in Maritime Settlement

As for the cultural evolution of coastal settlement, we can state that in the northern archipelago, in Chiloé Island and Reloncaví Sea, researchers describe continuity in technological traditions and subsistence during the hunter-gatherer occupation periods, noting that during the last millennium, pottery is recorded in association to the arrival of horticultural populations of Huilliche-Mapuche ancestry.

South of Gulf of Corcovado prehistoric groups keep a hunter-gatherer lifestyle unto historic times. However, there are different interpretations as to whether or not there was cultural continuity along the sequence, particularly in the case of the southern end. For Piana & Orquera (2007), the archaeological sequence shows a remarkable continuity, homogeneity, and stability over time, considering the subsistence elements, lithic and bone tools, and lifestyle in general. Other researchers argue that there would be a major change from the appearance

Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia, Fig. 5 Late marine hunter artifacts dating from the last 2.000 years BP: (**a**) characteristic bone harpoon points that last up to ethnographic times and (**b**) lithic pedunculated projectile points (green obsidian and cherty rocks)

of assemblages related with big lanceolate projectile points, remarking these sites as constituting a different cultural tradition, possibly related to assemblages described in the northern part of the archipelago (Morello et al. 2002; Ocampo & Rivas 2004; Schidlowsky 2004). Evidence supporting the identification of different traditions is based on both the appearance of new stone-tool designs, involving operational chains and methods of fabrication, as well as the abandonment of green obsidian lithic raw material use, particularly in the Strait of Magellan-Otway Sea area, where the source would be located. Among the hypotheses that would account for the emergence of a new cultural tradition, the possibility of migration of marine hunter groups from the northern area is raised. While a common hunter-gatherer marine lifestyle is a constant for 6,500 years, it is clear that there are changes in technology and wildlife resource exploitation. Current discussions are focused on the processes which could explain the changes perceived in the archaeological record through time. The argument that supports the notion of continuity tends to interpret these changes in technology and use of raw materials as innovation or diffusion involving no fundamental cultural change (Orquera et al. 2011). The counter arguments indicate that changes in technology and in the use and knowledge of certain raw materials involve cultural aspects that must be transmitted from generation to generation and characterize a distinct cultural tradition, therefore involving an essential cultural shift (Figs. 2–5).

International Perspectives

The study of the peopling of the Patagonian archipelago has a vast importance in the research on processes of colonization and effective occupation of the marginal end frontiers of the Americas. This region forms a distinctly marine environment, both because of its predominant wildlife

resources and its geographical setting, which makes it necessary the use of navigation media to travel around this intricate system of fjords, channels, and islands. The origins of maritime adaptation in Patagonia face us to a global problem related to the challenge of identifying archaeological evidence previous to the coastal marine transgressive phenomena (Massone et al. 2013). Researches in other areas of the Americas have determined coastal occupation records of at least 10,000 years BP. Some of these sites are located in the coastal desert of southern Perú and northern Chile. Furthermore, the presence of hunter-gatherer populations in late Pleistocene continental areas adjacent to the archipelago makes it plausible to propose a much older appearance of marine adaptations in Patagonia than those reported to date. The search for information that would give support to this idea confronts us with a crucial methodological and theoretical duel, that of designing search strategies that allow exploring conditions that might have preserved this type of evidence.

Future Directions

The current state of knowledge about the prehistory of Patagonian archipelago is restricted to areas located inland, along the continental coast and/or located on islands nearby narrow channels that were covered by glaciers during the LGM. It is a paradox that until now no research efforts have been done to incorporate the extreme western pacific coastline. Free of ice since the late Pleistocene, this area currently concentrates the greatest number and diversity of fauna of the region, something that could not pass unnoticed by hunter-gatherer populations. These characteristics determine the importance of incorporating the area in future research efforts.

In addition to expanding research areas, the incorporation of survey designs based on geomorphological studies to help guide the search for areas that could preserve ancient coastlines from times preceding the Holocene marine transgression should be achieved. In this sense, it is relevant to explore areas where tectonic phenomena and isostatic uplift of the land crust could contribute to the preservation of this type of evidence. This line of work can substantially contribute new evidence to the debate about the antiquity of coastal settlement and mechanisms – being migration or local development and adaptation – that have operated in the colonization of the American border.

Cross-References

- ▶ Bird, Junius
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Monte Verde, Archaeology of
- ▶ Peopling of the Americas

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Second Modernity and the Second Phase of European Colonialism

Daniel Rhodes
National Trust for Scotland, Edinburgh, UK

Introduction

The impact of European Colonialism upon world cultures has been, and continues to be, undeniably profound. More and more in contemporary archaeology (and heritage studies) this impact is being recognized in the way we formulate our perception of the past. Whether our gaze be cast upon pre-colonial societies or colonial and postcolonial heritages, it is all unavoidably (it can be argued) viewed through the lens of the European colonial influence.

Definition

The term *Second Modernity* is a theory first developed by philosopher Enrique Dussel in relation to the historic period between the seventeenth and the second half of the twentieth

century. It refers to the idea that people who live under colonial rule are subject not only to Western economic and political forces but are also influenced in the way they see and think of themselves (and others) based upon a change in mindset brought about by Western influence and control. The *Second Phase of European Colonialism* is the period of world history when global mercantile activities led to the development of European colonies, most notably by Britain, Holland, France, and later Germany, and largely focused on Africa and India from the seventeenth century until colonial states began to acquire independence in the second half of the twentieth century. This is sometimes referred to as *New Imperialism* and follows the earlier period of European Colonialism (or *First Modernity*) that saw Spanish and Portuguese exploitation in the Americas. The two are inseparably linked in the way that the global historical activity that occurred during the Second Phase of European Colonialism resulted in the development of subaltern non-colonialist social theory such as Second Modernity.

Historical Background

Developed out of postcolonial studies and specifically Latin American Social Theory, the idea of Second Modernity was a response to Marx's lack of analyses of class struggle in Latin America and his apparent skepticism in the development of the bourgeoisie in non-European societies. The bourgeoisie were central to Marx's theory of social change, or "Universal History," as it was the bourgeoisie who represented the first revolutionary class in history and who (through maintaining the ability to control and revolutionize the means of material production) were able for the first time to actively influence and change social relations. This, however, he did not apply to feudal societies. It was the development of international markets through the tool of colonialism that Marx saw as the necessary stage through which a previously feudal society must pass before the creation of the revolutionary bourgeoisie. His assessment was, however, from a purely European perspective and the lack of investigation into the development of capitalism outside that of the European model (i.e., where colonial control implanted European structures into non-European geographies). As Castro-Gómez (2008: 262) observes, "Latin America was, it seemed to Marx, a grouping of semi-feudal societies governed by large landowners that wielded their despotic power without any organized structure." Colonialism is then, for Marx, a tool of capitalism and responsible for the overthrow of feudal societies in the march toward revolution. Colonialism in effect "delivers" capitalism and, by association, the revolutionary bourgeoisie. He did not see, as others have subsequently done, that colonialism is more than an economic or political phenomenon. And it was the study of this more expansive and socially pervasive impact of colonialism that lead to the growth of late twentieth-century subaltern social theories from former European colonies of which Second Modernity and the writing of Enrique Dussel was one.

Dussel argues that European modernity was founded on materiality that had been specifically created after Spain's sixteenth-century territorial expansion (Castro-Gómez 2008: 272). He goes on to argue for the historical existence of two modernities. This first began in the sixteenth century when the Christian Renaissance spread globally via Spain's colonial domination of the Americas, and the second was the colonial expansion into Africa and Asia by Britain, Holland, France, and later Germany.

Enrique Dussel was born in 1934 in La Paz, Mendoza, Argentina, and is best known as one of the founders of the movement known as the Philosophy of Liberation. His writing aims to dismantle the nature of European thinking by critiquing the Eurocentrism of modern philosophy and characterizes the dominant model of philosophy as one of European conquest over the rest of the world (in this way mirroring Said's ideas of "Europe" and the "Other" (Said 1978) and Wallersteins' (1980) world-system with its "Core" and "Periphery." In doing this Dussel (1995: 148-49) aimed to liberate non-European social discourse from the "Eurocentric myth of modernity":

> Modernity is not a phenomenon that can be predicated on a Europe considered as if it were an independent system, but only about Europe if it is conceived as a centre. This simple hypothesis completely transforms the concept of modernity, its origin, development, and contemporary crisis, and consequently it also transforms the content of late and post-modernity. In addition, I would like to introduce another idea that qualifies the former: Europe's centrality within the world-system is not the result of an internal superiority accumulated during the European Middle Ages about and against other cultures. It is instead a basic effect of the discovery, conquest, colonization, and integration (submission) of Ameri-india. This simple fact gave Europe the comparative and determinant advantage over the Ottoman-Islamic world, India and China. Modernity is the result of these events, not their cause. Therefore, it is the administration of that centrality within the world-system that would allow Europe to become something like "the reflexive consciousness" (the modern philosophy) of world history. . .Even capitalism is the result and not the cause of this conjunction between European expansion around the world and the centralization of the world-system.

As a result, any study of world heritages should recognize non-European cultures for the role they have in the reflective dominance of European cultural narratives.

Another important figure in the development of the idea of Second Modernity and its intrinsic tie to colonialism is Walter Mignolo. Mignolo developed a critique of Wallerstein's world-systems theory based upon Dussel's ideas of the (non-bourgeois) Hispanic world, arguing that "World-systems analyses is indeed a critique of Eurocentrism, but a Eurocentric critique of Eurocentrism" (Mignolo 2000: 314).

World-systems analyses are based upon a neo-Marxist model of economic history formulated primarily by Wallerstein in the 1970s and 1980s (Wallerstein 1980, 2005). It attempts to explain economic globalization, or supranational economic activity, through the concept of inequitable interrelation between national economic units. The model's primary supposition is that the economies of "the developing world" are in every way effected by (and should therefore be analyzed in terms of their relation to) the economies of the wider world, a world which is dominated by the USA, Japan, and Europe. Like Marx, Wallerstein argues that the modern capitalist world-system originated in Europe in the sixteenth century via the economic transformation from feudal organization to capitalist (Wallerstein 1980: 2005):

> . . .our original primary purpose was to show that most production within the capitalist world-economy that placed items for consumption on the market was the result of a long chain that did in fact cross frontiers, and that this had been so throughout the entire history of the capitalist world-economy from the long sixteenth-century to today (Wallerstein 2005).

Mignolo bases his criticism of Wallerstein's world-system on the opinion that the theory is simply another example of Western ideas being presented to non-European peoples as *the* model for critical analyses. In his explanation Mignolo quotes Darcy Ribeiro:

> In the same way that Europe carried a variety of techniques and inventions to the people included in its network of domination. . .*it also introduced to them its equipment of concepts*, *preconcepts*, *and idiosyncrasy that referred at the same time to Europe itself and to the colonial people*. The colonial people, deprived of their riches and of the fruit of their labor under colonial regimes, suffered, furthermore, the degradation of assuming as their proper image that was no more than the reflection of the European vision of the world. . .. (Ribeiro 1968: 63 in Mignolo 2000: 13).

In looking at cultural identity and modernity in Latin America, the Peruvian sociologist Aníbal Quijano also put forward the argument during the 1990s that colonial power cannot be reduced to economic, political, and military domination of the world by Europe, but that it also supports and spreads globally European models of the formation of knowledge in modernity (Castro-Gomez 2008: 280). This is what Gómez calls the "coloniality of power" and sees the action of colonization as attempting to replace Indigenous forms of knowledge with those more appropriate to the underlying aims of the controlling Western regime.

This relationship between capitalism, colonialism, and the control of the formation of knowledge can, arguably, be seen in the histories of the expansion of mercantilism across national frontiers throughout the world in the later

European historic period (closely linked to Britain's industrial revolution and France's bourgeois revolution). The period categorized the Second Phase of European Colonialism.

Portugal (in alliance with Spain) was the world's major colonial power during the first phase of European Colonialism in the sixteenth century. This was to begin to diminish in the seventeenth century, a fall which was precipitated by the defeat of the Spanish Armada in 1588. By 1600, the formerly dominant Portuguese maritime establishment was in no state to counter the dual mercantile threat of the new royally chartered English East India Company and, in 1602, the Vereenigde Oost-Indische Comagnie (Dutch East India Company). The East India Company (EIC) was first established in 1600 as a joint-stock association of English merchants under the title of "The Governor and Company of Merchants of London Trading into the East Indies," the "Indies" being defined as the lands lying between the Cape of Good Hope and the Straits of Magellan. The aim in trading in the Indian Ocean for both the English and the Dutch was not Africa or India primarily, but Indonesia or the Spice Islands beyond. During its first 10 years the EIC sent 17 ships to Asia, in contrast to the VOC's 134. The result being that the Dutch were able to establish trade settlements at Java and Moluccas, Batavia (to be capital of their eastern empire) in 1607, Malacca in 1641, Mauritius in 1644, Table Bay in 1652, and Ceylon (taken from the Portuguese) in 1658. By the end of the century their "factories" and forts were dotted all over the East – in the Persian Gulf, on the coast of India, and the Malayan archipelago. The EIC was largely confined to Surat (1612), Madras (1639), Calcutta (1650), and Bombay (1665). This inequality of settlement numbers is also indicative of the different approaches to overseas trade at this time by the English and Dutch. In contrast to the VOC the EIC remained independent of direct state ownership (being answerable instead to company shareholders) and promoted its activities upon the basis of free enterprise.

By 1784 there was sufficient support in the British parliament for Prime Minister Pitt to introduce the *India Act*. The intention of which was to "...take care to prevent the Government from being ambitious and bent of conquest. Propensities of that nature had already involved India in great expenses, and cost much bloodshed. These, therefore, ought most studiously to be avoided. Commerce was our object, and with a view to its extension, a pacific system should prevail, and a system of defence and conciliation" (Pitt's speech in the House of Commons 6 July 1784 in Aspinall & Smith 1969: 826). The bill effectively gave the control of Company occupied lands to the British government by subordinating the Directors to a new government department, the Board of Control:

> It shall not be lawful for the Governors or Presidents and Councillors of Fort Saint George and Bombay...to...issue any order for commencing hostilities or...to negotiate...any Treaty...with any Indian Prince or State (except in cases of sudden emergency or imminent danger, when it shall appear dangerous to postpone such hostilities or Treaty) unless in pursuance of express orders from...Governor-General and Council...or from the...Court of Directors.... (clause XXXV of the 1784 *India Act* in Aspinall & Smith 1969: 830).

Following the Bill, trade to the East Indies was controlled by the newly organized United Company of Merchants of England and the sovereignty of India became Britain's responsibility. Thus, it was to begin that under the newly organized United Company of Merchants of England trading to the East Indies, the sovereignty of India became Britain's responsibility. By concentrating their main center in Java the Dutch had seceded any Indian interest to the English, and the French (who had not entered the competition until 1700s) lacked the support they needed to compete with the already established English.

Prior to the nineteenth century, Germany's maritime activity had concentrated upon internal European trade under the Hanseatic League. Preoccupation with the politics of unification also separated it from the kind of long-distance overseas trade enjoyed by other European rivals. During the nineteenth century, Germany's foreign policy was controlled by Chancellor Otto von Bismarck. Like the involvement of the other principal players in what was to become

the *Scramble for Africa*, movement into the African continent was instigated in equal parts by the desire to increase the nation's economic production in light of burgeoning industry and, by association, the need to maintain economic growth. It was also an attempt to balance internal European political and economic stability. By this note, Africa was for both Great Britain and Germany a tool by which to maintain a European equilibrium. This equilibrium was such a consuming matter that Bismarck himself later told a German explorer, "Here is Russia and here is France. . .with Germany in the middle. That is my map of Africa" (translated in Packenham 1991: 203).

By 1888 the British government was under pressure from antislavery campaigners and a conference in Brussels was convened under the guise of establishing civilizing legislation designed to end the scourge of the slave trade, but in reality was an opportunistic gathering together of the various European powers with a stake in the control of Africa. For the British government it was also used to reestablish naval supremacy in the Indian Ocean where the rights to stop and search vessels had not previously been fully realized between all nations, thus allowing for greater control of the movement of trade commodities and domination of the regional capitalist system.

The results of the conference were highly influential. For the first time, humanitarian concerns were addressed within an international political arena, with the measures agreed upon by the signatories affectively legitimizing colonial conquest through the agreed strategy of combating slavery by the establishment of colonial administration in the interior of Africa and the restructuring of African society. At the conference it was suggested by the Belgian delegation that the most effective way to establish such an administration was through the development of colonial infrastructure. This was to include the establishment of fortified posts in the interior to act as centers of refuge for emancipated slaves, as well as garrisons for troops able to pursue slave caravans. Roads and railways were to be constructed from the coast into the interior and steamboats were to be placed on navigable rivers and lakes. Although neither Britain nor Germany fully committed to these proposals, their discussion at the Brussels Conference was nonetheless later useful. When either government wished to propose large-scale infrastructure development in Africa it could now legitimately invoke the Brussels Conference and antislavery civilizing rhetoric.

This European drive to control overseas land and populations did not rest solely with Britain and Germany (though it was the antagonism of these two nations which was to drive other nations to develop their overseas "dominions" up to the twentieth century). Britain eventually controlled most of the subcontinent of India, Australia, New Zealand, Canada, and large areas throughout Africa (e.g., Sudan, Botswana, Kenya, Egypt, Gambia, Ghana, Nigeria, Zambia, Malawi, Sierra Leone, Zimbabwe, Swaziland, Tanzania, and Uganda). In Africa, France also controlled large areas throughout the continent (most notably Ivory Coast, French Sudan (now Mali), Guinea, Mauritania, Niger, Senegal, northeast Nigeria, Gambia, Chad, Republic of Congo, Gabon, Cameroon, Eritrea, Madagascar, Djibouti, Comoros, and Reunion). Germany controlled (among others) Burundi, Rwanda, Tanzania, and Namibia. With Italy dominating; Eritrea, parts of Somaliland and Libya.

Economic justification for national policies of colonialism and expansionism led in turn to global sociohistorical change through the development of class formation, political struggle, and cultural perceptions. The ultimate outcome of the Brussels Conference was therefore the partitioning of Africa into colonial blocks controlled by Europe and the full realization of the Second Phase of European Colonialism.

Key Issues/Current Debates

Central to this strand of social theory and postcolonial studies is the question of subjectivity. Accordingly there is a long tradition of Latin American intellectuals addressing this question. Among them were Dussel, Rodolfo Kusch (whose philosophy of Indigenous thinking as

equal to European thought was published in 1970 but not translated into English until 2010), earlier still the "cannibal" movement in early twentieth-century Brazil, and the "Forja" movement in Argentina in the 1930s. During the 1990s, subjectivity and the ways in which people describe themselves to others also became a significant area of interest within archaeology and cultural studies (see, e.g., Hall 1996; Gosden 1999). The primary questions being related to identity, i.e., the process and manner in which individuals, groups, communities, cultures, and institutions define themselves. However, the debate as to the nature of the establishment of identity can be approached in two ways. First, one can argue for fixed categories based upon definable "foundational" differences. Or secondly, one can view one's perception of identity as a more fluid phenomenon based upon reaction/reflexivity and dialogue (both inner and outer) (Meskell & Preucel 2004: 122). This first taxonomical approach can be useful when it becomes necessary to quantify groups of individuals, but can stray into dangerous labels/pigeonholes and meta-identities. The second, more poststructural view approaches the formation of identity as involving the negotiation of "race," class, religion, sexuality, ethnicity, and gender, as well as the environmental and cultural context in which individuals find themselves. Constructivists would even go so far as to argue that identities do not exist but are in reality discursive constructs which are formulated through one's personal dialogue with one's sociocultural, physical, and political environment.

It is the nature of this dialogue and one's autonomy within it that has developed into a philosophical debate as to the role of the self in the formation of identity. In the past the two main protagonists within this debate are Foucault (1972) and Giddens (1991). Both agree that:

> . . .self-identity is negotiated through linked processes of self-exploration and the development of intimacy with the other (Giddens 1991: 97).

However, the debate rests upon the level of autonomy available to the individual within the multiple and competing discourses within the postcolonial/colonialist world. Foucault (1972) argues that the individual is subservient to the dominant social discourse, which is based upon the power of shared knowledge. Alternatively, Giddens' (1991) views the individual within society as less the passive participant and more the creative transformer:

> The self is not a passive entity, determined by external influences; in forging their self-identities, no matter how local their specific contexts of action, individuals contribute to and directly promote social influences that are global in their consequences and implications (Giddens 1991: 2).

Giddens' *structuration theory* (1991) gives the individual an understanding of the social context in which they exist and allows for reaction against it. This not only allows for one to develop multiple situationist identities but also allows for the idea that individuals have an indelible political and social autonomy. This is a concept central to the postcolonial debate on the role of participants in colonial activity. Furthermore, the search for identity, be it individual or society, requires a meta-narrative in order to formulate a dialogue between life experience (meta-narrative) and perception (the self). This meta-narrative takes the form of *culture* while *cultural identity* is the extent to which one is representative of a given culture behaviorally, communicatively, psychologically, and sociologically.

All of these theoretical strands exist within the history of the development of postcolonial identities or, more specifically, the international politicization of identities in the twentieth century. As Hall (1990: 225-26) demonstrates in an essay addressing the African diaspora, wrestling control of contextualizing metanarratives is central to the struggle for equality:

> Not only, in Said's 'Orientalist' sense, were we constructed as different and other within the categories of knowledge of the West by those regimes. They had the power to make us see and experience *ourselves* as 'other'. Every regime of representation is a regime of power formed, as Foucault reminds us, by the fatal couplet, 'power/knowledge' (Hall 1990: 225-26).

International Perspectives

As can be seen from this short explanation of Second Modernity and the Second Phase of European Colonialism, although the social theory and events described above were born within distinct geographical regions of the world (i.e., Africa and Latin America), they possess the common linkage of having been the result of European action based on a capitalist development and world view. The commonality of the two is in the need to recognize the role of the colonized and its impact on the perceptions of Europe and its activity and the manner in which we have subsequently addressed non-European cultures from a dominantly European foundation.

This is a phenomenon that is reflected in the development of archaeology as a practice and it is important to recognize the nature of the "constructedness" within archaeology. The practice and debate of archaeology worldwide has not taken place in a vacuum immune to the influences of those ideas outlined thus far. Likewise, these ideas have not developed without the influence of archaeological and historical knowledge. Archaeology began as a Western colonial science, with a role in the conquest of territories and peoples (represented by antiquarian styled exploration and collection). It has become, through the application of deconstructive philosophies, a potential tool for the study, definition, and voice of subaltern or less well-represented groups within Western-dominated historical narratives, with specific strands of "new" archaeologies (such as historical archaeology – see discussion below) specifically attempting to construct non-European cultural narratives developed outside the world of historical and cultural colonialism.

Future Directions

Our current understanding of colonial processes is largely based upon the development of Western anthropologists. More recent studies have begun to question traditional colonial ethnographies and their close link to colonial powers (e.g., Comaroff & Comaroff 1992; Barker et al. 1994; Mignolo 1995; Benjamin 2002; Gasco 2005). What these studies have in common is their rejection of binary oppositions in colonial discourse. By rejecting the traditional historical view of the "colonizer" and the "colonized," new ideas of sociocultural hybridity have developed in response to the recognition of new societies created through the colonial process. The problematization of these traditional discourses has developed into what we now term postcolonial theory:

> Colonialism broadly conceived, or 'coloniality', when seen as a process including territorial expansion and imperialism, labour regulation processes, and epistemological and discursive 'reorganization', is not therefore only current because of territories which are still formally colonial, but because the relations of difference that mark the 'colonial' period are still very much in operation throughout the world, particularly in the West and wherever 'the West' and its epistemology asserts itself, i.e.: globally (Benjamin 2002: 15).

The second definition of postcolonial theory as an ideological application has been separated by Goldberg and Quayson (2002: xii-xvi) into three interrelated sets of ideas of particular relevance to the question of Second Modernity and the spread of Western capitalism via colonial activities.

Postcolonial study possesses a "theoretical expansiveness" by the way in which it aims to adopt the voice of "otherness" included within all experiences. With this approach the author would promote the role of archaeology and specifically historical archaeology as a means of addressing and examining accepted definitions of social and cultural activity within the colonial context (see Rhodes 2010). It may therefore be that archaeology of the traditionally historic period is able to attempt to strip our understanding of the past of its historical prescription through analyses of subaltern material evidence. Or at least offer new ways of viewing the historic colonial past as long as the unavoidable embedded bias of cultural perspective is recognized and deconstructed along with received historic narratives.

So what of the application of these definitions to the development of non-Western archaeologies? First is the rejection of meta-narratives. Although archaeology is well suited to address the actual material processes of European colonial activity over a large geographical scale, the aim should not be to lay claim to a totalizing knowledge of this process. The author would echo the so-called *Frankfurt School* and the development of *critical theory* (see, e.g., Hodder 1986, 1992 and Shanks & Tilley 1987), with its recognition of the historically conditioned nature of studies of the past, and accept that all archaeological research stands within a specific context and is generated form a specific world view but, nonetheless, aims to highlight shared characteristics within (perceived) events and activities in the past. As Foucault argues, the aim is to demonstrate the nature of discourse within a given context:

> Instead of following the thread of an original calendar, in relation to which one would establish the chronology of successive or simultaneous events, that of short or lasting processes, that of momentary or permanent phenomena, one tries to show how it is possible for there to be succession, and at what different levels distinct successions are to be found (Foucault 1972: 169).

Furthermore, archaeology exists within the postcolonial paradox, by openly beginning from the ideological position of defining one people at the rejection of others. It is hoped that active investigation of the remains of the past in a more ethically transparent way than has been previously attempted can offer a newer and broader insight into the past. The intention is that by applying archaeological techniques to an area that has previously seen little investigation outside traditionally historical interpretation newer perspectives can be created.

Can this be achieved? What is required is the application of a unifying approach which allows for the development or sharing of postcolonial strands of archaeological study over more globally inclusive geographies. This is to say that the issues raised by the experience/history/activity/narrative of colonialism exist in many places and over a wide temporal sphere (the examples above being Latin America and Africa). Dialogue between historically peripheral groups (that is to say groups not focused upon by European-led investigations) would seem the next step in developing truly non-capitalist global heritages. But this is not to say that all "new" or "subaltern" heritages should be essentially reactionary or counter colonial. Rather, scope should be given to define the internally heterogeneous character of cultures based on the ever re-negotiated identities.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Supermodernity and Archaeology

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Second Temple Judaism Archaeology

Mark A. Chancey
Department of Religious Studies, Southern Methodist University, Dallas, TX, USA

Introduction

The term "Second Temple Judaism" refers quite literally to the period of Jewish history when the second Jewish temple stood in Jerusalem, c. 515 BCE to 70 CE. The first temple, traditionally attributed to the Israelite King Solomon in the tenth century BCE, had been destroyed by the Neo-Babylonian Empire during its conquest of the region, c. 586 BCE. When the Achaemenid Persian Empire defeated the Babylonians, it acquired the southern part of the Levant associated with modern Israel, Palestine, and adjacent areas. The Persians allowed Jews to rebuild their temple, c. 515 BCE, and it stood until c. 70 CE, when the Romans destroyed it while suppressing a Jewish uprising, the First Revolt. Jews in the Second Temple period experienced rule by the Persians, Alexander the Great, the Ptolemies, the Seleucids, an independent Jewish dynasty known as the Hasmoneans, and the Romans, who administered Palestine through both appointed Roman officials as well as the Herodian dynasty of client kings. The era was formative for the development of Judaism, as various biblical works were composed and revised, a scriptural canon was nearly finalized, diverse Jewish sects flourished, Jewish territory expanded, and Jewish society was thoroughly integrated into the larger cultural matrix of the Mediterranean world. Although this period also saw the increasing dispersal of Jews beyond their traditional homeland to areas ranging from the Italian peninsula to North Africa to Asia Minor to Mesopotamia, this entry will focus primarily on the area known variously as Israel or Palestine, where evidence is more abundant. In general, more archaeological data is available for the later

centuries of this period than for the earlier ones, particularly in regard to religious practices. Historians are fortunate to have not only the archaeological record but also numerous literary sources written from various perspectives.

Historical Background

Biblical sources credit the Persian King Cyrus II for allowing Jews exiled to Mesopotamia by the Babylonians to return to Jerusalem and the surrounding area of Judah beginning c. 538 BCE. Scholars have often cited the famous cuneiform inscription on the Cyrus Cylinder, found in Babylon in the nineteenth century, as supporting evidence for a Persian policy of returning subject peoples to their native lands. The deportees returning from Babylonia, which were likely a small group, joined with Jews who had remained behind in rebuilding Jewish society and its primary city, Jerusalem. Yehud was the Aramaic name of the Persian province in which they lived, which was a subunit of a much larger Persian satrapy. The exact boundaries of Yehud are disputed, but it is obvious that it was fairly small and limited to the areas surrounding Jerusalem. Its initial population was correspondingly small. Although scholars once proposed that in the late sixth and early fifth centuries, Jerusalem, the major population center, had as many as 5,000–7,000 inhabitants, more recent estimates have been as low as 1,250 or even 400 (Meyers & Chancey 2012). What is clear from both surveys and excavations is that the Persian era inaugurated a period of population growth that would continue for centuries. Biblical sources suggest that construction of the Second Temple began c. 515 BCE, although virtually no archaeological evidence of the structure from this period survived due to the extensive renovations carried out later by the Hasmonean and Herodian kings.

Persian-period finds of various categories (architecture, local pottery, imported pottery import from Greece and the Eastern Mediterranean, inscriptions) from the southern Levant are abundant and have been the subject of considerable scholarly interest since the 1980s, largely due to the publication of an impressive archaeological synthesis by Ephraim Stern. Coins had already entered the region in the early sixth century but became more common under Persian rule. The province minted its own coins, marked by the Aramaic inscription YHD ("Yehud") and decorated with various images including the Athenian owl, the Greek deity Arethusa, griffins, and the Persian kings. Jars and jar handles from multiple sites bearing stamps reading "Yehud" in Aramaic and Paleo-Hebrew scripts were probably components of a tax-in-kind system. Many "Yehud" seals and seal impressions have also been discovered, sometimes accompanied by personal names and administrative titles. Efforts have been made to associate some of the names on the Yehud seals and coins with Jewish figures; it is possible, for example, that the figure "Yehohanan the priest" mentioned in inscriptions was a Jewish priest. The use of Aramaic characters on coins and seals reflects the importance of the language as the Persian lingua franca. Aramaic grew in importance as a written and spoken language throughout the Second Temple period, eventually displacing Hebrew as the primary Jewish language, and the Aramaic script became standard even for most Hebrew texts. That the inhabitants of Yehud held distinctive religious views is demonstrated by the general lack of figurines and cultic objects, which are common finds in surrounding areas (Stern 1982; Betlyon 2005).

The most important evidence from the Jewish Diaspora in this time period comes from the Egyptian island of Elephantine, located in the Nile River near Aswan. Papyri associated with the site preserve letters and legal documents from a garrison of Jewish and Aramean mercenaries stationed there. The military colony had a temple devoted to the Jewish deity YHWH, demonstrating that the later Jewish belief that animal sacrifices could only be carried out in Jerusalem had not yet fully developed. One papyrus preserves instruction regarding unleavened bread that is generally interpreted as a reference to the Jewish Passover festival (Porton 1996; Betlyon 2005).

Alexander the Great famously conquered the eastern Mediterranean coast in 332 BCE. The years between his conquest and that of the Romans in 63 BCE are known as the Hellenistic Period. After Alexander's death (323 BCE), Palestine lay at the meeting point of two of his successor kingdoms, the Ptolemies, based in Egypt, and the Seleucids, situated in Syria and parts of Asia Minor. The Ptolemies initially possessed Palestine until the Seleucids gained possession c. 200 BCE. Jews threw off Seleucid rule in the Maccabean Revolt, which began in 168 BCE, and from the leadership of that rebellion emerged a Jewish royal dynasty, the Hasmoneans.

Under the Ptolemies and the Seleucids, Hellenistic (Greek) influence in Palestine increased steadily, becoming a dominant component of Jewish and other local cultures in the region for the next thousand years. The minting of coins with Semitic inscriptions in Jerusalem initially continued in the Ptolemaic period but then ceased. Aramaic inscriptions YHD and YRSLM ("Jerusalem") appeared on jar handles, but such pottery was soon be joined by amphora handles with Greek stamps imported from the eastern Mediterranean (Arav 1989; Berlin 1997; Tal 2005). Papyrological records associated with Zenon, a third-century BCE agent of the Ptolemaic finance minister, shed light on government holdings and agricultural practices in Palestine, and numerous other papyri attest to the varying fates of Jews in Egypt, some possessing land and wealth, others working as artisans, peasants, and land tenants. Greek inscriptions in Ptolemaic Egypt attest to the existence of buildings there known as *proseuchai*, Jewish prayerhouses (Tcherikover et al. 1957–1964).

Under the Hasmonean dynasty, Jewish territory expanded considerably. With their Seleucid foes weakened, the Hasmoneans pushed in all directions, stretching Jewish territory far beyond the environs of Jerusalem to include Samaria (roughly equivalent to the modern West Bank), Galilee, portions of the Negev, and parts of modern Jordan. Archaeological findings sometimes corroborate literary reports of Hasmonean conquests. Evidence of destruction probably associated with Hasmonean campaigns has been found at sites including Gezer, Tel Istabah near Beth-Shean, Ashdod, Shikmona, and Maresha. In Samaria, a Persian-period temple on Mount Gerizim overlooking Shechem was completely destroyed. By the early first century BCE, Hasmonean forces had taken Galilee, which subsequently became a predominantly Jewish region. Surveys and excavations there have revealed the abandonment of older sites, the establishment of new ones, and dramatic changes in the ceramic repertoire that are best explained by population shifts (Berlin 1997; Tal 2005; Meyers & Chancey 2012).

The general parameters of Hasmonean territory can be traced by finds of their coinage. They minted numerous bronze issues of varying weights and sizes, typically employing Attic denominations, as had the Seleucids, rather than using Phoenician standards. Hasmonean coins differed from most other regional coinage in their less prominent use of Greek. Many coins had Hebrew inscriptions written in Paleo-Hebrew script, symbolically connecting the dynasty with earlier Jewish history, though some had Aramaic legends and those of later kings also used Greek. The symbols on Hasmonean coins also differed from those of surrounding minting authorities in their avoidance of anthropomorphic and zoomorphic imagery. They instead displayed symbols often drawn from the standard Mediterranean repertoire, such as cornucopiae, a lily, and an anchor. Only coins from the last Hasmonean ruler, Mattathias Antigonus, had what might be described as uniquely Jewish symbols: some depicted a menorah, while others portrayed an image often interpreted as cultic furniture from the temple, the Showbread Table. The names and titles on Hasmonean coins also show how Jewish and broader Hellenistic culture interplayed. Early coins bore rulers' Semitic names; only later issues were inscribed with their Greek names. The title of "king" did not appear until the first century BCE, but the title of "high priest" appeared throughout the Hasmonean era, and claims to be the "head of the council of the Jews" marked the currency of some rulers (Meshorer 2001).

Jerusalem grew considerably in the Hasmonean era, stretching beyond the area adjacent to the temple westward onto modern Mount Zion. The Hasmoneans enclosed the city's new territory with a major defensive wall equipped with additional towers. They also undertook occasional renovation of the temple complex, and some attribute particular ashlars in its eastern retaining wall to them because their crude bosses are similar to other Hasmonean masonry. Elites in the city constructed lavish tombs that closely resembled monumental tombs elsewhere in the Hellenistic world, advertising their political stature and wealth. Two of the better-known examples include the tomb of Benei Hezir, which stood just outside the eastern walls of Jerusalem, and the tomb of Jason, located west of the walls. The first is known for its red-painted Hebrew inscription associating it with "priests of the sons of Hezir," a family mentioned in the biblical books 1 Chronicles 24:15 and Nehemiah 10:21. Its interior chambers had the types of burial slots that would be typical of Jewish tombs for centuries, loculi (niches cut perpendicular into the wall) and arcosolia (shelves cut parallel to the wall). Doric motifs and a pyramid decorated its exterior. A pyramid and Doric motifs also marked Jason's Tomb, located west of the city. The walls of its porch bore an Aramaic and a Greek inscription as well as charcoal drawings of a ship, a palm branch (an early example of a symbol that comes to typify Jewish art), and five menorahs that are among the earliest images of the temple candelabrum. In addition, a drawing of a stag shows that not all Jews avoided figural representations of living things, suggesting that modern notions of strict ancient Jewish aniconism are an oversimplification (Berlin 1997; Levine 2002; Fine 2005; Hachlili 2005).

The Roman general Pompey's expeditions into the region started the Roman period, which lasted from 63 BCE until the mid-fourth century CE. The Romans quickly grew tired of infighting between the last members of the Hasmonean dynasty and appointed a new ruler from an entirely different family, Herod (variously called the Great or the First). Herod was a descendent of Idumeans who had converted to Judaism after the Hasmonean conquest.

Herod was deeply influenced by the massive construction he witnessed on his visits to Rome and became one of the most influential sponsors of Roman-style architecture in the Levant. In his own kingdom, he built a variety of monumental buildings, sports facilities, fortresses, and palaces that blended Roman, Hellenistic, and local styles. Roman construction and decorative techniques in his construction projects included *opus reticulatum*, the facing of walls with diamond-shaped blocks; *opus sectile*, the inlaying of multi-shaped and multicolored stone tiles on floors; mosaics with Roman-style floral and geometric designs; and frescoes with colored panels, stripes, dots, and patterns that resembled those in Pompeii (albeit without the images of humans, animals, or mythological characters found there). Limited Greek-style bathing facilities had entered Palestine in the Hellenistic era, but Herod's palaces had Roman baths with multiple chambers devoted to different temperatures and the use of hypocaust technology for warming (Netzer 2008).

Herod's embrace of Roman culture is visible in the layout of the new city he built on the Mediterranean coast outside of Jewish territory. Named Caesarea Maritima after the emperor, the city's streets were organized on a grid, like other typical Roman cities. Its buildings included a long oval-shaped structure that was either a stadium for foot races or a hippodrome for horse and chariot competitions and a 3,500–5,000 seat theater, built in a half-circle shape with a back wall behind the stage, as per Roman conventions. The new harbor reflected the most advanced technology of his day, with long breakwaters consisting of concrete blocks made of hydraulic cement. The centerpiece of the city was a temple dedicated to the emperor standing on a massive platform that made it easily visible from sea; it was one of the earliest temples of the imperial cult anywhere in the Roman Empire. It was one of three such temples Herod built; the others were at Banias, known in antiquity as Paneas and briefly in the first century CE as Caesarea Philippi, and at Sebaste, a new

Roman-style city built at the site of the ancient city Samaria (Netzer 2008).

Herod also strengthened the fortifications of Jerusalem. The lower courses of the so-called Citadel of David now visible at Jerusalem's Jaffa Gate are remnants of a Herodian tower, as are walls visible in the adjoining courtyard. By far, the best known of Herod's projects in Jerusalem, however, is his extensive renovation of the temple and the platform on which it stood, known in Jewish tradition as the Temple Mount and in the Islamic world as the Haram al-Sharif. Herod's engineers expanded the platform northward, westward, and southward; eastern expansion was impossible because of the steep Kidron Valley. Clear evidence of the southern extension can be seen in the eastern retaining wall, where a vertical "seam" separates Herodian ashlars from earlier ones. The size of the modern Temple Mount is largely due to Herod's construction; it measures roughly 315 m on the north, 280 m on the south, 485 m on the west, and 470 m on the east. The retaining walls, of which the most famous is the Western Wall, were themselves massive. Built from local limestone, most of their blocks weighed at least several tons, and some, such as the 14-m long and 4-m high example in a tunnel running along the Western Wall, weighed much more. A special station stood up top of the wall at the southwestern corner for the blowing of the traditional Jewish shofar, as indicated from the discovery of a corner block with the Hebrew inscription "the place of trumpeting. . .." Huge staircases led up to two gates (their outlines still visible) on the southern side of the temple complex, and evidence of four gates has been found on the western side. Porticoes lined the four sides of the courtyard atop the Temple Mount, their existence reflected in the many column fragments found in modern excavations; this extensive use of columns reflected both Hellenistic and Roman influence. Two copies of a Greek inscription have been found that marked the limits on the Mount beyond which non-Jews could not go upon punishment of death. As for the temple building itself, the presence of Islamic shrines (the Dome of the Rock and the Al-Aqsa Mosque) makes archaeological effort to recover it impossible. If, as is typically thought, silver coins from the Second Revolt against Rome (132–135 CE) with stylized representations of a temple preserve memories of its appearance, its facade had four columns and a cornice. Taken as a whole, the temple complex was the largest in the Roman Empire and one of the largest anywhere in the ancient Mediterranean and Near Eastern worlds (Bahat 1999; Levine 2002; Netzer 2008).

After Herod's death in 4 BCE, his territory was parceled out to his sons. Members of the Herodian dynasty would alternate with Roman prefects and procurators in governing his former territory, the complex administrative arrangements not stabilizing until after the First Revolt against Rome (66–73 CE). Herod's successors lacked his resources, though they still attempted their own building projects. His son Antipas, for example, who governed Galilee and Perea (east of the Jordan River) from 4 BCE to 39 CE, rebuilt the older city of Sepphoris (in Hebrew, *Zippori*) and established the new city of Tiberias (named after the emperor), both in Galilee. Modern habitation has limited the archaeological exploration of Tiberias, but excavations have recovered ample evidence of Jewish habitation at Sepphoris in the form of stone vessels and ritual baths (see discussion below). In the second century CE, Sepphoris would become a major center of Jewish thought as teachers known as rabbis settled there and began to compile traditions that ultimately were included in the rabbinic literature that became authoritative for Judaism. The site is noteworthy for the presence of Roman-style architecture (especially a theater) and art (most notably mosaics, including some with mythological imagery), although these appear to postdate the First Revolt, often by considerable margins (Meyers & Chancey, 2012).

Like the Hasmoneans, the Herodian client kings minted bronze coins. Those of some, like Antipas and Archelaus, refrained from depicting living things, but those of others bore busts and images of either themselves, the Roman emperor, or members of the royal or imperial family. Coins of Philip had images of a temple usually interpreted as that dedicated to Caesar at Banias,

while those of Agrippa II went so far as to depict classical deities; both rulers oversaw the northernmost parts of Herod's territory, where Jews were a minority. Most Herodian coinage had Greek inscriptions, although a few issues of Agrippa II had Latin (Meshorer 2001).

Jewish tensions with Rome ultimately led to the First Revolt (66–73 CE). The writings of the Jewish historian Josephus, who served first as a field commander of Jewish forces in Galilee and then as a translator for the Romans, are our primary literary source for understanding events (especially *Bellum Judaicum*; Williamson 1970). After initial successes, Jewish forces suffered a series of devastating defeats. In the north, the aftermath of siege warfare in 67 CE is clearly visible at the Galilean site of Yodfat (in Greek, Jotapata) and at Gamla, in the southwestern Golan Heights. Archaeological finds at the hilltop village of Yodfat include fortification walls, arrowheads, ballista stones, a rolling stone, other pieces of weaponry, portions of a siege ramp, and skeletal remains. Finds at Gamla are similar: some 2,000 ballista stones, 1,600 arrowheads, and 100 catapult bolts, as well as large stones dropped and rolled by the defenders down the steep ravines surrounding the site. Fortification walls are still clearly visible, including a major breach near the village synagogue. The town struck its own bronze coins during the revolt, each bearing the defiant Hebrew inscription "For the redemption of H[oly] Jerusalem" (Meshorer 2001; Berlin & Overman 2002).

Jerusalem was the site of the fiercest combat. Jewish forces there issued both silver and bronze coins with the Paleo-Hebrew inscription "Jerusalem the Holy," but they were not be able to defend the city against the Romans' overwhelming strength. Roman forces succeeded in entering the city and destroying the Second Temple in 70 CE. Excavations carried out since the Israelis gained possession of the Old City in 1967 have found ample evidence of widespread destruction in the elite residences of the Herodian Quarter west of the Temple Mount. In the so-called Burnt House, everyday domestic items lay scattered on the floor, a spear leaned against a wall, and the bones of a woman's forearm and hand remained stuck in the debris. South and west of the Temple Mount, extensive rubble lay on Roman-period streets, consisting of ashlars, pieces of columns, and other architectural fragments thrown down by the Romans as they dismantled the buildings of the sacred precinct above (Berlin & Overman 2002; Levine 2002).

In 73 or 74 CE, Roman units moved east into the Judean wilderness near the Dead Sea to complete their victory by mopping up the last of the Jewish resistance. The chief battle there occurred at the old Herodian fortress of Masada, built atop a massif. Josephus famously records that after a lengthy siege, Masada's Jewish defenders committed suicide rather than allow the Romans to claim a victory, though some modern scholars question the veracity of this account. The outlines of the Romans' siege wall surrounding the site can still be seen today, along with a 4,500-m long siege ramp and the rectangular boundaries of their military camps. A remarkable amount of military equipment has been found, including pieces of scale armor, helmets, spearheads, arrowheads, fragments of swords, and ballista balls (Berlin & Overman 2002).

The Romans advertised their victory over the Jewish rebels by striking coins proclaiming "Iudaea Capta." The Arch of Titus in Rome portrays legionnaires triumphantly carrying plunder from Jerusalem, including the menorah from the temple (Berlin & Overman 2002). The Second Revolt against the Romans under the leadership of Bar Kokhba in 132–135 CE would also prove unsuccessful and end Jewish attempts to reclaim Jerusalem and rebuild the temple.

Key Issues and Current Debates

Among the chief discoveries in recent decades is the ample evidence of ancient Jewish interest in ritual purity. One reflection of this interest was the construction of small pools generally interpreted as ritual baths (in Hebrew, *miqva'ot*) because of their general similarity to the descriptions of such baths in rabbinic sources. Ritual baths were stepped, plastered pools cut into bedrock. Their sizes varied, but they were generally

deep enough to allow full immersion of the body and were sometimes accompanied by a small storage pool to the side. Although the practice of ritually cleansing oneself through immersion is attested in the Hebrew Bible, the appearance of pools built specifically for this purpose was a new phenomenon of the Hasmonean period. By the first century CE, *miqva'ot* were numerous throughout Judea, and examples have also been unearthed in Galilee and in the Golan at Gamla. Ritual baths are found in Herodian palaces, where they served as the cold pool (in Latin, *frigidarium*) of Roman-style bathing facilities; on major roadways near Jerusalem, perhaps for the use of pilgrims; at various points in the vicinity of the temple; near synagogues (such as that at Gamla); near cemeteries (possibly to help remove impurity contracted by contact with or proximity to corpses); in association with wine and oil presses to facilitate production of pure juice and oil; and in both rural and urban domestic contexts (Berlin 2005; McCane 2010).

A related phenomenon was the use of limestone vessels, which rabbinic texts describe as impermeable to ritual impurity. These vessels were found in a variety of forms, including jar stoppers, mugs, kraters, bowls, and large storage jars. Most were clearly intended to hold and thus keep pure liquids. Their manufacture and use quickly extended beyond Jerusalem to other parts of Palestine, and whole vessels or fragments have been found at dozens of sites in Judea and Galilee, in both cities and villages and in the residences of both elites and commoners. Stone vessels are generally absent from sites in Samaria or in surrounding areas that were primarily inhabited by non-Jews (Berlin 2005). Yet to be answered in regard to both limestone vessels and miqva'ot is whether differences in practices between Jews associated with various sects (Pharisees, Sadducees, Essenes) or no sect can be identified archaeologically.

Another new phenomenon of the late Second Temple period was the use of small sarcophagi known as ossuaries for secondary burial. For reasons not yet clear (typical explanations appeal to views of the afterlife, hopes for the expiation of sins, or increasing emphasis on individual identity), some Jews began gathering up the bones of the deceased after the flesh had decayed (roughly a year's time) and placing them in ossuaries. Although the practice of secondary burial within Judaism is attested earlier, the creation of special receptacles for the purpose is apparently unprecedented. Most ossuaries were made of limestone, but ceramic examples are also known. Ossuaries have been discovered at sites in Judea, Samaria, and Galilee. The rate of their geographical diffusion is unclear, as is the date for the end of the practice; once thought to be the end of first century, it now clearly extends into second. Aside from coins, ossuaries are the single most common source of Jewish inscriptions from this time period. Typical content of these inscriptions includes the name, place of residence or origin, and names of family members of the interred. Most are in Aramaic or Hebrew, though roughly a third are in Greek and a few in Latin (Hachlili 2005).

Scholarly understanding of the early history of the synagogue has also made significant advances. Synagogues were categorically different from the Jerusalem temple. For most Jews, the temple was the only place where animals could be sacrificed. In contrast, many towns and villages had synagogues, in which where the local Jewish community gathered for worship, study, and public meetings. The earliest evidence of synagogues comes from Ptolemaic-period Greek inscriptions from Egypt referring to *proseuchai* (houses of prayer) and from a first-century BCE structure often interpreted as a synagogue on the Greek island of Delos. Several likely examples from the late Second Temple period have been found at sites in Israel, including Gamla, Masada, Herodium, Kiryat Sefer, Modi'in, and most recently, Magdala. In addition, the first-century CE Greek inscription from Jerusalem known as the Theodotus Inscription provides important information about a synagogue there. It identified the primary activities associated with the synagogue as teaching about the Law (the Jewish Torah) and the commandments and providing hospitality to strangers, and it mentions three generations of *archisynagogoi* (rulers of the synagogue) (Cotton et al. 2010: 53–6). Jewish

and Christian texts make clear that numerous other synagogues existed by the first century CE, but at present, they are difficult to identify in the archaeological record. A wave of construction beginning in the late third century CE resulted in the creation of over a hundred synagogues in Israel (Levine 2000; Meyers & Chancey 2012).

Like later synagogues, those from the pre-70 CE period are square or rectangular, with benches around their interior walls and columns that sometimes made aisles. Unlike later synagogues, they generally lack inscriptions, extensive decorations such as mosaic floors or external friezes, special shrines to hold the Torah scroll, or the raised platform known as a bema. An excellent example is the Gamla synagogue, which was destroyed in the First Revolt. Built of local basalt, it measured 13.4 by 9.3 m. Columns lined all four interior walls, their capitals in the Doric style, and those in the corner cut in the shape of hearts. Benches provided seating for perhaps 150 people (Levine 2000; Meyers & Chancey 2012).

Aside from Jerusalem, no single site has proven as important for understanding Second Temple Judaism as Qumran, a set of ruins found in the desert less than a mile west of the Dead Sea. The complex there included a tower, a pottery workshop, common dining area, cisterns, and large pools that are usually interpreted as communal ritual baths. A cemetery with roughly 1,200 graves lay nearby. The community was destroyed in the First Revolt, probably in 68 CE. Hidden in caves adjacent to the site were the over 900 manuscripts now known as the Dead Sea Scrolls, which were discovered in the late 1940s and the 1950s. The scrolls were mostly of parchment, though some were made of papyrus. They included a remarkable range of Hebrew, Aramaic, and Greek texts, with fragments of every book of the Hebrew Bible except Esther, apocryphal and pseudepigraphical books, rewritten scripture, commentaries on biblical books, apocalyptic works, astrological texts, legal texts, and liturgical texts. Some scrolls contained sectarian writings describing beliefs and practices similar to those of the Essenes, a group known from other literary sources. On the basis of the proximity of the caves to Qumran and the presence at both sites of an unusual ceramic form, a large lidded storage jar, most scholars have concluded that the group living at Qumran in antiquity was an Essene community. Other scholars, however, dispute the identification of the sectarian writings as Essene and question the wisdom of interpreting the settlement site primarily through the lens of the scrolls. Alternative theories regard the ruins as originally an agricultural villa, a fortress, a center for pottery production, or a trade station (Schiffman & Vanderkam 2000; Meyers & Chancey 2012).

The end of the Second Temple period marked a major transition in the historical development of Judaism. The religion continued its transformation from a tradition centered on a sacrificial cult to one focused on the teachings and practices prescribed in sacred texts such as the Hebrew Bible and rabbinic writings, which were composed in the centuries following the temple's destruction. Although memories of the temple and hopes for its restoration have played key roles in subsequent Jewish theology and liturgy, by the end of the Roman era the synagogue had emerged as the religion's dominant communal institution.

Cross-References

- ▶ Baths and Bathing, Roman
- ▶ Jerusalem (Hellenistic, Roman, and Late Antique), Archaeology of
- ▶ Sepphoris, Archaeology of
- ▶ Urban Planning, Roman

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Secondary Products and the "Secondary Products Revolution"

David C. Orton
Institute of Archaeology, University College London, London, UK

Introduction

The term "secondary products" was coined by Andrew Sherratt in 1981 to refer to three resources that can be provided by livestock prior to slaughter: milk, wool, and labor. He saw these as components in a post-Neolithic "Secondary Products Revolution" (SPR) that fundamentally changed the economic bases of pre- and protohistoric societies in the Near East during the fourth millennium BCE, before spreading to Europe by diffusion: systematic production of milk and wool rendered specialized large-scale pastoralism (geared toward exchange) feasible; cattle-drawn plows permitted both intensification of agriculture and expansion of cultivation to previously marginal soils; and wheeled vehicles pulled by livestock allowed transportation of both arable and pastoral products in bulk.

Sherratt was in fact building on arguments by previous researchers that milking and wool use were not part of the original "Neolithic package," but rather later developments (e.g., Bökönyi 1974). However, by bringing these two strands together with animal traction; by setting out a detailed model of their economic implications; and by providing testable hypotheses regarding the timing and geography of this putative

revolution, Sherratt set an agenda within economic prehistory that remains relevant more than 30 years on. There is some dispute as to whether this model requires the use of secondary products to be a unified post-Neolithic complex of *innovations*, or whether the SPR should rather be seen in looser terms as a revolution in the *scale* of their exploitation (see, e.g., Greenfield 2010). While research over the last three decades has steadily undermined the former, stricter view, there remains considerable empirical support for the broad thrust of Sherratt's argument.

In the decades since the phrase was first coined, the concept of secondary products has caught on more widely and has been expanded to include other preslaughter resources such as blood, hair, and dung. Beyond the geographic and temporal limits of the SPR model itself, Sherratt's ideas have focused the attention of zooarchaeologists and other researchers on the refinement of techniques for characterizing the nature of animal husbandry. The terminology inherited from Sherratt is perhaps unfortunate here: the "secondary" in his SPR referred to the hypothesized *chronological* precedence of exploitation for "primary products" (i.e., meat, fat, hide, and bone) over that for milk, wool, and traction, rather than to the relative importance of pre-slaughter and post-slaughter products. Taken out of this context, however, one must be careful to avoid the erroneous implication that pre-slaughter products are necessarily secondary to meat as a motivation for raising livestock.

Definition

"Secondary products" refers to all resources that can be extracted from domestic animals during their life as opposed to after death, including milk, blood, dung, fiber, and labor/traction. The term has sometimes been extended to certain processed plant products such as olive oil and wine, but is used here only for resources derived from animals.

The "Secondary Products Revolution" is a specific model of economic change set out by Andrew Sherratt with regard to European and Near Eastern pre/protohistory. It holds that a complex of exploitation of several secondary animal products (namely, milk, wool, and traction) spread across the region in the Chalcolithic and Bronze Age, allowing both intensification and extensification of agriculture, promoting development of specialized pastoralism, and ultimately playing an important role in the development of complex societies.

Key Issues/Current Debates/Future Directions/Examples

Milk and Dairying

Of the three secondary products that were central to Sherratt's original argument, milk (and by extension the wide range of foodstuffs derived from it) has probably received the most attention in the literature. Of the four main Eurasian Neolithic domesticates, three – cattle, sheep, and goats – can practicably be milked, with horses later added to this number.

Far from being a purely post-Neolithic development, lipid residue analysis (see below) has now provided fairly conclusive evidence that milking was practiced to some extent from the beginning of the Neolithic in the Near East and southeast Europe (Evershed et al. 2008). It should be stressed, however, that more than a single innovation was required for it to become a major component of husbandry strategies. For one thing, full adult lactose tolerance remains the exception rather than the rule for human populations globally, and its contemporary prevalence in – for example – northwest Europe is believed to have been driven by selection pressure resulting *from* the availability of ruminant milk. In most Neolithic contexts, the contribution of milk to adult diet would thus have been dependent on the development of fermented milk products – cheese, yoghurt, etc. – in which the lactose is broken down.

Meanwhile, Neolithic livestock would not have produced much more milk than was required by their infants, leaving little for human consumption. In recent dairy herds, most young are slaughtered very early to avoid

competition, and this pattern is sometimes sought as a signature of dairying in zooarchaeological mortality profiles (see below). The ability of cows to let down milk without the presence of their own offspring appears to have been a recent development, however (McCormick 1992), and in prehistoric herds, milking probably required calves to be kept alive (the situation for sheep and goats is less clear). Calves might nonetheless have been weaned early to increase the milk available for humans: isotopic evidence from French Neolithic cattle indicates fairly early weaning, at around 6–9 months (Balasse & Tresset 2002).

Fiber

While the milk production potential of early domesticates is debatable, the situation for wool is starker: wild sheep simply do not have woolly fleeces, and it must have taken many generations for domestic populations to develop them. The fine fibers that form the undercoat of wild sheep eventually came to make up the bulk of the fleece, replacing the much coarser outer hair, but despite being the subject of considerable research, the timing of this process remains poorly understood. Although surely a gradual development, the key point from a technological point of view was probably the emergence of wool that could be spun in the same way as flax. The present data seem to uphold Sherratt's view that this was a fourth millennium phenomenon in the Near East (see review in Greenfield 2010), although an earlier date cannot be ruled out. The subsequent spread of woolly sheep across Europe and Asia remains poorly resolved, but appears to have been fairly rapid.

As with milking, specialized production of wool has certain implications for herd structures. Both male and female individuals are likely to be kept alive into adulthood, and the former may also be castrated to improve the quality of their fleeces while facilitating management.

Of course, wool is not the only animal fiber: sheep hair may have been employed for various purposes before it became fine enough to spin, while the use of goat and horse hair in more recent periods is well attested. Nor are sheep the only woolly domesticate: llama wool has a long history of use in the Andean region, as does alpaca fiber (Mengoni Goñalons & Yacobaccio 2006).

Labor

In the present context, labor refers to the use of domesticates as draught- or pack-animals and for riding. Within the geotemporal range of the SPR model, the implicated species are cattle, horse, donkey, and camels (both Bactrian camel and dromedary); elsewhere, other bovines, South American camelids, reindeer, and the Indian elephant can be added to the list.

The development of the cattle-drawn plow is at the heart of the original SPR model, in which it is held to represent a fundamental shift in the relationship between plant and animal husbandry (Sherratt 1981, 1983). Yoking cattle to ards (and later to moldboard plows) allowed for effective cultivation of heavier soils, greatly increasing both the fertile land available for arable crops and the productivity of land already under cultivation.

As with exploitation of caprine fibers, the use of cattle for traction might be expected to increase the value of adult animals – particularly castrated males (oxen) – and hence to promote delayed slaughter. This depends on the scale of stock-keeping and its relationship with arable farming, however, and in many circumstances, it may be more economic to use cows for traction than to support dedicated plow oxen that neither breed nor provide milk (see Isaakidou 2006: 108). A recent survey of draught cattle use through time noted substantial global variation both in the age/sex of animals used and in the degree of training involved (Johannsen 2011).

If cattle can pull plows then they can also pull carts, and figurine evidence suggests that the first wheeled vehicles were cattle-drawn. Within the SPR model, the development of carts allowed for bulk transport of agricultural and pastoral products and was thus important to the development of extensive production and provisioning systems (Sherratt 1981). The domestication of equids and camelids and their use as pack-animals is seen in the same light, although it seems likely that cattle

had been used as *ad hoc* beasts of burden during the Neolithic (Greenfield 2010: 39).

Other Secondary Products

The use of blood from living animals is well-attested in the ethnographic record, particularly among cattle pastoralists. As with milk, blood represents one way of extracting sustenance from herds without reducing their numbers, although it requires considerable skill to carry out without endangering the animal. Unlike systematic milking, however, blood use need not have any impact on herd management.

Perhaps the most overlooked secondary product is dung, despite its often substantial role in agriculture. This may be because its use as fertilizer does not require any real technological innovations or specialized husbandry practices and is thus likely to have begun with the first animal husbandry. Manuring may have played an important role in the Early Neolithic of central and southeast Europe, for example, where intensive garden agriculture was probably integrated closely with small-scale herding (Bogaard 2005). Insofar as the shift toward extensive pastoralism implied by the SPR represented a spatial separation of caprine herding from agriculture, it may in fact have reduced the role of manure. That said, the degree of effort involved in dung collection and the range of uses to which it is put may vary widely: apart from fertilizer, dung may be used as fuel or building material (Moreno-García & Pimenta 2011).

Finally, domestic animals may provide less tangible resources related to their social and symbolic importance and role in exchange, e.g., as bridewealth (Russell 1998). While it would be a stretch to refer to wealth and prestige as secondary products, they may certainly be important motivations for keeping livestock and must be borne in mind when assessing husbandry practices, alongside both primary and secondary products.

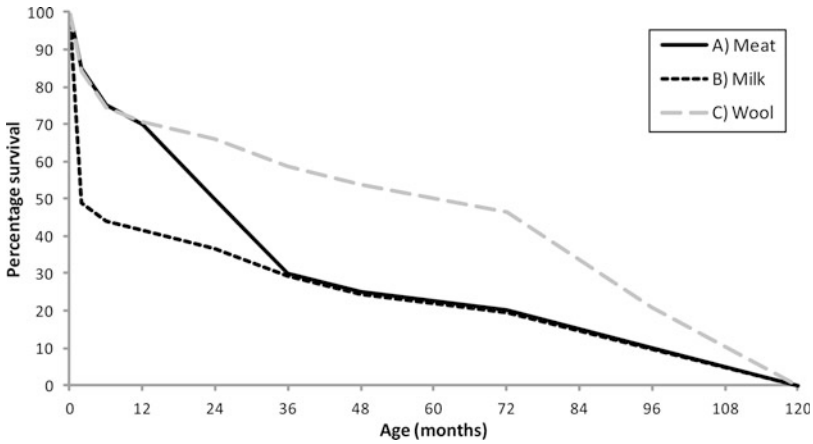
Lines of Evidence for Secondary Products Exploitation

Sherratt's original argument relied heavily on artifactual, iconographic, and early textual evidence for secondary products exploitation. In Mesopotamia, Uruk-period (fourth millennium) pictographs and cylinder seals present some of the earliest representations of milking, plowing, and wheeled vehicles; in central and southeast Europe, figurines and clay models play the same role from the Chalcolithic or Bronze Age. Such representations can only ever provide a *terminus ante quem* for the origin of the activities represented, however (Chapman 1982).

Artifactual evidence is also problematic, due largely to issues of preservation. Early plows and vehicles were largely made of organic materials and are thus rarely preserved, although ard marks may provide direct evidence for the use of the former. Occasional finds in waterlogged deposits from across Europe may post-date the earliest use of the technology in any given area by centuries. For textiles, this problem is compounded by the fact that wool survives in very different conditions to plant fibers such as flax, while the associated inorganic material culture (spindle whorls and loom weights) does not unequivocally reveal which fibers were used. Nonetheless, it is notable that while flaxen fabrics are known from the Neolithic in both Europe and the Near East, woolen textile fragments start to appear in Chalcolithic and later contexts.

Neither does milking necessarily have a distinctive material culture. Perforated ceramic vessels from Linearbandkeramik (central European Early Neolithic) contexts have sometimes been linked to cheese production (Bogucki 1984), but this is by no means certain. Recent advances in stable isotope analysis of lipid residues on ceramics have allowed ruminant milk fat to be distinguished from ruminant or porcine body fat, by comparing $\delta^{13}C$ between 16- and 18-carbon chains (Evershed et al. 2008). While this technique reveals widespread use of milk from the early Neolithic in the Near East and Europe, estimating the frequency of milk consumption or its contribution to diet remains problematic.

By contrast to artifactual and iconographic data, animal bone assemblages are near-ubiquitous features of prehistoric sites, and may provide indirect evidence for the use of secondary



Secondary Products and the "Secondary Products Revolution",
Fig. 1 Idealized survival curves for sheep herds managed for meat, milk or wool, according to Payne (1973)

products. Evidence for traction has been sought through systematic observation of pathologies and activity markers on animal bones (e.g., Bartosiewicz et al. 1997; Isaakidou 2006), but by far the most common approach involves quantitative analysis of age-at-death and sex ratio data (e.g., Greenfield 1988, 2005; Vigne & Helmer 2007). Systematic attempts to analyze herd management from age data began in earnest with Payne's (1973) publication of idealized mortality profiles for caprine herds managed for meat, milk, and wool, respectively (Fig. 1). Similar reasoning can be applied to cattle and their use for traction.

There are various obstacles to interpretation of mortality profiles, however. Firstly, prehistoric herds will rarely have been managed purely for a single resource, and the three models should therefore be seen as extreme cases; indeed, Payne also set out a "mixed meat and milk" profile. More nuanced models have since been proposed for "tender meat" and for nonintensive milk production more suited to primitive breeds and/or small-scale production systems ("type B milk" – Vigne & Helmer 2007). The next problem is one of equifinality: once one moves away from Payne's extreme cases, different production strategies cannot necessarily be distinguished from age data alone. Sex ratios may help to tease out different herd management strategies, although it is usually impossible to link age and sex data directly since different skeletal elements are used in each case. Widespread castration would be a strong indicator of systematic traction or wool use, in cattle and sheep respectively, but is itself difficult to demonstrate unless large numbers of intact limb bones are present.

As a result of these problems, it is not unknown for the same data to be interpreted in contradictory ways (e.g., Greenfield 2005 vs. Vigne & Helmer 2007). Moreover, particular herd structures can only ever indicate *potential* for exploitation of milk, wool, etc. (Halstead 1998). Additional factors such as herd security concerns or social incentives to maintain herds may intervene between theoretical optimal herd structures and reality. The scale of herding is important, with management of smaller herds likely to be more conservative and therefore to appear more generalist, but of course it is notoriously difficult to assess scale from bone remains. The upshot is that while highly specialized herd management might constitute convincing evidence for the type of large-scale specialized pastoralism inherent in the SPR model, the absence of such patterns does not necessarily indicate either small-scale herding or an absence of secondary products exploitation.

Matching observed mortality profiles to theoretical models is thus extremely problematic, but tracking changes over time may nonetheless help to reveal shifts in emphasis (Greenfield 2010). Post-Neolithic shifts broadly in line with the predictions of the SPR are indeed seen in the Balkans (Greenfield 2005; Isaakidou 2006), Anatolia

(Arbuckle et al. 2009), and elsewhere, but their interpretation remains contentious (see Vigne & Helmer 2007; Brochier 2012).

One final line of evidence that is likely to become increasingly important in the near future is ancient DNA. On the one hand, ancient DNA studies are rapidly improving our understanding of the spread of adult lactose tolerance among human populations; on the other, genetics has the potential to trace the development and spread of traits such as woolly fleeces in sheep.

The "Secondary Products Revolution" 30 Years On

In the three decades since its inception, the SPR has been subject to critique on both empirical and conceptual grounds, and the fact that it is still a subject of debate today speaks to the contribution it made to economic prehistory. Three aspects of the model may be reevaluated in the light of recent research: (1) the idea that milking, plowing, etc., were post-Neolithic *innovations*; (2) the existence of a coherent "package" of husbandry practices that diffused from the Near East into Europe and elsewhere; and (3) the core argument for a revolution in scale and specialization of animal husbandry during the fourth millennium.

The first of these is arguably a red herring (Greenfield 2010: 46-7). While Sherratt's 1981 paper did seem to imply that the SPR involved a complex of innovations, his 1983 reprise of the model clarified that elements of this complex probably had Neolithic roots, and that the "revolution" was one of scale. This has not prevented the construction of strawmen, however: it is hard to reconcile Sherratt's statement that "milking was probably practised in Europe by Neolithic populations" (1983: 95) with the view that Neolithic people were "without any abilities other than killing animals for their meat, exactly as did hunters-gatherers" – attributed to him 24 years later in an unusually passionate critique by Vigne and Helmer (2007: 35).

Regardless of Sherratt's original intentions, it is now clear that at least some features of the SPR can be traced well back into the Neolithic of Europe and the Near East. Most notably, the lipid residue evidence makes clear that milking was practiced *to some extent* from fairly early in the Neolithic (Evershed et al. 2008). Likewise, few would deny that sheep and goat fibers may have been exploited before they became fine enough to spin, or that cattle were sometimes used to pull or carry loads before the development of the ard or the wheel. On the other hand, 30 years of new empirical data has done little to overturn the idea that the plow and the wheel *were* fourth millennium developments, or that spinnable sheep's wool developed at a broadly similar time.

The second point – the idea of the SPR as a coherent package of practices that spread together – is also highly problematic. It is increasingly clear that each component had a discrete origin and subsequent take-up and spread (Greenfield 2010).

At its core, however, the SPR model was about the development of large-scale specialized pastoralism on the one hand; systematic use of cattle (and later equid) traction to transform agriculture on the other; and the implications that both had for the development of economic systems. "Large-scale" is of course an ambiguous term, but there remains considerable empirical support for the idea that major changes to this effect took place around the fourth millennium BCE in the Near East, and had taken hold in parts of Europe by at least the third millennium. The most contentious aspect of these changes is the role of milking, with debate continuing to rage over (a) whether or not the available zooarchaeological data indicate a widespread post-Neolithic shift in herd management, and (b) to what extent earlier signatures of dairying can be identified in Neolithic mortality profiles (e.g., Greenfield 2005, 2010; Vigne & Helmer 2007).

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Asses/Donkeys: Domestication
- ▶ Camels: Domestication

- ▶ Cattle: Domestication
- ▶ Goat: Domestication
- ▶ Horses: Domestication
- ▶ Organic Residue Analysis in Archaeology
- ▶ Sheep: Domestication
- ▶ Social Zooarchaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Secwepemc Cultural Education Society and Simon Fraser University (SCES-SFU) Indigenous Archaeology Program

George P. Nicholas[1] and Nola M. Markey[2,3]
[1]Department of Archaeology, Simon Fraser University, Burnaby, BC, Canada
[2]Golder Associates Ltd., Kamloops, BC, Canada
[3]O-Chi-Chak-Ko-Sipi First Nation, Crane River, MB, Canada

Basic Information

The Secwepemc (or Shuswap) are an Interior Salish people of south-central British Columbia, Canada, today comprised of 17 bands. In 1989, the Secwepemc Cultural Education Society (SCES) and Simon Fraser University (SFU) entered into a partnership to develop a unique post-secondary education program for First Nations Students on the Kamloops Indian Reserve in Kamloops, British Columbia. These efforts were led by then-Skeetchestn Band chief Ronald Ignace, Marianne Boelscher Ignace (anthropologist, SFU), and Hari Sharma (sociologist, SFU). The goal was to offer university courses on the reserve in order to enhance the quality of life for the Secwepemc peoples and their indigenous neighbors; to preserve and promote their history, language, and culture; and to provide training in research, and developmental opportunities to assist them in controlling more fully their own affairs (Ignace et al. 1996). Ironically, the program started in several rooms within the former residential school run by the Catholic Church, whose mission it was to "remove the Indian from the child."

The campus sought to provide First Nations individuals, from near and far, with an entry into post-secondary education, but also welcomed non-indigenous students. The location on the reserve was intentional as it provided a comfortable setting distinct from that of regular universities, which many individuals found intimidating. A significant percentage of students were the first in their family to ever attend a university course or complete a university degree. The SCES-SFU program was known informally as Coyote U; the campus logo featured *Sk'elep*, the Coyote, a trickster figure to Secwepemc people known for both good deeds and causing trouble.

Soon after it began, the program quickly expanded into a small campus, consisting of six portable classrooms, adjacent to the residential school. The small permanent teaching and administrative staff was complemented by sessional instructors from other academic institutions in the region. The curriculum was designed to help Secwepemc communities meet their needs, especially those related to cultural heritage. Anthropology, First Nations, Linguistics, Ethnobotany, Archaeology, and museology were all emphasized, with courses also offered in sociology, writing, mathematics, history, and geography. Over 100 lower- and upper-level university courses were offered each year, as well as several graduate courses. Special courses and workshops were occasionally offered on treaty negotiations, film making, theater, wildlife management, and health and safety. In 1993, the SCES-SFU program received the "Award for Excellence" from the Canadian Association for University Continuing Education. The volume *Coyote U: Stories and Teachings from the Secwepemc Education Institute* (Murphy et al. 1999) is a collection of writing by students in the program.

The Archaeology program was developed in 1991 by George Nicholas (archaeologist, SFU), who directed it until 2005. The annual Archaeology Field School component combined a commitment to socially relevant, community-based archaeology with a scientific research program focused on the identification and excavation of pre-5,000-year-old sites and the land-use system they represent (Nicholas 1997). These initiatives contributed to capacity building in field and research skills, as well as cultural resource management services to the communities. The Archaeology Field School (Fig. 1) provided students with a thorough grounding in archaeological survey, site recording, testing and

Secwepemc Cultural Education Society and Simon Fraser University (SCES-SFU) Indigenous Archaeology Program, Fig. 1 Students in the SCES-SFU Indigenous Archaeology program received classroom instruction and field training in all aspects of archaeology – from theory and practice to community engagement (Photo: George Nicholas)

excavation skills, and basic laboratory analysis. The Field School worked closely with the Kamloops Indian Band to mitigate the impact of a large housing development and golf course on and around a location where Nicholas and students had previously conducted extensive field studies, and conducted work on behalf of the Secwepemc Cultural Education Society and the Secwepemc Museum. These and other projects assisted the Secwepemc people in balancing current land-use plans with heritage preservation, and introduced students to the very real demands of mitigative archaeology and to the rewards and frustrations that are part of cultural resource management.

Provincial certification in archaeological training was incorporated into the field school program or offered separately. The Resource Inventory Standards Committee (RISC) program prepares students with technical training in practical field methods to assist archaeologists in cultural resource management projects. This program has been delivered to numerous First Nation communities throughout British Columbia since 1997. For some, RISC training has been an introduction to the discipline of archaeology that has inspired them to pursue a post-secondary education, and for others, it has provided seasonal work. This work has provided networking with the archaeological community and other potential employers (Nicholas & Markey 2002).

The Secwepemc-SFU campus closed in 2010 due to financial cutbacks, increased competition for students, and a shift in priorities by the partnering organizations.

Major Impact

For 20 years, the SCES-SFU Indigenous Archaeology Program provided archaeological courses and field training to hundreds of First Nations students, more than any other institution in Canada. It created opportunities for their involvement in stewardship, heritage management, heritage policy making, developing on-reserve permit systems, cultural sensitivity in heritage research, land-use planning, cultural liaison with industry, and even mentoring for high school students. Through its archaeology, ethnobotany, and language immersion courses, the SCES-SFU campus offered many opportunities for First Nations students to visit, or revisit, parts of their traditional territories, and to work with elders who, as teachers and cultural advisors introduced them to knowledge lost to the language and cultural restrictions imposed through the residential school system and earlier Federal Indian policies.

For its part, archaeology assisted community members in identifying more fully with their culture by supplementing and expanding oral histories, and by giving them the tools to identify, recover, and interpret ancestral sites and the material culture contained therein. SCES-SFU students have subsequently pursued their interests in heritage in a variety of contexts, including:

- As band council or committee members charged with making decisions on land-use planning (including archaeological overview assessments) for their communities
- As archaeological permit holders, project managers, business managers, project

directors, or crew members for cultural resource management companies working on local, national, and international projects
- As managers, researchers, and field workers within First Nation cultural and/or natural resource departments, involved in archaeological and environmental assessments that incorporate both western science and traditional knowledge
- As museum archivists and tour guides
- As graduate students having the opportunity to teach at universities as sessional instructors
- As educators and instructors who have incorporated archaeology, ethnobotany, and language into the curriculum into elementary, high school, and university-level courses

The SCES-SFU program represented a manifestation of Indigenous Archaeology in which First Nations' concerns with heritage were addressed by providing First Nations members with the tools of archaeology that they could employ themselves as CRM practitioners, educators, or decision makers. The approach melded community values and recognition of sensitive and sacred places with scientific collection and preservation of archaeological materials, and has proved pivotal in educating future generations of both First Nations and the general public about First Nation histories, cultural identity, political perspectives, and social dynamics. It has also served to enlighten Industry (private and corporate) and Government with respect to developing better relations and protocols with First Nations (Markey 2010). The program has left a lasting legacy in Secwepemc territory, as well as contributed to the increased breadth of archaeological practice elsewhere.

Cross-References

- ▶ Canada: Cultural Heritage Management and First Nations
- ▶ Canada: Cultural Heritage Management Education
- ▶ Community Archaeology
- ▶ Field Schools, Archaeological
- ▶ Heritage and Higher Education
- ▶ Indigenous Collaboration in Archaeology Education
- ▶ Indigenous Knowledge and Traditional Knowledge

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Seeds: Conservation and Preservation

Patti J. Wright
Department of Anthropology, Sociology, and Languages, University of Missouri-St. Louis, St. Louis, MO, USA

Introduction

Not all seeds that are preserved and recovered from archaeological contexts reflect uses by past peoples. Some of the seeds may be of modern origin: they may have been blown in, dropped from local plants (i.e., "seed rain"), or transported by burrowing animals or plant roots. Seed rain also operated in the past and could be a source during site occupation and after site abandonment. At mesic sites where, as discussed below, carbonization is normally deemed necessary for preservation, uncharred seeds are often considered modern intrusions. However, the burning of an abandoned occupation site may result in the deposition of considerable quantities of carbonized seeds incidentally introduced by seed rain. Carbonized seeds can also be a result of indirect sources such as burning dung for fuel (Miller & Smart 1984). At water-logged sites, seeds may be introduced via beach drift (Matthews & Gosden 1997). Understanding depositional history is thus critical to interpreting seeds that have been preserved and recovered from archaeological sites.

Definition

Seeds are plant reproductive structures. In flowering plants, they develop within ovaries, and the ovaries and seeds then develop into fruits. The term "seed" as applied in many archaeological contexts refers to true seeds as well as kernels, achenes, pits, pips, and other kinds of dry fruits. It was the recovery of ancient seeds among other floral remains by nineteenth century researchers like John Harshberger, Oswald Heer, and Carl Kunth which propelled interest in the uses of plants by past societies. By the mid-twentieth century, it became widely recognized that seeds derived from archaeological deposits provide the kind of data needed to answer questions about diet, origins of food production, diffusion of cultigens, biodiversity, land use strategies, medicinal and ritual practices, and technological use of plants.

Key Issues/Current Debates/Future Directions/Examples

There are a number of means by which seeds may survive physical and chemical decomposition to become a part of the archaeological record. These include carbonization, desiccation, quick-freezing, and water-logging. In general, these processes inhibit the growth of decomposers like bacteria or saprophytic fungi, slow the rate of enzyme action, and lower the speed at which chemical reactions occur (Sobilik 2003: 21-28). Desiccation, quick-freezing, and water-logging are remarkable for the types of tissue preserved, if not for the shear abundance of material. The water-logged deposits of the ancient lake dwellers who built wooden houses along the shores of Switzerland's lakes have yielded cultivated grains, fleshy fruits, field weeds, legumes, and nuts, among many other kinds of plant remains, whereas the dry coastal valleys of southern Peru are equally rich in yielding desiccated seeds. Unfortunately, preservation by these means is relatively rare.

Most seeds are derived from open-air archaeological sites in mesic habitats where supplies of moisture are moderate. There the botanical remains are often subjected to oscillations between wet and dry regimes that increase their susceptibility to chemical decomposition. Repeated cycles of wetting and drying bring the seeds into contact with fresh supplies of inorganic and organic acids and bases (Bryant 1989). These substances dissolve or weaken cellulose (a component of most plant cells) to such a degree as to accelerate mechanical reduction. Also, a host of small organisms that facilitate decomposition inhabit mesic environments. Dead plant materials

serve as food for earthworms, millipedes, ants, and mites, among other soil organisms (Bryant 1989). Fungi and bacteria, nature's most effective decomposers, also abound. Under these conditions, dead organic matter tends to decay rather rapidly. There are exceptions. First, seeds that were deeply and quickly buried may preserve. Deep layers of silt or clay can result in relatively anaerobic conditions that inhibit saprophytic organisms. The deeper the material is buried, the better the potential for preservation (Sobilik 2003). Such situations can arise in the case of a mudslide or in the event of the quick burial beneath meters of mound fill.

The second and a major exception are those seeds that have undergone the physical and chemical changes associated with carbonization. During the carbonization process, chemical constituents are converted to elemental carbon, which is extremely durable and offers no nutrients on which saprophytic organisms can feed (Sobilik 2003). Beck (1989) developed and conducted experiments to evaluate basic rates of decomposition for carbonized and non-carbonized remains. She found that rates of decomposition will be greatest at those sites where the sediments are warmer, wetter, have higher organic carbon content, are more alkaline, and have more concentrated soil nutrients (e.g., phosphorus, calcium, nitrogen). However, if a seed is composed of more resistant materials – it has been carbonized – such a state will outweigh environmental factors. In many cases, seeds that have fortuitously carbonized can withstand the rigors of mesic environments.

While carbonization is a mechanism by which seeds can preserve, it is a very biasing mechanism (Wright 2003). Carbonized seed assemblages tend to reflect only a small portion of the population of plants used by past peoples. Miksicek (1987) illustrated this point when he observed traditional saguaro fruit harvesting and processing by members of the Tohono O'odham, and a year later returned to sample the processing loci. Ultimately, he found that "The flotation samples yielded evidence for approximately 0.2 % of a morning's work, of which only 0.02 % was carbonized" (Miksicek 1987: 221-222). Carbonization, hence the likelihood of seed preservation in mesic contexts, is influenced by proximity to a heat source which, in turn, is influenced by how seeds were used and/or discarded. For example, seeds consumed as a part of eating a fleshy fruit would have less of a chance to be introduced to a heat source and carbonize, than the accidental burning of maize kernels while roasting an ear or the partially digested grains contained within animal dung that was burned as fuel.

The culturally dependent phenomenon of proximity represents only a portion of the preservation equation. The ability of plant materials to carbonize is dependent on phenomena such as thermal intensity, length of exposure, the presence of oxygen, and moisture and chemical contents. A number of researchers have experimented with the carbonization process (for examples, see Wilson 1984; Wright 2003; Margaritis & Jones 2006; Braadbaart et al. 2007; Markel & Rosch 2007). Wilson (1984) and Wright (2003) observed that a particular seed accidentally subjected to a high temperature for a very short time may differ in distortions or degree of degradation than one exposed to a lower temperature for a longer time. Markel and Rosch (2007) and Wright (2003 & 2008) noticed differences in the survival of oily versus starchy seeds: oily seeds may have less of a chance of fully carbonizing at lower temperatures than their starchy counterparts. Carbonization can impact the shape and dimensions. For example, Wilson (1984) and Wright (2003) found that there is less size change in drier seeds than in moisture specimens. The potential impact on size has ramification when researchers rely on lengths, widths, and diameters of seeds to determine if a plant remain reflects a wild or a domesticated species (see Braadbaart & Wright 2007).

Carbonization and postdepositional processes can reduce seeds and fruits to simpler structures, as seed coats, embryos, and endosperm are

disarticulated (Pearsall 2000). Mechanical damage due to a host of natural activities such as freezing and thawing, gravity, rodent gnawing, and so on can thoroughly destroy seeds or render them unidentifiable. Seed coats, which are often an important to identification, can be lost, blackened during carbonization, highly eroded when desiccated, and distorted or lost in the event of water-logging (Pearsall 2000). Even the methods used to recover the seeds can impact whether or not the seed will be preserved in an identifiable state as a part of the archaeological record as the wetting of remains during flotation can cause increased splitting and damage seeds that will impact recovery rates (Wright 2005).

Seeds recovered from archaeological sites as well as the associated documentation (e.g., analytical forms, reports, images, and so on) need to be conserved for future reference. Unfortunately, little has been written in the archaeological literature about this topic. Conservation of archaeological remains recovered from marine contexts is perhaps the most researched and published in the archaeological literature. One of the more crucial tasks is the removal of salts from any seeds or other plant materials excavated from salt-water deposits. The Conservation Research Laboratory at Texas A&M University provides details about how to conserve all kinds of archaeological remains recovered from such contexts (see http://nautarch.tamu.edu/CRL/conservationmanual/File1.htm).

Governments, museums, and other professional organizations provide guidelines for conserving organic materials. For example, the U.S. Department of the Interior, National Park Service provides free, online leaflets, referred to as "Conserve O Grams," that treat preservation issues of all kinds of remains including organic materials like seeds. Phenomena to avoid when storing seeds include excessive heat, direct sunlight, radical changes in temperature and humidity, atmospheric pollutants, and pests as all of these can be deleterious. Collections should be regularly inspected to detect and record deterioration of the seeds themselves or of associated labels, containers, and/or archival documents. Also appropriate are procedures used by herbaria. Courses like that offered by the Brooklyn Botanic Garden in conjunction with the Royal Botanic Gardens, Kew, where international and institutional standards of curating plant materials at herbaria and ideas about promoting collections of plant materials to scientific and lay communities are discussed, can be useful sources of information in the curation and conservation of archaeologically recovered seeds.

Cross-References

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- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ International Council of Museums (ICOM)
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Paleoethnobotany
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes

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Seleucid, Parthian Mesopotamia, and Iran, Archaeology of

Roberta Menegazzi
Centro Ricerche Archeologiche e Scavi di Torino per il Medio Oriente e l'Asia, Turin, Italy

Introduction and Definition

At the time of Alexander's conquest, Iran and Mesopotamia had been regions of ancient civilization that possessed a multi-millenary history of contacts, exchanges, and conflicts, and they had been part of the Achaemenid Empire for two centuries. With the conquest of Babylon by Cyrus the Great in 539 BCE, Mesopotamia lost its political independence, becoming part of a multinational empire that had its center in Iran, homeland of the ruling dynasty. Nevertheless, thanks to its key geographical position and to its rich agricultural resources, the region still played a very important role within the empire. The city of Babylon was cited by Herodotus as one of the royal residences of the Achaemenid kings, together with Pasargadae-Persepolis, Susa, and Ecbatana.

By choosing Babylon as the capital city of his empire, Alexander shifted the axis of the political power from Iran to Mesopotamia. A few years later, in 311 BCE, Alexander's general Seleucus – satrap of Babylonia from 321 to 315 BCE – moved from Babylon with the aim of conquering what was going to be the largest of the Diadochi kingdoms, first annexing Media and Susiana. The centrality of the area was confirmed by the Arsacids, the Iranian dynasty that succeeded the Seleucids in the rule of the Eastern part of Alexander's Empire. They set up their capital in Ctesiphon, which was opposite the Greek metropolis of Seleucia on the Tigris. Ctesiphon also retained its role as capital under the

Sasanians, who displaced the Arsacids in the early third century CE.

From the Achaemenid time on, the political destinies of Mesopotamia and Iran were closely linked; for over a millennium, they were part of complex state structures, characterized by the coexistence and – with different nuances depending on different periods – by the transmission and assimilation of artistic and cultural features of various origins. It was the conquest of the Persian Empire by Alexander the Great that especially opened the Near Eastern and Central Asian territories to Greek culture and led to an extraordinary process of encounter and exchange with the local cultures. The available archaeological data enable one to recognize the significance of this process and to observe some of its results, but unfortunately it does not enable one to follow step by step every single phase of it. Because of their political and cultural centrality, Iran and Mesopotamia must have played a key role in the intercultural dialogue between the Greek culture, the Iranian element, and local traditions; in spite of this, the archaeological documentation coming from these areas is far from being complete.

Key Issues/Current Debates/Future Direction/Examples

The Seleucid Period

The archaeological documentation from the Seleucid period is particularly scanty. In the case of Mesopotamia, the lack of data is at least partly due to the difficult political situation suffered by Iraq in the last 20 years, which has resulted in a necessary reduction if not an almost complete lull in the field activities. This situation has been partly counterbalanced by recent developments in historical research that has offered a more articulated picture of the administrative, social, and economic reality of the Seleucid Empire through its growing attention to the local sources.

In spite of the systematic investigation conducted during the last century on the site of Seleucia on the Tigris, the Seleucid court art and architecture still remain unknown. In fact, 20 archaeological campaigns carried out by the University of Michigan and by the Centro Scavi di Torino only affected a very small portion of the entire surface of the city, which encompasses a surface of about 550 ha on the right bank of the Tigris, approximately 30 km south of Baghdad. Moreover, the Seleucid levels were reached only in some of the investigated areas. Seleucia was founded in the last years of the fourth century BCE by Seleucus I; its location – close to the mouth of the Royal Canal and the outlet of the Diyala Valley – was highly strategic for the communications between the western territories and the far eastern lands of the empire via the Iranian plateau. The city master plan probably falls under the foundation period. The urban layout was organized in accordance with basically Greek planning principles; the main public buildings are concentrated in the northern part of the city, where wide open areas divide the regular grid of rectangular blocks. These are the largest in the Hellenistic world, with an extension of 144.70 × 72.35 m, and they are bound by streets intersecting at right angles. A larger street running along the southern limit of the urban perimeter and a ship canal cutting it in two halves are the main street axes. On the northern limits stood the theater, a major institution in a Greek city. The massive remains of its mud-brick substructures, enclosed later in a Sasanian watchtower, form the artificial mound of Tell ‘Umar that dominates the archaeological area of the city. Immediately south of the theater, the agora is an open area with a long, rectangular shape. On the east wing of the square stands a stoa; the west wing is occupied by the public archives hosted in a building destroyed by fire in the last quarter of the second century BCE and never rebuilt.

The Greek character of Seleucia is hardly surprising. The city was a royal Macedonian foundation, and it was conceived as the eastern capital of the empire. What is remarkable is the ability to adapt Greek features to a different geographic and cultural context, as shown by the huge size of the city, by the presence of a ship canal as a main street axis or by the use of mud brick for the civic theater. Moreover, some data points to the coexistence of different architectural

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 1 Seleucia on the Tigris. Clay sealing with portrait of the Seleucid king Demetrius II (Photo archive Centro Scavi Torino)

traditions; in the agora, a stoa, an edifice with a strictly codified Greek plan, is opposite a building that hosted the archives and whose plan offers analogies with Mesopotamian temple precincts (Messina 2007: 60–3). Also the seal impressions found inside the archival building testify to the complex cultural life of Seleucia. Over 11,000 figured seals offer an overview of the different features of artistic production that existed in the Seleucid period. Hellenistic style and iconography predominate; particularly noteworthy is the large set of representations of Greek gods and the portraits of the Seleucid kings, some of which are true masterpieces of the Hellenistic glyptic (Fig. 1). Besides Greek subjects, one can still find a little but significant number of pre-Hellenistic patterns, both of Mesopotamian and Greco-Persian origin (Invernizzi 2004).

The coexistence – in different proportions – of Greek and local elements appears to be a common feature of the main cities of Seleucid Mesopotamia. With the foundation of Seleucia, Babylon lost its dominant position in terms of internal and international politics. However, it was still an important regional center, as testified by textual sources and archaeological remains. The first phases of the theater, which is located in the northeastern sector of the city known as Homera, may have dated to the last years of the fourth century BCE. The mud-brick cavea leans on an artificial mound formed by debris coming from other areas of the city. The presence of a theater fits well within the framework of the city, whose Greek community was organized as a polis. On the other hand, textual documents and archaeological data both attest continuities in the use of pre-Hellenistic buildings, from the royal palaces to the temples. The texts record Seleucid royal activity in the sanctuary of Marduk. The active role of the Seleucid kings in the religious life of the main Mesopotamian centers – which is clearly testified by the well-known cylinder of Antiochus I from Borsippa, the last known royal inscription written in cuneiform – coheres completely with the political attitude of the new rulers. These were respectful to the different cultures of their composite empire inasmuch as they were particularly concerned with the accomplishment of the duties connected to Babylonian kingship.

The continuity of traditional religious practices is even more evident in the case of Uruk, the most ancient center of Southern Mesopotamia. The main temple complexes of the city – the Bit Resh and the Irigal – were constructed and renovated according to the traditions of Babylonian religious architecture, both in terms of plan and decoration. In charge of the works in the Bit Resh was the governor of Uruk, a member of the Anu-uballit family who received the Greek name of Nikarchos from the king Antiochus II. Subsequent works were undertaken by another member of the family, Anu-uballit Kephalon, governor of the city under Antiochus III. The fact that the local ruling elite was closely connected to the royal dynasty is attested by the royal practice of conferring Greek names on its members; moreover, such important works as the ones carried on in the Bit Resh sanctuary had to enjoy direct or indirect royal patronage. Even Uruk, in spite of its strongly conservative character, shows important traces of Greek cultural presence, as demonstrated by the exceptional discovery of the two

tumuli of Frehat en-Nufegi. In this case, both the funerary practices and the grave goods – which include golden wreaths and iron strigils – are completely foreign to the Mesopotamian milieu and point to the Greco-Macedonian world (Pedde 1991).

If we look at the material culture, the relation between Greek and Mesopotamian tradition seems to go beyond the simple coexistence of features of different origins. In the case of the pottery production, the extremely rich documentation shows that already in the Seleucid period Mesopotamian craftsmen freely employed local techniques – such as glazing – to produce vessels inspired by western shapes. Unfortunately, the thousands of terracotta figurines found in Central and Southern Mesopotamia do not provide precise indications on the first phases of the encounter between Greek and Mesopotamian traditions; examples certainly dating to the Seleucid period are too rare to be informative about the tendencies of the coroplastic production of that époque. Some representations of gods on the seal impressions from Seleucia stand out in that respect, for their western iconography is enriched with Mesopotamian features that allow one to offer a twofold Greco-Mesopotamian interpretation: Athena-Nanaia-Artemis with a helmet, crescent, and torch and Apollo-Nabu with an arrow-stylus in the hand and both a crescent and a tablet in the field.

Archaeological data coming from Northern Mesopotamia is very scanty and seems to suggest a contraction of the settlements in the area. At Nimrud, traces of a third-/second-century village were found in the area of the Ezida. At Nineveh, surface pottery finds that can be closely compared with the materials from Nimrud possibly indicate a Hellenistic occupation of the area east of the citadel. Besides, some epigraphic evidence point to a potential Seleucid origin as regards the organization of the city as a polis (Reade 1998).

French excavations carried out since 1986 at Dura-Europos, a Macedonian foundation on the northwestern corner of Mesopotamia, shed new light on the early history of the site. The city, with its Hippodamian plan and its powerful fortifications, is now dated to the latest phases of Seleucid rule, around the middle of the second century BCE. In early Seleucid times, the site was only the place of a stronghold established on the citadel in order to control the route connecting the two capital cities of the empire, Antiochia on the Orontes and Seleucia on the Tigris. Beyond the southern limits of Mesopotamia, the island of Failaka, near the head of the Gulf, was the seat of a small Hellenistic settlement dating from the end of the fourth to the second century BCE. Both the material finds from the excavations – namely, the pottery and the terracotta figurines – and the epigraphic evidence point to the coexistence and mutual exchanges of Greek and non-Greek elements.

The archaeological data from Mesopotamia allows one to recognize some of the cultural dynamics generated by the encounter of Greek culture and local traditions; by contrast, the information coming from Iran is too fragmentary to enable the creation of a general interpretative framework. The historical sources attest the interest of the Seleucid rulers in Iran. As already mentioned, in 311 BCE Seleucus I started to build his empire by annexing Media and Susiana. Moreover, Seleucid rule in Iran was consolidated by new foundations, by the refounding of old cities, and by the establishment of garrison sites. Unfortunately, the pattern of the Seleucid settlements in Iran has largely been lost, and many of the foundations quoted by the written sources have not yet been identified on the ground. The archaeological remains of the Seleucid period are not homogeneously distributed on the Iranian plateau; on the contrary, they are mainly concentrated in the western regions, namely, Media and Susiana, which were areas of great economical and strategic importance for the ruling dynasty. In the heart of Media, close to Nihavand, the Greek city of Laodicea was founded. A stele found on the site bears a double Greek inscription – dated to the reign of Antiochus III – that identifies the city as a Greek polis and testifies to the spread of the Seleucid dynastic cult in Iran. At Bisutun, on the route connecting Mesopotamia to the Upper Satrapies, there was a Greek sanctuary dedicated to Heracles. To the sanctuary belonged the well-known high relief depicting the reclining

hero, with an inscription dated to 148 BCE. Further north, in Media Atropatene, a Seleucid garrison was established on the site known as the Karafto Caves (Kuhrt & Sherwin-White 1993: 72–81).

The city of Susa was refounded as a Greek polis under the name of Seleucia on the Eulaios. Not much data concerning its Seleucid phases is available. The site was an object of systematic exploration by French archaeologists from the end of the nineteenth century on, but the documentation concerning the recent phases suffered neglect from the lack of interest of the first archaeological missions. A recent reexamination of the data collected in almost a century of excavations has led to the conclusion that the city was not densely populated in the early Seleucid period. The Greek presence became more manifest starting from the second half of the third century BCE. In the meantime, the city underwent a strong commercial development that reached its peak in the period between the end of Seleucid times and the first century CE (Martinez-Sève 2002a). From the excavations of Susa come many terracotta figurines – generically dated to the Seleucid-Parthian period – whose iconography and style represent an original synthesis of local traditions and Greek influences. The presence of types from the coroplastic repertoire of Susa in other sites of Susiana and Elymais testifies to the cultural influence exercised by the city between the Seleucid and the Parthian periods. A fragment of a bronze statue possibly depicting a Seleucid king found in the little sanctuary of Shami, in Elymais, suggests that the sacred area was already in use in the Seleucid period.

In Fars, homeland of the Achaemenid dynasty, the Achaemenid heritage has been evident for a long time, and the reuse of previous buildings was a common practice; at Pasargadae, the archaeological data points to continuity between the Achaemenid and the Seleucid phases. The interest of the new ruling dynasty in the area is evident in the foundation, probably by Antiochus I, of the city of Antiochia Persis, whose localization on the ground is still debated. Fragments of marble statues of Hellenistic taste – some of which are considered to be imports from the eastern Mediterranean – were found in different sites of the region (Callieri 2007). On the whole, the number and variety of the archaeological remains support scholars' quite recent reassessment of the end of the Seleucid rule in Fars. On the basis of the coins minted by the first local rulers, the *frataraka*, the end of the Macedonian control of the region has been shifted from the beginning of the third to the beginning of the second century BCE.

The Parthian Period

141 BCE marks the beginning of Parthian rule in Mesopotamia. This was when the city of Seleucia on the Tigris was taken by Mithridates I, founder of the Arsacid Empire. The attempts of the Seleucid king Demetrius II and his successor Antiochus VII to regain possession of Mesopotamia were in vain and ended with the defeat and death of Antiochus VII in 129 BCE. During the reign of Mithridates II (123–88 BCE), who consolidated the empire, Parthian rule stretched from Central Asia to the Euphrates.

The starting point for the conquests of Mithridates I was Parthia, a region of outer Iran that had been under Arsacid control since the second half of the third century BCE. In Parthia, at the feet of Kopet Dagh mountains, Mithridates I founded Old Nisa/Mithradatkert: not an ordinary seat of the Arsacids, but the center of their dynastic cult. The site is of a primary importance; from Nisa comes the only available evidence of Arsacid court art and architecture, as the royal residences of the Parthian rulers have been so far unknown. The buildings brought to light by Soviet, Russian, and Italian excavations (Pilipko 2001; Invernizzi & Lippolis 2008) conform to the Iranian architectural traditions of Central Asia in their recurring use of centric layouts, organized around a central space and surrounded by perimetral rooms and/or corridors. The architectural decoration features patterns of Greek origin that have been freely adapted to the different exigencies of mud-brick architecture; this is the case, for instance, with the terracotta assembled capitals. The influence of Hellenistic culture is definitely stronger in the works of art. If the marble

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 2 Old Nisa. Fragmentary clay head of Mithridates I (Photo archive Centro Scavi Torino)

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 3 Old Nisa. Ivory rhyton n. 43 (Photo archive Centro Scavi Torino)

statuettes and some of the metal figurines are purely Hellenistic works, the monumental clay statues – unfortunately badly fragmentary – possess western features that find expression in a technique which is meant to bring great fortune in Central Asia, as demonstrated by Kushan and Greco-Buddhist clay sculptures (Fig. 2). The 48 ivory rhytons found in the Square House are the extraordinary result of a synthesis of Greek subjects, Iranian elements, and local tastes and traditions. The drinking horn, a type of vessel widespread in Iran and Central Asia, is enriched with a decorative apparatus dominated by western themes and iconographies, alongside which we can find oriental patterns (Fig. 3). All of the Nisean finds contribute to underlining both the philhellenism of the first Arsacid kings and the ability of local artists to re-elaborate cultural influences of different origins. In fact, the synthesis of Greek, Iranian, and local traditions is a common trait of much of the archaeological evidence from the Parthian period.

Greek culture still maintained a considerable influence at Seleucia on the Tigris. Under the new rulers, the city kept flourishing through its commercial activities and retained a high degree of political and administrative autonomy. This status, however, changed after a revolt of the Seleucian inhabitants in the first century CE. The Arsacid kings were aware of the strategic importance of the site; opposite Seleucia, on the left bank of the Tigris, they founded Ctesiphon, capital of the empire from the first century CE, whose Parthian phases have not yet been identified on the ground. In the area of Seleucia-Ctesiphon – named by the Arabic sources al-Madain, "the cities" – urban settlements flourished up to the Islamic period.

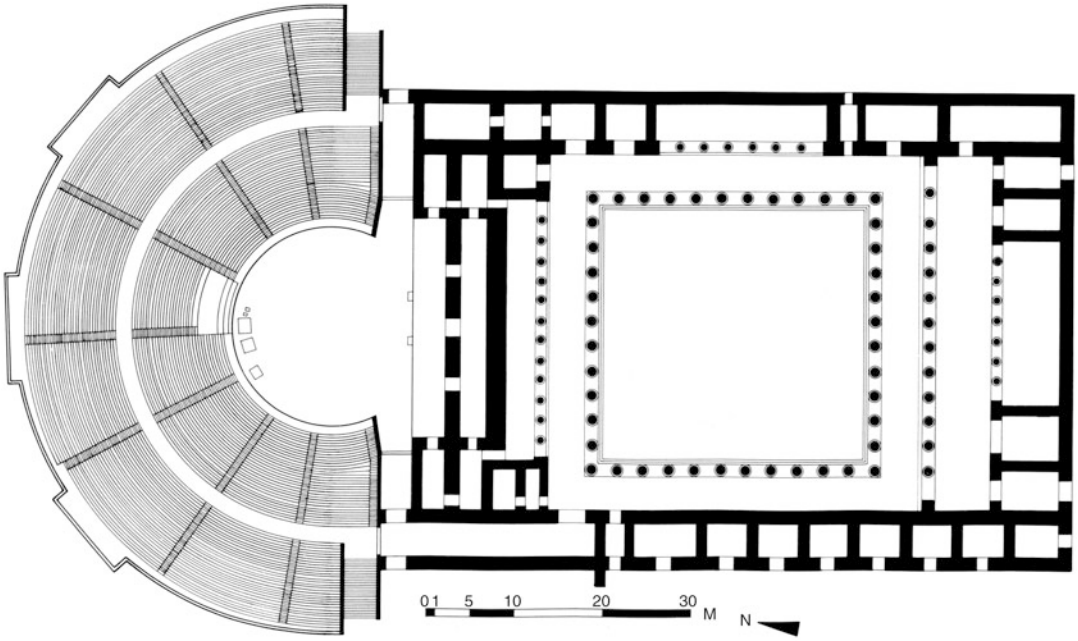
The development of Seleucia in Parthian times respects the outline of the Seleucid layout. Important public buildings, such as the theater, are maintained. By contrast, in the agora dwelling houses and workshops are built on the remains of the archival building and the stoa. The excavation

of a dwelling block in the southern half of the city illuminates the emergence, between the first and the second century CE, of a new architectural feature that characterizes civil and religious Mesopotamian architecture of the first centuries CE: the iwan, a large rectangular room open to one short side. The coroplastic repertoire from Seleucia gives us a reflection of what probably was the richness of the artistic production of the city. Over 11,000 terracotta figurines brought to light by excavations are the product of a sustained process of interaction and synthesis between Greek and Mesopotamian culture that led to new and original results. New western iconographies, styles, and techniques stimulated the renewal of subjects and practices that had persisted for millennia. Very ancient Mesopotamian subjects, such as rigidly standing naked women, coexisted with western subjects, such as women in Greek dresses, reclining figures, and children (Fig. 4). These were all freely reinterpreted according to local taste and sensitivity. This process resulted in the creation of a new and original iconographic and formal language that characterized the coroplastic production of Seleucia and spread throughout the repertories of Central and Southern Mesopotamia.

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 4 Seleucia on the Tigris. Terracotta figurine showing a draped woman (Photo archive Centro Scavi Torino)

Continuity with the Seleucid phases and the strength of local traditions, together with the intensity of intercultural dialogue and the creation of new artistic solutions, are features that Parthian Seleucia shares with the other regional centers. The persistence of ancient local customs is demonstrated by the burial practices. Even though extramural cemeteries are attested, intramural burials appear to have been the norm, both in inhabited dwelling houses and in abandoned areas of the city. Various types of inhumation included simple ditch graves, jar burials, backed brick graves, and vaulted tombs with loculi. Glazed ceramic "slipper coffins" were a particularly distinctive type that was popular in Central and Southern Mesopotamia during the first to the second century CE.

The urban layout of Babylon shows elements of continuity with the previous phases. The theater remained in use until the second century CE; it was accompanied by an adjacent peristyled building variously interpreted as a gymnasium or an agora (Fig. 5). In the Merkes, an area whose occupation goes back without interruption to the neo-Babylonian times, the Parthian houses follow the same plans already in use in the Seleucid period; they are characterized by a peristyled courtyard. On the contrary, during the Parthian period, the big sanctuaries were progressively abandoned. At Babylon, there is no archaeological evidence showing continuity in the use of the Esagila, even though some texts indicate that the sanctuary was still in use in the early Parthian period. A cuneiform tablet from Uruk dating to 108 BCE demonstrates that the Bit Resh and the Irigal were in use at that time. However, both sanctuaries were later destroyed by fire and dwelling areas were situated on their remains. At Uruk, the temple of Gareus provides



Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 5 Babylon. Plan of the theater (Graphic elaboration Claudio Fossati)

a sample of the religious architecture of Parthian period. Its interior follows a plan of Babylonian type, with a forecella and a cella of equal breadth; by contrast, the decoration of its outer walls freely employs architectural details of clear western influence.

The original synthesis of different cultural influxes shown by the temple of Gareus is a common feature of many architectural remains from Northern Mesopotamia. During the Parthian period, this area experienced a great development, as testified by the growth of urban settlements. Parthian-era Assur covered more or less the same extent of the ancient city, and this old Assyrian capital has provided substantial architectural evidence. The persistence of old religious practices is testified by the rebuilding of the Bit Akitu on its old plan. On the contrary, the so-called Peripteros is a combination of very different features; the nucleus, which consists of a broad forecella and cella of Babylonian origin, is preceded by an *iwan* on the façade and a peristyle that surrounds the back and the sides of the building. Likewise, a multiple *iwan* temple is built on the ruins of the old Assur temple. This peculiar feature also recurs in residential architecture, as shown by the palace of Assur; a large *iwan* opens to each side of its central courtyard. The stuccoed decoration of the courtyard's façades was organized in three registers of slender engaged columns that framed niches.

Many of the features evidenced for Assur recur in the architecture of Hatra, the main center of the Jazira. Located on a frontier zone between the Parthian and Roman empires, the city was governed by Arab rulers, while being under the Parthian political sphere of influence. The archaeological data elucidates its extraordinary development in the late Parthian period, between the second and the first half of the third century CE. The heart of the city was the sanctuary dedicated to the sun god Shamash, and its sacred precinct enclosed many temples. Whereas the temple of Maran – rising on a high podium and surrounded by a double peristyle – recalls Romanized Syrian temples, the *iwan* is the dominant feature of almost all the temples built on the western part of the *temenos*. Particularly outstanding is the "Great Iwan" complex, a series of juxtaposed iwans with a number of subsidiary

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 6 Hatra. The Great Iwan complex from southeast, detail (Photo Antonio Invernizzi)

rooms. Its façade, 115 m long, is dominated by arched openings that are framed by richly sculpted archivolts and separated by high engaged columns (Fig. 6). On the contrary, some of the small shrines built outside the sacred precinct, in the dwelling areas, show plans analogous to earlier Mesopotamian religious architecture.

Besides architecture, the city of Hatra has left us a large body of evidence for figurative arts. These include reliefs and statues depicting gods and members of the city elite involved in ritual acts or in devotional attitude. These sculptures are characterized by the strict frontality of the poses, the descriptive taste in the careful rendering of decorative details, and the paratactic organization of the figured scenes. In his essay *Dura and the Problem of Parthian Art*, which focused on the figurative documents from Dura-Europos and was published in 1935, M. Rostovtzeff identified these features as main principles of Parthian art. Thanks to the availability of further artistic evidence from the Parthian world, today we can say that the above-mentioned principles define an artistic tendency that developed in the late Parthian period, has been attested in different areas of the empire – namely, Northern Mesopotamia and Elymais – and spread even beyond its geographical and chronological limits. In fact, Palmyra – whose figurative production shares common traits with the Duran and Hatrean art – falls within the Roman cultural and politic sphere of influence, and many of the mural paintings from Dura-Europos are dated after the Roman conquest of the city. Moreover, some artifacts from Northern Mesopotamia seem to suggest the contemporary presence of different artistic tendencies, even in the same area; this is the case of the statuette of Heracles Epitrapezios from Nineveh, which dates to the second century CE and was strongly inspired by western models. As regards Central Mesopotamia, the above-quoted terracotta figurines from Seleucia offer another different perspective concerning figurative arts in the late Parthian period. In the light of that complexity, a recent essay has pointed out the necessity of a diachronic rereading of the figurative materials of the Parthian period for tracing a history of Parthian art (Invernizzi 2011).

Similar complexity also characterizes the Iranian archaeological remains. The material culture of Iran in the Parthian period is marked by strong regional features and significant gaps in the archaeological documentation. It is nonetheless possible to recognize some of the cultural traits already highlighted within the Mesopotamian context.

Seleucid, Parthian Mesopotamia, and Iran, Archaeology of, Fig. 7 Hung-e Azhdar (Khuzestan). Rock relief (Photo courtesy Centro Scavi Torino and Iranian Center for Archaeological Research)

The strength and variety of local traditions are verified by the different burial practices attested in the various areas of Iran: jar burials in the north, rock tombs in Media, cairn burials in Fars and in the southeast, and vaulted tombs at Susa. In regard to the architectural remains, the temples built on the sacred terraces of Bard-e Neshandeh and Masjid-i Sulaiman, in Elymais, are indebted to Iranian and Near Eastern building traditions. Particularly, the temple of Bard-e Neshandeh – with its portico on the façade and the central, four-columned room surrounded by shallow, rectangular spaces – perfectly fits with the Iranian and Central Asian architectural traditions already mentioned for Old Nisa. Features of Iranian origin – the portico and the circumambulatory corridor isolating the inner spaces of the building – also recur in the Great Temple of Masjid-i Sulaiman, which otherwise show a connection with Mesopotamian religious architecture through its possession of a forecella and cella unit behind a court (Downey 1988: 131–6).

The materials from Parthian-era Susa testify to continuity with the Seleucid phases; epigraphic evidence – still written in Greek – attests the persistence of Greek traditions and institutions. The western influence is evident also in the figurative arts; besides the above-quoted terracotta figurines, which are generically dated to the Seleucid-Parthian period, some fragments of stone sculptures that include a well-known female head with a Greek inscription on the crenelated crown are worth mentioning. In the sculptural production from Susa, iconographies inspired by Hellenistic art coexisted with purely Iranian types, such as men in Parthian dress that closely recall – in spite of the difference in size and material – the famous bronze statue of the Parthian prince from Shami. Hellenistic culture left a clear mark on the plan of Ecbatana, a former Median and Achaemenid capital. Recent excavations have demonstrated that the regular grid of the city dates to the Parthian period. Likewise, the palace of Khorheh in the central Iranian plateau, with its slender columns with Ionic capitals, has been interpreted in the past as a Seleucid temple, but it was founded in Parthian times.

The stuccoed decoration – already seen in Mesopotamian architectural decoration – is a distinctive feature of the palace of Qaleh-i Yazdigird. This palace dates to the late Parthian era and is located on the westernmost slope of the Iranian plateau, not far from the Zagros gates that connect Iran and Mesopotamia. The extremely rich decorative patterns include not only abstract motifs and architectural elements but also figural motifs both of Greco-Roman and Eastern origin. The excavator of the palace also hypothesizes the presence of iwan chambers.

From Elymais comes an important series of rock reliefs that date from the first to the early third century CE, which is otherwise the time when the area was ruled by local dynasts. These reliefs, often carved on boulders, usually depict reclining figures, scenes of devotion, investiture, or homage to the prince; hunting scenes and riding figures are less common. The reliefs from Elymais are the product of a local, provincial

art. Nonetheless, they share meaningful stylistic features with the above-quoted artistic production of Syria and Northern Mesopotamia in the late Parthian period; they are characterized by frontality, paratactic distribution of the figures taking part in a scene, and descriptive taste in the rendering of the details (Fig. 7). These common traits were already highlighted in the late 1960s by D. Schlumberger, who explained their birth in different regions of the Parthian Empire by hypothesizing that they might have been reflections of the lost court art of Ctesiphon (Schlumberger 1970: 152–60).

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- ▶ Antioch, Apamea, and the Tetrapolis, Archaeology of
- ▶ Dura-Europos, Archaeology of
- ▶ Sasanian Empire, Archaeology of the

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Semiotics in Archaeological Theory

Alexander A. Bauer
Department of Anthropology, Queens College, CUNY, Flushing, NY, USA

Introduction

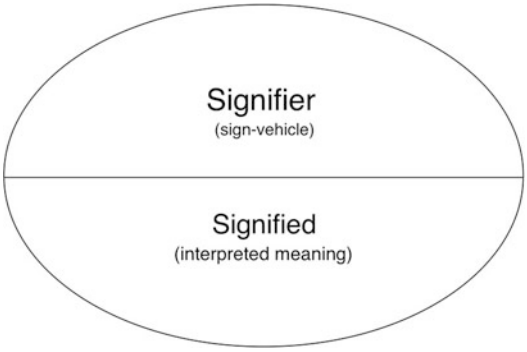
Archaeological interest in semiotics, or the study of signs, has a long history due to the centrality of interpreting "meaning" in the archaeological record. It has had particular currency with respect to questions of symbolism and style, two areas traditionally associated with the Saussurean language-based model of the sign that underlies structuralism. Its emphasis on linguistic codes and meanings also found favor among

archaeologists interested in terminological classification schemes and computer applications, especially the use of artificial intelligence modeling. The limited interest in structuralism or even symbolism within Processual archaeology, on one hand, and the turn toward poststructuralist approaches within Post-processualism, on the other, however, reduced the overall impact of Saussure's structural semiotics in archaeology. In spite of this, semiotics has recently been undergoing something of a renaissance as archaeologists have turned to alternative semiotic models, in particular that of the American philosopher Charles Sanders Peirce, best known as being the founder of pragmatism. This entry presents an overview of the two main types of semiotics, that of Saussure and Peirce, and reviews their archaeological applications and key contributions and then closes with a discussion of the current and future prospects for semiotic approaches within archaeology.

Definition

Semiotics is the study of signs and the ways in which they convey meaning. The term comes from the Greek word *semeion* ("sign") and has been the focus of philosophical debate since Plato. At the heart of such debates is the question of how well signs – and most often linguistic signs, or words – represent reality or truth in the world, and what the precise relationship is between the sign or *that which represents* and idea or thing *being represented* by the sign.

The two most influential approaches to semiotics were both developed around the turn of the twentieth century: those of French linguist Ferdinand de Saussure (1857 – 1913) and American philosopher Charles Sanders Peirce (1839–1914). Saussure's has had a lasting effect on anthropology and, to a lesser extent, archaeology, since its adoption as the foundation of structural analysis by Claude Lévi-Strauss. Peirce's approach, largely ignored for the half-century following his death, has more recently found favor in both anthropology and archaeology.

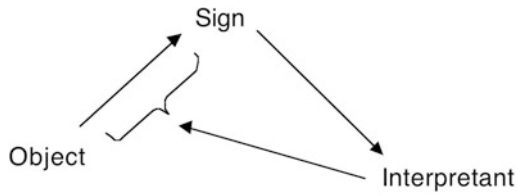


Semiotics in Archaeological Theory, Fig. 1 Saussure's model of the sign

Saussure termed his approach *semiology* and though he acknowledged that nonlinguistic signs such as rites and customs act as signs, he focused mainly on linguistic signs as he felt those were the most complex types of signs. Understanding a language system could thus provide insight into all other dimensions of a culture. In Saussure's model, the sign is the fundamental unit of analysis and consists of two interrelated components, the "signifier" (*signifiant*), or the form of the sign itself, and the "signified" (*signifié*), or the concept being represented by the signifier (Fig. 1).

For example, the word "tree" is the signifier for the concept of that thing with branches and leaves known as a tree. Two key points about Saussure's model follows from this: (1) the concept being signified is not the instantiated thing in the world, but rather the mental concept or idea of that thing and (2) the relationship of the signifier to the signified is arbitrary and based on a social/linguistic group's convention. There is no necessary relationship between the word "tree" and the concept it represents, as other languages have other words for the same concept, such as "arbre" in French and "ağaç" in Turkish. A complete language system depends on the interrelationship among its various words/signifiers, and the aim of linguistic analysis is to understand the structure and rules at the core of that system.

Peirce's *semeiotic* model differs from Saussure's approach in several ways. First, rather than accord special status to language, Peirce conceived of all things in the world, even thoughts and humans themselves as signs.



Semiotics in Archaeological Theory, Fig. 2 Peirce's model of the sign (after Parmentier 1994: 10)

To Peirce, words are only one particular (and quite limited) kind of sign. Second, and perhaps most important, Peirce's understood signs to be triadic, rather than dyadic in nature. Rather than consisting of a signifier that stands for a signified idea, Peirce understood the sign as "something which stands to somebody for something in some respect or capacity" (Hartshorne et al. 1938–51: 2.228). In other words, Peirce understood a sign to represent its "object," or thing out there in the world, for some interpreter of that sign. The resulting interpretation in the mind of the interpreter is itself a new sign, termed the "interpretant," which stands in triadic relation with both the sign being interpreted and the object that sign was meant to represent (Fig. 2).

In this way, Peirce both acknowledged that there is a physical world "out there" which impinges upon and constrains interpretation, while at the same time recognizing that any interpretation of the world is not direct but mediated through signs generated through the act of interpretation, interpretation itself being a sign. The implication of this is the third important difference with Saussure's model: that rather than being a closed "system," semiosis may be understood as continually unfolding in two directions, both by endlessly generating new signs in further acts of response and interpretation and by referring back to previous signs in the semiotic chain.

Historical Background

Saussure and Structuralism

Saussure's focus on codes and structures as being key to linguistic analysis was taken up in anthropology by Claude Lévi-Strauss (1963 [1958]) and formed the basis of his structuralist approach. He suggested that anthropology uses Saussure's framework to determine the binary logic of categories that constitute all aspects of social life. Through the analysis of the constitutive elements of various aspects of a society – its kinship terms, its myths, and its cuisine – Lévi-Strauss felt that the researcher could uncover the codes and "deep structures" underlying thought and behavior in a given culture.

While Lévi-Strauss had enormous influence in anthropology (though few will today claim that his results are either replicable or even reliable), structuralism's influence in archaeology was limited. While sharing some of the positivist goals of Processual archaeology, structuralism's emphasis on symbolism and meaning did not easily fit within the largely ecological framework of Processualism. Nonetheless, we can identify several ways in which Saussure's approach influenced archaeological thinking in the 1960s and 1970s.

The most direct archaeological engagement with Saussure's linguistic model and structuralism was that of American historical archaeologist James Deetz in his book *Invitation to Archaeology* (Deetz 1967). In that book, he advocates studying the elements of culture as signs and, taking up Saussure's approach explicitly, argues (1967: 87), "there may be structural units in artifacts which correspond to phonemes and morphemes in language... reflecting an essential identity between language and objects in an structural sense." He then coined the terms "factemes" and "formemes" as material correlates to Saussure's "phonemes" and "morphemes" as a way of categorizing specific artifact types in order to identify the grammatical rules underlying the relationships among them. Deetz's approach was taken up by several of his students, most notably in work by Mary Beaudry (1988) and Ann Yentch (1991).

Structuralism and its focus on grammatical categories have also been influential in analyses of artifact style and meaning. Dorothy Washburn's (1977) symmetry analysis of polychrome pottery design, for example, builds on the

idea that information is encoded within particular design elements like a linguistic code or grammar and that particular design structures displayed on painted pottery is therefore reflective of social interaction among pottery-making groups. Similarly, Hodder (1982a) drew on symmetry analysis and structuralist ideas about grammar in his study of Nuba material culture. At the same time, though, Hodder (1982b, 1986) raised important questions about the limitations of a structuralist approach and (along with his students) began a move away from it toward the discourse and text model of poststructuralist theorists such as Derrida, Ricoeur, and Foucault.

A final important application of Saussurean semiotics within archaeology is built upon the problem of grammar and terminological meaning to focus on how archaeologists themselves name and categorize artifacts and how differences in those terminologies can affect what kinds of archaeological knowledge are produced. This was the problem taken up by French prehistorian Jean-Claude Gardin (1980), whose work drew upon both Saussure's semiotics and elements of Peirce, mediated through the work of Umberto Eco (1976). Of particular concern to Gardin was the issue of how the language of archaeology could be standardized both for the sake of translation among scholars working in different languages and traditions, and for computational and artificial intelligence (AI) applications (Gardin 1987; Gardin & Peebles 1992).

In spite of these applications, a good deal of skepticism remained about the applicability to archaeology of Saussure's linguistic model (e.g., Hymes 1970) and structuralism in general (Wylie 1982). Part of the reason may be due to the poor fit between Processual archaeology and a semiotic approach that was largely concerned with interpreting symbols. More than that, however, is the fact that, as Hodder (1989: 73) argued, material objects depart from the Saussurean linguistic model because their meanings are often nonarbitrary, they are polysemous and ambiguous, and they have durability that spoken words do not.

Current Debates

Recent Engagements with Peirce

In spite of the important critiques of earlier (mainly Saussure-based) semiotic applications in archaeology, semiotics has recently witnessed a resurgence of interest, mainly due to the (re-)discovery of the semiotic writings of Charles Sanders Peirce (Preucel 2006). Peirce's anti-foundational approach (which inspired the philosophy known as pragmatism), coupled with his view that the meanings of signs are not fixed as in a code, but are continually remediated in the process of communication and semiosis, parallels critiques raised by Post-Processualism. At the same time, the growing popularity of Peirce among linguistic anthropologists concerned with problems of discourse and contextual meaning (e.g., Silverstein 1976; Parmentier 1994), as well as a new project dedicated to editing and publishing his entire corpus (The Peirce Edition Project, based at Indiana University), has made his work newly accessible to archaeologists.

Most critically, Peirce's semiotics addresses the very problems with material culture meaning identified by Hodder (1989). In his most oft-cited contribution, Peirce argued that most relationships between signs and the objects they represent are not "arbitrary" in the Saussurean sense, but necessary, and he typologized such relations as either "iconic," "indexical," or "symbolic." This distinction (and trichotomy) was the subject of the earliest archaeological references to Peirce (e.g., Conkey 1982 [via Jakobson, Sebeok, and Eco]; Chase 1991; Byers 1994; Deacon 1997), as most archaeological interpretation is grounded in iconic and indexical meanings (e.g., the distribution of artifacts, how things mediate social relations, how style and function are related to materiality). His semiotic model also offered a way to account for the seeming ambiguity or polysemy in a sign's meaning, since he argued that any given sign may variably function as an icon, index, or symbol, depending on the particular interpretation generated (what Peirce called the "interpretant") in the mind of the interpreter of that sign.

The first substantial engagement with Peirce in archaeology was by Preucel and Bauer (2001),

in which they argued that Peirce offered a way to deal with the problem of ambiguity in material culture meaning and provided a framework for not simply dealing with, but building a rigorous archaeology upon, seemingly incommensurable approaches to archaeological interpretation. Preucel followed this with a book-length treatise on the subject (Preucel 2006), and several of his students took up the challenge of applying Peirce to various questions in archaeology (Bauer 2002, 2013; Capone & Preucel 2002; Coben 2006; Cipolla 2008; Liebmann 2008). Since then, Peirce's ideas have been increasingly invoked, highlighting the broad potential of the approach in helping to answer questions of archaeological interest. While several have focused on epistemological issues (e.g., Knappett 2002; Lele 2006; Watts 2008), Peirce's model has also been applied to understanding material culture style and technology (Capone & Preucel 2002; Joyce 2007; Agbe-Davies 2010); architecture (Ferguson & Preucel 2005; Coben 2006), bodies (Crossland 2000), and religion (Aldenderfer 2011).

Peirce's ideas are particularly relevant to current discussions about materiality and the agency of material culture. As described above, Peirce argued that all signs (including material objects) actively mediate interpretation in the ongoing process of semiosis, effectively generating new signs (interpretants) as interpretive responses. This view intersects recent ideas about material agency, where objects are seen to play an active role and even demand certain actions through their very existence. But while those approaches seek to break down the barrier between structure and agency (Dobres & Robb 2000), and human and nonhuman agents (Knappett & Malafouris 2008), Peirce's model at its core avoids the Kantian dualism underpinning Saussure's model of the sign that these theories seek to transcend. Rather than focusing on how objects do or do not represent "reality," by adding the third dimension to the sign relation, Peirce instead focused on the act of interpretation itself, to consider the ways in which such interpretations about reality were made. This "pragmatic" approach was not meant to suggest that a real world didn't exist, but that it was not directly accessible in the interpretive act. Instead, what something "means" depends on what kinds of interpretations are being privileged in each moment of semiosis. Peirce's model thus offers a way to think through material culture's active and meditative role in social life, but from the perspective of an active interpreter rather than in the object itself.

International Perspectives

Outside of Anglo-American archaeology and anthropology, almost all engagements with semiotics draw upon Saussure's ideas, particularly since his work and ideas were widely disseminated (and critiqued) through the work of a number of important twentieth-century linguists and philosophers, including Louis Hjelmslev, Valentin Voloshinov, Mikhail Bakhtin, Roman Jakobson, and Umberto Eco. Voloshinov and Bakhtin raised important critiques of Saussure's emphasis on language structure at the expense of its experiential, dialogic qualities, criticisms that parallel Peirce's ideas about mediation, though it is unlikely that they ever read Peirce. Jakobson, a founder of the influential Prague School of Linguistics early in his career, both built on and departed from Saussure's model in his analysis of sound systems. After his move to the United States later in his career, he incorporated Peirce's ideas into his thinking, in turn influencing his student at Harvard, Michael Silverstein. Otherwise and until recently, most scholars outside the United States who have engaged with Peirce's ideas have done so through Umberto Eco's (1976) work, which builds on both Saussurean and Peircean approaches.

Gardin's (1980, 1987) work on the relation of language to archaeological terminology and meaning is perhaps the most internationally well-known application of semiotics in archaeology. Gardin's focus on the problem of translation in archaeology has been a particularly important question of how to transcend academic language barriers, which he attempted to address through the use of computer applications and AI modeling. In short, Gardin argued that if some universal

code for categorizing and describing artifacts were developed, scholars from different countries could share and compare data much more easily and without confusion in meaning. While some attempts have been made to employ Gardin's ideas, the issue of translation and artifact meaning remains a difficult problem in archaeology.

Future Directions

While semiotic perspectives that directly build on Saussure's writings have largely fallen out of favor in archaeology, his impact can still be felt in the numerous post-Saussurean approaches popular in contemporary social theory (particularly those of Bakhtin, Ricoeur, Foucault, and Bourdieu). Approaches that build on this work often still wrestle with the dualistic sign at the core of Saussure's system, seeking ways to transcend the objectivism assumed by its oppositional structure of meaning relations. Theories of agency and practice increasingly invoked in archaeology seek to highlight the recursive nature of structure and agency and thus see signs such as material objects as actively reinforcing, shaping, and challenging social life.

One potential impact of a Peircean semiotic approach is in laying the foundation for a pragmatic archaeology, one that is committed to understanding the various ways that individuals and cultures mediate their social lives through signs (Preucel 2006; Preucel & Mrozowski 2010). Such an approach is important for the epistemology and ethics of archaeology in the twenty-first century. In the aftermath of the Processual/Post-Processual debates of the 1990s, the diversity of interpretive approaches has expanded to the point that some fear an irreconcilable disciplinary divide. At the same time, indigenous and other perspectives are challenging many of archaeology's core assumptions and methods and demanding an archaeology that addresses a broader range of concerns. As a non-foundational approach, pragmatism offers a way to recognize and productively build upon multiple voices, perspectives, and ways of knowing the world in the interpretive process, and suggests that such disunity adds strength to our inquiries about the world. Moreover, as Preucel and Mrozowski (2010: 33-4) argue, a pragmatic archaeology is one that continually challenges current understandings and is open to new dialogues leading to "meaningful social action."

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Beaudry, Mary C.
- ▶ Deetz, James (Theory)
- ▶ Gardin, Jean-Claude
- ▶ Hodder, Ian (Theory)
- ▶ Indigenous Archaeologies in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Post-Processual Archaeology
- ▶ Practice Theory in Archaeology
- ▶ Pragmatism in Archaeological Theory
- ▶ Preucel, Robert W.
- ▶ Processualism in Archaeological Theory
- ▶ Structural Archaeology

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Sepphoris, Archaeology of

Aaron M. Gale
Program for Religious Studies, West Virginia University, Morgantown, WV, USA

Introduction

Sepphoris was a major ancient city located in lower Galilee, in what is today Israel. Most prominent in the Roman era, the city was located about 6 km from Nazareth. Sepphoris became an important commercial and political center in the first century CE, and likely due to this affluent economic status, its residents did not actively take part in the Jewish rebellion that took place from 66 to 70 CE. Ultimately, Sepphoris fell into decline during the Islamic era. In the twentieth century, largely due to its proximity to Nazareth, the childhood home of Jesus, the site attracted the attention of biblical scholars and archaeologists, and many excavations have taken place over the last several decades. Although never actually mentioned in the Bible, scholars have long sought to uncover any possible links that may exist between this ancient city and Jesus. In addition, ancient historians have maintained an interest in Sepphoris because of its prominent status in the Roman world.

Definition

Known in Hebrew as *Tzippori* (from the word "bird"), Sepphoris was a major Roman city located in lower Galilee that thrived from approximately the first century BCE through the seventh century CE. The name *Tzippori* is a reference to the city's prominent location perched upon the top of a hill (286 m above sea level) in the Beit Netofa Valley (Batey 2001). The city's location was also strategic due to the fact that it sat at the intersection of two major roads. Little is known of the city's early history prior to its rise to prominence in the first century BCE, although it is likely that the city existed much earlier. Archaeological evidence has been found dating as far back as the Iron Age. This evidence, mainly in the form of pottery fragments, is sparse. Scattered pottery sherds as well as vase fragments and a rhyton date from the Persian era (Chancey 2001). However, no firm architectural evidence has survived from this time period. Therefore, the city was likely functional, yet still small, during the Persian era. During the Hasmonean era, around 104 BCE, the historian Josephus notes that the city was attacked by an invading Cyprian king, Ptolemy Lathyrus (*Ant*. 13.338). This, in fact, is the first historical reference to Sepphoris by Josephus, and from this point on, the city is mentioned frequently in his histories. This suggests that Sepphoris was probably an established city by the first century BCE. However, it is only with Rome's ascension to power that Sepphoris rose to its greatest heights.

Several years after the Roman takeover of Palestine at the hands of Pompey, around 55 BCE, Sepphoris was elevated to the status of council seat (for the Sanhedrin) after a visit by the proconsul in Syria, Gabinius (*Ant*. 14.91). By this time, the city was probably largely Jewish and would remain so for the duration of its existence. There is no evidence to suggest a strong Roman presence within the government and everyday affairs of Sepphoris (Chancey 2001). Herod the Great retained the city during his reign (beginning in 37 BCE) until his death in 4 BCE. Upon his death, Jewish nationalists in Sepphoris revolted against the Romans, resulting in a legion being sent in to subdue the city (*Ant*. 17.271). Much of the city was destroyed as a result of the riots. Out of the ashes came a renewal effort instigated by Herod's son, Antipas. Hence, Sepphoris became a fortified, cosmopolitan Herodian city, and Antipas made it his capital until Tiberias replaced it some 20 years later. The city was rebuilt in a typical Roman grid fashion, with a main east–west street (*decumanus*) intersecting with a main north–south one (*cardo*).

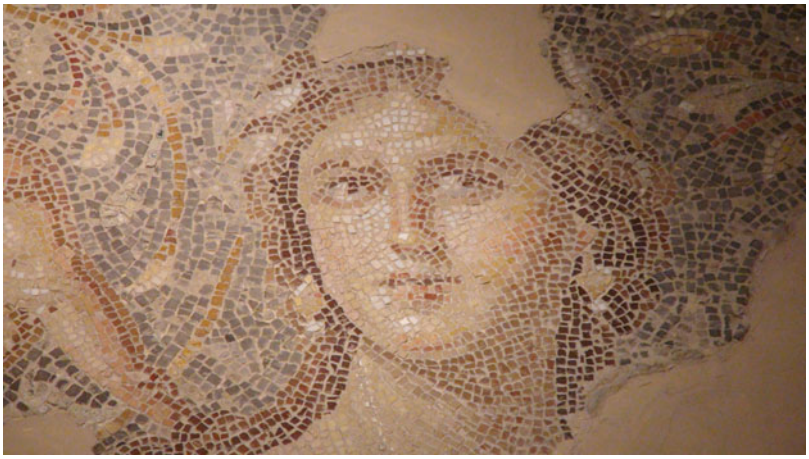
During this period of growth and fortification, Josephus refers to Sepphoris as the "ornament of Galilee" (*Ant*. 18.27). It has been suggested that this phrase was only used when referencing strongly fortified and secure cities (Miller 1984). In the latter twentieth century, many facets of the ancient Roman city were uncovered, including a paved road system, a first-century villa, an aqueduct, cisterns, two marketplaces, a cemetery, and a theater. Population estimates for first-century Sepphoris range anywhere from about 10,000 to 25,000. Surveys conducted in the early twenty-first century suggest that several small "satellite" settlements may have sprung up near Sepphoris during the Roman and Byzantine eras, which indicate that the city's robust economy spurred the creation of small support villages nearby (Dark 2008).

During the Jewish revolt of 66–70 CE, most residents of Sepphoris, although mostly Jews themselves, chose a pacifist stance and did not fight against the Romans (*War* 2.574). Archaeologically, the most significant finds from this period are probably the pro-pacifist Roman coins, which date from the year 68 CE. The coins, minted in Sepphoris, were meant to honor the emperors Nero and Vespasian. Most noteworthy, however, was the inclusion of the Greek inscription "City of Peace" (Reed 2000). Also relevant is the fact that none of these coins exhibit a portrait of the emperor, suggesting a willingness to adhere to Jewish tradition, which forbids human images on coins.

Following the revolt, and despite Rome's victory, Sepphoris became a vital center of Jewish learning, as rabbinic texts indicate. The most famous Jewish tradition linked to Sepphoris was the belief that the Mishnah was recorded in the city by Judah Ha-Nasi early in the third century CE. Archaeological remains from the late Roman and early Byzantine periods are plentiful and point to a time of renewed building. This is especially the case in the late first and early second centuries. Revamped water systems, additional roads, an agora, and a Roman bathhouse have all been found, and the city became known in the Roman world as Diocaesarea. Some estimates have placed the size of Sepphoris in the late Roman era at about 35 ha (approximately 86.5 acres).

Yet the population of the city remained mostly Jewish, although Hellenistic and Roman influences may have become more prevalent at this time, as coins now bearing busts of the emperors indicate (Chancey 2001). In addition, Greek inscriptions have been found at Sepphoris dating from the late Roman and early Byzantine periods, further suggesting the presence of pagan inhabitants. Noteworthy archaeological finds from the Roman period include the discovery of a third-century basilica-like building (70 × 95 m) and a private residence (48 × 23 m) containing exquisite mosaics. The former structure, however, remains somewhat of a mystery regarding its function. The two most popular theories are that it was either part of a marketplace or it was an actual basilica. The latter structure has become known as the house of Dionysus, since many of the mosaics pertain to the life and cult of this Greek god of wine and fertility. Most noteworthy, the house of Dionysus contains a mosaic housing what has become known as the "Mona Lisa of the Galilee." This mosaic, found on the floor of the residence, contains the face of a beautiful, unknown woman. The discovery of the "Mona Lisa" has been called one of the "Ten Most Significant Finds" of the twentieth century by Biblical Archaeology Magazine, although some experts downplay the importance of this assertion (Fig. 1).

Sepphoris itself continued to thrive into the Byzantine era, despite earthquakes and periodic revolts. Remains of a fifth- to seventh-century synagogue have been found, containing a floor mosaic complete with a picture of the Zodiac. By this time, it was not unusual to find traces of Hellenistic influence in Jewish buildings, even synagogues. In addition, the remains of two churches have been uncovered on either side of the *cardo*. Christianity likely gained a foothold in Sepphoris by the fifth century (Miller 1984). In recent years, a second-century pagan temple has been found, suggesting that Jews, Christians, and pagans eventually inhabited the city together until the Muslim era. The most noteworthy structure found dating from the Byzantine era may be the Nile Festival building,



Sepphoris, Archaeology of, Fig. 1 Mona Lisa of the Galilee at Sepphoris

located east of the *cardo*. The mosaic found inside the building, known as the Nile Mosaic, is one of the most famous features of the archaeological site.

After the seventh century, Sepphoris declined as a city, due to many factors, including natural disasters and wars (Ward 2001). The city became known after its Arabian conquest as *Saffuriyya*. During the Crusader era, when Christians briefly inhabited the city, a watchtower was erected on the hill, which is still visible today. Ultimately, the city was under Muslim rule until the modern era. Worth noting is the fact that although in a state of decline, Sepphoris may be the only site in Galilee that was occupied from the Hasmonean era to 1948 (J. Strange *pers. comm*., February 2012) (Fig. 3).

Key Issues/Current Debates

The earliest major archaeological excavation of Sepphoris was undertaken in 1931 by Leroy Waterman from the University of Michigan, who was looking for a link between the city and Jesus. Virtually no additional excavations were undertaken until 1983, when James Strange (University of Southern Florida) renewed the efforts. In 1985, a joint team from Duke University and the Hebrew University of Jerusalem under the direction of Eric Meyers and Ehud Netzer, respectively, began excavating the site. Since the 1980s, work at Sepphoris has continued. In the twenty-first century, a team from the Institute for Archaeology at the Hebrew University of Jerusalem under Zeev Weiss continues to dig and provide field reports from the site. Other universities also still excavate at Sepphoris. Some tombs from rabbis have recently been found, mostly northwest of the center of the site (J. Strange *pers. comm*., February 2012).

Although never mentioned in either the Old or New Testaments, Sepphoris remains a relevant site for biblical scholars, historians, and archaeologists. Due to its proximity to the city of Nazareth, where Jesus lived for a time (6 km), Sepphoris has been studied with an eye toward the Bible. Most noteworthy, biblical scholars have debated the cultural and religious composition of the city. In particular, the conflict centered upon whether Sepphoris contained a Jewish, pagan, or mixed population in the early Roman era. Initially, claims were made that Sepphoris was a largely Hellenistic city that attracted the attention of Greek philosophers (Downing 1987). Others argued that the city was almost entirely Jewish. However, it is possible that Greco-Roman culture was not in itself incompatible with Jewish life and practice (Reed 2000). In other words, some aspects of pagan culture (i.e., artwork, decorations) could coexist side by side within a population that still adhered to the Jewish faith. Jews would have considered them to be ornamental only and not a threat to the faith itself. Yet the debate concerning the religious

Sepphoris, Archaeology of, Fig. 2 Synagogue floor (with zodiac) at Sepphoris

Sepphoris, Archaeology of, Fig. 3 Looking across the archaeological site of Sepphoris

nature of Sepphoris continued throughout the late twentieth century (Fig. 2).

At the dawn of the twenty-first century, the controversy seemed to peak over the issue of whether stepped pools (discovered on the western summit) were bathing pools or Jewish ritual baths (Heb. *mikva'ot*). A general scholarly consensus affirmed that they were indeed ritual baths (Meyers 2000; Chancey 2001). Additional archaeological evidence found at Sepphoris, including a lack of pig bones and the discovery of limestone vessels, has resulted in a predominating view that the city was primarily Jewish during the Roman era. James Strange believes that Sepphoris was almost 100 % Jewish, at least until the second century CE (J. Strange *pers. comm.*, February 2012).

One other archaeological feature is still being debated by scholars. A 4,500 seat theater was uncovered on the northern slope of the acropolis, and a controversy has emerged over the date of its

construction. It has been suggested that those attempting to link Sepphoris to the historical Jesus are biased toward an early first century date. However, other scholars refute this claim, dating the theater instead to the late first or the early second century (Charlesworth 2003). Such debates have served to keep Sepphoris at the forefront of archaeological dialogue today, and the city continues to remain a relevant site for historians and biblical scholars.

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Sequence and Date in Field Archaeology

Martin Carver
Department of Archaeology, University of York, York, UK

Introduction

For the field researcher, a primary task is assigning a date and a sequence (order of occurrence) to the features and structures they record. Occasionally an archaeological site has already been recorded in history, for example, the celebrated urban excavation at Five Points, New York City, exposed a plan of buildings and streets that had appeared on a map in 1855. Even sites mentioned in documentary references seldom offer a date as precise as this, and dated events which might *seem* to refer to an excavated site have to be used with great caution.

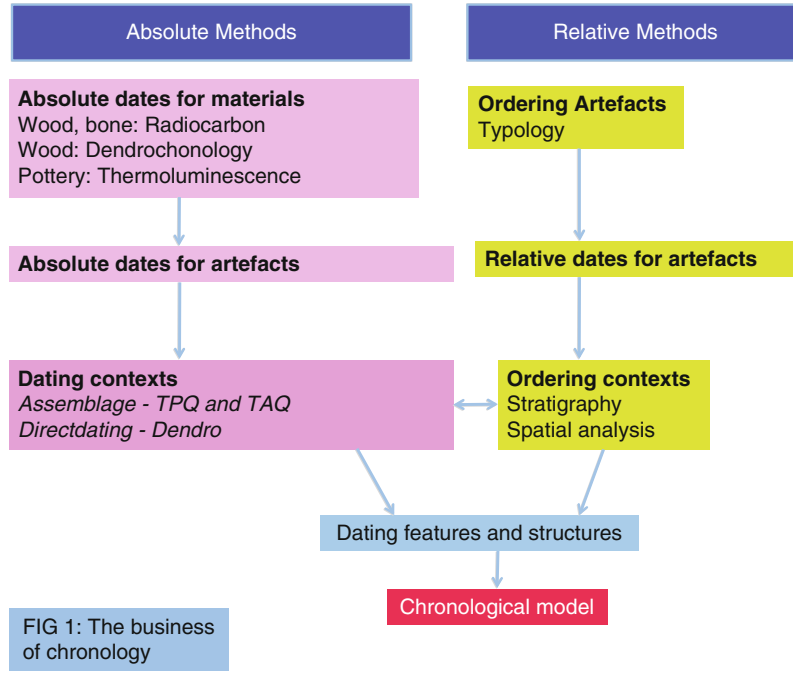
In general, very few objects, activities, or structures discovered by fieldwork can be given a precise calendar date, and archaeologists are obliged to build a *chronological model*, which balances all the available information (Fig. 1).

Key Issues

Dating Objects

As applied to objects, the methods at our disposal are *typology*, which offers a *relative dating* for artifacts (e.g., pottery) and structures (e.g., architecture). Typology uses the likely order of manufacture, based on form and style, combined with the dates given elsewhere. For example, pottery, one of the most useful of artifacts since it occurs widely and endures well in the ground, has an enormous range of types. Some periods of manufacture are known from kiln sites, but most are deduced from which types occur together; in this way archaeologists have built up extensive typologies that help to date every kind of site built by pottery users.

Artifacts may also be given an *absolute dating*, by scientifically measuring the *age of materials* they are made from. Well-known examples here include *radiocarbon dating*, which measures the age since the death of a living plant (i.e., wood) or creature (e.g., bone); *dendrochronology*, which measure the age of timber since it was felled, from the numbers and spacing of annual growth rings; *archaeomagnetism*, which measures the age of a hearth since it was heated; and *optically stimulated luminescence* (OSL) which measures the time that has elapsed since a layer of sand



Sequence and Date in Field Archaeology, Fig. 1 The business of chronology (Carver 2009: 267)

was last exposed to sunlight (Hedges 2001). These dates, which have an error range from 1 year (dendro) to 25 % or more, indicate when an organism died or a mineral was buried.

Dating Contexts

Absolute and relative dates for artifacts, or groups of artifacts, can be used to date the archaeological layers they are found in – but the relationship is not a simple one. A layer is always deposited later than the latest object found in it, for example, a floor with a coin of 400 CE beneath it must have been laid in 400 CE or later (since the coin must have existed before the floor was laid). This relationship is called a terminus post quem (TPQ). A wall which has a date written on it (say 1929) must have been constructed before 1929. This relationship is called a terminus ante quem (TAQ). However, these equations are by no means always valid or helpful. A coin may be not just earlier, but centuries earlier, than the floor that covers it. A coin within a floor may be *intrusive* and so later than the floor. A coin found on top of a floor may be later than the floor, if dropped on it soon after manufacture and never moved, or much earlier than the floor if carried around for decades in someone's pocket. Similarly a coin or a potsherd found in a foundation trench is usually earlier than the wall in the same trench, but it may also be much earlier since it has been displaced – is residual – from an earlier phase or site. Since we rarely know the circumstances in which a coin was discarded, it is risky to use coins to date structures. They are at least very rarely contemporary. In spite of this, equating the date of a building with the date of the coins found in it remains a widespread practice.

Structures, features, and contexts may also be dated directly – by typology and by scientific dating. Typology may be applied to the shape of hearths or kilns, or the ground plans of houses, comparing them to others found elsewhere and so presuming that they can be assigned to the same culture and date. Absolute dating can sometimes be applied, for example, *dendrochronology* will date the timbers of a timber-framed house (Kuniholm 2001). However, it is frequently found that such a house, in the form it survives, is composed of structural timbers of different dates. Even the earliest of these may

Sequence and Date in Field Archaeology, Fig. 2 A vertical section through consecutive layers at the early monastic site at Portmahomack, Scotland (M. Carver)

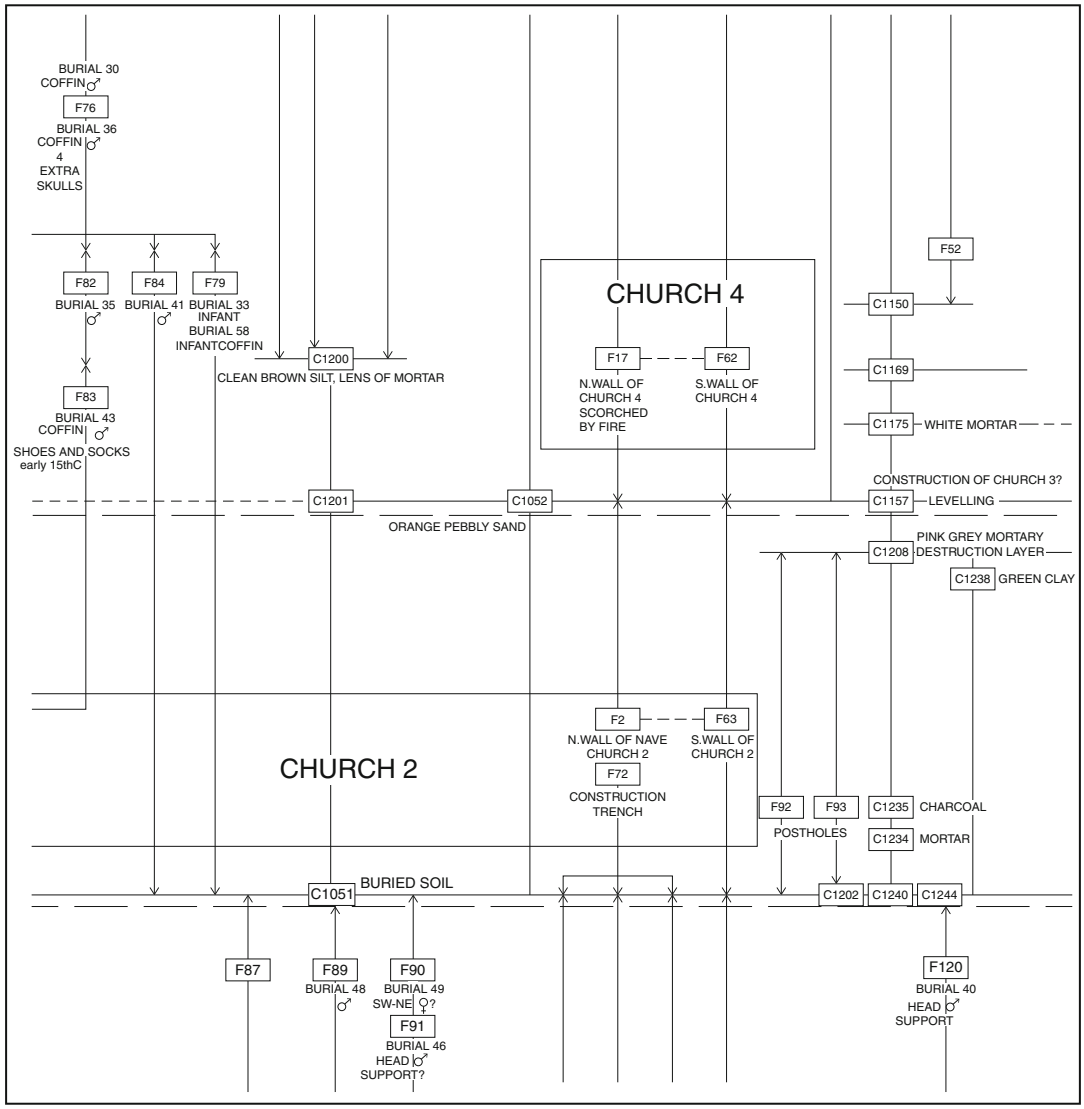
have been recycled from another usage – for example, in a ship. *Radiocarbon* dating is applied to carboniferous materials, such as charcoal or bone, but here the association with the deposit is of crucial importance (Taylor 2001). The charcoal in a hearth may represent the date of last burning but only if it derives from twigs or animals. Otherwise the wood may have already have been cut down long before it was burnt (the 'old wood' effect). Similarly the bones in a grave should date the digging of the grave very well, but animal bone may have been disturbed and redeposited and so give a date before, perhaps long before the deposition of the layer in which it was found.

An important method applied by excavators to contexts, features, and structures is stratigraphic ordering. This does not date them but provides a *relative order* for each deposit in the overall sequence. The traditional method of presenting the order of occurrence is the section, which shows the deposition of layers from the side, and is recorded by drawing (Fig. 2), and these may still be valuable even if they only report the sequence in a specific slice through the strata. A more comprehensive method of stratigraphic ordering that applies to the whole site is the stratification diagram – which models the sequence in two dimensions, the earliest contexts at the bottom and the latest at the top (Fig. 3). These have developed from pioneer examples in the 1970s (e.g., Harris 1989) to more comprehensive models which include features and structures and represent uncertainties in the sequence (Carver 2009: 296). These uncertainties form an important aspect of the modelling process and show where other interpretations are possible.

The stratigraphic ordering of graves containing bone or hearths containing charcoal can be dated with much greater precision by using radiocarbon dating combined with *Bayesian analysis***.** The radiocarbon dates give a range of error, but this range is reduced by knowing the order in which deposition occurred. The Bayesian analysis produces shorter ranges of probability for each date (posterior density estimates, Fig. 4). This is giving archaeological sequences of high precision dating back to 20,000 years ago (Buck 2001).

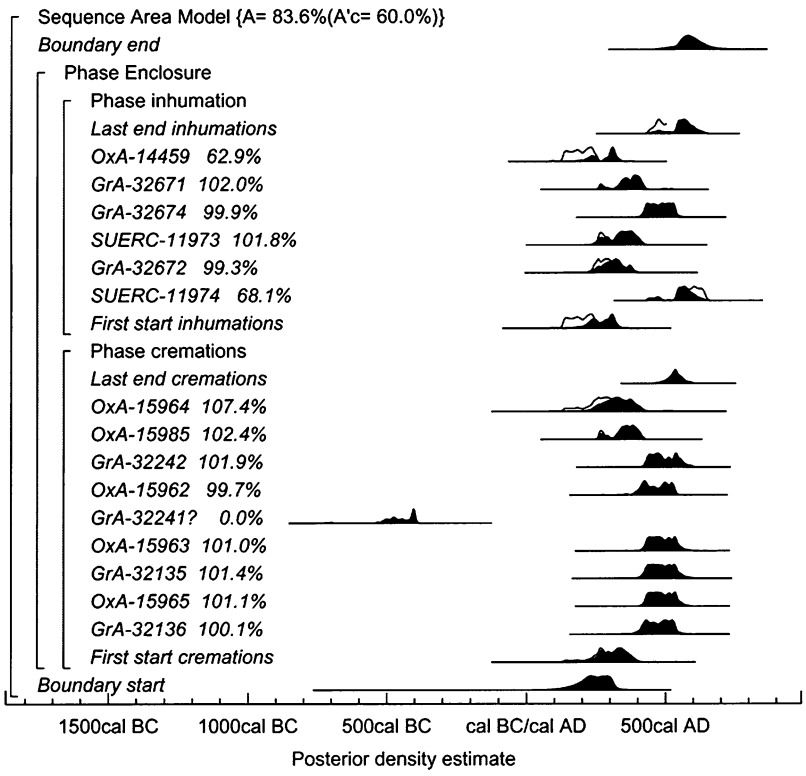
Relative Ordering by Space

The business of establishing a sequence makes also use of *spatial analyses*. For example, a settlement that is spatially coherent (like the grid of a *planned* town) suggests that all the streets and houses were laid out at the



Sequence and Date in Field Archaeology, Fig. 3 Extract from a stratification diagram, showing the sequence of contexts and features at an urban excavation in the Stafford Town, England (Carver 1980: Fig. 51). The features are shown as vertical arrows, locating them in time. Contexts not belonging to features are shown as horizontal lines. This diagram was devised to show the sequence in a deep but poorly stratified deposit

same time. Features that are *aligned* are also thought to reflect contemporary use. For example, inhumation graves in a cemetery may have different orientations, but those that are most closely aligned are said to be close to each other in date. Similarly, graves that mimic the orientation of a building are later in date than the building. On the scale of a landscape, alignments are important indicators of sequence. Roads and field boundaries seen from above may indicate a sequence where they "respect" one other. For example, the field boundaries may join up to a preexisting road, or the road may cut straight across the line of the fields, showing it was imposed on a preexisting agricultural landscape.



Sequence and Date in Field Archaeology, Fig. 4 A sequence of graves from the Anglo-Saxon cemetery at Wasperton, England, placed in their best order by Bayesian analysis. The outline shows the error range of the calibrated date; the solid black profile is the more precise "posterior density estimates" derived from Bayesian modelling (Carver et al. 2009: Fig. 4.1)

Modelling

At the scale of a landscape, archaeologists use such spatial mapping as an indication of sequence. It is often possible to apply typology, for example, to infer the likely culture and date of cropmark forms encountered in *aerial investigation*. Similarly, forms recorded in *subsurface survey* are sometimes recognized by virtue of their shape alone: a straight road or a circular ditch or a settlement grid. When using *surface survey* to find sites, archaeologists rely on typologies to provide a broad date for the pottery or stone implements or metal artifacts they are mapping. The distribution of this material provides the location of sites belonging to a particular culture and period.

On excavated sites, stratigraphic ordering provides the surest indication of relative sequence. The alignment of features and structures often give an inference of where these might be contemporary. The broad dates of objects and structures (and the very occasional documentary reference) allow a sequence to be anchored more closely in time. In well-stratified sites, such as towns, the stratigraphic sequence is treated as primary. Poorly stratified sites (the majority) rely more on relative and scientific dating of objects and samples. The method is to examine and record the detailed possible relationships of objects and strata in every case and then to use typology, stratification, spatial analysis, and absolute dating to build up a robust chronological model.

Cross-References

- ▶ Aerial Archaeology
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Dating Methods in Historical Archaeology
- ▶ Nondestructive Subsurface Mapping in Field Archaeology
- ▶ Radiocarbon Dating in Archaeology

▶ Recording in Archaeology
▶ Spatial Analysis in Field Archaeology
▶ Surface Survey: Method and Strategies
▶ Urban Archaeology at Five Points

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Serra da Capivara National Park

Anne-Marie Pessis
Universidade Federal de Pernambuco, Recife, Pernambuco, Brazil

Introduction

The Serra da Capivara National Park, which covers 320,000 acres, is located in Northeast Brazil, in Piauí state. The park has a geological border where a large row of vertical walls separates two distinct formations: the plateaus that form a mountain range, and the sedimentary basin of Piauí-Maranhão (Fig. 1).

Its current climate is semi-arid. There is a brief rainy season when large amounts of precipitation produce lush vegetation, and the power of water flowing across the area causes the land to degrade. The rain period is then followed by a dry season, and the local vegetation loses its foilage. However, the climate in the region has not always been as such. Until 9,000 years ago or so, when the onset of Holocene climate triggered the current desertification process the region was covered by tropical rainforest.

Definition

The Serra da Capivara National Park houses a dense and diverse collection of prehistoric paintings and petroglyphs produced over the millennia. There are rock art sites are located in different ecosystems within the park, in valleys, and canyons. The rock art is more numerous inside the caves where rockshelters are at different heights from the bottom of the valley to the top of the *chapada*. Opposite to the *cuesta* is a chain of limestone outcrop caves. There appear to be no traces of paintings or engravings inside them other than an occasional isolated motif at their entrances.

Key Issues/Current Debates

Since the 1970s, more than a thousand sites with prehistoric paintings and engravings have been identified in the National Park. The continuous research and conservation work in the Park has allowed for new discoveries of archaeological sites to periodically increase the volume of the graphic collection. Due to the cultural value of its archaeological sites, UNESCO's World Heritage Committee included the Serra da Capivara National Park in the World Heritage List in 1991.

The paintings in the archaeological sites of the National Park are diverse, both thematically and technically, as well as in the way the figures are arranged on the rocky surface. The paintings feature mostly recognizable figures and compositions. In many places it is possible to recognize

Serra da Capivara National Park, Fig. 1 Chapadas, valleys, dendrites, and *cuesta* abysses of the National Park

pictures created at different times, by different human groups.

During an initial organization of the National Park's rock art collection, a preliminary general classification was proposed, based on morphological criteria and on the establishment of a thematic typology guided by techniques and scenography (Guidon 1991). One of the proposed types, designated as *Tradição Nordeste* (Northeast tradition), is dominant in the region's conservation unit and its surroundings. It is composed by figures that are recognizable thanks to the presence of essential traits for identification, that graphically represent actions or events.

Assorted anthropomorphic, zoomorphic, and phytomorphic figures can also be recognized – and some figures are arranged to represent scenes. The most frequent themes are hunting, dancing, sex, violence, fighting, and scenes depicting rites around a tree (Figs. 2 and 3). The figures address the themes through identifiable postures and gestures. The graphical representation of the action suggests rhythms. Differentiation among grouped figures is made based on the graphic themes and modes of representation used in each situation. The presence of repeated actions performed by human figures in which the represented theme is not recognizable in an emblematic marker that allows characterizing the narrative. Sometimes, the figures display emblematic features similar to conventional signs that reveal encoded information as image attributes (Fig. 4).

The paintings and engravings provide information on the techniques developed and used for its production. The choice of location and the rock characteristics are primary aspects. As seen in a diversity of surviving paintings, there are sites in the National Park that were painted on across millennia by different human groups.

The features of the engraved or painted lines inform us about the types of instruments used to obtain specific graphic effects. These techniques included a range of means, ranging from the

Serra da Capivara National Park, Fig. 2 Toca da Extrema – ritual scene around a tree

Serra da Capivara National Park, Fig. 3 Toca Subida da Serrinha I – hunting scene

body parts– hands and fingers – to instruments made of reeds, cotton, thorns, and stamps made with clay and rubber plant. The paintings also inform us about the composition of paints prepared with pigments and dyes mixed with other elements, thus providing different degrees of robustness. The differences in thickness of the paints enabled the acquisition of distinct textures. Volume effects were also obtained through successive superimposition of paints of different consistencies applied on flat and uniform surface. A broad spectrum of dark hues that created a series of visual effects was obtained by exposing the paints to high temperatures. Physicochemical analyses also revealed the use of saps, blood, and other products of organic origin. High rates of calcium, associated with the presence of painted human bones in graves suggest that the

Serra da Capivara National Park, Fig. 4 Toca do Baixão das Mulheres I – emblematic back to back figure

paints' composition also included ground bones. The identification of composition patterns in rock art, allows for the reconstruction of the graphical profiles of the cultural groups to which the authors of these pieces belonged. Such profiles are formed by different and precise graphic attributes, detectable by the way the paintings are done and through the reconstitution of the operative chain of the art production technique. There are numerous components to the graphic profiles, but they appear standardized according to aspects prioritized in each piece of the work. The accuracy of the records outlines these aspects as it singles out differences allowing for the identification of meaningful patterns.

There are indicators of the symbolic theme choices of these human groups. These compositions are recognizable, while the identification of the action theme may not. They are standardized representations of gestures and postures that do not allow for a functional association to an action. Through their frequent repetition, they become emblematic by theme and not necessarily by technique. In the National Park, there is a figure repeated at several sites, composed of two human figures positioned back-to-back. This is present in all stylistic variations through time, suggesting a symbolic value in a cultural horizon (Pessis 2003).

The state of conservation of the paintings depends mainly on the homogeneity of the painted shelter rock and the exposure of the paintings to the impact of natural agents determined by their positioning on the wall. The National Park covers a geographical area composed mainly by sandstone and conglomerate resulted from the rising of the seabed. The presence of water in the region created a residual surface, which is an amalgam of heterogeneous rock and sediment. Thus, the cortex on the site wall detaches itself more easily, which also suffers the impact of daily atmospheric temperature range.

The paintings of *Tradição Nordeste* (Northeast tradition) are scattered throughout all Northeastern Brazil. Chronologies obtained in archaeological excavations as well as the density of the figures indicate that paintings of this tradition have its origin in the area now known as Serra da Capivara National Park. Between the region of Seridó Potiguar (RN) and the Serra da Capivara (PI), there are sets of paintings with features similar to those of Serra da Capivara. A case of dispersion stands out in the region of Seridó Potiguar (RN) where there are a multiple archaeological sites with paintings of belonging to *Tradição Nordeste* (Martin 2008). Such paintings have specific themes and scenography that suggest a different graphic development compared to the Serra da Capivara

National Park. They appear to have some overlapping features that suggest a close cultural relationship.

Future Directions

Dating prehistoric rock art is still a complex and vague task. With the exception of some sites kept in isolation, the dating of paintings is relative. The action of natural agents on the painted or engraved walls, over the millennia, affects the results of physicochemical analyses on samples altered by sedimentary deposition. In the National Park's sites, the effects of the detachment of rock cortex with paintings are noticeable. Dropped painted fragments are deposited on the sediment, and are retrieved in the course of archaeological excavation. Dating the sediment in which these fragments were collected indicates the moment the detachment happened, thus providing an (minimum) estimate of the dating of the paints.

Natural and anthropogenic agents destroy numerous rock art sites each year. To declerate this process, the sites within the National Park are being systematically monitored using laser scanning which is the most accurate technical resource available. Only the intensive photogrammetric recording of rock art sites will allow us to save this heritage from eventual total loss.

Cross-References

- ▶ Brazil: Cultural Heritage Management Education
- ▶ Brazil: Historical Archaeology
- ▶ Rock Art Recording Methods: From Traditional to Digital

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Service Learning and Public Archaeology

Mary Ann Levine
Department of Anthropology, Franklin and Marshall College, Lancaster, PA, USA

Introduction

Public archaeology has experienced exponential growth since the term was coined in 1972 in the context of legislation designed to conserve the archaeological record in the public interest. Public archaeology in the twenty-first century is an increasingly diversified pursuit in which professional archaeologists, employed in a variety of settings including both heritage management agencies and academic institutions, collaborate in a multitude of ways with a diverse array of community partners. Professional archaeologists in academic settings are uniquely positioned to extend the scope of public archaeology through community service learning where students in course-based, credit-bearing experiences actively engage with the public in real-world settings on projects of local interest emanating from the community itself. By integrating learning, service, and research, students develop deeper understanding of course content as they link theory with practice, become sensitive to both community needs and assets, and express greater interest in civic engagement.

Definition

Service learning is a form of experiential learning where students gain knowledge through active

participation in an organized service activity coordinated with the community that affords students the opportunity to critically reflect on their service experience (Bringle & Hatcher 1999). Service learning is a pedagogical initiative undertaken by institutions of higher learning to better integrate liberal arts colleges as well as public and private research universities into their surrounding communities through faculty and student collaborations with community members. As the needs of the community shape the nature of the service project, service learning necessitates engagement between faculty and the community prior to the commencement of any work. Faculty, students, and community partners collaborate within a research framework in which the community benefits from the resources offered by the college and the students profit by developing a greater sense of social responsibility. Most colleges and universities now include service learning as part of their curriculum. In a society thought to be experiencing a disintegration of civic life (Putnam 2000), service learning is a way to reintroduce students to the idea that they are part of a social world beyond their immediate campus environment. Service learning is thus distinguished by its pedagogical underpinnings, and academic archaeologists have incorporated this powerful teaching method into the archaeological curriculum since the early 1990s (Baugher 2007).

Examples

Archaeological applications of service learning have engaged with a wide range of community partners including museums, historical societies, historic preservation groups, elementary schools, churches, and cemetery associations and have had as their focus Mississippian-era Native American mounds (Homsey et al. 2012), seventeenth-century forts (Nassaney 2004), eighteenth-century Spanish missions (Mendoza 2009), and nineteenth-century African-American sites (Levine et al. 2005; Levine & Delle 2009). Service-learning experiences have been successfully integrated into all levels of the archaeological curriculum from introductory courses (Levine & Delle 2009) to graduate-level seminars (Chilton & Hart 2009). Summer field schools are also common sites for integrating service-learning pedagogy into archaeological practice (Nassaney 2009). Service learning can define an entire college course or it can be a component of a regular academic course. Service learning is a flexible pedagogy and, as McLaughlin (2009: 66) aptly points out, is "not a one-size-fits-all teaching strategy." The service-learning component that was incorporated into the Thaddeus Stevens and Lydia Hamilton Smith public archaeology project can serve as an example of how this pedagogy can be incorporated into a college-level "Introduction to Archaeology" course.

The public archaeology program through which this service-learning project developed began when the Historic Preservation Trust of Lancaster County requested that James Delle and I undertake an excavation at the former homes of Thaddeus Stevens (1792–1868), one of Pennsylvania's most famous radical politicians, and Lydia Hamilton Smith (1813–1884), his African-American housekeeper and companion. Thaddeus Stevens was an influential congressman who was a leader of the Radical Republicans who advocated for universal public education, opposed the death penalty, and agitated for the abolition of slavery and equal rights to emancipated blacks. He was a primary author of both the 13th and 14th Amendments to the US Constitution. Lydia Hamilton Smith served as housekeeper for the bachelor Stevens and became a pioneering businesswoman by owning and renting various properties. The houses were in imminent danger of complete destruction to make way for a new convention center-hotel complex in Lancaster, Pennsylvania. The historic preservation laws in the state did not explicitly require that archaeology be done at that site as no demolition or construction funds came from the federal government. Archaeological excavations unearthed evidence of many episodes of Lancaster's history including evidence that a cistern at the Stevens and Smith site had been modified to be a hiding place to harbor fugitive slaves escaping north during the antebellum period (Levine & Delle 2009).

The Stevens and Smith project was undertaken with an explicit commitment to making the project accessible to the community (see Levine and Delle 2009 for examples of our community outreach efforts). Once the excavation was over, we received many requests from various school groups to provide presentations on Stevens and Smith, archaeology, and the Underground Railroad. We responded by partnering with the local inner-city school district to have the undergraduate students enrolled in "Introduction to Archaeology" at Franklin and Marshall College provide presentations designed to expose elementary and middle school children to archaeology in general, the rich archaeological heritage that lies beneath their city streets, and to the historical significance of Thaddeus Stevens and Lydia Hamilton Smith. For their service-learning project, college students brought a traveling kit of artifacts from the excavation, large-scale photos of the excavation, and an archaeological toolbox of equipment used on a typical dig. Schoolchildren learned about the practice of archaeology, principles of stratigraphy, interpreting historic artifact assemblages, nineteenth-century urban life in Lancaster, and the role Stevens and Smith played in the Underground Railroad. After several iterations of this class, nearly 40 college students had engaged an estimated 1,500 schoolchildren with the Stevens and Smith archaeology project and issues of race, slavery, and emancipation. Reflection journals kept by my students report that the experience resulted in understanding course content on a more profound level because they taught it and fostered increased interest in civic engagement. Their interactions with the schoolchildren promoted personal growth and served as a catalyst to reflect on their own position and role in society. As archaeology is not a part of most curricula prior to college, the presentation filled an educational void in the community, and schoolchildren expressed considerable enthusiasm for learning about archaeology, handling artifacts, and hearing about their city's heritage.

Future Directions

Although archaeological applications of service learning can productively extend the current contours of public archaeology, they are still in their infancy. While an increasing number of faculty have embraced service learning, it is far from being a permanent fixture in archaeological pedagogy. Advocates of service learning acknowledge that there are challenges that come with retooling our pedagogical approaches but contend that the benefits of service learning far exceed any difficulties (Baugher 2009; Nassaney 2009, 2012). Implementing a service-learning project can be time-consuming and does create additional responsibilities for faculty. Untenured faculty may be concerned that the extra effort required to create service-learning opportunities for their students will not be rewarded. Nevertheless, many colleges and universities are providing the infrastructure to facilitate service-learning partnerships. As archaeological practice in the twenty-first century continues to reach out and acknowledge multiple stakeholders in diverse communities, the prospects for service learning are promising.

Cross-References

- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community and Archaeology
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Public Archaeology, The Move Towards

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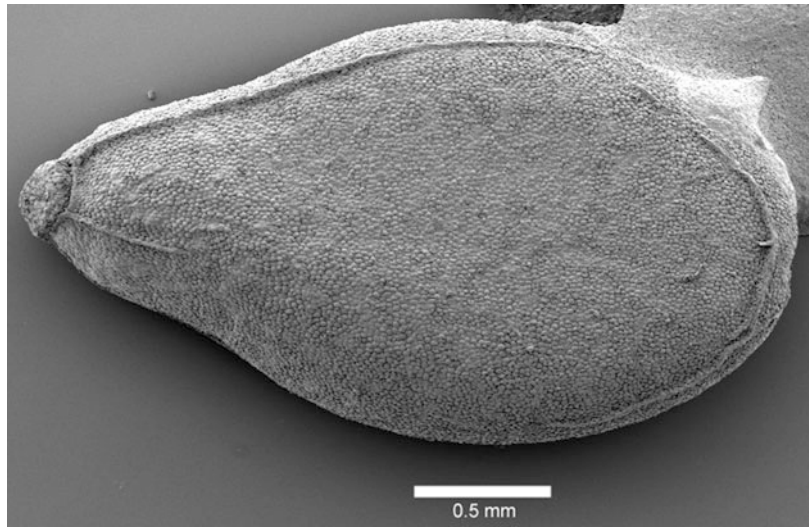
Sesame: Origins and Development

Alison Weisskopf and Dorian Q. Fuller
Institute of Archaeology, University College London, London, UK

Basic Species Information

Sesamum indicum L. (syn. *S. orientale* L.) Pediliaceae. The name sesame is derived from the Late Babylonian *shawash-shammu*, "oil seed" or plant oil, via Phoenician to Greek *sesamon* to Latin *sesamum* (www.etymonline.com). Sometimes sesame is known as gingelly from the Hindi *gingli*, which is from Arabic *jaljala*, the meaning referring to the sound of the seeds rattling within the capsules (http://www.oed.com). Sesame has one of the highest oil contents of any seed, approximately 50 % oil and 25 % protein. The meal left after pressing for oil can be used as a high-protein animal feed. The oil can survive for long periods before going rancid due to the presence of antioxidants, sesamol and sesamolin (Oplinger et al 1990). There are many recorded medicinal uses (Bedigian 2004).

Sesame is an oilseed crop that is self-pollinating and annual but occasionally perennial (Bedigian 2004). The four-segmented seed capsule is grooved, is rectangular in section, and ranges from 2 to 8 cm long/0.5 to 2 cm wide. Once ripe the seed capsules split open to release the seed – "open sesame." The ovate flattened seeds range from 3 to 4 mm long/2 mm wide/1 mm deep and are thinner at the hilum end. The testa is slightly raised and reticulate (Fig. 1), and this is especially marked in wild sesame (*Sesamum* spp.). The seeds are usually white/yellow but can be brown or black. Sesame can be grown from seed in warm climates. Although drought resistant, it cannot tolerate frosts, waterlogging, or salinity (Oplinger et al. 1990; Van Wyck 2005). Sesame takes between 70 and 120 frost-free days to mature, and there is morphological variation between plants (Bedigian 2004). While tolerant of many growing conditions, sesame prefers well-drained fertile soils and neutral pH. Its large branching root system can improve poor soil structure. A non-shattering mutation was not found until 1943, so traditionally sesame is grown in small hand-harvested plots. Instead domestication focused on reduction of germination inhibition which is linked to a thinning of the seed, a reduced seed coat architecture, and an increased tendency for seeds to be black (Fuller & Allaby 2010).



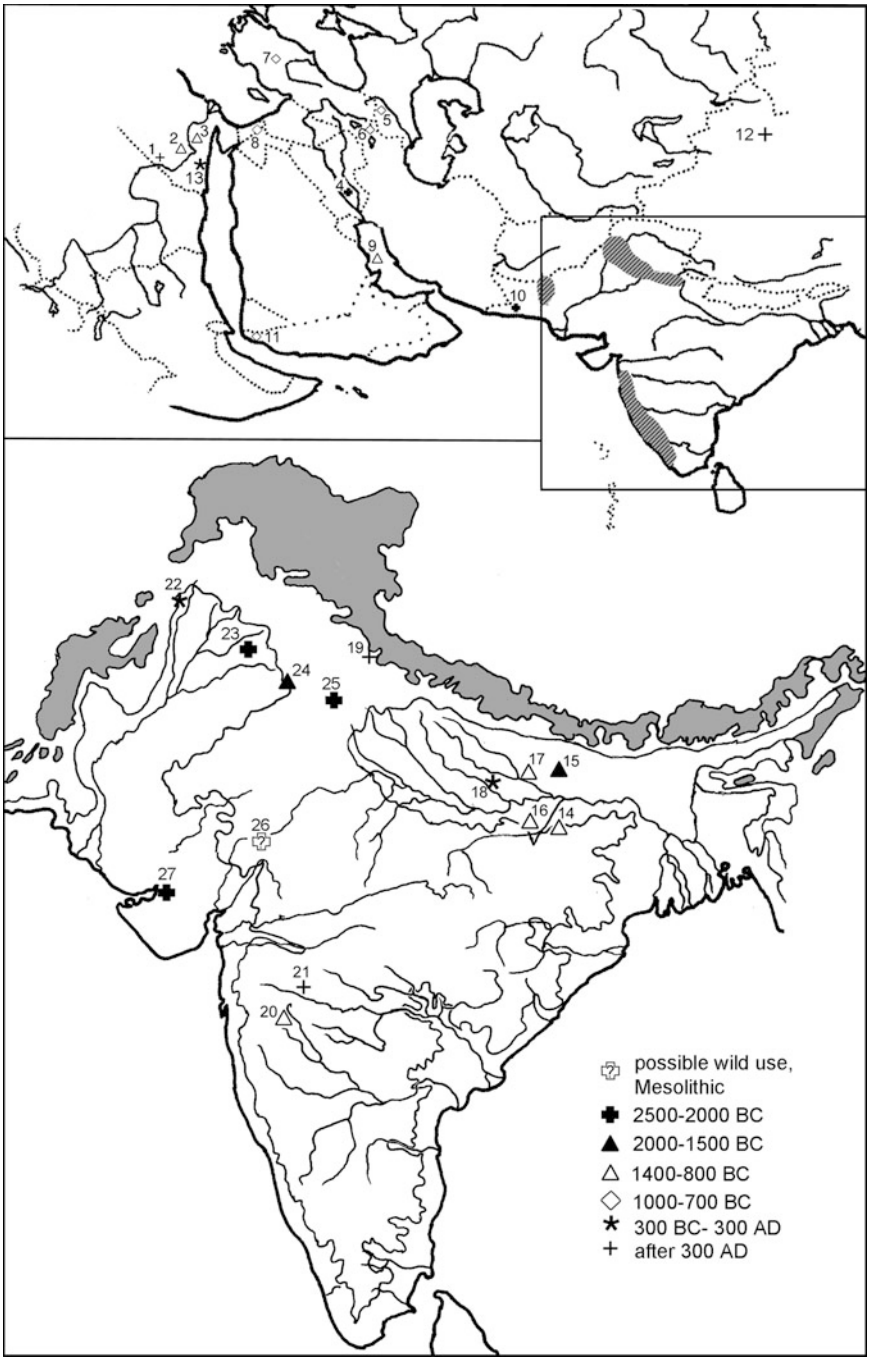
Sesame: Origins and Development, Fig. 1 Scanning electron micrograph of typical domesticated *Sesamum indicum* seed

There has been debate over the correct taxonomy for cultivated sesame (see Bedigian 2004). Wild sesame taxa are widespread with many wild species in sub-Saharan Africa and fewer in India. Studies of wild populations of *Sesamum* sp. support an origin from the South Asian *Sesamum orientale* L. *var. malabaricum* Nar. (syn. *S. mulayamum Nair*) (Fuller 2003; Bedigian 2004). This is likely to have taken place in the Indus Valley, including the Indian Punjab and parts of Pakistan, although the wild progenitor also occurs down the west coast of the Indian peninsula (Fig. 2).

Timing and Tracking Domestication

Archaeobotanical evidence has been slow to accumulate due to preservational biases against oilseeds like sesame in favor of charred preservation of more robust-seeded species like cereals. Early archaeological evidence for sesame stems from Harappan sites in the greater Indus Valley from the Mature Harappan civilization (2600–2000 BCE), including Harappa in Pakistan; Miri Qalat in the Markan region of Pakistan; Farmana in Haryana, India; and Kanmer in Saurashtra, Gujarat, India (Tengberg 1999; Weber et al. 2011; Pokharia et al. 2011). This is in keeping with a domestication in the Indus region sometime prior to 2500 BCE, although this might also have occurred to the east in Saurashtra, Haryana, or somewhere in between. There is a suggestion that starch grain evidence collected from a tool by A. Kashyap from Bagor, a preceramic Mesolithic site (4000–5000 BCE), has evidence for exploitation of possible *Sesamum* (cf. Shinde 2008); if verified this would suggest wild exploitation, although this site may not be within the wild distribution and towards the top of the Indian peninsula. Historical linguistic data suggest sesame was known to early Dravidian speakers, prior to knowledge of many other crops (Fuller 2007), which fits with a Saurashtran origin.

There is limited evidence for the early spread of sesame. First it was taken westward to Mesopotamia by 2300–2200 BCE (Fuller 2003; Bedigian 2004). There are numerous reports from the second millennium BCE across India (Fuller 2003). After 1400 BCE sesame is known from Bahrain and ancient Egypt, famously among seed finds in Tutankhamun's tomb (de Vartavan & Amoros 1997). In the Late Bronze Age (c. 1300 BCE), sesame is apparently mentioned in early Greek Linear B texts, although archaeobotanical finds from this period and region are so far lacking (Kroll 2000). Recently



Sesame: Origins and Development, Fig. 2 Map showing the approximate modern wild range of *Sesamum indicum* subsp. *malabaricum* and the distribution of archaeological reports, with an enlarged focus on the India subcontinent. (Map updated, modified from Fuller 2003). Sites numbered *1*. Qasr Ibrim, *2*. Luxor (Tutankhamun's tomb and Deir el-Medina), *3*. Amarna, *4*. Abu Salabikh, *5*. Karmir Blur, *6*. Bastam, *7*. Gordion, *8*. Deir Alla, *9*. Bahrain, *10*. Miri Qalat, *11*. Sabir, *12*. Thousand Buddha Grotto (Xinjiang), *13*. Myos Hormos, *14*. Malhar, *15*. Imlidh-Kurd, *16*. Sunuwar, *17*. Narhan, *18*. Hulaskhera, *19*. Ufalda, *20*. Inamgaon, *21*. Paithan, *22*. Hund, *23*. Harappa, *24*. Sanghol, *25*. Farmana, *26*. Bagor, *27*. Kanmer

finds from Southern Thailand indicate the presence of sesame in the last few centuries BCE (C. Castillo, personal communication). There are also Roman era finds from the port of Myos Hormos (Quseir al-Qadim) on the Egyptian Red Sea coast (van der Veen 2011). Elsewhere in Yemen and Anatolia, sesame appears in the early first millennium CE (Fig. 2).

In China, although sesame is known from written sources going back about 2,000 years to the Han dynasty, archaeobotanical finds have been elusive. The only positively identified sesame comes from a 700-year-old Buddhist monastic cave in Xinjiang province, as well as reports from similarly aged or slightly older graves (Qiu et al. 2012). A few earlier claims for sesame in central China are mostly misidentifications (Qiu et al. 2012).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Sex Assessment

Soren Blau
Department of Forensic Medicine,
Victorian Institute of Forensic Medicine,
Monash University, Southbank, VIC, Australia

Introduction

The evaluation of the sex of a deceased person from an analysis of skeletal remains is one of the

first procedures undertaken by anthropologists and osteologists as the sex of a person affects other analyses such as estimation of ancestry and age at death. In forensic cases, the estimation of sex is pivotal in contributing to the identification of unknown bodies as determining whether the individual is male or female halves the number of possible matches.

Definition

The sex of an individual is a biologically determined variable and differs from the gender of a person which is a social construct.

Key Issues

Age of the Individual

There has been considerable research undertaken on estimating the sex of an individual from the examination of juvenile skeletal remains (e.g., Bilfeld et al. 2012). However, estimating the sex of individuals who have not reached puberty is limited because in most cases the degree of sexual dimorphism in the juvenile skeleton is not distinct enough to allow accurate methods for evaluation of the sex, particularly for forensic cases.

Nonmetric Methods

In cases of adult skeletal remains, the estimation of sex can be undertaken using a visual examination of nonmetric traits, that is, the morphology (shape) of sexually dimorphic parts of the skeleton (Phenice 1969). Many studies have demonstrated that the pelvis is the most reliable area of the body to evaluate sex (cf. Spradley & Jantz 2011). The overall shape of the pelvis (broader in females than males as a result of the need for childbirth), the angle of the sciatic notch, the subpubic angle, subpubic concavity, the shape of the ischiopubic ramus, the presence or absence of the ventral arc, as well as the shape of the sacrum are all examined to evaluate the sex.

After the pelvis, the skull is the most sexually dimorphic structure in the body. On the skull, the morphology of the nuchal crest, mastoid process, supraorbital ridge/glabella (Graw et al. 1999), mental eminence, flexure of the ramus, and size of the palate and teeth (Jones Haun 2000) are assessed. In general, within different populations, male skulls illustrate features that are more robust and muscular than those of females.

Metric Methods

In addition, metric criteria in the form of indices (comparison of measurements) and/or discriminant functions (uni- or multivariate statistics) can be used in sex evaluation (e.g., Robinson & Bidmos 2009). A number of skeletal measurements can be taken that are indicative of the sex of an individual. The most commonly used include the ischiopubic index (e.g., Krogman & Iscan 1986), the discriminant function cranial sexing method of Giles and Elliot (1963) and Giles (1970), and the diameters of the articular ends and/or the midshaft circumference of long bones (Krogman & Iscan 1986). Research has been undertaken to attempt to evaluate the sex from measurements from various parts of the body including vertebrae (Snodgrass 2004), ribs (Wiredu et al. 1999), femur (Stojanowski & Seidemann 1999), tibia (Iscan & Miller-Shaivitz 1984), patella (Kemkes-Grottenthaler 2005), clavicle (McCormick et al. 1991), humerus (Rogers 1999), radius (Berrizbeitia 1989), ulna (Purkait 2001), feet (Introna et al. 1997), and metacarpals (Burrows et al. 2003). The decision about which method to use is influenced by the condition and preservation of the skeletal remains and the age of the individual.

Context and Disease

The circumstances of a burial are also important to assess when evaluating the sex of an individual. For example, recognition of fetal bones in the abdominal area will indicate the individual was female. Further, some diseases which affect the skeleton are sex-specific (Ortner 2003).

Molecular Methods

Finally, the ability to extract DNA from skeletal remains of varying ages and preservations has meant that DNA analysis has also been used to determine the sex of both juvenile

Sex Assessment, Table 1 Categories used in the determination of sex

Category	Comment
F	Definitely female
F?	Possibly female
A	Ambiguous (shows neither male nor female characteristics)
M?	Possibly male
M	Definitely male
?	Unable to comment on the sex due to poor condition or preservation of the skeletal remains

(e.g., Townsend 2001) as well as adult (e.g., Gibbon et al. 2009) skeletal remains. "Genetic sex identification is done through the isolation and amplification of a gene or genes in the sex chromosomes (X and Y). The most commonly used sex determining genes are the sex determining region Y (SRY locus), zinc finger protein (ZF) and the amelogenin (AMEL) genes" (Bidmos et al. 2010: 4). While extraction techniques become increasingly less invasive, molecular approaches to the determination of sex are nonetheless destructive and expensive. In addition, the success of DNA analysis is influenced by the relative preservation of the remains and the ability to recover DNA.

Categories and Population-Specific Approaches

Skeletal dimorphism occurs as a result of the differences in hormone levels between men and women. As a result of individual variation (i.e., gracile males and robust females exist), it is not always possible to provide a definitive answer. Consequently, forensic anthropologists and osteologists use a range of categories to describe the sex of the individual (Table 1). In addition, population-specific variation (e.g., in size) are known to influence the evaluation of sex from the skeleton. For this reason, population-specific reference collections are essential for developing standards to assess sexual dimorphism within populations (e.g., Smith 1997; King et al. 1998; Robinson & Bidmos 2011).

Accuracy

If the entire skeleton is present and well preserved and both morphological and metric methods can be employed, the sex of an individual can be estimated with nearly 100 % accuracy. If only the pelvis is examined, accuracy is said to be 95 % and decreases as less skeletal elements are employed (Krogman & Iscan 1986; Duric et al. 2005).

Future Directions

As technology advances and debate continues about the impact on preservation of studying and handling collections of archaeological human skeletal remains, there has been a shift to the virtual analyses of skeletal remains. Virtual evaluation of sex has been demonstrated to be as accurate as examining the physical bone (e.g., Decker et al. 2011).

Cross-References

- ▶ Age Estimation
- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Taphonomy: Definition

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Shackel, Paul

Paul A. Shackel
Department of Anthropology, University of Maryland, College Park, MD, USA

Basic Biographical Information

Paul Shackel received his Ph.D. from the State University of New York at Buffalo in 1987. After completing his dissertation, Shackel worked for a short time for the Historic Annapolis Foundation coordinating various archaeological projects in the historic district of Annapolis. In 1989 he entered the National Park Service and worked for over seven years at Harpers Ferry National Historical Park. He has served as principal investigator for several projects with the National Park Service in the National Capital Region. Shackel became an Assistant Professor at the University of Maryland in the Department of Anthropology in 1997. In 1999 he became an Associate Professor, and in 2002 he was promoted to Full Professor. He also served as chair of the department.

Major Accomplishments

Dr. Shackel's dissertation research in Annapolis, Maryland, examined archaeological materials, probate inventories, and the development of etiquette books to show the development of a modern discipline. This new behavior helped to create separate and segmented places as well as the development of the individual. Much of this new behavior can be found in the development of Renaissance ideals that helped to standardize behavior necessary for industrial capitalism.

His work at Harpers Ferry National Park focused on the Harpers Ferry Armory, which developed as one of two US installations for the manufacturing of arms for the US military. The armory initially developed with craft manufacturing, whereby the gunsmith made the entire gun, lock, stock, and barrel. However, in the 1820s, the War Department placed John Hall in Harpers Ferry where he perfected the process of interchangeable parts in gun manufacturing. With the implementation of wage labor in the 1840s, the landscape became more formal as new surveillance techniques were implemented. Workers appear to have damaged an increasing number of products and machinery. Families tended gardens, raised pigs, and purchased material culture that was fashionable when they had control over their means of production.

In 2002 Dr. Shackel embarked on a cooperative project with several other institutions to document the founding the settlement of New Philadelphia, a town established by a freed African American in 1836. Frank McWorter and his family sold town lots to whites and blacks and used the proceeds to purchase family members out of slavery. Based on census and deed records, it appears that both White families and Black families lived next to each other. The archaeology shows that material culture differences between households of different ethnic backgrounds is indistinguishable. The archaeological

record is more of a reflection of class rather than ethnic background.

Beginning in 2009, Shackel began exploring issues of race in the anthracite region of northeastern Pennsylvania. In the 1880s and 1890s, people of Slavic and Italian backgrounds migrated to this region, and they were treated poorly by their employers and their established neighbors whose families migrated here several generations earlier. The new immigrant spoke a different language, dressed differently, and had different customs. Lattimer Mines is the site of one of the most deadly labor massacres in US history, although the event has disappeared from the national public memory. Archaeology located the place of the massacre, and work is currently being undertaken at domestic sites in this coal town. The archaeology team notices parallels between the treatments of the historic immigrant with the new Latino immigrants that now make up a significant proportion of the contemporary community's population.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Community Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Local Communities and Archaeology: A Caribbean Perspective

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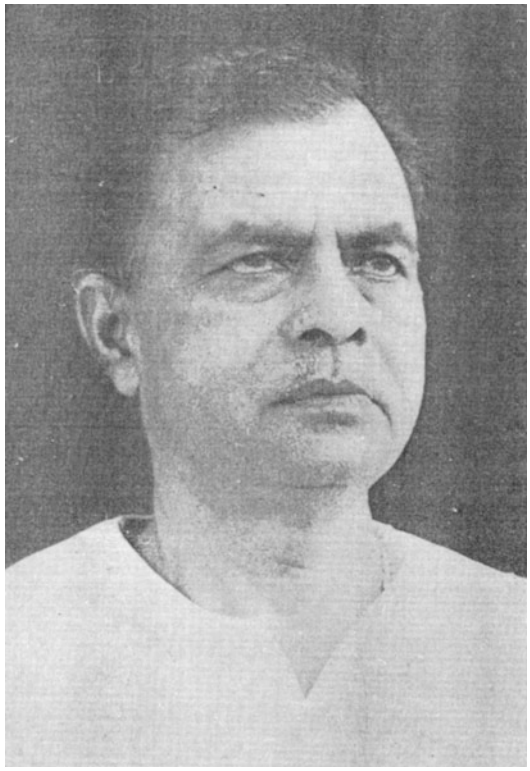
Sharma, Govardhan Rai

Manoj Kumar Singh
Department of Anthropology, University of Delhi, Delhi, India

Basic Biographical Information

Govardhan Rai Sharma was born on 13 August 1919 in a rural family of Ghazipur district in Eastern Uttar Pradesh. After his primary education in the village school, he shifted to Allahabad where he had all his subsequent school and university education. G.R. Sharma was a brilliant student throughout and passed his M.A. in History in 1942, securing a first division and standing first in order of merit. It was customary in those days for the above-average students of Allahabad University to go in for the civil services. Nationalist to the core and taking active part in the Quit India Movement, G.R. Sharma shunned the very idea of serving under an alien government. Instead he chooses the teaching profession, joining the Allahabad University as a Lecturer in history in 1944.

G.R. Sharma was appointed as a Professor in 1958 in Allahabad University, remaining there till his retirement in 1981, as a Head of the Department. He was appointed Advisor, Archaeology and Museum, of the Uttar Pradesh



Sharma, Govardhan Rai, Fig. 1 Prof. G. R. Sharma, a pioneer prehistorian of India

Government. Sharma was a Co-director of the Indo-Soviet Commission for cooperation with UNESCO. Sharma was an active member of the Central Advisory Board of Archaeology for well over 20 years. Sharma was also a member of the Indian Council of Historical Research and the National Commission for the History of Sciences. Sharma died on November 11, 1986 (Fig. 1).

Major Accomplishments

G.R. Sharma remained in the archaeological research for over three decades. His entry in the field in the year 1949 was itself an event of far-reaching significance for Indian Archaeology. When in that year Allahabad University, under his direction, began archaeological excavations at the famous site of Kausambi, a new era in archaeological research had been ushered in. This continued until 1966. Sharma's major task in the fifties was introducing archaeology as a subject in the university's teaching and research program. This task is by no means easy even today, and one can imagine how difficult it must have been 30 years back. Sharma had to face an unsympathetic Head of the Department, a hostile Vice-Chancellor, and a totally insensitive state government, a situation almost tailor-made to break the nerves of any ordinary persons. Overcoming various odds coming in his way, he forged ahead to build, nurture, and develop a strong Department of Ancient History, Culture and Archaeology in Allahabad University. In recognition of work done by Sharma and his colleagues, the Allahabad University Department of Ancient History, Culture and Archaeology was brought under the UGC Special Assistance Program which besides creating an adequate infrastructure of archaeological field research also helps many of his younger colleagues to improve their careered prospects.

With the help of A. Ghosh, the then Director-General of the Archaeological Survey of India, G.R. Sharma went on to make discovery after discovery at Kausambi, which was against the wish of K.M. Munshi, the then Chancellor of Allahabad University. His initial digging at the spot near the Asokan Pillar brought to light a textbook sequence of the early historical period. This was followed by the spectacular discovery of Ghositarama monastery dating back to first-second century CE.

The Lower, Middle, and Upper Paleolithic remains of the Belan valley with a rich haul of remarkable faunal finds, the Mesolithic burials of Sarai Nahar Rai and Mahadaha, and the Neolithic settlements of Kaldihwa are some of his significant achievements in this area. It was indeed G.R. Sharma's brilliant insight that led him to achieve a major breakthrough in the identification of Mesolithic settlements in this area.

It is largely to the credit of G.R. Sharma and his colleagues that southern Uttar Pradesh is now firmly on the Stone Age map of the subcontinent. The last 15 years of his career was devoted almost exclusively to researches in the Stone Age Archaeology of the region. The archaeological discoveries made by the Allahabad University

under his leadership have added very significantly to our knowledge of India's past. And the archaeological findings are deposited in the Allahabad University museum.

In recognition of his work, Professor Sharma was invited by the British Academy to deliver lectures at the Universities of Cambridge, Oxford, and Southampton and Institute of Archaeology London. Professor Sharma singly and jointly authored several books and articles incorporating the results of his fieldwork. Notable among them are *Excavations in Kausambi* (Sharma 1960), *Reh Inscriptions of Menander and the Indo-Greek Invasion* (Allahabad, 1980), and *Excavation at Mahadaha* (Sharma et al. 1980). He also coauthored with his colleagues in the *University Beginning of Agriculture and Prehistory of History*, and with Desmond Clark as the coauthor, he published *Palaeoenvironment and Prehistory of the Middle Son Valley*. Professor Sharma also wrote books in Hindi. From his last publication entitled *Bharatiya Sanskrit – Puratattvika Adhara* (Delhi, 1984) which can serve as a model of writing on Archaeology in Hindi.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Complex Hunter-Gatherers
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Jericho Archaeological Site
- ▶ Rice: Origins and Development

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Sheep: Domestication

Jennifer R. S. Meadows
Science for Life Laboratory, Department of Medical Biochemistry and Microbiology, Uppsala University, Uppsala, Sweden

Basic Species Information

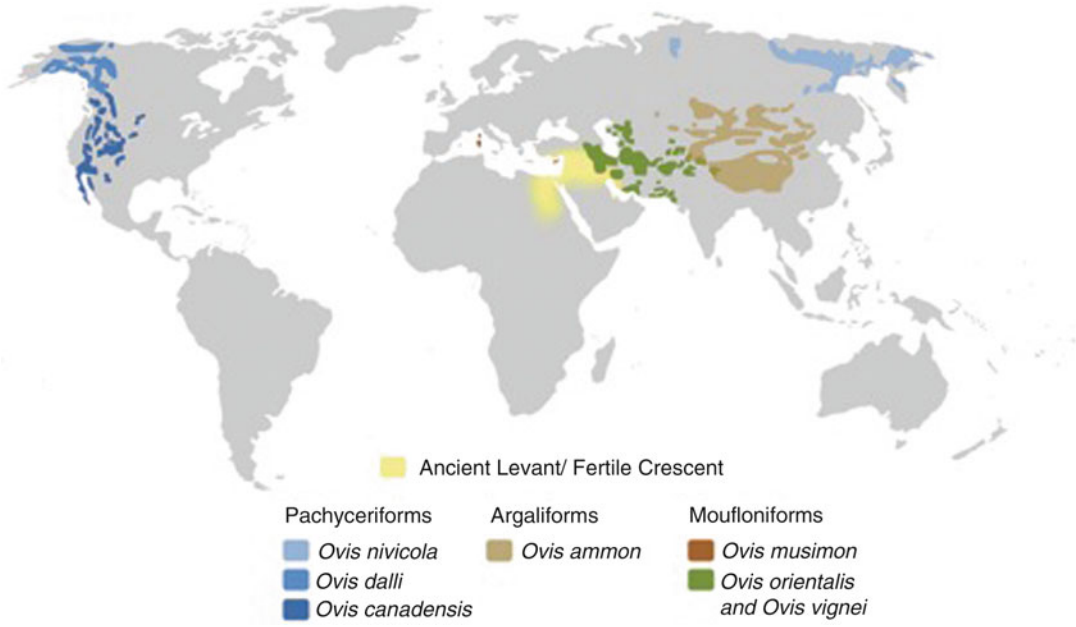
Sheep, *Ovis aries*, (Mammalia, Artiodactyla, Bovidae, Caprinae) are a highly versatile and adaptable species. From their domestication in the Fertile Crescent, approximately 11,000 years ago, sheep now span the diverse terrains of each inhabited continent where they are exploited for a variety of uses including the production of food (milk, fat, meat) and clothing (skin, wool) (Dwyer 2008). Selection based on environmental tolerance, behavioral, and commercial traits has led to the development of more than 1,400 breeds. These designations are traditionally based upon morphology (e.g., coat color, fleece, and carcass conformation, Fig. 1). Sheep weigh between 25 kg and 160 kg depending on breed, and display significant sexual dimorphism, with males often ~40–50 % larger than females (Dwyer 2008). The key adaptations since domestication have included the selection for thicker wool coats that do not molt (hair sheep are an exception), and an increase in the number of polled breeds. Members of both sexes can either be horned

Sheep: Domestication, Fig. 1 Naturally occurring phenotypic variation within a single breed of *Ovis aries*, the Icelandic sheep. This breed demonstrates a range of color morphs from black spotted (**a**) to full black (**b**) and full white (**c**) as well as the full complement of ornamentation, horned (**a**, **c**), polled (**b**), and the unusual four horned sheep (**d**). (Image credit F. Imsland)

or polled (Fig. 1). Sheep are reproductively mature at 4–8 months of age, gestation occurs over 5 months, and individuals can be expected to live for 10 or more years (Dwyer 2008).

Due to their similar sizes and shared geographic range, it is difficult to use bone morphology to distinguish between ancient sheep and goats. The zooarchaeological record suggests sheep were domesticated in the northern Levant (a large area of the Middle East including modern Israel, Lebanon, Syria, and Turkey, Fig. 2) during the Pre-Pottery Neolithic (PPN), and subsequently transported south in the mid to late PPNB, toward the end of the ninth millennium BP (Haber & Davan 2004). Neolithic farmers are also thought to be responsible for the transport of sheep north to Europe by approximately 7000 BCE, while demographic profiling of the fossil record has dated the expansion of sheep south into Africa and east into Asia to 6000 BCE and 3000 BCE, respectively (Dwyer 2008; Gifford-Gonzalez & Hanotte 2011). There is ongoing debate with regard to which wild sheep species were domesticated to form *Ovis aries*, how many times this process occurred, and to what extent subsequent introgression of wild animals has augmented modern domestic sheep.

The current natural geographic range of wild sheep relative to the Fertile Crescent is illustrated in Fig. 2. Wild sheep are divided into three classes: pachyceriforms (*O. dalli*, *O. canadensis*, both $2n = 54$, Northern America; *O. nivicola*, $2n = 52$, Northern Russia), argaliforms (*O. ammon*, $2n = 56$, central Asian highlands), and moufloniforms (*O. vignei*, $2n = 58$, Aralo-Caspin basin; *O. orientalis*, $2n = 54$, Iran, Armenia, Turkey;



Sheep: Domestication, Fig. 2 Natural global distributions of the seven wild *Ovis species* relative to the center of domestication, the Ancient Levant or Fertile Crescent. *Ovis orientalis* is the proposed progenitor of domestic sheep, *Ovis aries*, although *Ovis species* are known to interbreed where their geographic ranges overlap. Distributions are adapted from the IUCN Red List of Threatened Species. (Image credit D. Meadows)

O. musimon, $2n = 54$, Europe). Based on overlapping cytogenic and geographic data, *O. orientalis* has been suggested to be the progenitor of domestic sheep (*O aries*, $2n = 54$). Unraveling the genetic contribution of other *Ovis sp.* to *O. aries* has been complicated, however, by known fertile cross-species hybridizations which can result in odd numbered karyotypes (Bunch et al. 2006). *O. musimon* is considered a feral derivative of early domestic sheep.

More recently, genetic evidence following maternally (mitochondrial) or paternally (Y-chromosomal) inherited data has been used in attempts to elucidate the process of domestication. In domestic animals with controlled matings, a small number of males are often responsible for a disproportionate number of offspring. Genetic data focused on the Y-chromosome suggests two patrilines in domestic sheep, one with a possible European origin and the other a less restricted distribution (Meadows & Kijas 2009). The female mediated picture from mitogenome data has revealed five distinct matrilineages (A-E) that diverged before domestication (Meadows et al. 2011).

Each of these five signatures is present in modern domestic sheep sourced from the Near East, but the frequency with which they occur together decreases with distance away from the center of domestication (Meadows et al. 2011). To date, only *O. musimon* has been shown to share a matriline (B) with domestic sheep in keeping with its classification as a feral domesticate (Meadows et al. 2011). Global analyses of modern domestic sheep have shown matrilineages A, B, and C to be the most common. Studies of ancient DNA taken from sites spanning Bronze Age China demonstrate that A was originally predominant and that B may have been introduced through later trade with the West (Cai et al. 2011). A similar study using diverse breeds of modern domestic sheep calculated that matrilineages A and B expanded at the same time into Europe from the Near East via the Caucasus (~9000 BCE), and that matriline C was introduced ~3,000 years later (Tapio et al. 2006).

Autosomal data paired with archaeological finds have been used to suggest two distinct entry points for thin and fat tailed sheep into Africa. Thin tailed sheep are thought to have arrived first, entering overland from the Levant and spreading west (tomb paintings, 3100–2613 BCE). Fat tailed sheep appeared later in recorded history and dispersed south past the horn of Africa to the continental cape (first depicted 1991–633 BCE) (Gifford-Gonzalez & Hanotte 2011). Autosomal data (endogenous retroviruses) has also revealed that the global colonization of sheep breeds occurred in waves. Improved breeds were shown to replace their primitive counterparts in a pattern of migration which followed that of initial domestication, i.e., from the Fertile Crescent into Europe and Africa, followed by a later phase east across Asia (Chessa et al. 2009). No signature of extant wild introgression has been recorded.

The ability of sheep, *Ovis aries*, to adapt to a range of climatic and dietary extremes, combined with their specialized production traits and ease of transportation, has made this ruminant one of the most valuable domestic animals to man. As access to the past and current ranges of wild sheep increases, archaeological and genetic studies will continue to combine in an effort to elucidate the complex history of sheep domestication.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Goat: Domestication

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Sherratt, Andrew

Alexander A. Bauer
Department of Anthropology, Queens College, CUNY, Flushing, NY, USA

Basic Biographical Information

Andrew Sherratt was a prehistorian whose regional focus was Europe and Eurasia but whose wide-ranging command of archaeological data and interest in large-scale (even intercontinental) questions and syntheses made him an Old World prehistorian rare in contemporary

archaeology. He earned a B.A. in Archaeology and Anthropology at the University of Cambridge in 1968. He continued his graduate studies there and completed a Ph.D. in 1976 on the Bronze Age in the Balkan region, under the guidance of David L. Clarke, whose students at that time included Robert Chapman, Norman Hammond, Ian Hodder, and Stephen Shennan.

Beginning in 1973, Sherratt took up residence at the Ashmolean Museum, Oxford, where he served as Assistant Keeper of Antiquities. His service at Oxford far exceeded what that title suggests, as he was a central figure in the university's archaeological community, such as when he helped establish its joint archaeology and anthropology program in 1993. In 1996, he was named a recipient of the McNeill Erasmus Prize for his contributions to European prehistory. Sherratt was finally made a Reader in Archaeology at Oxford in 1997 and Professor in 2002. In 2005, he moved to the University of Sheffield to assume a new Chair in Old World Prehistory, a move that seemed to promise new opportunities until he died suddenly from a heart attack in the spring of 2006.

Major Accomplishments

The breadth of Sherratt's work resulted in his making significant contributions on a wide range of subjects in archaeology, including European prehistory, plant and animal exploitation, ancient trade and exchange, history of drugs and alcohol, climate and environmental change, and archaeological theory. He is perhaps most widely cited for his wide-ranging analysis of the "secondary products revolution," referring to formative use of animals for their renewable products such as milk, wool, and traction and its impact on human society (Sherratt 1981). The data-rich yet sweeping perspective he took in that analysis was characteristic of his work, so much so that he was often compared to his intellectual forbear, V. Gordon Childe, whose contributions Sherratt both sought to defend and reassess through his own collection of essays on European prehistory (Sherratt 1997).

Inspired by both Childe and Clarke, Sherratt spent much of his energy focusing on the "big" questions of European prehistory – from the beginnings of agriculture and the spread of farming into Europe to first use of iron and coinage in the Mediterranean – but his perspective on these questions combined his predecessors' ideas into an approach that was unmistakably his own. As exemplified by his work on "secondary products," Sherratt was drawn to the study of technological and economic innovations and their impact on society as a whole and would use both his deep grasp of archaeological data and cross-cultural analogy to make his case. Like Childe, he explored how such innovations spread from neighboring regions through communication and trade networks, thus seeking a reengagement with diffusion as an important explanatory idea long after it had fallen out of intellectual favor. Through all his work, Sherratt remained dedicated to the idea that the "Grand Narrative" was important for archaeology and that archaeology was uniquely situated to facilitate such long-term and large-scale syntheses (Sherratt 1995).

Sherratt's interest in long-term and large-scale processes led him to explore the potential of a range of models and tools for archaeological analysis. He had a great interest in the potential of world systems analysis for archaeology, critically thinking through the concept and focusing on dimensions neglected in other archaeological engagements, such as the "margin" between "cores" and "peripheries" and the role of consumption as an instigator of contact and social change (Sherratt & Sherratt 1991; Sherratt 1994). More recently, he turned to geographic information systems and the growing availability of high-resolution satellite imagery for mapping and modeling settlement patterns and interregional route systems (Sherratt 2005), and he began an innovative project at Sheffield called "ArchAtlas" to explore their potential (see www.archatlas.dept.shef.ac.uk).

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Childe, Vere Gordon (Theory)

- ▶ Hodder, Ian (Theory)
- ▶ Secondary Products and the "Secondary Products Revolution"
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ World-Systems Analysis

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Ship Archaeology

Seán McGrail
University of Southampton, Southampton, UK

Introduction and Definition

Ship Archaeology is that subset of Maritime Archaeology that deals with water transport: floats, rafts, boats, and ships. By the analysis and interpretation of excavated remains, archaeologists trace the origins of such vessels, their function, how they were built, propelled, steered, and navigated, the harbors they used, and the origins and destinations of the cargo and the people that they carried. Those who specialize in this subject have to be multidisciplinary: In addition to archaeology and/or history, a sound understanding is needed of seafaring, navigation, naval architecture, woodworking techniques, ancient climates, and former sea levels.

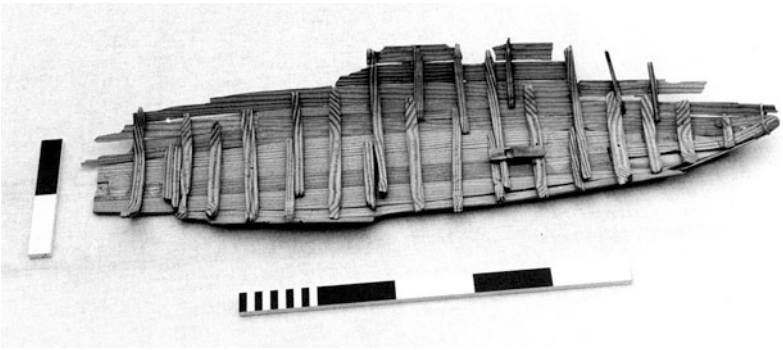
Historical Background

During past millennia, lakes have altered their bounds, and rivers changed their courses; sea levels have varied, thereby altering coastlines, and latterly there have been large-scale drainage projects. Nowadays, therefore, ancient vessels may be found not only in seas, rivers, and lakes, but also on what is now land. Some vessels were ritually deposited – for example, one of the oldest plank-built vessels in the world, Pharaoh Cheops' ship of c. 2,600, BCE, was found entombed in the Egyptian western desert. Furthermore, five medieval ships excavated at Skuldelev in Roskilde Fjord, Denmark, that were subsequently published in standard-setting volumes by Ole Crumlin-Pedersen, had been reused to block sea inlets against invaders. Nevertheless, the majority of excavated, seagoing vessels are found to have been wrecked inshore or in deeper water, or abandoned on what was then the foreshore. River and lake boats (for example, simple logboats) are usually excavated from the environment in which they had been used.

In the intertidal zone, excavation tactics have had to be developed to cope with the conditions encountered underfoot and with the varying stages of the tide. Reliable excavation underwater has been possible only since the post-WW2 development of diving gear and of specialized surveying and excavation techniques.

Related Disciplines

Early accounts and representations of water transport have the potential to increase understanding of excavated remains, but that enhancement may not amount to much. It is often difficult, and sometimes impossible, to



Ship Archaeology, Fig. 1 "As-found" 1:10 scale model of the Barland's Farm boat, based on measured drawings of all timbers excavated (Courtesy and copyright of the Newport Museum)

understand details depicted in early drawings and carvings. Moreover, chroniclers' accounts are usually general in nature, and, even where boats are mentioned, the technological information derived may be minute. On the other hand, technical instructions compiled by ship builders are of exceptional importance, the earliest known being published in sixteenth century CE Venice. Useful accounts have also come down to us from travelers and explorers who were familiar with boats. In recent times, traditional boats have been described in detail as a result of ethnographic fieldwork. Such accounts have proved useful in the interpretation of enigmatic features found on excavated vessels.

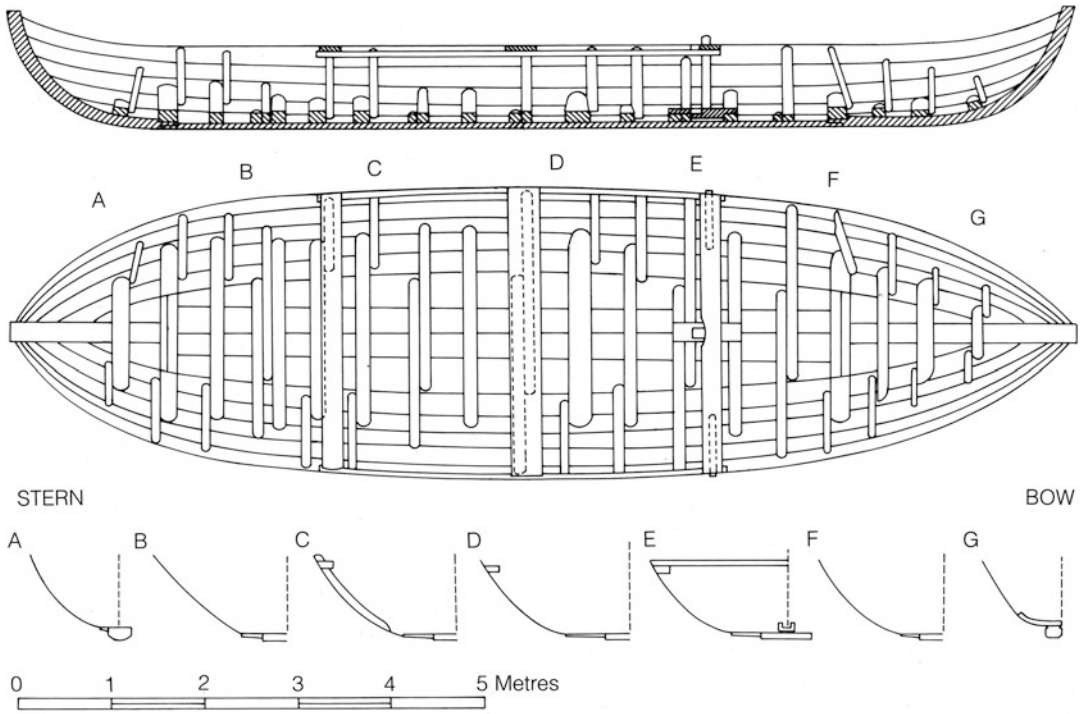
The theoretical reconstruction of former environments is essential to a full understanding of each maritime site. Early sea levels and the former run of coastlines and rivers must be ascertained so that a picture is obtained of the environment in which the vessel was wrecked or abandoned. Furthermore, "back-casts" of ancient tidal flows, currents, and weather patterns (especially predominant winds) provide a guide to the sailing conditions prevailing in former times.

Key Issues/Current Debates

Archaeological Research

The focus of ship archaeological projects is initially on the site itself, supplemented by related information drawn mainly from the fieldwork experience of the excavator. Subsequently, research shifts to the laboratory where samples from the excavation are identified and dated, and the constituents of substances such as fastenings, tar, and paint are determined. After the remains have been recorded on site, they are lifted, either as a coherent whole or timber by timber, and stored in water within a specialized laboratory where, before active conservation, each component is recorded by measured drawing, photograph, and written description. The timbers are conserved by spraying with, or immersion in, polyethylene glycol; alternatively, or in addition, freeze-drying may be used. Other methods under development include the use of sucrose, and impregnation with a resin which is then cured. Whichever method is chosen, the process (including the final drying phase) may take years, even for a medium-sized vessel.

While the timbers are being conserved, an "as-found" measured drawing of the vessel is compiled using the results of the recording process. This drawing depicts the remains as they were when excavated, but with displaced timbers reinstated, distorted timbers realigned, incomplete and fragmented timbers made whole, and the resulting structure rotated until it is orientated as was the original vessel when in use. A small-scale model (Fig. 1) may then be built from this "as-found" drawing and used to investigate whether it is possible to reconstruct – in a theoretical way – the complete hull of this vessel: Insufficient surviving evidence may make this impossible. A valid reconstruction of the original form and structure of the hull is likely to result when:



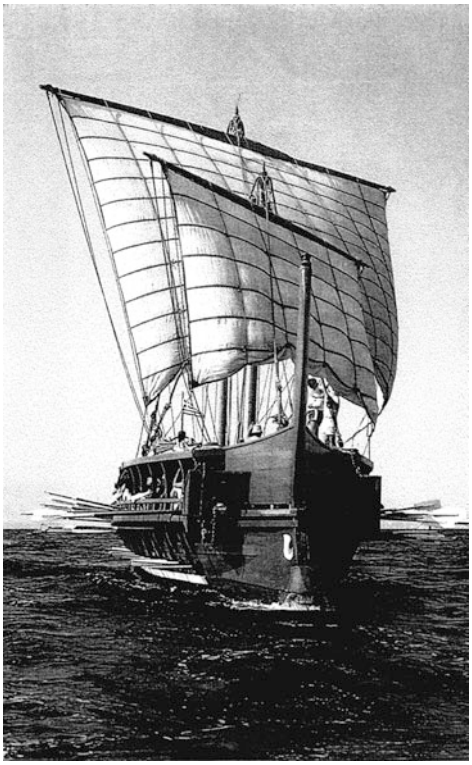
Ship Archaeology, Fig. 2 Reconstruction scale drawing of the hull of the Barland's Farm boat. Elements reconstructed may be identified by comparing this drawing with the "as-found" model in Fig. 1 (Courtesy and copyright of the Glamorgan-Gwent Archaeological Trust)

- (Most of) both ends of a boat have survived, or one end survives and it can be deduced that the boat had been "double-ended"
- Articulated runs of planking survive, up to an undoubted sheerline and/or sufficient framing survives to define the outline of the hull

During such reconstruction, wishful thinking must be avoided: Only those features that are supported by rigorous argument should be added to the "as-found" scale drawing. It is valid, for example, to incorporate hull structure and fittings that it is believed are undoubtedly essential and have been documented in a near-contemporary wreck of the same building tradition. When evidence for sail (such as a mast-step) survives on an excavated vessel, contemporary iconographic evidence – if such exists – may assist in the difficult task of determining details of mast, sail, and rigging. At intervals in this process, findings and intentions should be presented to a "jury" of specialists in this type of research. If the final hypothetical reconstruction drawings (Fig. 2) are validated by such a group, they may be used to estimate performance figures. A scale model may also be built which will probably be more informative to the nonspecialist.

When conservation of the excavated vessel is finished, and timbers can be handled, the remains are reassembled in the area in which they will be displayed. This "rebuilding" of the vessel may result in fresh ideas about the hypothetical reconstruction that if validated can be incorporated in another revision of the drawings and model.

Subsequently, if funding can be acquired and working spaces identified, it may become feasible to use these drawings and the model to build a full-scale reconstruction that, after launch and fitting-out, should undergo rigorous sea trials. This process is known as "Experimental Archaeology" and the vessel built and tested is considered to be a "floating hypothesis."



Ship Archaeology, Fig. 3 The "floating hypothesis" *Olympias*: a full-scale reconstruction of a fourth century BCE Greek *trireme*, under sail in the Aegean (Courtesy and copyright of the Trireme Trust)

The reconstruction and the building of a floating hypothesis of a *trireme* (Fig. 3) – an eastern Mediterranean warship of seventh to fourth centuries BCE – is a (possibly unique) example of such an experimental project that was based almost entirely on documentary and illustrative evidence rather than on excavated remains (Shaw 1993; Morrison et al. 2000).

The most difficult processes in such experiments have proved to be:

- The formulation of the academic aims of the project
- The rigorous production of a reconstruction drawing or model
- After each phase, the submission to external criticism of (a) conclusions drawn and (b) the project's intentions for the next phase

Unless these procedures are satisfactorily undertaken, any hypothetical reconstruction will be invalid, and any vessel built will not be authentic (Bennett 2009: 16-23)

Key Issues

Terminology

In the preface to his classic work *Water Transport*, James Hornell (1946: vii; 1970: xv), observed: there are "many devices upon which men, living in varying stages of culture, launch themselves afloat upon river, lake and sea." Since, in earlier times, every raft or boat was individually built, each one was different in some respect from all others. We therefore need a method of grouping together boats that are generally similar so that patterns may be identified and fundamental shifts in technology recognized.

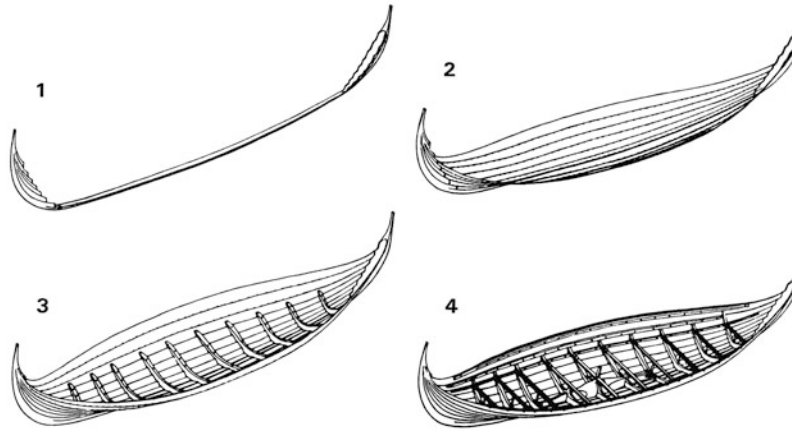
The primary classification of water transport is into the three classes: floats, rafts, and boats/ships. A *float*'s buoyancy is applied directly to the human body which is part-immersed, whereas the buoyancy of rafts and boats is applied indirectly. How that indirect buoyancy is derived differentiates rafts from boats/ships: Rafts are "flow-through"; therefore, a *raft*'s buoyancy is derived from each floating element of its structure; a *boat*'s buoyancy, on the other hand, is derived from the displacement of water by her continuous, watertight hull. In this context, a *ship* is considered to be a large boat.

It is convenient to subdivide these classes into subclasses identified by the principal material used in their construction:

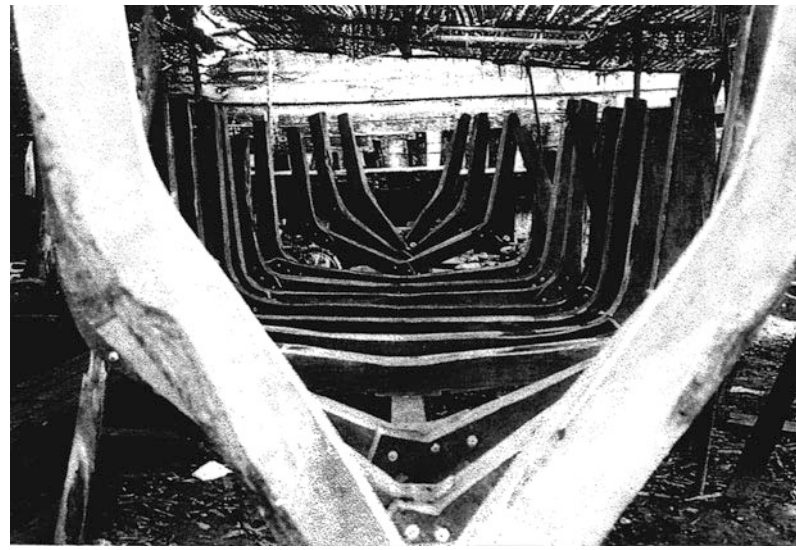
- Four types of float: log; bundle; hide; and pot – plus, in recent years, oil drums
- Four types of raft: log; bundle; hide-float; and pot-float
- Six types of boat: log; bundle; hide; bark; basket; and plank

Building Sequences

In the mid-twentieth century CE, two sequences, "shell-built" and "skeleton-built," were identified as the principal ways in which plank boats were built (Hasslöf 1963). This distinction can also be seen in bark boats and hide boats. In the "shell-built" sequence (Fig. 4), planking is fashioned and then fastened together to form



Ship Archaeology, Fig. 4 Four stages in the plank-first sequence of building a medieval Scandinavian boat (Copyright of Seán McGrail, after Ole Crumlin-Pedersen 1983: Fig. 5)



Ship Archaeology, Fig. 5 The frame-first sequence: the framing of a *vattai* fishing boat fashioned to shape and set up in Atirampattinam, Tamil Nadu, before planking was added (Copyright of Seán McGrail)

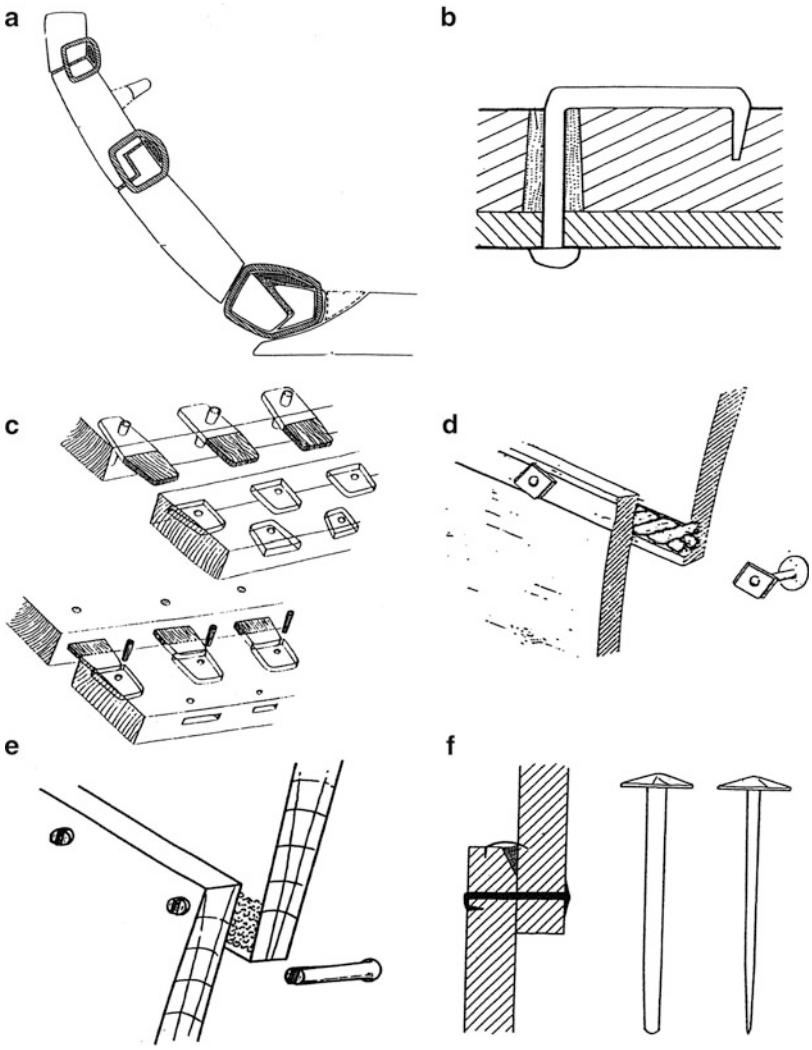
a watertight hull; framing is then fastened inside that planking. The builder visualizes such a boat as a watertight shell reinforced by framing. This sequence is now known as "plank-first."

In the "skeleton-built" sequence (Fig. 5), framing is fashioned to give the hull shape required; planking is then fastened to that framework. The builder visualizes such a boat as a framework or skeleton made watertight by adding planking. This sequence is now known as "frame-first": It may be further divided into:

- Those built sequentially: first, lower framing, to which planking is fastened; then, upper framing that is then planked. This sequence of building may be described as "framing-first": Such boats are mostly early in date.
- Those that were not planked-up until virtually the entire framework/skeleton had been erected. This sequence is the true "frame-first": Such vessels are mostly from postmedieval times when great ships were built in this way.

Building Traditions

Builders and users today recognize the concept of a "tradition" of building for the range of vessels with which they are familiar. For excavated vessels, it would be desirable to use the original



Ship Archaeology, Fig. 6 Plank fastenings. (**a**) Planking lashed together, as in the early, sewn plank boats of southern Britain. (**b**) Planking fastened to the frames of an early centuries CE, Romano-Celtic boat. (**c**) Locked mortise-and-tenon plank fastenings used in early, eastern Mediterranean vessels. (**d**) Early medieval, Nordic fastenings in overlapping (clinker) planking, with hair caulking and nails clenched over a metal rove. (**e**) A Slav variant of (**d**) with moss caulking and treenail fastenings. (**f**) Hooked nail, plank fastenings in the medieval Bremen cog, with moss caulking held in place by metal clamps (Copyright of Seán McGrail)

type-names but, even when names have survived, it can prove difficult to link one to specific excavated vessels. In northern Europe, this link has proved possible in one case: The characteristic features of the medieval merchant ship "cog" were deduced from late medieval texts and from depictions on town seals. Using this key, a number of wrecks have been identified as cogs. A principal feature of the cog, and of several other traditions, is the way the planking is fastened together (Fig. 6).

The distinctive boat-and-ship type used by Scandinavians (and subsequently others) from the early centuries CE to the fourteenth century (and later) CE is not precisely named in early texts but in recent times has been known as "Viking." Since this way of building originated before the Viking Age, and continued in use long afterward, it is now described as "Nordic." Excavations, research and publications by Ole Crumlin-Pedersen, during the past 50 years, have greatly added to our knowledge of this boatbuilding style (Crumlin-Pedersen & Olsen 2002).

For other periods and places, it has been found useful to group excavated vessels with similar features into "traditions." A "tradition" may be defined as: "the perceived style of boat-and-ship

building generally used in a certain region within a given time range." This concept has increased understanding of the way building techniques have changed over time, and has facilitated the recognition that some traditions have induced changes in the building methods of other regions. Such traditions are artificial groupings constructed by archaeologists after the analysis of each excavated vessel over a wide range of characteristics – mostly structural features such as fastening methods (Fig. 6), but also hull shape, propulsive means, and steering arrangements. It is not necessary that the vessels in each tradition should have all characteristics in common. In a *polythetic* group, each boat shares a large number of characteristics with every other boat in that tradition, but no one characteristic has to be possessed by all boats. In this respect, polythetic groups reflect an understanding of the real world (Doran & Hodson 1975: 160), and should be used whenever possible.

Sewn plank boats, excavated or ethnographic, are known throughout the world (McGrail 1996). The group of prehistoric sewn plank boats is generally undifferentiated, although two broad types have been identified in those excavated in northwest Europe:

- Boats with planks *lashed together* by single stitches through large holes (Fig. 6a)
- Later boats with planks fastened by *continuous sewing* through smaller holes

Other traditions, such as "Romano-Celtic" (Fig. 6b) and "Nordic" (Fig. 6d), which were initially identified by intuitive, ad hoc methods, were subsequently placed on a sound basis using evidence from excavated boats.

Design and Building

It is generally considered that the earliest rafts and boats were built by eye, using "rules of thumb." It seems likely that rafts continued to be constructed in this way into recent times. Boats were probably similarly built (in the plank-first sequence) until the early centuries CE, when there is the earliest evidence for frame-first boats built on a designed framework (see below). In time, and in certain places (for example, Europe and China), the size of these designed boats was increased so that they became ships.

Building Frame-First Vessels

Three, seagoing boats of the first to fourth centuries CE have been excavated: from the River Thames at Blackfriars, London; in St Peter Port harbor, Guernsey; and in a former tributary of the River Severn, at Barland's Farm in southeast Wales (Rule & Monaghan 1993; Marsden 1994; Nayling & McGrail 2004; Oleson 2008: 625-27). From them, distinctive structural features of this Romano-Celtic tradition have been identified, the most characteristic being:

- Absence of plank-to-plank fastenings (Fig. 6b), and no plank scarfs but butt joints at frame stations
- Use of the framing-first building sequence (the earliest known)

These features are clearly different from those used to build prehistoric logboats and sewn plank boats, the only other known types of early European wooden boat. The builders of these Romano-Celtic boats appear to have used a unit of measurement (55–56 cm – possibly two human feet) to space the framing. There may also have been a 1:2:3 ratio between maximum breadth, length of plank-keel, and length overall. Moreover, it seems possible that, before planking, longitudinal battens on a master frame were used to give hull shape. In these, characteristics may be seen the beginnings of a formal design method. Early framing-first builders probably handed on their skills by word-of-mouth as "rules of thumb," since not until the late medieval period do we get written accounts and illustrations of such procedures (McGrail 2001/2004: 160-65; Oleson 2008: 613-25).

It may be that this northwest European frame-first building sequence originated in the building of hide boats. No early hide boat has been excavated, but there is documentary and iconographic evidence for their use in the British and Irish archipelago from the mid-first millennium BCE suggesting that, in earlier times, they had a significant role in northwest European seafaring. From postmedieval accounts, we learn that such boats were built – as they still are today – by

covering a wicker framework with hides: first the framework; then the "skin": This is the frame-first sequence.

A similar sequence of construction, but differing in detail from that in the Romano-Celtic ships, was used from the fifth/sixth to the ninth century CE to build several Mediterranean planked vessels excavated from Levant coastal waters. It has been suggested that this framing-first building sequence may have come to mind when replacement planking was fitted to the framing of a plank-first vessel (Kahonov 2011: 161-81).

After the fourth century CE in northwest Europe, and the ninth century CE in the Mediterranean, there is, at present, no sign of the frame-first sequence until eleventh century when it was used in Asia Minor and in southern Europe; from there, the technique appears to have spread along the coast of Atlantic Europe as far as the Baltic. In the fifteenth century CE, this sequence was used to build the European sailing ships that sailed "all the seas of the world" (McGrail 2001/2004: 245-57). During this period, there also seems to have been a shift to building frame-first in China (Xi & Xin 1991; McGrail forthcoming). Some of the medieval ships recently excavated in Chinese waters may well have been built "bulkhead-first" – a variant of frame-first. Like the medieval European ocean-going ships, the hull shape of these late-fourteenth century CE Chinese ships appears to have been determined by their framework (of bulkheads).

In both China and Atlantic Europe, this significant shift from plank-first to framing-first (possibly around the same time) was followed by ocean-going voyages: into the India Ocean by the seven Chinese fleets commanded by Admiral Zheng Ho, and into the Atlantic Ocean by Portuguese and Spanish ships.

Building in the Mediterranean

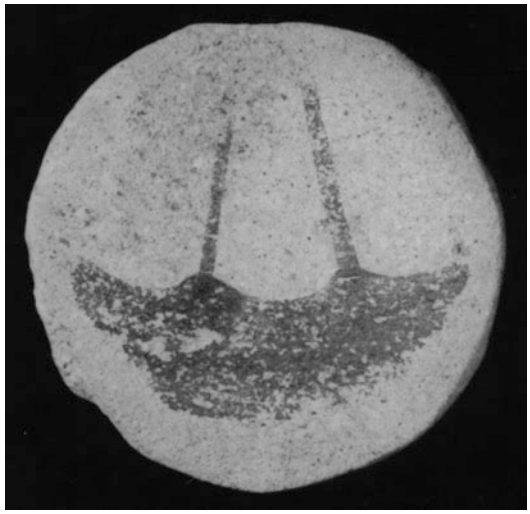
Although logboats have been excavated in the Mediterranean region (for example, in Italy), plank boats, subsequently ships, dominate the archaeological record (Oleson 2008: 606-37). The earliest known are from late-fourth millennium BCE Egypt: In addition to sewn fastenings, wooden tenons were used within the plank thickness to link planking together. Sewn plank boats were still being used in the Adriatic until the twelfth century CE. From the fourteenth century BCE, however, the locked mortise-and-tenon joint (Fig. 6c) appears to have become the principal eastern Mediterranean fastening. It continued in use through Greek and Roman times and on into the Byzantine period until it was superseded by framing-first vessels (without plank-to-plank fastenings).

As Roman commercial interests expanded, the use of mortise-and-tenon plank fastening spread over much of the then-known world. Several northwest European vessels of the early centuries CE were built with such fastenings, including a third/fourth century CE boat excavated from Lough Lene in County Westmeath, some 50 miles northwest of Dublin (O'Heailidhe 1992). This fastening has also been found in southeast Asia: on an undated wreck at Johore Lama in Malaya, and during recent excavations in northern Vietnam of a first century BCE plank-extended logboat and a second century CE boat planking reused in a coffin (Bellwood et al. 2007).

Boat Operations

Steering and Propulsion

Rivers may be obstacles to land travel (hence the development of fords and ferries) but they can also be used as "highways" across land to the sea. Drifting downstream would have been unreliable until a means of steering had been devised – paddles (examples of which have been excavated from European Mesolithic sites), poles, and oars could have been used to steer as well as to propel. Rudders differ from other means of steering in that they are fastened to the hull of the boat and are rotated by the helmsman around their own, near-vertical axis. There are two types: side rudders fastened to the boat's hull on one (sometimes both) quarter(s); and median rudders fastened at the stern. When the helmsman rotates a rudder so that its aerofoil section blade lies at an angle to the water flow, a horizontal force is generated in the water at the stern; this force



Ship Archaeology, Fig. 7 A painted ceramic disc from Kuwait, dated to the Ubaid 3 period (sixth to fifth MBC), depicting a vessel with a bipod mast (Copyright of Carter 2006: Fig. 4)

causes the boat to turn until the rudder is returned to its neutral position.

The problem of returning upstream against the current was solved in early Mesopotamia by rowing and by towing, the latter from an oared tug or by a team of men walking along the river bank. In Egypt, on the Nile below Aswan where there was generally a northerly wind, sail was used to overcome the northward-flowing current, and propel boats southward. Depictions of the use of sail, dated 3,000–4,000 BCE, have been excavated in Egypt, but earlier evidence has recently been excavated from a site in Kuwait (Carter 2006): a vessel with a bipod mast on a ceramic disc dated sixth to fifth millennium BCE (Fig. 7).

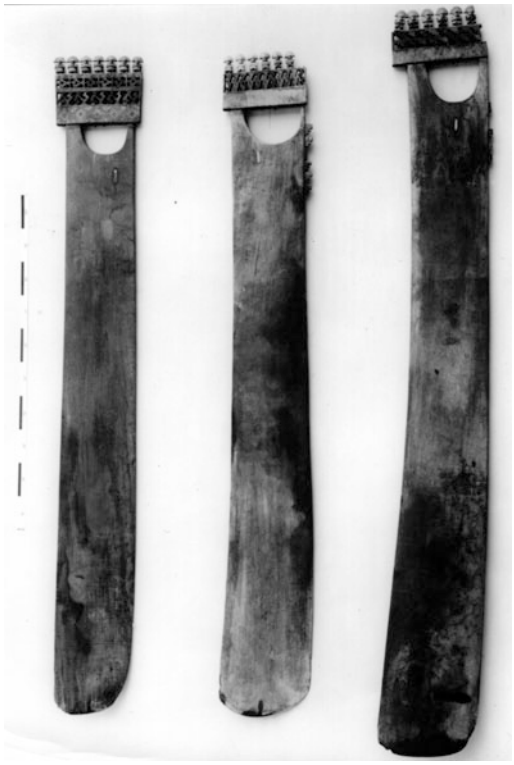
It seems likely that these earliest sails – in both in Mesopotamia and Egypt – could only be used to propel a boat down- or across-wind. How, and when, sailing vessels first made ground against the wind is difficult to determine, but there are indications that it may have been in the second millennium BCE. Interpretation of Egyptian representations of sailing vessels dated to the middle of that millennium suggests that such vessels could have been sailed when the wind was from a point forward of the beam. At around this same time, the methods used to find and settle Oceanic islands appear to have changed significantly. As these pioneering seafarers spread eastward from the western rim of the Pacific, island groups were found to be much more widely spaced. Passages could therefore no longer be undertaken by visual, pilotage methods, and ways of navigating when out-of-sight of land had to be devised (see below – "Early Seafaring"). It may be that at this time, in Egypt as well as in Oceania, a sailing rig was evolved, and procedures established, that resulted in vessels making ground against the wind.

From the dates now given for the earliest depictions of sail in India and China, and in the Eastern Mediterranean, Western Europe, and Scandinavia, it might seem that sail use spread outward from the Egypt–Mesopotamia region through the Mediterranean to Atlantic Europe in the northwest, and through India and SE Asia to China in the east. This may or may not be true, but it is undoubtedly not true that Egypt–Mesopotamia was the sole origin of sail. Early European explorers of the Americas found a range of sail types and rigs on rafts and boats, on both east and west coasts, from the Arctic to Brazil and Peru. Such rigs and sail shapes have no parallels in Europe or elsewhere, and must have had an American origin.

Associated with sail in several European depictions of South American craft was the *guares*, an immersed steering foil or "variable leeboard." These long, wooden boards, of aerofoil cross-section and with a handle at the upper end (Fig. 8), were lowered through gaps between the logs of seagoing rafts. By varying their position and depth of immersion, course could be altered, sailing balance attained, and leeway reduced. Such usage was first noted by Europeans in the eighteenth century CE. Excavated *guares* have been dated to *c*. 300 BCE (McGrail 2001/2004: 401-12).

Sailing Seasons

Periods of storms and of obscured skies were avoided and times of favorable winds used: thus seasonal sailing evolved. In European Atlantic waters, for example, vessels were generally not used on sea passages between mid-October and



Ship Archaeology, Fig. 8 Variable leeboards ("guares") excavated from graves of c. 300 BCE, at Ica, Peru (Courtesy and copyright of the Museum für Völkerkunde, Berlin)

mid-March; similarly, Arabian vessels avoided approaching the west coast of the Indian subcontinent between mid-June and mid-September. In Roman times, ships sailing for India left Red Sea ports in July so that the southwest monsoon wind would take them across the Arabian Sea in August and September. In late November, the northeast monsoon was similarly used for their return passage. Columbus, heir to much seafaring knowledge, timed his pioneering, fifteenth century CE Atlantic voyage so that he would have a generally following, easterly wind for his outbound passage, and, in more northerly latitudes, a fair, westerly wind for his return to European waters (McGrail 1992).

Landing Places and Harbors

In tidal waters, early water transport was used from intertidal beaches where, on each flood (rising) tide, vessels floated. Where beaches and river banks were soft, withies and poles or hurdles and stakes were laid to form a hard. In tideless seas, such as the Mediterranean, on the other hand, vessels were left afloat, at anchor, with their stern moored by line to the shore. Such informal sites are still used in many parts of the world (McGrail 1987/1998: 267-74)

The earliest known harbor walls were built in the eastern Mediterranean during the eighth to ninth centuries BCE to protect landing places exposed to onshore winds and seas. As time progressed, additional features – jetties, lighthouses, silt-dispersal facilities – were incorporated until, by late Roman times, important harbors had many of the facilities seen in nineteenth century Europe. During the tenth to eleventh century CE, as towns in northwestern Europe grew, and economic life became more complex, seagoing ships became bigger. Rather than remaining at anchor, such vessels could more readily be loaded and discharged in deep-water berths, alongside wharfs. These requirements, the state regulation of trade, and the introduction of warehouse marketing methods, all combined to cause a surge in the building of formal harbors at focal points in international networks.

Early Seafaring

There is no direct evidence for any type of water transport before 9,000 BCE, but other archaeological and geophysical evidence demonstrates that Man crossed seas very much earlier (Anderson et al. 2010). Two questions arise about such early voyages:

- What type of water transport was used?
- How did these early mariners navigate?

Water Transport

Since these voyages were undertaken millennia before the date of any excavated example of water transport, it is necessary to work indirectly toward an answer to that first question. Using data from recent examples of all known types of water transport, the technical stage (hence approximate date) appropriate to the building of each one of those types (each with a simple and a complex version)

can be estimated. This method suggests, for example, that the settlement of Australia from southeast Asia in Palaeolithic times could have been undertaken in paddled rafts of bamboo logs (Anderson et al. 2010: 95-107).

Navigation

It seems likely that such early overseas migrations were undertaken over a lengthy period from island to island, with succeeding generations undertaking successive legs. On each passage, in that age of lower sea levels, land would always have been in sight, ahead or astern, or both. Thus, *pilotage techniques*, using the human eye, would have been used to keep track of a vessel's position as she progressed from one island to the next.

From the second millennium BCE, widely spaced groups of Oceanic islands were settled by mariners who must have been out-of-sight of land during much of the passage. It is conjectured that these island groups were first sought on reconnaissance voyages from southeast Asia and from the islands of western Melanesia. Such voyages would have lasted several days during which *deep-sea*, *navigational techniques without instruments* would have been necessary. After these explorers had returned home and thereby "fixed" the position of the newly located islands, settlement voyages in more capacious boats would have been undertaken (McGrail 2001/2004: 339-45).

In the late-twentieth century, Micronesian seaman demonstrated how boats could be navigated without instruments, using methods handed on by their ancestors that are generally similar to those now known to have been used by Arabs and other late medieval seamen. Courses were steered relative to the sea swell or to the wind, or, at night, by reference to specific stars – in the northern hemisphere, especially the Pole Star and its circumpolar constellations. These courses would then be cross-checked during daylight by noting the relative bearing of the sun at sunrise, noon (its highest point), and sunset. The boat's speed was probably assessed by comparison with past performance in the light of the existing wind and sea states, such "speeds" being expressed as "faster" or "slower than usual."

Land may be detected long before it becomes visible, by the sight of cloud sitting over it, by the flight line of birds, and by soundings that reveal decreasing depths of water. The outline shapes of coastlines, especially those with high peaks or distinctive cliffs, would have been memorized for future use. On subsequent passages, navigators would have to identify their actual landfall relative to this known silhouette and thus be able to turn along the coast toward their intended destination. The accuracy of this "navigation without instruments" has been demonstrated during sea trials in which Micronesian navigators, monitored by Australian and American observers, used such methods on Oceanic passages out-of-sight of land.

Future Directions

In conjunction with documentary, iconographic, and ethnographic evidence, excavations have thrown light on the building and the use of the early plank boats and ships of Egypt, the eastern and central Mediterranean, and the European Atlantic seaboard. Furthermore, in Chinese and southeast Asian waters, several important seagoing medieval ships have been excavated and published. In other regions of the world, however, Boat and Ship Archaeology is, at best, still in its infancy. Moreover, direct evidence worldwide for water transport is strongly biased, there is no evidence of early floats and negligible examples of rafts. Furthermore, evidence for boats is almost entirely limited to those built of planks or of logs.

Water transport is its own advertisement: Through the ages, boatbuilders everywhere have been influenced by nearby building traditions, or by the traditions of overseas trading partners. To understand fully the ancient water transport of any one region, a sound knowledge of the ancient vessels of other lands is needed: The early maritime aspects of India, China, and similar regions should be investigated.

By its published research during the late-twentieth to early twenty-first century CE,

ship archaeology has attained a recognized place within the archaeological discipline. To consolidate that position, it is now necessary not only to improve fieldwork techniques, but also to make the study of water transport worldwide, and to trace early examples of every type of float, raft, and boat.

Cross-References

- ▶ Islamic and Maritime Archaeologies
- ▶ Maritime Iconography
- ▶ Mexico: Underwater Archaeology
- ▶ Waterlogged Finds: Conservation

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Shipyard Archaeology

Lynn Harris
Program in Maritime Studies, East Carolina University, Greenville, NC, USA

Introduction

A growing body of international peer-reviewed research on shipyards published since the 1990s is testimony to the rapid expansion of the discipline beyond the traditional focus on shipwrecks and vernacular watercraft. Analytical frameworks such as maritime cultural landscapes

and maritimity, regional and global approaches, ship graveyards, shoreline, and port studies are conducive to the inclusion of shipbuilding and repair facilities (Pastron & Delgado 1991; Pitt & Goodburn 2003). The bulk of the yards that scholars have investigated are located in proximity to active ports in urban areas. The multiple footprints of these sites in the archaeological record, both on land and underwater, are commonly wharves, slipways, docks, sawpits, sandpits for kiln work, warehouses, and specific tools and machinery associated with the shipbuilding process. Researchers have addressed a colorful cross section of themes related to shipyard archaeology including critiques of archaeological methodology, recycling ship parts, innovation and technology, gender, ethnicity, labor, and land use. Management of shipyard sites are associated primarily with concerns about rapid urban development along inland waterways and ports, coupled with lack of training of cultural resource managers to either identify or document these sites (Stammers 1999; Ford 2006; Richards 2008; Harris 2010; Moser 2011).

Definition

A shipyard, generally situated close to the water and building resources, is an industrial site closely linked with labor history and current socioeconomic events. It represents the crucial connecting piece between the product – the ship – manufacturers or shipbuilders, society, and environment in which the ship is designed to operate. There exists a wide variation in the size of the shipyard, services the shipyards offered, and how the yard conducted primary shipbuilding functions through time. Some were located inland on rivers at small towns and others served larger cities and ports.

Moser (2011) proposes a useful typology dividing shipyards into five broad categories or tiers: (1) large state-owned and operated yards like the naval British dockyards of the eighteenth and early nineteenth centuries, (2) well-organized private yards with a large labor force like the Dutch East India Company operatives in Amsterdam, (3) private yards with a substantive labor pool that could build multiple vessels at the same time, (4) smaller private shipyards with single slipways that could only build or repair one vessel at a time such as Wicomico shipyard in Maryland, and (5) shipyards with little permanent infrastructure only constructing or repairing a few vessels and often in dire financial straits.

Key Issues and Current Debates

The limitation of a typology is that most yards, in any time period, went through spiraling stages of economic development and decline influenced by a variety of factors, most prominently war and labor issues. Shipyards in category 3 and 4 often had multiple site identities and served a variety of roles for the local community functions beyond shipbuilding. The multifunctional nature of a "shipyard" further complicates interpretation of the archaeological record. Shipyards were both small and big businesses that survived or thrived, went out of commission, partnered reluctantly or enthusiastically with other enterprises, or dabbled in other economic endeavors in addition to shipbuilding to stay solvent. In the North American colonies, for example, the shipyard labor pool was comprised of a potpourri of immigrants, apprentice and itinerate shipwrights often trained in the large European yards, hired plantation slaves, shipyard-owned slaves trained in shipbuilding skills, and free black and white laborers. Shipyards were supported financially, and often precariously, by family still living in Europe, wealthy local colonial and marriage networks, and lucrative skilled partnerships with other shipwrights. One of the key issues in attempts to add meaning to shipyard research is how to discern the signatures of socioeconomic changes in shipyard status through time. Another dilemma is how to tweak out the essence of contributions of women, family networks, and labor pool to the success and failure of shipyard enterprises from the archaeological record. Lacking that dynamic

socioeconomic context, shipyard archaeology studies are at best only a descriptive site report or database entry.

Between 2003 and 2004 scholars conducted extensive excavations at the *treasure* shipyard or *boachuanchang* in Nanjing. The yard was utilized actively in a period of China's maritime history during the early fifteenth century when thousands of government-commissioned ships ventured from the mouth of the Yangzi River southwards along the Chinese coast to Southeast Asia and the Indian Ocean. Archaeologists recorded multiple pylons believed to provide stable frameworks for ships under construction. Excavators unearthed an assemblage of around 2,000 artifacts. Among the collection were two rudder posts, both over 10 m long. These artifacts complement the 11.6-m rudder post discovered at the same shipyard in 1957, currently stored in the National Museum of China in Beijing. Iron artifacts included shipbuilding tools like knives, chisels, punches, rings, hoops, picks, and nails. Of interest in the archaeological record for shipbuilding processes were iron staples or *bading*. These straight pieces of iron, with the two ends bent at 90° in the same direction, were used to fasten wooden joints. The site also yielded ceramic items including a variety of earthenware and porcelain (Nan Jing Shi Bo Wu Guan 1991).

Shipbuilding yards have been identified in Greece, Italy, and Israel (Baika 2003; Blackman 2003; Raban & Linder 1978: 243). Many ships were simply built on the shores of the beaches, like the Black Sea coastline, with easy access to launching. In Turkey thirteenth-century shipyard buildings survived at Alanya on the Mediterranean Coast. Buildings provided an important study in architecture and further knowledge about the types of warships used by the Anatolian Seljuk. The shipyard is situated within a medieval town, cut into the rock on a hill and surrounded by high walls. The enterprise comprises sheds for building and protecting vessels, metal-working areas, and administrative spaces. Productively utilized, the shipyard not only was a place to build and store ships not in use but also provided facilities for repairs, with the additional capability of producing sails and rigging for the navy (Daggullu 2009: 13–20).

Northern European shipyard scholarship is devoted primarily to military shipyards beginning in the 1970s with work by Courtney (1974–1975) at the Royal Woolwich dockyard. This formative study interpreted land use through time while explaining specific uses of facilities for dockyard operations. While industrial facilities comprise a dominant portion of the work, other ancillary features investigated included the surgeon quarters, the clock house, and roadways. Underwater investigations in the 1990s around the Beaulieu River in England, the London and Amsterdam waterfront centered on slipways, which were the most diagnostic underwater component of a shipyard site. Archaeological interpretation encompassed bathymetric and topographic surveys, followed by documentation of the stylistic features of the slipways (Adams 1994; Gawronski 2003).

In North Wales and North West England, Stammers (1999: 253–264) explored a variety of historical shipbuilder records including census records, court records, trade directories, advertisements, artwork, and ordnance maps showing shipyards. The study identified variation in size of shipyards in urban England and the problem of space in working areas. Stammers reinforces the value of shipyards to the archaeological record as important resources that can show evidence of the construction process of shipbuilding, the materials deployed, information about a workforce, and how it transmitted ideas into tangible form. In Ireland, research of maritime landscapes included phase one archaeological surveys and historical documentation of shipyards such as the industry surrounding Portaferry, a leading port for Strangford Lough during the late eighteenth and nineteenth centuries. The town grew around a sixteenth-century tower house, later expanding into a large industrial operation with three yards that could accommodate the construction of an impressive array of ships for the transatlantic trade (McErlean et al. 2002: 220).

To date, most landscape analysis in the southeastern USA has been devoted to plantation sites rather than industrial sites. In a sense,

Shipyard Archaeology, Fig. 1 Artistic impression of Hobcaw shipyard (Courtesy of Hernandez family)

plantations with slaves trained as craftsmen, including boat and shipbuilders, represent a form of rural and private sector industrialization. Studies of coastal and riverine shipyards including Hobcaw shipyard and Mars Bluff shipyard in South Carolina, McKnight yard in North Carolina, and Willink shipyard in Georgia offer pertinent information about the diverse archaeological signatures of southern shipyards in different time periods and geographic locations (Figs. 1 and 2). The case studies reveal that choice of site, location, and layout plan of the work facility are key elements in understanding the operation of the shipyard. Historical records of these three shipyards like naval recommendations, advertisements for land, sale receipts, probate records, and comments of customers all provide keener insights into social perceptions about suitable shipyard locations, the trade-offs of choices, growth, and fiscal stability of shipyard endeavors.

In 1984 investigations at Hutchinson Island in Savannah Harbor included observations of features such as Willink's marine railway, a shipyard in operation from 1873 to 1898; shoreline spoil edge; and extensive brick scatter. Archaeologists recovered over 2,000 artifacts related to shipbuilding and machinery repair. The material culture record was supplemented by a plat showing wharf lot titles, a floating dry dock, and two useful plans dating respectively to 1879 and 1891 showing landscape features like a fence, engine house, power plant, railway, and city saw mill, and docking area (Babits & Barnes 1984: 48–52). The site was increasingly critical to regional shipping and tracing the sales of this property through time reflected a shift in the use of the harbor and shipyard from small, locally owned companies to a large corporate structure with greater fiscal stability and ability to monopolize the shipping industry.

Shipyard Archaeology, Fig. 2 Caulking tool from Mars Bluff Shipyard (Courtesy of East Carolina University)

During the latter half of the eighteenth century, Hobcaw Creek outside Charleston

became the colony's largest shipbuilding center despite the presence of smaller yards scattered around the colony. An advertisement in the *South Carolina Gazette* on November 30, 1769 by these new partners lists the services of Hobcaw yard and John Rose's other yard, Rose's Wharf in Charleston, including shipbuilding, heaving down, repairing, graving, and mast building. Apart from their service as a shipbuilding depot, the yard also represented a sales depot that supplied the products required for shipbuilding and repair like live oak, cypress, and spars for topmasts, yards, and booms. Despite the existence of several yards on Hobcaw Creek, the success of the yard was attributed to attractiveness of this specific location for naval shipbuilding, sufficient space to heave down three large vessels simultaneously, good depth of water, a freshwater spring close to the shore, and enough distance away from the distractions of the city of Charleston to the laborers. From formative status as a plantation smallholding to small private yard run by two shipwrights, it evolved into the largest state yard leased by the South Carolina Navy during the Revolutionary War. Ultimately, the successful shipyard reverted back to a smallholding in the aftermath of the war, and the shipwright, John Rose, left for Jamaica where he used his shipyard earnings to purchase over 9,000 acres and 221 slaves (Harris 2010: 17–35).

Clients of shipyards also reveal why one shipyard succeeded economically over another – reputable craftsmen, timely completions of tasks, and use of high-quality lumber. Loss of labor, including slave labor, resulted in losing the edge with competing shipyards. Sufficient resources to purchase and train shipyard slaves was more beneficial to business than renting slaves from planters. Consensus between business partners in shipyard businesses about investments and business practices was also a critical part of the equation, as demonstrated in the case of Hobcaw where squabbles about managing shipyard finances ultimately led to a suicide, or murder, of one of the shipyard partners.

By the mid- to late 1800s through years of the Civil War and postbellum period, concerns about the wartime vulnerability of shipyards on the coast and the convenience of shipping hardware materials and machinery by rail became critical planning factors in shipyard location. Southern shipyards served as manufacturing facilities and needed convenient access to transportation networks, building materials, and labor. Other considerations for fiscal success in the investigation of Mars Bluff Confederate War shipyard was proximity of clientele for shipbuilding and repair contracts and a wealthy community to raise funds and invest in the shipyard operation when warfare drained government subsidy of wartime manufacturing.

Shipyard studies primarily consider the role of European men. Less evident are the significant background roles played by women and slaves from the surrounding community in supporting the success of this southern manufacturing industry. Similar to plantations a skilled workforce comprised of slave artisans were an important ingredient for success. Women also played a role in the financing and support behind shipyards, whether through marriage and connections to the local community. Others participated in fundraising and attracting men to the shipyards with social events (Harris 2010: 34–35).

In Australia, ship graveyards or discard areas are frequently also the locale of repairing, modifying, and building ships from recycled parts. In Tasmania ship repairers used the waterway as a demolition yard for vessels beyond repair with floatation problems. Major shipbuilding locations along the Derwent River were situated close to ship dumping grounds (Richards 2008: 88–89). Other places in the world also have correlates between dismantling of ship timbers and shipyards, for example, Egypt, and waterfronts like Dublin in Ireland, Bergen in Norway, and numerous English port cities (Richards 2008: 26). The recycled parts are, in essence, potential chronological records and signatures of socioeconomic trends linked to the life of the shipyard in proximity. A 1,800 shipbreaking yard in San Francisco, California, represents the deliberate salvage of unused hulks along the waterfront subsequent to the Gold Rush (Pastron & Delgado 1991).

Shipyard Archaeology, Fig. 3 Boatbuilding in Tanzania (Courtesy of Lynn Harris)

Future Directions

Possible directions for future research include delving deeper into the historical fabric, ethnographic record, and social narrative from actively working shipyards around the world to develop new frameworks and research questions of a more global character. Neglected geographic areas of scholarship, beyond Europe and North America, suited to shipyard research might be explored to assess potential for contributions to shipyard archaeology and history, for example, sites of traditional dhow shipbuilding at East African Swahili ports (Figs. 3 and 4), along the coast of the Persian Gulf at centers like Qesh, Khamir, Kong, Busher, Ganaveh, Chabahar, and Jask (Fig. 5) (Agius 2008: 142–147; De Leeuwe 2005: 107–113), and in India at Surat, Gujarat, and Alang.

Archaeologists might consider looking beyond seventeenth- to nineteenth-century shipyards to investigate the potential of derelict twentieth century, World War I and II shipyards drawing on a wealth of literature. Historical publications present vibrant and colorful compilations of personal anecdotes and historical information from letters and legal documents. Photographs depicting shipyard facilities, workers, and working scenes add to the appeal of historical investigation and could serve as an essential supplement to material culture studies of shipyards.

Another key direction is exploring appropriate archaeological methodology to interpret shipyard sites and make meaningful contributions to the historical record and management inventory. Ford (2006) and Moser (2011) attempted to create models and typologies using landscape features combined with the historic record to create layers in geographic information systems to predict, locate, and identify shipyard sites in Maryland, USA. While this study contributed to the archaeological and historical database in the state, an acknowledged limitation was that the footprint of substantive archaeological remains was very ephemeral due to shoreline filling, erosion, and development. Artifacts were not specific to shipbuilding and it was impossible to incontrovertibly conclude the presence of a shipyard. These two studies are landmark works towards the archaeological inventory and interpretation of shipyard sites in the new millennium that might be duplicated in other areas of the world.

Beyond basic inventory and exploring reasoning in selecting shipyard location, a productive example of a shipyard study is Goodburn's (1999)

Shipyard Archaeology, Fig. 4 Maintenance on a Tanzanian dhow at low tide (Courtesy of Lynn Harris)

Shipyard Archaeology, Fig. 5 Shipyard in Iran (Courtesy of Sorna Khakzad)

investigation of postmedieval London waterfront where researchers correlated tool marks on wood recovered from shipyards to tools and practices of shipwrights through time. Other diagnostic features of prominence at shipyards are remnants of wharves and docks. There is growing body of unpublished theses and dissertation scholarship since the 1980s on these structures in other contexts, like plantations and waterfront settlements that include critical assessments of typologies, recording methodologies, and theoretical frameworks that might be fruitfully applied to shipyard research. Most recently, a new and less static direction of study by Blackman (2011) that might

be duplicated as an analytical framework is the query into the sociology of landings in the Baltic Sea Region that reaches across time and space, considering shifts in social relations and site functions.

Cross-References

- ▶ Cultural Heritage Management and Submerged Sites
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Heritage Landscapes
- ▶ Heritage: History and Context
- ▶ Ship Archaeology
- ▶ Shipyard Archaeology

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Siberia: Paleolithic

Jiri Chlachula
Laboratory for Paleoecology, T. Bata University in Zlin, Zlin, Czech Republic
Institute of Geoecology and Geoinformation, Adam Mickiewicz University, Poznan, Poland

Introduction

Siberia is a territory of 13.1 mil km^2 encompassing the northern part of Asia east of

Siberia: Paleolithic, Fig. 1 A: Geographic map of Siberia with the principal regions of Paleolithic research. *1*. Trans-Urals and West Siberia; *2*. Southwestern Siberia (the Altai region, the upper Ob River Basin); *3*. South-Central Siberia (the Sayan Mountains, the upper Yenisei Basin); *4*. East Central Siberia (the Baikal region, the Angara and upper Lena Basins); *5*. North-East Siberia (the Lena, Yana, Indigirka and Kolyma Basins), the Russian Far East

the Ural Mountains to the Pacific coast (the Far East). This vast area has major significance for documenting the evolutionary processes of initial human settlement in the frame of past climates and climate change in the boreal and (circum-) polar regions of the Northern Hemisphere. Particularly, the central continental areas in the transitional subarctic zone between the northern Siberian lowlands south of the Arctic Ocean and the southern Siberian mountain systems characterized by a strongly continental climate regime have been subjected to multidisciplinary Quaternary (paleoecological and geoarchaeological) investigations during the last decades. Siberia is also the principal territory for transcontinental studies and correlations of geological climate proxy records across Eurasia following the East-West and South-North geographic transects (Fig. 1). Among them, loess (fine aeolian dust) represents, together with the Lake Baikal limnological archives, the most significant source of globally indicative paleoclimate and paleoenvironmental data with bearing for reconstruction of the past climate history in the north-central Asia (Chlachula 2003a).

The broader Siberia with the adjacent parts of the Urals and the Russian Far East (the Primorye, Magadan and Chukotka regions) has the key relevance for elucidation of timing and conditions of environmental adaptation of the prehistoric and early historic people to the high latitudes of Eurasia, as well as the initial colonization of the Pleistocene Beringia, including the NW of the American continent. The particular geographic location and the variety in topographic configuration of regional landscape reliefs together with changing Quaternary environments governed by the past global climate change played the key role in this long and complex process over the last 2.4 Ma. The spatial and contextual distribution of the documented archaeological sites reflects a climatic instability and a timely discontinuous inhabitability of particular geographical areas of Siberia. The cyclic nature of glacial and

interglacial stages led to periodic geomorphic transformations and generation of specific ecosystems adjusted to particular topographic settings and responding to acting atmospheric variations. Diversity of the present reliefs and environments, reflecting the past climate change, played the key role in the process of the initial peopling of the immense territory. Paleoenvironmental databases (palynological, paleontological) as well as early cultural records provide unique evidence of strongly fluctuating Pleistocene glacial and interglacial climates, corroborating the continental geological as well as Marine Oxygen Isotope (MIS) chronostratigraphic archives. Because of the large spatial extent and a limited accessibility, particularly the north (eastern) regions of Siberia and the Russian Far East belong to the least explored ones in terms of elucidating the World prehistory.

Definition

The regional geographic diversity with vegetation zonality of Siberia encompassing the southern parkland steppes and semi-deserts, vast boreal taiga forests, and the northern Arctic tundra illustrates the diversity of the present as well as past environments, with the most extreme seasonal temperature deviations in the World ranging from +45 °C to −80 °C. The main physiographical units include the continental basins of the Western Siberian Lowland, the Lena and Kolyma Basin; the southern depressions (the Kuznetsk, Minusinsk, Irkutsk and Trans-Baikal Basins); the Central Siberian Plateau; the mountain ranges in the South (Altai, Sayan, Baikal, and Yablonovyy Range) and in the NE (Stavonoy, Verkhoyanskyy, Suntar-Hajata, Cherskego, Kolymskyy Range). The major Siberian rivers (Ob, Yenisei, Lena, Kolyma) drain the territory into the Arctic Ocean. The Cenozoic neotectonic activity together with the periodic Pleistocene glaciations and interglacial geomorphic processes modeled the configuration of the former relief. During the cold Pleistocene stages, the vast extra-glacial regions of West Siberia south of the NW Arctic ice-sheet were transformed into a large periglacial superzone which became a major sedimentation area of aeolian (silty) deposits cyclically derived by winds from the continental ice-front ablation surfaces. Main paleoenvironmental records, spanning over several hundred thousand years, have been preserved in deeply stratified sections within the major basins (Ob, Yenisei, Angara, and Lena River) that were exposed after progressive erosion triggered by constructions of large dams. Equally important sources of the Quaternary (geological and biotic) paleoclimate proxy data originate from open-coalmines and other modern industrial landscape disturbances.

Because of the complex, multifactorial nature of a long-term climatic and ecology evolution, Siberian geoarchaeology-oriented studies have become increasingly interdisciplinary, integrating Quaternary geology and paleogeography, paleopedology, paleontology, paleobotany, Paleolithic archaeology, and other fields (Chlachula et al. 1999; Prokopenko et al. 2001; Chlachula & Catto 2010). Reconstructions of past environments in the specific regions and the time periods have been used to assess the effects of orbital variations on seasonal and latitudinal distribution of solar radiation and atmospheric circulation patterns, and the consequential changes in regional temperatures, precipitation, and moisture balance. Some long-term models provide means of predicting future climatic evolution in the context of the global climate history and help in the assessment of the modern human factor in environmental change. Because of the pronounced climatic continentality of the territory, even minor variations in atmospheric humidity and temperature led to major transformations in local ecosystems, particularly in the open southern Siberian continental sedimentary basins and the upland depressions.

Geoarchaeology of the Siberian Paleolithic and Mesolithic, framed into the broader scope of Quaternary science, chronologically entails the Pleistocene time span with the documented cultural records dating from the Early till Final Pleistocene depending on the particular geographic area. The evidence of the occupation includes technologically diverse stone and bone

industries, butchered fossil fauna remains, paleoanthropological remains, fireplaces, and other early human behavioral elements stored in geocontexts.

Historical Background

Until the 1980s, Siberia was generally believed to have been colonized by the Late Pleistocene people. Human occupation was traditionally associated with the Late Paleolithic cultures (Tseitlin 1979). Systematic geoarchaeology investigations during the last 20 years across the entire Siberia (with the key research loci in the Tran-Ural region of West Siberia, the Altai region, the Upper Yenisei, Angara and Lena Basins, as well as at the easternmost margins of the Russian Far East in Primoriye and on the Sakhalin Island) revealed several hundred of Paleolithic and Mesolithic sites (e.g., Astakhov 1986; Derevianko 1990; Drozdov et al. 1990; Larichev et al. 1990; Medvedev et al. 1990; Mochanov 1992; Derevianko & Markin 1992; Konstantinov 1994; Marin 1996; Chlachula et al. 1999, 2003; Mochanov & Fedoseeva 2002; Zenin 2002; Vasilevsky 2008; Derevianko & Shunkov 2009). Particularly the discoveries of numerous Paleolithic locations, some of potentially great antiquity (>0.5 Ma), in large-scale surface exposures (river erosions and industrial mining) followed by systematic archaeological investigations within the major river basins of south and central Siberia between the Irtysh River in the west and the Lena River/Lake Baikal in the east (Fig. 1), have provided overwhelming evidence of a much greater antiquity of human presence in the broader Siberia and capability of early people to adjust to changing Pleistocene environments. Cultural remains are located in diverse geomorphic settings (i.e., lowland plains, mountain valleys, upland plateaus) and geological contexts (aeolian, fluvial, lacustrine, palustrine, alluvial, glacial and karstic), with the highest concentrations in the Pleistocene periglacial parkland steppe and the boreal tundra-forest foothill zone. Particularly the geographically extensive and deeply stratified loess-paleosol sections in the southern Siberian parkland zone have revealed a long and complex cultural sequence of human occupation. The variety of cultural finds provides witness to several principal stages of inhabitation of the Pleistocene Siberia, possibly encompassing the time interval close to 1 Ma. The earliest (Early/Middle Pleistocene stages) are represented by "pebble tool" industries, followed by the Middle Paleolithic complexes, including the (Neanderthal) traditions with the Levallois prepared-core stone-flaking technology, and the regionally diverse Late/Final Paleolithic blade complexes eventually replaced by the microlithic Mesolithic cultural facies that developed in response to major natural transformations during the final Pleistocene.

A further northern geographic expansion of humans into the Arctic regions reflects a progressive cultural adaptation to extreme climatic conditions of (sub)polar Pleistocene environments (Mochanov & Fedoseeva 2002). Presence of the Paleolithic sites in North Siberia (Pitulko et al. 2004) provides eloquent evidence that people reached the Arctic coast already before the Last Glacial (>24,000 years ago/24 ka BP). All these discoveries logically lead to revision of the traditional perceptions on a late peopling of northern Asia as well as the "late chronology" models of the initial human migrations across the exposed land-bridge of Beringia to the North American continent (Chlachula 2003b). Geoarchaeology studies, particularly in the poorly explored and marginal geographic regions of northern and eastern Siberia (Slobodin 1999; Vasilevsky 2008), are of utmost importance for reconstruction of past climate change as well as the early human history in north Eurasia.

Key Issues/Current Debates

Siberia has principal bearing for elucidating the prehistory of peopling of northern Eurasia, with the key issues of the traditional debate – the antiquity, the chronology of migration processes, and the environmental contexts of the Pleistocene

dispersal of early humans within this vast territory. A specific study issue is the cultural adaptation in the extreme environments of the Russian (sub-)Arctic regions. Interactions of past climate change and the regional relief modeling triggered by the neotectonic activity and reflected by natural transformations of local ecosystems attest to the complexity of the Quaternary landscape development, ultimately affecting timing, intensity, and adaptations of the early human occupation of north-central Asia. Contextual geology, paleoecology, and paleontology records from investigated archaeological sites and stratified geological sections provide evidence of pronounced (paleo) environmental and biotic shifts triggered by the global climate evolution as well as the associated glacial and interglacial geomorphic processes. Quaternary climatic cycles regulated spatial and temporal movements of prehistoric people into the high latitudes of Eurasia. Integrated ecology multi-proxy databases thus document trajectories of the complex and long occupation history of this extensive, but still rather marginally known part of the World.

Southwest Siberia

Natural Context, Paleogeography, and Climate History

The territory of West and SW Siberia, encompassing the West Siberian Lowland, the Altai region, and the Kuznetsk Basin, is characterized by a mosaic physiography with high mountain massifs in the south and east (max. 4,506 m asl), and open lowlands in the north and west (Fig. 1). Hydrologically, the area belongs to the Ob River drainage system with the Katun', Biya, Irtysh, and Tom' River being the main tributaries. The lower relief zone (>1,200 m asl.) includes >50 % of the area and constitutes relics of old denudation surfaces covered by more recent (Pleistocene) deposits derived during glaciations. The territory shows a complex Quaternary history for the last 2.5 Ma governed by climate changes leading to the present pronounced continentality of the inner Eurasia in association with a regional Cenozoic orogenic activity initiated by the Miocene uplift of the Trans-Baikal region and reaching the Sayan-Altai area during the late Pliocene (3 Ma ago). Dynamics of these processes continued until the early Middle Pleistocene leading to construction of a system of mountain ranges separated by deep depressions filled by lakes. The beginning of the Pleistocene period brought a major modification of former landscapes as a result of dramatic climatic changes with progressive continental cooling and aridity. Periodic glaciations caused a regional topographic restructuring with intensive erosion in the glaciated zone and accumulation of (pro)glacial, alluvial, proluvial, lacustrine, and aeolian deposits in the intramontane depressions. The geological records display a wide range of environments and climates. Particularly the deeply stratified loess-paleosol sections deliver most detailed information on high-resolution and globally indicative Late Quaternary atmospheric variations in Siberia.

The climate evolution in the southern mountain regions is witnessed by interglacial alluvial deposits separated by glacial moraine (till) formations with the most extensive dating to the final Middle Pleistocene (MIS 6) glacial stage. The alpine glaciers periodically formed coalescent ice fields supporting large glacial lakes in the central and southern mountain basins of Gorno Altai followed by cataclysmic drainages shaping the paleolandscape topography in the form of prominent glacio-fluvial terraces (Fig. 2). The two Late Pleistocene glacial stages (MIS 4 and 2) are separated by the mid-Last Glacial (MIS 3) warming (59–24 ka BP) associated with accumulation of gravelly alluvial sediment facies from the former ice ablation. The broken mountain relief differentiated the regional climatic pattern during the Last Glacial (24–12 ka BP), with microclimate conditions in protected locations along the northern Altai foothills and in the central Katun' River basin, allowing potential survival of interstadial flora and biota until the Holocene. The Pleistocene climate variations in the lowland extra-glacial areas of SW Siberia and the continental depressions north of the Altai-West Sayan Mountains are evidenced by a massive deposition of aeolian (silty and sandy)

Siberia: Paleolithic, Fig. 2 A system of terraces at the confluence of the Katun' and Chuya River (Gorno Altai) resulting from cataclysmic drainages of ice-dammed glacial lakes. The mountain areas of Siberia provide witness of major past geomorphic processes having impact on visibility and preservation of the Pleistocene occupation sites

deposits during glacial periods and surface stabilization with soil formation during warm (interglacial/interstadial) stages. The extensive loess-paleosol formations on the Altai Plains provide the most detailed multi-proxy records of the climatic cycles for the last c. 300,000 years. The MAT during the Last Interglacial climatic optimum (MIS 5e, 125 ka BP) in SW Siberia was by 1–3 °C higher than at present, with a c. 100 mm increase in annual precipitation. Environmental conditions were broadly similar to the present ones during the following interstadials that were the most suitable time intervals for human colonization and inhabitation.

Pleistocene Environments and Early Human Occupation

Studies of the Paleolithic and Mesolithic occupation have a long tradition in Siberia with the key foci in the Altai region. The transient geographic areas along the margin of SW Siberia are believed to be the main gateway and passages for early human migrations from the southern regions of Central Asia into Siberia (Fig. 1). Reconstruction of the past climate dynamics that shaped the configuration of the regional topography and local ecosystems is essential for understanding timing and adaptations of the initial peopling of northern Asia. The spatial distribution of the Pleistocene sites on the territory of SW Siberia shows a location of most sites within the 75–150 km wide zone of the 300–1,000-m altitude between the southern mountain ranges and the northern plains and lowlands (Baryshnikov & Maloletko in Chlachula et al. 1999). This (paleo)geographic occupation pattern, reflecting specific environmental adaptation strategies to local settings, applies for both open-air localities buried in alluvial, colluvial, or aeolian deposits, as well as cave sites concentrated in the NW Altai (the Anui valley). Formation of the karstic systems is linked to a progressive down-cutting by fluvial erosion through the Devonian-Carboniferous limestone bedrock during the late Middle Pleistocene.

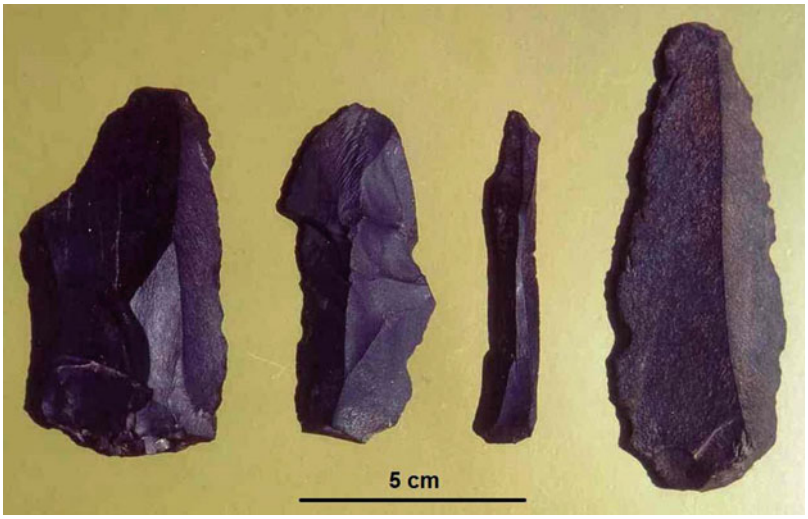
Timing of the Pleistocene human migrations in Siberia was principally governed by climatic change and the associated environmental development. Intensified orogenic uplifts, triggering large-scale erosions in river valleys, reshaped natural occupation habitats. Relatively stable conditions seem to have persisted in the central and northern Altai due to increased regional precipitation and a tempering atmospheric effect of the mountain ranges. Limestone caves provided shelters for a more permanent human inhabitation of the Altai area, particularly in the northern foothills and the central intramontane depressions (Derevianko & Markin 1992; Markin 1996), characterized by warm microclimate conditions. The initial peopling of

the Altai-West Sayan region likely occurred in some of the early Middle Pleistocene interglacials in the process of the northern expansion of warm biotic communities. Mixed coniferous and broadleaf forests established in the mountain areas with elevations 1,500–2,000 m asl. Parklands covered most of the adjacent plains of southwest Siberia with continental depressions filled by lakes and drained by meandering rivers. Rudimentary core and flake ("pebble tool") stone industries scattered on high river terraces and along former lakeshore margins of the present arid basins (Kuznetsk and Zaisan Basin) attest to several stages of early human inhabitation and a relative environmental stability (Chlachula 2010). There is limited evidence on persistence of the Early Paleolithic occupation during glacial stages, although some intermittent semi-continuity in the southernmost areas is assumed in view to finds of weathered lithic artifacts from the old periglacial alluvia in association with cold-adapted megafauna. Mastering the technique of fire making was clearly the main precondition for early human survival in cold tundra-steppe and tundra-forest habitats of southern Siberia.

The Last Interglacial warming (starting at 130 ka BP) is associated with a recolonization of southern Siberia by coniferous taiga forests and the appearance of the Mousterian Neanderthal tradition. Changes in the relief configuration influenced a regional climate regime and opened new niches of habitats for the Middle Paleolithic population concentrated in the karstic area of the NW Altai foothills (Ust'-Kanskaya, Strashnaya, Denisova, Okladnikova, Kaminnaya Caves) as well as at open-air sites in the central valleys (Kara-Bom, Ust'-Karakol, Tyumechin I and II) (Derevianko & Markin 1992; Chlachula et al. 1999). The Middle Paleolithic horizons, encompassing a timespan of up to 140,000 years (180–40 ka BP), represents a marked cultural phenomenon in the Altai (Figs. 3 and 4). Isolated teeth (2) from the Denisova Cave dated to MIS 5 and identified as *Homo neaderthalensis* support the model of biological evolution of premodern humans in Siberia (Derevianko & Shunkov 2009). Major cooling during the early Last Glacial (MIS 4) led to establishment of full glacial conditions in the central and southern Altai, and a zonal geographic replacement of boreal forest by periglacial tundra forest in the northern Altai and by arid tundra-steppe in the adjacent lowlands (the Ob River basin and the Kuznetsk Basin). Accentuated moderate climate fluctuations between cold stadials are evidenced by embryonic regosolic soils in the loess formations on the North Altai Plains and sparse cultural records in protected locations in the Altai foothills.

Siberia: Paleolithic, Fig. 3 Stratigraphy of the multilayer Denisova Cave Site (the Anui River valley, NW Altai) enclosing a series of c. 15 occupation horizons dating since the late Middle Pleistocene until Holocene

Human occupation of the central and southern Altai during the early Last Glacial (74–60 ka BP) was impeded by harsh, ice-marginal environments and expansion of glaciers in the upper reaches of the Katun'-Chuya valleys subsequently filled by proglacial lakes. Progressive



Siberia: Paleolithic, Fig. 4 Denisova Cave, the Anui River valley. A transitional Middle-Late Paleolithic industry including the Levallois as well as the blade stoneflaking techniques

Siberia: Paleolithic, Fig. 5 Krasnaya Gorka Site (Gorno Altai). A view from the Paleolithic locality positioned on a promontory of an alluvial fan (1,780 m asl) over the Chuya River valley with stone artifacts made on highquality raw materials (jasper, chert) exposed by erosion on the present top surface

warming during the early mid-Last Glacial interstadial interval (MIS 3, 59–35 ka BP) caused a dramatic wasting of the ice fields accompanied by cataclysmic releases of ice-dammed lakes and large-scale mass-flow and slope erosional processes (Fig. 2). The former valley glaciers receded to the highest elevations as corrie glaciers. The periodic outbursts of the glacial basins had a dramatic impact on the local ecosystems, but also obliterating most of the earlier cultural records. Enormous erosional processes associated with these major events significantly reduced the site visibility potential in the formerly flooded areas, with traces of former inhabitation locations preserved only at high topographic elevations above the glacial lake basin waterlines (Fig. 5). Mixed forests dominated by birch, pine, spruce, and fir invaded the former periglacial and ice-marginal landscape. The presence of broadleaf arboreal taxa (oak, lime, chestnut, maple) indicates a climate warmer than at the present time.

Siberia: Paleolithic, Fig. 6 Stratigraphy of the Ust' Karakol Site (the Anui Halley, NW Altai) with several Late Paleolithic occupation horizons ^{14}C-dated to 28,700–31,400 year BP. Complex post-depositional processes are evidenced by slope-wash and cryogenic periglacial disturbances of the geological context due to climatic fluctuations in the Altai Mountains during the mid- and late Last Glacial stage

Increased humidity and cooling during the later stage of the mid-Last Glacial interstadial interval (35–24 ka BP) initiated mass gravity slope processes and cryogenic deformations followed by warmer oscillations with formation of podzolic gleysols (Fig. 6). Appearance of the transitional early Late Paleolithic cultural facies reflects human adaptation to mosaic interstadial habitats, including sub-alpine taiga, dark coniferous forests, mixed parklands, and steppes with mixed non-analogue biotic communities. The identical geographical distribution of the Middle-Late Paleolithic sites and the time-transgressive lithic technologies suggests a regional cultural (and biological?) continuity in the Altai area during the Late Pleistocene (Derevianko 2010). A phalanx fragment from Denisova Cave dated to 40,000 years ago and interpreted on basis of DNA as an extinct human species (Dalton 2010) reinforces this scenario. Reestablishment of cold tundra-steppe habitats correlates with dispersal of the developed Late Paleolithic with blade-flaking techniques in stone tool production and associated with a periglacial "mammoth" megafauna that possibly survived in protected and climatically milder locations in the northern Altai throughout the LGM (20–18 ka BP). Emergence of the microlithic stone tool assemblages with wedge-shape cores is linked with a new cultural adjustment during the final stage of the Paleolithic development responding to natural transformations of the former periglacial ecosystems toward the end of Pleistocene.

South-Central Siberia

Natural Context, Paleogeography and Climate History

The south-central Siberia, bordered by the western Mongolia from the South and the Central Siberian Plateau in the North, is topographically and biotically a varied territory structured by high ranges of the Sayan Mountains passing into foothills transected by river valleys draining water discharge from the southern mountain massive (Fig. 1). The regional (paleo)relief is built by the south Siberian continental basin with intermountain depressions modeled by fluvial erosion of the Yenisei River and its tributaries. An extensive loess cover with a series of buried paleosols in the parkland-steppe zone of the Northern Minusinsk Basin, being a continuation of the southern Siberian loess belt, has provided the most complete, high-resolution Late Quaternary paleoclimate record in the north-central Eurasia (Chlachula 2003a). The interglacial periods are evidenced by stages of landscape stabilization and soil formation disrupted by intervals of loess

deposition and cryogenic surface deformation during cold (glacial/stadial) stages. Coupled with the pollen evidence, the continuous loess-paleosol sequences encompassing a time interval of the last c. 300,000 years (MIS 8-1) document periglacial steppe-tundra established during cold stadials, replaced by mixed boreal forests and a mosaic parkland steppe during warm interstadials and interglacials. The associated Pleistocene natural transformations are reflected in the large diversity of fossil faunal species, including non-analogue communities, to modern biota. The variety of the Quaternary faunal communities recorded in the Minusinsk and Kuzbas Basins documents particular evolutionary stages with zonal vegetation shifts triggered by pat climate change. The presence of cold-adapted species in the fossiliferous sedimentary beds indicates a very high biological potential of the Pleistocene periglacial steppe. A major drop of annual temperatures marks the time around the Last Glacial Maximum (20,000–18,000 years BP) that was less dramatic than during the preceding early Last Glacial stage (74,000–59,000 year BP). A progressive warming with several climatic oscillations expressed by an initial pedogenesis characterizes the Final Pleistocene climate development, leading to establishment of the Holocene (MIS 1) interglacial conditions. The present continental climate (with MAT −0.4 °C), with cold and dry winters with little snow cover and warm to hot summers, is strengthened by the geographical location of the territory near the geographical center of Asia.

Pleistocene Environments and Early Human Occupation

The upper Yenisei basin in the southern part of the Krasnoyarsk Region is together with the Altai region and the Angara basin in the Irkutsk Region the key area of the Quaternary climate and Pleistocene geoarchaeology studies. Systematic investigations in the Northern and Southern Minusinsk Depressions, initiated after progressive erosion of unconsolidated aeolian (loess) deposits, revealed a rich series of Early, Middle, and Late Paleolithic stone industries associated with abundant fossil faunas (Drozdov et al. 1990; Chlachula et al. 1999). The main focus of the current studies is on reconstruction of the Pleistocene ecology and chronology of the human occupation in the frame of peopling of Siberia. The loess-paleosol formations, being the principal geological context of the early human cultural remains, also have a fundamental bearing for the high-resolution mapping of the past climate and the environmental history of north-central Asia. The archaeological and paleontological records incorporated in fluvial and subaerial sedimentary formations have provided new insights on timing, processes, and conditions of the initial peopling of this territory, as well as on the ecosystem biodiversity of the Pleistocene occupation habitats.

The earliest archaeological (Early Paleolithic) finds represented by simply flaked, but diagnostic stone artifacts originate, together with the taxonomically rich paleontological remains, from alluvial gravels of the 60–70-m Yenisei River terrace beneath 20–40-m thick loess deposits. The abundant "pebble tool" assemblages bear witness to human occupation of the area prior to the Last Interglacial (>130 ka BP). The formal variability of these lithic industries, displaying a differential degree of patination and aeolian abrasion, points to several stages of peopling with the earliest documented from the Tobol Interglacial (the Berezhekovo Site). The cultural implements also suggest, in conjunction with the cold-adapted megafauna, an early human adjustment to local periglacial environments. The archaeological records from the Minusinsk Basin, together with analogous finds from the Kuzbas and the Angara Basins (Medvedev et al. 1990), indicate a repeated occupation of the broader southern Siberia during the Middle Pleistocene (740–130 ka BP).

Evidence on the more recent Middle Paleolithic inhabitation of south-central Siberia is principally from the foothill areas of the Altai and Sayan Mountains and the local tributary river valleys (Konstantinov 1994; Derevianko 2010). Favorable climatic conditions promoted expansion of the Mousterian (Levallois) tradition during the Last Interglacial (MIS 5) that persisted until the early Last Glacial stage (MIS 4).

Siberia: Paleolithic, Fig. 7 Late Quaternary loess sections at Kurtak exposed along the Krasnoyarsk Lake (the Northern Minusinsk Basin, south-central Siberia) with the Last Interglacial pedocomplex encompassing a time interval of 130–74 ka BP (Section Kurtak 29). The buried parkland-steppe paleosols (MIS 5e, 5c, 5a) correlate with stages of the Middle Paleolithic occupation of the area

Siberia: Paleolithic, Fig. 8 The Middle Paleolithic occupation site Ust'-Izhul' (the Kurtak Archaeological Region) dated to 125,000 year BP. Remains of megafauna (mainly of early *Mammuthus primigenius*) with stone artifacts and fireplaces attest to early human hunting and adaptation strategies in the upper Yenisei River Basin

In the Minusinsk Basins, the Middle Paleolithic is principally found in the Last Interglacial (130–74 ka BP) paleosols (Fig. 7). An exceptional Middle Paleolithic occupation site Ust'-Izhul' produced concentrated fossil skeletal remains incorporated in situ on top of the Last Interglacial (MIS 5e) chernozem IRSL dated to 125 ± 5 ka and overlying the 65 m Middle Pleistocene Yenisei terrace (Chlachula et al. 2003). The well-preserved fauna included an early form of mammoth (*Mammuthus primigenius* Blum.), wooly rhinoceros *(Coelodonta antiquitatis)*, bison *(Bison priscus)*, horse *(Equus mosbachensis)*, elk *(Cervus elaphus)*, as well as small mammals (Fig. 8). The most abundant species – mammoth – was represented by at least 12 individuals, parts of which were recorded in anatomical position. The associated and mostly expedient stone artifacts (200 pcs) were used for processing the slaughtered animals. Human activity is also manifested by flaked/cut ivory and bones of mammoth, rhinoceros, bison, and elk, and

by three fireplaces with a fir-wood charcoal ($^{14}C > 40$ ka BP). The paleogeographic site configuration with the discrete concentration of the skeletal remains point to game hunting by people in the nearby area over a terrace cliff and transported in dissected pieces to the habitation place. In respect to the high age and the contextual completeness, the Ust'-Izhul' locality is unique in Siberia. The megafaunal assemblages bear witness to the rich biological potential of the Yenisei area for early human inhabitation. There is no consensus if the Middle Paleolithic tradition in southern Siberia can be associated with the European and Near Eastern cultural milieu, although some "classical" Mousterian influences in the Altai cave sites are evident (Derevianko & Markin 1992). Analogous cultural finds are exposed on the present surface in low-sedimentation-rate areas of Khakhasia, Tuva, Gorno Altai, and East Kazakhstan (Astakhov 1986; Chlachula 2010). The Middle Paleolithic stone-flaking technology, especially the Levallois technique, is still reminiscent in the Late Paleolithic traditions, suggesting a certain continuity of the cultural and possibly biological human evolution in Siberia during the Pleistocene.

The Late Paleolithic occupation in the southern Central Siberia is documented at both open-air and cave sites. Warming during the mid-Last Glacial interstadial stage (MIS 3) accelerated the cultural development characterized by blade-flaking techniques. The upper Yenisei basin is one of the major loci of the Late Paleolithic sites in Siberia (the Krasnoyarsk – Kanskaya forest-steppe, the Northern and Southern Minusinsk Basin, and the Western Sayan foothills) (Astakhov 1986; Drozdov et al. 1990; Larichev et al. 1990; Vasiliev 1992). The earliest occupations are buried in the Karginsk (MIS 3) pedocomplex (31–29 ka BP), in the early Sartan loess and the intercalated, weakly developed interstadial forest-tundra soils (dated to 25–22 ka BP). Intervals of significant climatic deterioration and onset of full Last Glacial (MIS 2) conditions are manifested by the absence of archaeological records except for biotic refugia in the northern foothills of the Western Sayans. During the LGM (20,000–18,000 year BP), the Yenisei area, as most of southern Siberia was vacated due to very cold and hyper-arid conditions with the biologically productive mid-Last Glacial parkland steppe replaced by barren steppe-tundra. More recent Final Paleolithic finds from the lowland and foothill areas provide evidence of recolonization of the upper Yenisei region during warm climatic oscillations at the end of the Pleistocene. A reindeer, red deer, argali sheep hunting, composite bone tools (spears/harpoons), and a micro-blade stone flaking illustrate major shifts in adaptation strategies in response to changing environments during the warm interstadial (16–13 ka BP), preceding the last cold climatic interval of the Final Pleistocene (Younger Dryas, 12.9 ka BP). The present archaeological records from the larger southern Central Siberia provide definite evidence that this territory was occupied repeatedly by people at several stages during the Pleistocene, including some intervals of glacial stages with productive periglacial natural conditions. Human occupation may have persisted throughout the Last Glacial in protected southern locations despite severe climates over most of the northern plains.

East Siberia

Natural Context, Paleogeography, and Climate History

East Siberia, including the Pribaikal area (the upper Angara Basin), the Trans-Baikal area (the Selenga Basin), and the Lena Basin, is a vast territory of contact of the tectonic structures of the Siberian Platform and the adjoining mountain massifs (Fig. 1). The major orogenic activity initiated during the Pliocene/Pleistocene (the Baikal Tectonic Phase spanning for the last 3.5 Ma) led to formation of the present regional topographic configuration built by a series of tectonic depressions. The Baikal rift zone extends for about 2,500 km from Lake Khubsugul in Mongolia to the upper Aldan River in SE Yakutia. Most of the relief is shaped by smooth mountain ranges (800–1,300 m asl.) separated by river valleys and shallow basins occupied by mixed (spruce, larch, and birch) taiga forests. Cold and extreme continental climatic conditions prevail in East Siberia (MAT −4 °C). Most of the

territory is covered by mountain tundra with larch *(Larix sibirica)*, Siberian pine *(Pinus sibirica)*, and dwarf birch *(Betula nana)* and underlain by seasonally active perennial permafrost.

The paleogeographical and paleoenvironmental evolution over East Siberia during the Quaternary was influenced by a dynamic interaction of global climatic change and the regional neotectonic modeling. The orogenic movement around the Pliocene/Pleistocene boundary (2.5 Ma ago) triggered uplifting of the Pribaikal and West Trans-Baikal regions, reactivated during the early Middle Pleistocene (after 750 ka BP) with accumulation of thick deltaic, fluvio-lacustrine, and slope deposits filling major river valleys and intermountain depressions. The Cenozoic tectonics in conjunction with the mountain glaciations continuously shaped the topography of Eastern Siberia structured by a system of mountain ranges (North Baikalskyy, Verkhoyanskyy, Cherskego, Kolymskyy) separated by the major (Angara, Lena, Viluy, Aldan, Indigirka, Jana, Kolyma) river basins and their tributaries. The sub-rifting regimes of the Mongolian-Siberian mountain zone gave rise to a diversity of geomorphic settings throughout the Pleistocene. The Quaternary glaciations over the East Siberian mountain ranges with the major one of the late Middle Pleistocene (MIS 8) played a significant role in the regional landscape development and environmental shifts in the extra-glacial depressions. Contrary to the Pribaikal Highlands, experiencing the most extensive glaciation during the Last Glacial Maximum (20–18 ka BP) with piedmont glaciers advancing far down into the foothills (Rezanov & Kalmikov 1999), only isolated ice-caps and corrie glaciers formed in the Eastern Sayan Mountains (above 2,700 m) and on the NE Siberian mountain ranges (Verkhoyanskyy, Cherskogo, Kolymskyy) despite very low temperature, but due to a high aridity and lack of winter precipitations.

The Pleistocene climatic variations in the extra-glacial areas are witnessed by a wide range of paleosols indicating mosaic vegetation and a high relief zonation. Increased accumulation rates of aeolian sediments with periglacial deformations point to a gradual cooling during the Late Quaternary. A major drop of temperature following the Last Interglacial climatic optimum (MIS 5e; 125 ka BP) around 115 ka BP (MIS 5d) suggests a major glaciation in the eastern Siberia corroborated by records from Lake Baikal as well loess-paleosol sequences (Prokopenko et al. 2001; Chlachula 2003a). The mid-Last Glacial (MIS 3) optimum (31 ka BP) was thermally approaching the Last Interglacial (MIS 5e) climate conditions. Fossil pollen, fauna, and early cultural records from stratified geological contexts provide evidence of pronounced regional paleoecology changes in occupation habitats. A great variety of the early Quaternary faunal communities became reduced as a result of the long-term climatic cooling, leading to the relative taxonomic species uniformity in the Late Pleistocene.

Pleistocene Environments and Early Human Occupation

Present cultural evidence attests to several stages of human inhabitation of Eastern Siberia during the Pleistocene, with the oldest represented by the Early and Middle Pleistocene records, implying very early hominid migrations into the middle and high latitudes of Asia. Systematic investigations at the occupation sites in the upper Angara, Lena, Vitim, Aldan, Viluy, and Selenga River basins, along the Baikal Range and the Eastern Sayan foothills, contextually associated with diverse paleo-geomorphic zones and geological (alluvial, colluvial, aeolian, karstic) settings, deliver detailed multi-proxy information on the Pleistocene climate evolution and the associated paleoenvironmental trends (Medvedev et al. 1990; Mochanov 1992; Konstantinov 1994; Lbova 1996; Mochanov & Fedoseeva 2002; Ineshin & Teten'kin 2010). Archaeological sites may be partly obliterated or poorly preserved around the Lake Baikal due to the neotectonic activity, triggering intensive erosional processes. The cultural finds, chronologically defined by the stratigraphic geological positions and technological attributes of stone flaking, include: (1) the Early Paleolithic from the Early(?)/Middle Pleistocene alluvial deposits (>130 ka BP); (2) the

Middle Paleolithic buried in the Last Interglacial (MIS 5) pedocomplex and the early Last Glacial (MIS 4) gleysol horizons; (3) the early Late Paleolithic (42–30 ka BP) from the mid-Last Glacial (MIS 3) humic soils; (4) the "classical" Late Paleolithic from the late mid- and early Last Glacial (MIS 2) gleyed soil horizons (30–17 ka BP); (5) the final Paleolithic (17–12 ka); and (6) Mesolithic (12–8 ka BP) from diverse geocontexts.

The earliest Pleistocene sites are associated with old alluvial formations in the Lena and Angara River basins. The Diring Uriah Site sealed in coarse sandy deposits of the 200-m-high terrace of the Lena River is presently one of the earliest sites found in Siberia (Fig. 9). Despite its indefinite chronological assignment ranging from 2.5 Ma to 350 ka (Mochanov 1992), this site eloquently demonstrates a very early peopling of northern parts of Asia in the principal river valleys during some of the Early but surely the Middle Pleistocene interglacials that also promoted northern expansion of mixed taiga and open parklands. The Middle Pleistocene cultural records from the upper Lena and Angara areas, represented by stone artifacts made of quartz and quartzite cobbles with the typical archaic tool forms (choppers, bifaces, scrapers on flakes, polyhedral cores), display strongly wind-abraded surfaces. The age of these cultural assemblages from the Angara region exposed along the Bratsk Lake (the Igetei locality), referred to as of the Acheulian-Mousterian tradition, is estimated to be c. 200 ka BP, corresponding to the Shirta Interglacial /MIS 7 (244–170 ka BP) (Medvedev et al. 1990). A Middle Paleolithic occupation at the Mungkharyma Site (64*N) located on the 70 m terrace of the middle Viluy River produced a well-made stone industry of the Levallois tradition, including bifaces, bifacial knives, and side-scrapers, found with Pleistocene fauna (mammoth, wooly rhinoceros) (Fig. 10). A luminescence date 150 ± 38 ka BP (RTL-958) from the overlying sandy-silt layer suggests a (late) Middle

Siberia: Paleolithic, Fig. 9 Anthropogenically worked quartz flakes from the Diring site from the 200 m Lena River terrace representing the earliest (Early Paleolithic) cultural inventories found in NE Siberia

Siberia: Paleolithic, Fig. 10 Excavations of the Middle Paleolithic Mungkharyma Site (64*N) on the 70 m Viluy River terrace, east-central Yakutia (Y.A. Mochanov 2009)

Siberia: Paleolithic, Fig. 11 The Middle Paleolithic quartzite tools from central Yakutia (the Kyzyl Syr Culture) (Courtesy S.A. Fedoseeva)

Pleistocene age (Mochanov & Fedoseeva 2001). Climatic cooling, leading to expansion of mosaic steppe and pine-larch parklands, is linked with the onset of the Samarovo (270–244 ka BP) glacial period. A drop of annual temperature and increase in aridity during the Tazov Glacial (170–130 ka BP) hastened the degradation of interglacial forests and extension of open periglacial landscapes. The marked final Middle Pleistocene environmental deterioration is indicated by a cold-adapted tundra-steppe fauna from alluvial deposits including progressive taxa (mammoth, wooly rhinoceros, bison, horse, kulan, giant deer, argali), as well as species specific to the Trans-Baikal area (the Kiakhta antelope, the Baikal yak, dzeren, camel). Human survival in SE Siberia during the Samarovo (MIS 8) and the Tazov (MIS 6) glacial stages with MAT by up to −10 °C lower than at the present time presumes knowledge of fire making. The Middle Pleistocene sites from the central and southern Lena basin and its tributaries (Viluy, Aldan) (Fig. 11) have the principal implications to the initial prehistoric colonization of NE Asia as well as North America.

During the Last Interglacial (MIS 5), mixed taiga forests were widely distributed in the mountain areas, indicating a temperate continental climate with summer air temperatures up to 5 °C higher than at present. Fossil chernozems at the Middle Paleolithic sites Mal'ta and Igetei (MIS 5e and 5c, resp.) illustrate open parkland-steppe settings of the upper Angara basin. Marked cooling, increased aridity, and intensified aeolian activity contributed to accumulations of extensive sandy deposits derived from drying up of river beds in the Irkutsk Depression and the Lena Basin during the early Last Glacial (MIS 4). Cold intervals with increased humidity correlate with cryoturbation processes, solifluction horizons, and pollen records of invading periglacial grasslands and open pine-birch tundra. Despite very harsh conditions, a Middle Paleolithic (Mousterian?) occupation may have locally survived in the Angara area. The mid-Last Glacial interval (MIS 3), with an early cold and arid loess sedimentation phase (59–40 ka BP) followed by a warm and humid pedogenic phase (40–24 ka BP), brought a major change in the distribution of vegetation zones in East Siberia, with a northern expansion of mixed taiga forests and pine-birch dominated parklands. Broad-leaved arboreal taxa (oak, beech, elm, hazel) distributed in river valleys of the Baikal region attest to mosaic habitats with climate conditions possibly warmer than today. Cultural finds from the principal occupation sites (Ust'-Kova in the Angara basin, Mezin in the Kana valley, Kamenka in the Selenga basin, and the Aldan River complex) dated to 30–24 ka BP display a poor preservation due to cryogenesis and solifluction processes persisting until the onset of late Last Glacial (Sartan) stage (MIS 2). Remains of fauna exploited by people (horse, antelope, wooly rhinoceros, mammoth, bison, sheep-argali, and camel) and rodent taxa are indicative of an open steppe and parkland habitat. At the Kamenka Site, specific site complexes of game-processing, wood-working, stone and bone tool production, mineral paint manufacturing, and other behavioral cultural (ritual) activities were documented (Lbova 1996). The fossil fauna variety from different (mountain) ecotones shows a wide (>100 km) mobility range of the local Paleolithic hunters. A northern expansion of the Late Paleolithic occupation ambit into the extreme parts of the East Siberian Arctic is recorded at the Yana RHS site located 100-km south of the Laptev Sea coast (70° 43′ N, 123° 25′ E) (Pitulko et al. 2004).

Siberia: Paleolithic, Fig. 12 A view from the Final Pleistocene Kheta Site onto the Kheta valley, the Kolyma Basin, NE Siberia. River valleys served as the main migration corridors during the Pleistocene colonization of the northern territories of Siberia all photos by the author

The cultural evidence (stone and bone industry) and fossil fauna sealed in frozen and cryogenically distorted silt blocs on an 18 m Yana River terrace dated to 28–26 ka BP indicate late interstadial (MIS 3) climates and an environmental stability of floodplain meadows of the Yana River delta. This site provides evidence of humans migrating along the ice-free northern coast of Siberia/the exposed continental Arctic shelf.

During the late Last Glacial stage (MIS 2) – the Sartan Glaciation (24–12 ka BP) – tundra-steppe covered most of the territory occupied by the Late/Final Paleolithic people represented by the famous sites Mal'ta and Buret' in the upper Angara basin (Tseitlin 1979). Climate deterioration with sparse Arctic vegetation and a progressive loess accumulation around the LGM caused presumably a major decline in the population density over East Siberia despite some adaptation indices to extreme periglacial environments (the Krasnyy Yar Site in the upper Angara with animal bones and fossil coal used as fuel) (Medvedev et al. 1990). A periglacial fauna (horse, wooly rhinoceros, mammoth, bison, giant deer, elk, saiga) implies cold periglacial tundra-steppe in the Angara, Lena, and the Trans-Baikal basins. Climate amelioration after the LGM (18 ka BP) is best evidenced by rodents from the Baikal-Angara-Lena Paleolithic sites (Buret', Krasnyy Yar, Igetei, Mal'ta, Bolshoi Jakor) that indicate a gradual transition from tundra-steppe and meadow-steppe to forest-steppe landscapes corresponding to shifts from a cool and dry climate to milder and humid conditions. This warming trend fostered dispersal of the Final Paleolithic complexes during the late Last Glacial (18–12 ka BP) associated with the Diyuktai Culture with micro-blade stone and bone technologies. The Final Pleistocene recolonization of East Siberia reached the marginal subpolar regions of the NE Arctic (e.g., the Berelekh Site in northern Yakutia at 70° N, dated to 14–13 ka BP). The broad geographical distribution of the new technologies to the most distant parts of Siberia and the Russian Far East Islands (Slobodin 1999; Vasilevskyy 2008; Ineshin & Teten'kin 2010) reflects a successful prehistoric adaptation to the Final Pleistocene environments (Fig. 12). This process culminated in a spatial spreading and presumably a major population increase by the end of the Pleistocene, represented by the early Mesolithic (11–10 ka BP) hunters and gatherers. In sum, the geological and biotic climate proxy records document a complex Quaternary evolutionary environmental development in East Siberia as seen in the gradual cultural adaptation of people and the geographic expansion of occupied areas.

International Perspectives

The geological and paleoecological evidences across western, south-central, and eastern Siberia, including the Ob, Irtysh, Kuznetsk, Yenisei, Angara and upper Lena basins and the adjacent regions of the Trans-Urals, Altai, Western and Eastern Sayans Mountains, Baikal Range and the NE Siberian mountains, disclose cyclic climatic changes during the Quaternary leading to establishment of the present environments. A global trend toward a strongly continental climate, with increased aridity and high seasonal temperature fluctuations, is traced since the late Pliocene. The progressing development during the Quaternary Period (the last 2.5 Ma) is evidenced by the zonal geographic shifts in the vegetation distribution, with the expansion of boreal (taiga) forests northward during the interglacial periods and warm interstadials stages, succeeded by the subarctic periglacial forest-steppe and tundra-steppe during the glacial periods with the tree cover confined to refugia in the southernmost areas of Siberia (the Altai and Sayan Mnt. foothills). Complex paleoenvironmental evolution archives are stored in the high-resolution loess-paleosol sequences, pollen records, and fossil fauna remains from deeply stratified alluvial and loessic formations. The loess-paleosol sections on the Altai Plains and the upper reaches of the Yenisei basin have provided most complete information on the past climatic variations, the landscape development, and the associated changes in the Pleistocene biotic communities on the territory of Siberia. The high-resolution stratigraphic records coupled with pollen and paleontology data indicate marked Pleistocene ecosystem transformations, with arctic tundra and forest-tundra during cold stadial intervals replaced by boreal forest and parkland – steppe during the warm interstadial intervals.

The Early and Middle Pleistocene climates brought major transformations of natural habitats, facilitating the northward dispersal of the Paleolithic people from the southern areas of Central Asia and Mongolia, and their environmental adaptation to the Siberian regional settings. The earliest unequivocally documented Middle Pleistocene (Early Paleolithic) occupation followed the main continental basins and the major river valleys. The human dispersal further east and north is assumed to have principally occurred during warm interglacials in the processes of the northern expansion of mixed parkland forests and the associated fauna communities, whereas only local movements of early human groups are envisaged during cold stages. The Tobol (MIS 9) Interglacial (390–270 ka BP), when the MAT was by c. 3–4 °C higher than at present, is likely to have been (one of) the most favorable time periods for initial migration to northern Asia reaching as far north as 60 °N latitude. The Early and Middle Paleolithic finds bear witness of repeated inhabitation of the Irtysh, Ob, upper Yenisei, Angara, Viluy, Vitim, Aldan, and the upper Lena River basins prior to the Last Interglacial. During the late Middle Pleistocene, glaciers in the Western and Eastern Sayan ranges expanded into the foothills to about 300–400 m altitude preceded by a downslope retreat of dark coniferous taiga forests. In the Minusinsk Depressions, the Kuznetsk Basin, and the northern Altai valleys protected from arctic tundra in the north, propitious (although periglacial) conditions with high biomass concentrations of steppe-parklands may have persisted during the glacial stages. This is evidenced by the abundant fossil remains from the Yenisei and Angara alluvia (60–80 m terraces) found with cultural records, as well as a colluvial reworking of the older (late Middle Pleistocene) loess cover, indicative of a fluctuating moderately cold climate regime, not excluding a continuation of the early human inhabitation of these areas.

Within the Last Interglacial (MIS 5; 130–74 ka BP), most of Siberia was covered by coniferous or mixed forests including broad-leaved taxa (lime, elm, oak), with forest-steppe distributed at lower elevations and in river valleys. At that time, the Middle Paleolithic (Neanderthal or early *Homo sapiens*) people entered the territory from Central Asia and/or the East European Plains. Expansion of the occupation habitat into the mountain areas, following

the Last interglacial climatic optimum, likely occurred in the later (MIS 5c and 5a) interstadials. During the early Last Glacial (Zyriansk) stage (MIS 4; 74–59 ka BP), cold periglacial tundra /tundra-steppe and continuous permafrost expanded across most of Siberia. The approaching glacial maximum disrupted human settlements, although this may have persisted in some protected southern locations. Following the interval of intensive loess deposition at the end of the glacial, renewed warm climate pulses during the mid-glacial (Karginsk) interval (MIS 3; 59–24 ka) preconditioned formation of zonal soils associated with the transitional Middle/early Late Paleolithic stone industries, suggesting a certain regional cultural (and possibly biological) continuity in the Late Pleistocene Siberia. Moderately cold and stable environments during the second half of the interstadial interval (30–24 ka BP) promoted a major enlargement of occupation habitats marking a climax of the Paleolithic peopling in Siberia associated with the emergence of the "classical" Late Paleolithic cultures. Productive interstadial ecosystems with mixed parkland-forest vegetation were gradually transformed into periglacial tundra with the approaching Last Glacial (Sartan) stage (MIS 2; 24–12 ka BP). A reduced population density is assumed around the LGM (20–18 ka BP) hindered by extremely cold climate conditions. Some occupation continuity persisting until the end of the Pleistocene may have applied just for biotic refugia in the protected southernmost locations along the Altay-Sayan foothills. Overall, the spatial and temporal distribution of the early cultural records documents environmental instability over large parts of Siberia during the Quaternary Period (the last 2.5 Ma). Specific geographical and contextual locations of early sites indicate that natural conditions during the earlier periods were generally more favorable for peopling than during the later periods. On the other hand, increased continentality and gradual shifts towards cold and arid conditions accelerated adaptation of Paleolithic populations to harsh periglacial climates promoting a progressive development of sophisticated survival strategies.

Timing and evolutionary processes related to the initial colonization of northern Asia are still insufficiently mapped, although ongoing archaeological investigations supply continuously new evidence about particularities and general trajectories of this evolutionary process. The traditional views, assuming a very late (Late Pleistocene) inhabitation of Siberia and Beringia, have been definitely challenged. The archaeological discoveries disprove the long-held assumption of a late penetration (by Late Paleolithic people) into the middle and high latitudes of northern Asia. Instead, glacial-interglacial and stadial-interstadial climate cycles regulated a geographic movement of early people northward, predetermining the inhabitability of particular geographical areas. During glacial maxima, most of Siberia seems to have been vacated, especially during the earlier periods, because of the expansion of continental glaciers in the north, and inhospitable environments in the southern extra-glacial regions. Gradual adaptation to cold natural habitats accelerated during the Late Pleistocene in connection with the advanced cultural and biological adjustment, enabling people to establish permanently in the vast and geographically diverse Siberian territory.

Future Directions

The studies on the Paleolithic of Siberia have made a major progress during the last 20 years changing radically the once valid paradigm on the Late Pleistocene colonization of north-central Asia. Despite this, most of the presently mapped sites tend to concentrate in the southern geographical regions and reflect a limited accessibility of the northeastern subarctic and Arctic areas which are, however, of major potential for future investigations also with respect to mapping the initial peopling of the American continent. The evolutionary processes in the natural environments and specific behavioral Paleolithic adaptation patterns and material-technological conditions as well as documentation of the sequenced climatic events stored in geological records are the principal objectives of the current

multidisciplinary Quaternary investigations. Equally important are the contextual past climate and paleoecology studies encompassing the last 2.5 Ma, because of increased awareness of the value of regionally reconstructed geological and natural proxy histories for understanding the past and present-day ecosystems and the early human (Pleistocene-Holocene) cultural adjustment strategies to the diverse Siberian environments. The integrated Quaternary geology and geoarchaeology studies are of principal importance for the future field surveys particularly in the marginally investigated areas of Siberia and the Russian Far East aimed at completing the culture-historical mosaic of the early human inhabitation of these geographically very extensive and scientifically fascinating territories.

Cross-References

- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ *Homo neanderthalensis*
- ▶ Lithic Technology, Paleolithic
- ▶ Urals: Paleolithic
- ▶ West and Central Asia: Early *Homo* Fossil Records

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Sicily and Magna Graecia, Archaeology of

Justin St. P. Walsh
Department of Art, Chapman University, Orange, CA, USA

Introduction and Definition

The Latin term "Magna Graecia" (in Greek, "Megalē Hellas") means "Greater Greece." In the term's first attested usages, by Pindar and Euripides in the fifth century BCE, it applied to all of the territory inhabited by Greeks around the Mediterranean (Cordano 2005). While it has been suggested that "Megalē Hellas" was used as early as the fifth or fourth century to mean only the parts of modern Italy that were colonized by Greeks – the coasts of Sicily, Campania, Calabria, Basilicata, and Puglia – the texts which might have done so, by Antiochus of Syracuse and Pythagoras of Croton, are not preserved today.

The earliest recorded use of the phrase to mean southern Italy and Sicily is thus Polybius (*Histories* 2.39) in the second century BCE, followed by Strabo (*Geography* 6.1.2) and, for the Latin version, Pliny the Elder (*HN* 3.95). Modern scholars tend to be even more restrictive in their usage, employing Magna Graecia to mean only peninsular Italy where it was settled by Greeks, in contrast to Sicily, which is often considered as a case by itself.

Much of the landscape of Magna Graecia and Sicily is composed of rolling hills and low mountains up to 2,000 m in height. The environment is well suited to a pastoral agricultural economy of sheep and goat herding, supplemented by other animals on a limited basis. Coastal plains were farmed for grain – wheat, barley, and spelt – while hilly areas typically featured olives, grapes, and other plants adapted to the terrain. The climate is generally dry and temperate, with an average annual rainfall of about 40–60 cm.

Key Issues/Current Debates

Bronze Age

The archaeology of the Bronze Age (c. 2200–900 BCE) in southern Italy is largely marked by the transition through successive cultural phases from pre- and proto-Apennine through the Apennine and sub-Apennine periods. The distinctions between these cultural phases do not correspond well to the usual chronological divisions of the Eneolithic (or "Copper Age") and the Early, Middle, and Late Bronze Ages. Dates for the later periods are largely given by the presence of Aegean imports. In the pre-Apennine phase, from roughly 2200 onwards, settlements were placed on low hills to allow control of surrounding agricultural zones. Burials were inhumations in single pit graves organized into cemeteries, and grave goods of a few bronze objects occasionally supplemented by one or two vases. The earliest contacts with Mycenaeans date to the latter part of the proto-Apennine phase, which started in the early second millennium and continued down to c. 1500. Typical imports consisted of Late Helladic I and II pottery. In this phase,

Sicily and Magna Graecia, Archaeology of, Fig. 1 Late Bronze Age rock-cut chamber tombs in the cliffs of Pantalica, Sicily

the coasts of the Adriatic and Ionian Seas (though not the Tyrrhenian Sea) were the locus of many settlements. Funerary practices comprised a wide variety of types, from caves to tumuli, though in every case, burials remained single inhumations grouped together. The Apennine culture ultimately gave way around 1200–1100 to the proto-Villanovan culture, with the introduction of cremation burials. From 900 onwards, Italic-speaking populations south of the Tiber River developed separately from the Etruscan-speaking groups of central and northern Italy, reintroducing inhumation burials.

In Sicily, the Early Bronze Age (c. 2500–1500 BCE) was characterized by multiple burials in chamber tombs. The primary EBA cultural group was identified with the site of Castelluccio, where pottery had black designs on a red background. As in south Italy, Mycenaean artifacts began to appear between 1500 and 1250 BCE, during the Sicilian Middle Bronze Age. At Thapsos, a town on the south-eastern coast with notably large storage areas (possibly indicating thriving commercial activity), Mycenaean pottery was particularly well represented. Locally produced pottery is marked by incised decoration and carinated shapes, most strikingly on large pedestaled bowls with zoomorphic features.

Two major typologies have been identified for the Late Bronze Age (c. 1250–1050 BCE) and the so-called Final Bronze Age (c. 1050–900 BCE): Ausonian, in the north, and Pantalica, in the southeast. Affinities with the Apennine culture have led to the suggestion that the Ausonians, known from tombs and huts on Lipari and the Milazzo peninsula, might have migrated from the mainland (as mentioned by Greek authors). Evidence for the later Sikel language from Iron Age inscriptions indicates an Italic ancestry which could have come to the island at this time. Ausonian culture was characterized by inhumation and cremation burials in large jars. Pantalica represented continuity from the Thapsos culture, with baggy vase shapes and pedestaled bowls, usually with incised geometric decoration. Burial was made in thousands of chamber tombs cut into limestone cliffs (Fig. 1). There is little evidence for settlements in the Late and Final Bronze Ages.

Iron Age

Increased contact with the Greek world began again in the eighth century, with the earliest identifiable artifacts arriving in the form of Middle Geometric cups from Euboia. The earliest Greek settlement in the region was made at Pithekoussai, on the island of Ischia just north

of the Bay of Naples, in the second quarter of the eighth century. This town, known mainly from the excavation of a cemetery, seems to have been an *emporion*, or a trading post lacking in agriculture. It seems likely that the foundation of the town at this location was meant to facilitate trade with Etruscans who controlled metal production in central Italy and Sardinia. There is strong evidence of Phoenician and indigenous presence at Pithekoussai, the latter particularly in female burials, which might imply intermarriage with local groups from the mainland. The earliest example of writing in the Greek alphabet is known from Italy rather than Greece itself: an inscription, perhaps reading "euoin," was incised on a vessel found in a tomb of the Osteria dell'Osa necropolis near Gabii, in Lazio, and was dated to perhaps as early as 800–770 (Watkins 1995: 37–39). Likewise, the earliest known reference to Homeric myth was found in a dipinto on a Euboian cup (c. 750) found at Pithekoussai. The text, in dactylic hexameters, refers both to the legendary cup of Nestor and to Aphrodite.

The first true colony (*apoikia*, or "foreign home," in Greek) was founded at Kyme, a mainland promontory facing Ischia, around 750. More colonies followed around the coast of southern Italy and eastern and southern Sicily, with new foundations occurring into the sixth century in Sicily and into the fifth century on the mainland. Greek colonies shared cultural ties with their mother city (*metropolis*) and felt some allegiance to their homeland, but an *apoikia* was politically and economically independent. While colonization of Sicily was mostly carried out by only two *metropoleis*, Chalcis and Corinth, expeditions to south Italy originated from a wider swath of the mainland, including Achaea, Sparta, and even (in one late example, Thurii) Athens. Ancient narratives often described colonizing expeditions that were carried out as a result of an oracular instruction from Apollo at Delphi; these were commonly represented as ignorant of the territory that was their destination. In reality, these expeditions demonstrated significant prior Greek experience with the Italian landscape. Colonies often seem to have displaced indigenous settlements, as at Syracuse and Naxos, and were purposely situated to take advantage of flat arable land, good harborage, and river valleys leading into the hinterland. Such advance planning can be identified at Catane, Syracuse, and Gela in Sicily and Poseidonia, Sybaris, and Taras in Magna Graecia. A system of land division existed in each colony to apportion plots of land to colonists in both their urban and rural areas. Aerial study combined with excavation has brought to light the grid of roadways that were created to divide the countryside of Metapontion; crossroads were marked by groups of tombs. It is not clear to what extent attempts at equitable land division at the time of foundation – as identified, for example, at Megara Hyblaia – reflect political equality among colonists, although some efforts have been made by scholars to suggest it.

Ancient authors (Thucydides, Diodorus Siculus, Dionysius of Halicarnassus, Strabo, and others) identified a number of indigenous groups in Sicily and south Italy at the time of Greek colonization. The Daunians and Iapygians inhabited Puglia, and the Lucanians and Oenotrians were in Basilicata, the Ausonians and Opicians in Campania, and the Sikels in Calabria. In Sicily the Sikels (or the Ausonians or the Morgetians) in eastern Sicily were found, the Sikans in the west, and the Elymians in the northwest. The ancient writers, who were uniformly Greek or Roman, sometimes lacking firsthand experience in the region, and often writing several centuries after contact, did not explain what ethnic or cultural distinctions existed between any of the groups, except to mention divergent lineages extending back to foundational heroes. It is therefore unclear to what extent Greek identifications reflected natives' views of the boundaries between and among themselves.

In striking contrast to the written record, archaeology has not shown significant differences between indigenous groups in Sicily, for example, either before or after contact with Greek or Phoenician settlers. Two types of pottery – one matte-painted, called Siculo-Geometric, or after the type site of Licodia Euboea, and another incised, named for the site of S. Angelo Muxaro,

near Acragas – were produced by the indigenous cultures of Iron Age Sicily. Siculo-Geometric seems to predominate in the supposedly Sikel east, but it is also found in the west, while the opposite is true for S. Angelo Muxaro ware. Rather than revealing a strict dichotomy, then, between eastern Sikel and western Sikan cultures, respectively, the archaeological record shows that individual sites should be placed instead at various points along a continuum defined by these pottery types and other attributes. Indigenous settlements were composed of cellular nuclear-family housing, as at Sabucina or Vassallaggi, or longhouse-type dwellings up to 25 m long for extended families, as at Morgantina.

Bronze hoards are one of the most impressive indicators of Iron Age indigenous culture; the most spectacular deposit was the Mendolito hoard of the eighth or seventh century, found near modern Adrano, consisting of over 1,000 pieces (especially spearheads, plaques, belt-like girdles, and other objects) weighing 900 kg. Brief inscriptions dating into the fifth century have been found in Sikel, employing a Greek alphabet.

Greek Colonization

Equality seems to have been the rule in the distribution of land to colonists, with urban plans tending towards orthogonality – even at Megara Hyblaea, where the plan is not orthogonal but the streets were laid out in straight lines, the house lots were designed to be approximately equal in area (Tréziny 1999). Pottery from Corinth and Euboea continued to dominate in Sicily into the sixth century.

Phoenician Colonization

Phoenician colonial expeditions were also sent to Sicily, though not to south Italy. These began around the eighth century, in the northwest of the island, closest to Carthage. Major settlements were founded at Panormus and Solunto and on the island of Mozia in the seventh and sixth centuries. Phoenician towns do not seem to have had strong agricultural components and on the whole were probably less independent than Greek colonies from their mother city. These towns enabled trade between Carthage and Italy and, to a lesser extent, the northwestern Mediterranean instead. Phoenician-style spaces have been found in these settlements, such as a *tophet* (where first-born sons were ritually sacrificed) on Mozia and several cemeteries with rich burials dating from the seventh through the third centuries at Panormus. Solunto's Roman-period settlement shows a highly Hellenized character, including peristyle-courtyard houses and a theater.

Archaic and Classical Period

The fifth century in both Sicily and Magna Graecia was marked by conflict. In both areas, wars were waged between Greek cities and between Greeks and indigenous groups. The city of Poseidonia was conquered by the Lucani (Strabo *Geography* 6.1.3) at some point in this period, after which the town was renamed Paestum and the two groups lived together, apparently as equals. In Sicily, Greek tyrants fought against each other, against a Sikel league, and against Carthaginians, leading to the destruction or forced evacuation of several major centers. A Carthaginian invasion destroyed many Greek cities between 409 and 405, including Selinous, Acragas, Himera, Gela, and Camarina. Syracuse barely escaped destruction. The appearance of fortification walls across the island, as at Selinous, Gela, Tyndaris, and the Euryalos fort outside Syracuse, is testimony to the violent nature of this period.

Sicilian and south Italian builders began building monumental stone architecture almost as soon as they appeared in mainland Greece. There are Doric temples at Syracuse, Selinus, Poseidonia, and Taras dating to between 600 and 550 (Fig. 2). These early buildings are long and narrow, with small intercolumniations, similar to contemporary mainland temples such as the Temple of Hera at Olympia. Later buildings assumed shorter and wider proportions in their plans (Fig. 3). Colonies often placed extramural temples (especially ones dedicated to Hera) on the edges of their territory as a means of sending a message regarding their claim to the land to natives and other Greeks alike

Sicily and Magna Graecia, Archaeology of, Fig. 2 The early Doric Temple of Hera I at Poseidonia (c. 550 BCE)

Sicily and Magna Graecia, Archaeology of, Fig. 3 The Temple of Hera II at Poseidonia (c. 460 BCE)

(de Polignac 1995). At the same time, however, religious life in Sicily was marked by syncretism of indigenous and Greek beliefs and practices. At Palike, the site of a volcanic spring and an indigenous shrine to chthonic deities, Greek-style buildings including a *hestiatorion* (dining hall) and stoas were built (Maniscalco & McConnell 2003). Greek myth incorporated the worship of female fertility deities around Lake Pergusa by identifying them with Demeter and Persephone; this pair received shrines at sites across the island. A crater rim found at the archaic settlement of Morgantina was inscribed with an inscription in Greek reading "Kuparas emi," "I am (or I belong to) Kupara" (Antonaccio 1997) (Fig. 4). The name Kupara is connected with a Sikel water deity located near Syracuse, perhaps indicating that this Greek vessel had been dedicated as a gift to an indigenous god by a Greek speaker. At the same time, "kupara" can mean "hollow" in Greek, reflecting the crater's large open shape. Such word play was common in the Greek symposium, and thus the inscription can be seen as evidence for linguistic crossing in a mixed cultural environment.

By the mid-sixth century, large stone buildings at Selinous and Poseidonia included stone sculpture in the metopes. Both Sicilian and South Italian colonies maintained strong ties to Greece, most clearly in the construction of numerous treasury buildings at the panhellenic sanctuaries of Olympia and Delphi (where they also competed in the games). Sicilian tyrants were especially successful in Panhellenic

Sicily and Magna Graecia, Archaeology of, Fig. 4 A Lakonian krater rim from the Archaic settlement at Morgantina (Aidone Museum inv. 90-61) with an inscription in Greek reading "Kuparas emi" ("I am Kupara" or "I belong to Kupara")

Sicily and Magna Graecia, Archaeology of, Fig. 5 Terracotta plaque of a gorgon from the Temple of Athena at Syracuse (Syracuse Archaeological Museum "Paolo Orsi," inv. 34540, 34543, 34895, c. 570 BCE)

competitions. Victories were celebrated by sculptures including the Delphi Charioteer (c. 478–474), given by Polyzalos of Gela, and the Motya Charioteer (c. 470). Cities also competed for prestige the construction of massive temples, especially following the Greek victory at Himera over the Carthaginians in 480. Temple G at Selinous and the Temple of Zeus at Acragas vied for recognition as the largest Doric temple in the Greek world. Greek colonies also seem to have featured *heroöns*, or shrines where a colony's founder was worshiped as a hero, in its marketplace, though such a structure is only well identified at Poseidonia.

The lack of marble in the region led to the use of local limestone and sandstone for building material. Sicilian builders made up for the lack of high-quality stone by using brightly colored terracotta revetments and figural sculptures as decoration, such as the relief plaque from the Temple of Athena at Syracuse depicting a gorgon running on bended knee (Fig. 5), and even on structures built in Greece, such as the Treasury of Gela at Olympia. Imported marble was used for smaller works, such as the so-called Ludovisi Throne, which is made of marble from the Aegean island of Thasos. This work, with its remarkable reliefs depicting the birth of Aphrodite flanked by smaller scenes showing a clothed and a nude female worshipper, respectively, was actually one half of the frame for an altar. It was found in Rome, where it had been taken in antiquity. The sculpture's original location has now been determined as the sanctuary of Aphrodite at Lokris (modern Locri Epizefiri). Imported marble was also used for the exposed skin of some sculptural subjects, such as for the heads, hands, and feet of the metope figures of Temple E at Selinous. Free-standing acrolithic sculptures using imported stone were much more common in Sicily than elsewhere in the Greek world. The most important examples are the archaic Demeter and Persephone from Morgantina and the spectacular over-life-size cult statue, probably of Hera or Demeter, that is claimed to be from the same site (in the Aidone Museum since 2011 but formerly in the J. Paul Getty Museum collection, where it was erroneously identified as depicting Aphrodite) (Fig. 6). South Italian and Sicilian sculptors also created a few free-standing sculptures in marble of youths (*kouroi*) and boys from Akragas and Rhegion which show links to contemporary

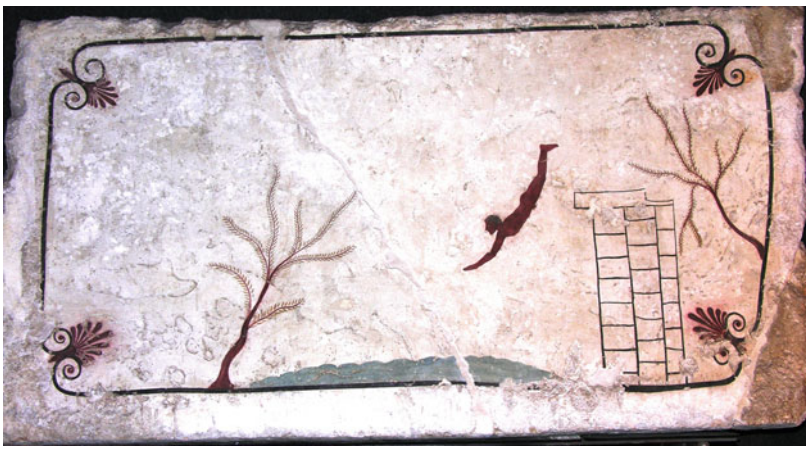
mainland Greek types like the Kritios Boy from Athens.

The best preserved example of Greek major painting – indeed, practically the only one from the Classical period – was found at Poseidonia, in a grave now known as the Tomb of the Diver (c. 480–470). The interior of the grave's sarcophagus was decorated on its side walls with scenes of a symposium, while the inside of the lid showed a young man diving from a platform into a pool of water, which has been interpreted as possibly being a metaphor for the transition from life to death (Fig. 7).

Sicily and Magna Graecia, Archaeology of, Fig. 6 Over-life-size Greek cult statue of a female deity in limestone and marble (c. 425–400 BCE), today called the "Morgantina goddess"

People in south Italy and Sicily continued to be consumers of imported Greek pottery, primarily Corinthian and East Greek wares (especially Ionian cups – though many of these were also manufactured in the colonies) in the sixth century and Athenian in the fifth. Greek pottery is found in Greek, mixed, and non-Greek settlements and in domestic, religious, and funerary contexts. In the fourth century, with the decline of Athenian exports of painted pottery due to the crisis following the Peloponnesian War, south Italian and Sicilian production grew significantly. In southern Italy, regional groups have been distinguished (especially by A.D. Trendall and A. Cambitoglou) for Apulia, Lucania, Campania, and Poseidonia. The red-figure painted decorations featured mythological stories and especially scenes from theater productions – testimony to the popularity of drama in the western Mediterranean.

The existence and importance of democratic institutions is evident in many cities throughout both regions at various points in time. Both Poseidonia and Metapontion built large circular assembly structures (*ekklesiasteria*) of a type that may



Sicily and Magna Graecia, Archaeology of, Fig. 7 Interior of the lid of the sarcophagus from the burial known as the Tomb of the Diver, Poseidonia (National Archaeological Museum, Paestum, inv. 23103, c. 480–470 BCE)

be related in some way to the shape of the Comitium at Rome. At Morgantina, large flights of stone steps that mitigated the sloping terrain of the city's agora were arranged in a trapezoidal form starting at the end of the fifth century so that they could also be used as seating for the citizen assembly to hear speakers.

Interpreting Cross-Cultural Relations, 800–400 BCE

In the nineteenth and early twentieth centuries, scholarship was defined by the prevailing colonialist attitudes of the time. Greek colonists were seen not only as members of one of the two ancestral societies of western civilization (the other being Rome) but as the initial transmitters of their cultural traditions to the Romans. Greeks appeared urbane, cosmopolitan, and sophisticated compared to the natives they met in Sicily and south Italy. At the same time, scholars approached the process of ancient colonization as analogous to modern colonialism, particularly as carried out by the British empire, where colonies existed for the purpose of controlling and exploiting far-off resources on behalf of the colonizing nation (Dunbabin 1948). For the purposes of historical explanation, then, Greeks were the primary, if not the sole actors, and either indigenes passively received Greek culture or they abandoned their own traditions in order to become as similar to Greeks as possible. The latter process was identified as "Hellenization," a local variant of what anthropologists elsewhere in the world referred to as acculturation. It is true that indigenous populations adopted Greek practices and material culture, and at least in Sicily from the fourth century on, it is no longer possible to distinguish between Greek and indigenous cultures in the archaeological record (Antonaccio 2001). Siculo-Geometric and S. Angelo Muxaro pottery were no longer made, for example, and the shapes and fabrics that survived were Greek.

Recognition of this broad phenomenon has often obscured other important facts, however: first, natives did not abandon their own culture wholesale, but selected aspects of Greek culture that they found useful within their own societies; second, in southern Italy, the process was never fully completed, particularly because Magna Graecia was ultimately conquered by the Romans, who were themselves an Italic group like those who were neighbors to the Greeks; and third, Greeks were also open to adopting some native ideas and traditions, even in Sicily – for example, the greater emphasis on worship of Demeter and Kore in the island's center because of the importance of similar deities for Sikels. Athenian potters made vases in indigenous forms, such as the pair of *nestorides* (an ornate Daunian shape) in the Getty Museum collection (since the findspot of these vases is unknown, it is not clear whether they were intended for indigenous or Greek buyers) (Fig. 8). So acculturation was not inevitable, nor was it a one-way street. Beginning in the 1980s, Classical archaeologists began to adopt new theoretical perspectives from other branches of archaeology, especially world-systems theory (Cunliffe 1988).

Sicily and Magna Graecia, Archaeology of, Fig. 8 Athenian red-figure vase in a Daunian shape, the *nestoris* (Attributed to the circle of the painter Polygnotos, c. 450–440 BCE; J. Paul Getty Museum inv. 81.AE.183.2)

More recently, others have focused on the altered meaning imported objects could be given in new cultural environments, with the process of meaning change given the name "consumption" (Dietler 1999). In these ways, the ability of indigenous populations to make active choices about how to shape and interpret the world around them has been acknowledged and integrated into scholarly discourse about ancient colonization.

The Hellenistic Period

Southern Italy came under Roman control as a result of victory in the Pyrrhic War in 272. Links to Rome grew quickly from the time of the construction of the Via Appia to Capua in 312 and the road's extension to the heel of Italy and the port of Brundusium in 264. Little evidence has appeared to differentiate south Italian culture in this period from what came before it, however, apart from the wide distribution of mass-produced moldmade terracotta figurines at Taranto (Graepler 1997). These sculptures, known as the Tanagra type, generally depicted women in various activities, especially moving rapidly, dancing, or twirling – perhaps to be interpreted as religious or dramatic action. They were exported across the Mediterranean.

Both regions suffered greatly during the First and Second Punic Wars, with several major cities being sacked and their populations sold into slavery. The main exception was Syracuse, which remained independent and prosperous until the death of the tyrant Hieron II (270–215). The kingdom of Syracuse's wealth is shown by evidence from Morgantina, which underwent great development under Hieron's rule. Several public buildings including stoas, granaries, and a fountain house can be dated to this period. A private house at Morgantina revealed the earliest known tessellated mosaics, dating to the mid-third century, and, perhaps most significant, a bath complex built at the same time was found to incorporate the world's earliest known self-supporting domed roof, constructed of interlocking tubes (Lucore 2009). Although these examples are so far known only from Sicily's interior, it appears likely that the innovations of tessellated mosaics and domes were made at Syracuse. Extant monuments known from Syracuse itself in this period include the theater and the 200-m-long Altar of Zeus Eleutherios. Some of the most distinctive cultural products of the Hellenistic period were the pottery produced at Centuripae. This ware, developed in the third century, employed a wide range of bright colors to produce realistic scenes comparable to Hellenistic wall painting, and it was further adorned with ornate molded pieces.

One important trend that is clearly visible in the Hellenistic period was related to the domestic sphere: the size and development of housing. Hellenistic houses tended to be considerably larger than their Classical predecessors, and they included new features, such as second stories and particularly courtyards with a peristyle colonnade, as seen at Megara Hyblaia, Solunto, and Monte Iato. The latter site featured a house with an area of 800 m^2.

The Roman Period

The result of the shift in control to an external power was the advent of peace, if not necessarily prosperity, for both Greeks and non-Greeks by the second century. Sicily became the first Roman province in 241 BCE, and Roman military forces completely conquered Sicily by 211. The island was seen by Rome as a significant source of grain. As a result, slave-run *latifundia* became a dominant part of the economy (though slave revolts occurred twice between 135 and 100). The cultural and economic wealth of pre-Roman Sicily was famously looted in the first century BCE by the governor Verres (Cicero *Verrine Or.*). Overall, the island seems to have been in serious decline during the empire perhaps initially because most cities supported Sextus Pompey against Augustus during the civil war. The town of Centuripae, however, thrived following Augustus' victory; it

alone had been a supporter of the emperor. The town was given control of much of the Catania plain, which led to a building boom in the town, including a large public building (perhaps a *porticus*), baths, and a large suburban nymphaeum (Wilson 1990). There were few other Sicilian centers in this period; Halaesa is the best known, though it, too, had seen its greatest flourishing under the Republic rather than the empire.

The most important archaeological sites for this period in south Italy are undoubtedly the ones destroyed by the eruption of Mount Vesuvius in August of 79 CE, especially Pompeii and Herculaneum. The Via Appia's route was altered under the emperor Trajan in the second decade of the second century CE. The new road split from the old one at the town of Beneventum in order to take a shorter route across the Apennine mountains to the southern ports that linked Rome to the eastern empire. The construction was commemorated by a triumphal arch at Beneventum, decorated with relief sculptures showing the good deeds and welfare projects undertaken by Trajan on behalf of Italians. Saepinum, not far from Beneventum, is a well-preserved Roman town in the mountains of Molise, complete with remains of a basilica, a small theater, and walls built under Tiberius in the masonry style known as *opus reticulatum*.

Late Antiquity

Sicily is best known in late antiquity for several large villas, especially the Villa Casale at Piazza Armerina, where the largest extant collection of mosaic floor decoration has been found. The luxurious nature of the Villa Casale's architecture and decoration led to the initial hypothesis that it belonged to a member of the imperial family, perhaps even one of the Diocletianic tetrarchs. The discovery of similar complexes at Patti and elsewhere shows it instead to be simply the grandest example of a *latifundium* headquarters, owned by a well-connected Roman family. Similar complexes existed in southern Italy (just as they did in Spain and elsewhere); the best known of these is at San Giovanni di Ruoti, where three villa houses were built on the same site between the first and sixth centuries CE. Christianity was well established by the time of Constantine, and catacombs dating as early as the third century are known from Palermo and Naples.

Cross-References

- ▶ Central Italy: Pre-Roman and Archaic Ceramics
- ▶ Classical (Greek) Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Expansion, Invasion, and Nation-State Building: Influences on Archaeology
- ▶ Cultural Property, Trade, and Trafficking: Introduction
- ▶ Getty Foundation
- ▶ Greek Colonialism, Archaeology of
- ▶ Italy, Sicily, Malta, and the Lipari Islands: Prehistory
- ▶ Religion, Greek, Archaeology of
- ▶ Repatriation and Restitution of Cultural Property: Relevant Rules of International Law
- ▶ Romanization
- ▶ Trade and Transport in the Ancient Mediterranean
- ▶ Urban Planning in the Greek World

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Sidibé, Samuel

Daouda Keita
Département d'Histoire et d'Archéologie, l'Université des Sciences Sociales et de Gestion de Bamako, Bamako, Mali

Basic Biographical Information

Born in Diaramana (Cercle of Bla) in 1952, Samuel Sidibé (Fig. 1) is the Managing Director of the National Museum of Mali. After his secondary studies in Mali, Dr. Sidibé received a postgraduate scholarship, which took him first to Clermont-Ferrand (France), where he obtained a Masters in Art History and Archaeology in 1975, then to the University of Paris I Panthéon Sorbonne for his doctoral studies between 1976 and 1980. He defended a thesis on the theme of funerary archaeology *Archéologie funéraire de l'ouest africain: sépultures et rites*.

On his return to Mali, Samuel Sidibé worked at the Institut des Sciences Humaines (ISH) as a researcher from 1981 to 1987. In this capacity, he actively participated in field missions and was involved in a project to create an inventory of archaeological sites in the lake region and the Inner Niger Delta. The launch of this project coincided with his arrival at the ISH. During the same period, Dr. Sidibé was responsible for courses in Art History at the National Institute of Arts (INA) in Bamako, Mali. In 1987, he was appointed Director of the National Museum.

Dr. Sidibé is an active a member of several professional associations and organisations at the national, sub-regional, and international level, including the International Council of Museums (ICOM), the International Council on

Sidibé, Samuel, Fig. 1 Samuel Sidibé, at his office in the National Museum of Mali

Monuments and Sites (ICOMOS), and the West African Association of Archaeology (WAAA). From 1993 to 2003, he was a member of the AFRICOM (International Council of African Museums), working group, the program of the ICOM (International Council of Museums) for Africa and He was a founding member of AFRICOM as an association and Dr. Sidibé was a member of the scientific committee for archaeological research at the Dia site in the Inner Niger Delta (1998–2002) and of the committee for the rehabilitation of earthen architecture. He has been a member of the screening committee and the acquisition committee at the Musée du quai Branly in Paris, a member of the Advisory Board of the World Festival of Negro Arts (2007–2009), and a member of the Commission of French archaeological excavations abroad (from 2008).

Major Accomplishments

As the head of the National Museum of Mali, Dr. Sidibé brought about profound changes in the management and operation of this institution. The National Museum, a showcase of Malian culture, is now open to the world and has become a place for encounters between, and dialogue about, cultures.

Dr. Sidibé made a considerable contribution towards enhancing the museum's collections by implementing some major research projects and initiating collections on material and immaterial culture. These projects generated research and collections on musical heritage (1991–1996), traditional pottery (1992–1994), material culture of the Dogon people (1996–1997), and ornaments (2008–2010). Taken together, these collections make a substantial contribution to the preservation of culture in Mali. Since 2005, Dr. Sidibé has opened the National Museum to modern art, making it one of the few African museums to have a collection in this domain.

In addition to developing major new collections, Dr. Sidibé's contributions to the National Museum have included expanding and renovating its premises aimed to support the museum's increasing role in promoting of Mali's cultural heritage. This included the opening of new exhibition space as well as a multipurpose hall, the construction of a storehouse for archaeological objects, the redevelopment of the Koulouba caves in the prehistory garden, and the development of the Point G cave as a place to visit. New initiatives in respect to the museum's cultural activities included a revitalization in visitor programs for school groups, aimed at educating young people about the discovery, study, and understanding of Malian cultural heritage. Another public outreach program "Musical Thursdays," was initiated to make the museum more accessible to the public. Every Thursday afternoon from October to May the stars of Malian music perform at the National Museum.

The National Museum of Mali remains true to its original purpose, namely, the dissemination and promotion of Malian cultural heritage. At the same time, it presents many international exhibitions, one of which includes the exhibition Vallées du Niger (1991–1997). Dr. Sidibé was the Deputy Commissioner and Coordinator of the African itinerary for the exhibition which travelled through Mali, Burkina Faso, Nigeria, Mauritania, Guinea, and Niger. Since 2009 the National Museum has hosted the African Photography Biennial and Dr. Sidibé has been the General Delegate of the "Rencontres de Bamako".

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- ▶ International Council of Museums (ICOM)
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)

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Siega Verde Rock Art Sites

Rodrigo de Balbín Behrmann
Departamento de Historia I y Filosofía,
Universidad de Alcalá de Henares, Madrid, Spain

Brief Definition of the Topic

Paleolithic art was always regarded as a product of mystery and deep caves, even in the latest proposals of the great French scholar A. Leroi Gourhan (1971). That idea was overtaken by events when the Portuguese site of Mazouco was discovered and published in 1981 (Jorge et al. 1981), in an area bordering Spain.

The second open-air Paleolithic rock art site discovered was Domingo García in Segovia, the third was Piedras Blancas in Almería, the fourth was Fornols Haut in the French Pyrenees on the border with Spain, and the fifth was Siega Verde, on the Spanish side of the border with Portugal. Other findings in Spain and Portugal ensued.

Siega Verde was discovered in a survey organized within the Museum of Salamanca by the then director Manuel Santonja Gómez. The year was 1989, and after the discovery of the first recorded horse, the team from the University of Alcala de Henares joined the task and finally published the scientific monograph of the site (Alcolea & Balbin 2006).

Siega Verde is located in the middle Agueda River, a tributary of the Douro River, parallel to the Portuguese border in the vicinity of Ciudad Rodrigo, Salamanca. There, among the villages of Castillejo de Martín Viejo, Villar de la Yegua, and Villar de Argañán, the river often passes between the vertical Paleozoic schist outcrops. In some places, its slopes soften, producing fords like the one located in the center of the site.

The site has a length of 1 km, on the left of the Agueda river banks, marking its development with the same organization as cave galleries. The first figure, a horse (Fig. 1), is located south of the site, and to get to the core, two hundred meters without finding artistic elements must be traveled, until a watermill is reached, the construction of which seized several engraved rocks.

The first horse motiv discovered is pecked (outline) the most abundant technique used in the art of this region. There are 443 motifs in total, 241 animals, 3 anthropomorphic, 165 non-figurative representations, and 34 indeterminate. Most are animals, especially horses and bulls (Fig. 2), followed by deer and goats, generally engraved through incision and with smaller size. There are also engraved reindeer, bison, *cervus megaceros*, and woolly rhinoceros. Schemes are the next group, lines, and signs, the latter rarely.

Siega Verde Rock Art Sites, Fig. 1 Picketing horse. Firstly found figure of the ensemble 1, the most southern place of Siega Verde

Siega Verde Rock Art Sites, Fig. 2 Engraved bull in the center of Siega Verde, eroded by the river current

The engravings are distributed in 29 sets and 91 panels. The panels are vertical in the south and center, and horizontal in the north, where they have slightly more recent chronology. Most figures are engraved and there are very few remains of painting, which in any case appear as iron oxides and manganese oxides, with phosphates and silicates in its composition. This demonstrates a probably extensive use of normal colors in Paleolithic art, red and black, here largely disappeared by exposure to the elements.

Siega Verde's rock art started during the Gravettian or the Solutrean, contemporary to most of the engravings from the neighboring Côa Valley, styles II–III of Leroi-Gourhan, but with fewer and unimportant figures in Agueda. Most of the figures were made in the Solutrean-Magdalenian, styles III–IV of Leroi-Gourhan, and the Magdalenian, style IV of the French author, on dates ranging between 17000 BCE and 13000 BCE. Both in the site and in the neighboring Côa, the decoration does not stop with the end of the Ice Age, but continues with dates after 8000 BCE with a style we call V, following Leroi-Gourhan's proposal. In the last phase various signs are marked in the rocks through fine incisions.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Côa Valley Rock Art Sites
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ Leroi-Gourhan, André
- ▶ UNESCO's World Heritage List Process
- ▶ World Heritage List: Criteria, Inscription, and Representation

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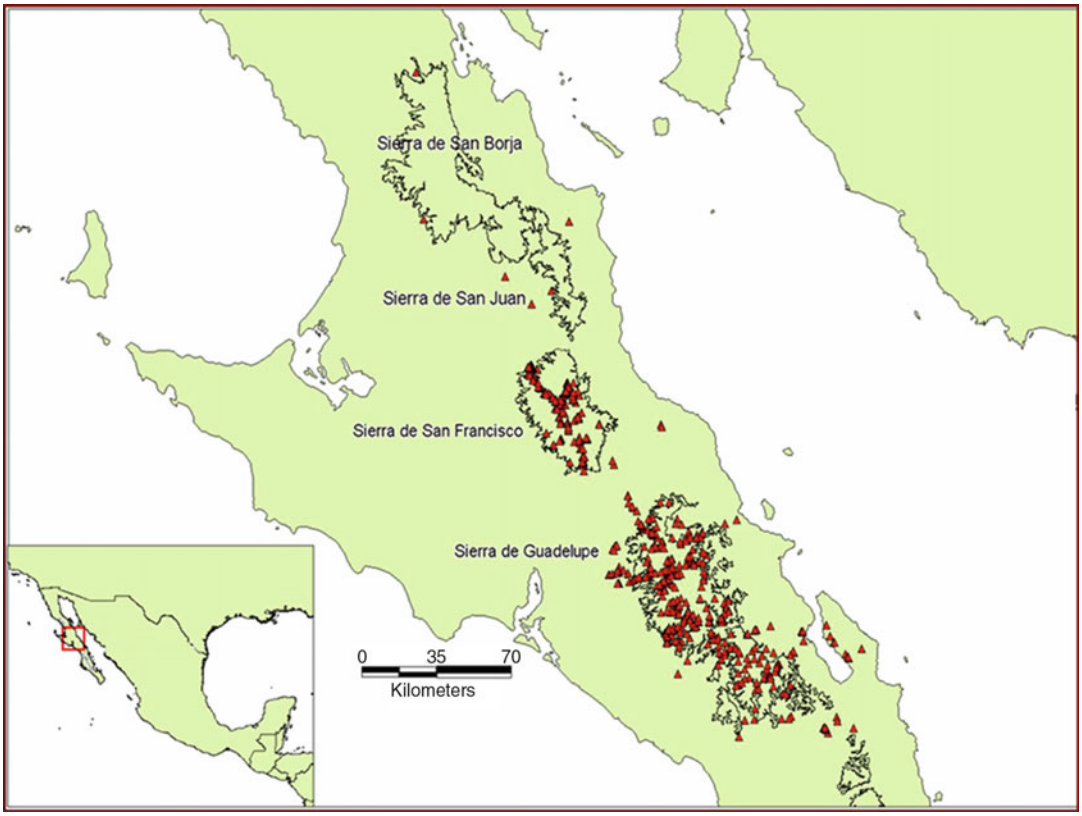
Sierra de San Francisco: Great Mural Rock Paintings

María de la Luz Gutiérrez Martínez
National Institute of Anthropology and History, La Paz, Baja California Sur, México

Introduction

In the Baja California peninsula, Mexico, exists one of the most extraordinary repertoires of rock



Sierra de San Francisco: Great Mural Rock Paintings, Fig. 1 The central mountain ranges in Baja California peninsula: this is the distribution area of the Great Mural style

art in the country. This long and narrow strip of land sits between the calm, tepid waters of the California Gulf and the impetuous Pacific Ocean. In this peninsula rises an impressive series of mountain ranges that, along with the oceans that embrace it, provides interesting contrasts between the ocean, the desert, and the mountain. This landscape scenario provided optimal conditions for hunter-gatherer-fishing societies, who first inhabited the peninsula in the early Holocene, until the arrival of explorers and Jesuit missionaries at the end of the seventeenth century (Gutiérrez & Hyland 2002).

One of the most salient features of this region's prehistory is that its protagonists produced massive quantities of rock art since very ancient times. They found in the practice of painting and engraving an extremely important medium of ritualistic expression and in the resulting rock art an extraordinary instrument of communication. In this way, the symbolism expressed in the imagery can be considered an essential element in the process of construction and consolidation of the social identities of these peoples through the millennia.

The central mountain ranges of the peninsula represent the densest concentration of rock art (Fig. 1). In these mountains, the imagery is persistently integrated with the landscape, symbolically inscribed, and it gives it a cultural meaning that shows us with clarity the fluid movement of the peoples who created it, witnesses and protagonists of the comings and goings (Conkey 1984: 264-267; Gutiérrez & Hyland 2002: 30).

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 2 Cueva del Batequi, Sierra de San Francisco. The female image is identifiable on the basis of her breasts and probable pregnancy

Key Issues/Current Debates/Future Directions/Examples

The Rock Art Tradition of Great Murals

The Great Mural style (Gran Mural) is one of the most prominent of the region. This term was coined by Harry Crosby (1997) in the seventies taking into account their large size. The Sierra de San Francisco is the one that concentrates the most spectaculars Great Mural sites. The paintings are located in hundreds of rockshelters in the intermountain canyons. The style is essentially realistic and is dominated by human figures and animals painted in red, black, white, and yellow. In 1992, these rock paintings were inscribed in the UNESCO World Heritage List.

On the rock panels of the Sierra de San Francisco, the anthropomorphs are static or unmoving, while the posture of some animals suggests certain movement. The female figures can be identified by the breasts that are positioned under the arm as well as by the demonstration of pregnancy (Fig. 2). The animal that appears most frequently is the deer, followed by the Bighorn Sheep, but there also exists a broad range of land and marine animals depicted (Fig. 3).

Chronology and Cultural Affiliation

One of the key questions surrounding the archaeological investigation of the Great Murals concerns their antiquity. The first references to the murals can be found in the records of the Jesuit missionaries of the eighteenth century (Barco 1973). The impression given by some of these records was that the paintings were "old," while the indigenous people denied knowledge of their origins, attributing them to the work of an ancient and lost race of giants from the North.

Before 2000, there were only six radiocarbon dates for three panels of the Great Murals (Fullola et al. 1994; Gutiérrez & Hyland 2002: 337). There has been a more recent focus on increasing the chronological information about this pictorial tradition. From the radiocarbon dates that have been obtained so far, one stands out. The panel of Cueva San Borjitas has a date as far back as 7,500 B.P. (which signifies Before Present) (Watchman et al. 2002). The investigations surrounding chronology have produced interesting debates but also valuable information about the production process of the paintings and the meaning behind their creation.

Another essential aspect has been to verify the origin of the pigments and explore the possibility of identifying the minerals. The analyses indicate that the paint is composed of local mineral pigments: red and yellow from iron oxides, black from manganese oxide, and white from gypsum. Large deposits of gypsum and of red iron oxide, intense in color, quality, and varying shades, can

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 3 It is common to find maritime animals in some Great Mural sites. To the *left*, the sea lion-whale of site San Gregorio II and to the *right*, hare and stingrays in site Cuesta de San Pablo

be found in the Azufre Canyon, in the Volcanes Tres Vírgenes (Three Virgins Volcanoes) (Fig. 4). Archaeological evidence tells us that this source was used to obtain the pigments. It should be noted that this paint recipe was formulated not only for creating the rock art imagery but also for the development of body painting (Gutiérrez & Hyland 2002; Gutiérrez 2009).

It is interesting to note that as the Great Mural panels are located further away from this source, decreases the intensity of the color in the rock paintings and many of them were only outlines. This may correspond with the difficulty that faced the most distant groups to travel to the volcano and collect the precious pigment and could explain the changes in the chromatic component of the southern substyles. A hypothetical explanation is that the volcano could have been perceived as the dwelling of mythical beings, bearers of unusual properties like the pigments and obsidian; in these terms, the pigment could have been considered rare, and the distant groups would have had limited access to them and thus had to use them in moderation.

Context and Function

In general the panels of the Great Murals present a complex diversity of style, theme, and archaeological context, showing us of the plurality of its origin and function. The presences of human figures or wounded animals have led many researchers to suggest that the painters reproduced scenes or hunting and/or combat, while others describe the shamanistic orientation of the imagery.

Another perspective has been to contextualize the paintings based on the religious concepts and ritualistic practices of the peninsula (Gutiérrez & Hyland 2002). The veneration of the ancestors and of the dead shaped the nucleus of the indigenous worldview around which developed a set of ritual practices; among these practices stand out the communication with such entities through its embodiment, and the spirit possession under a

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 4 Extensive pigment deposits found at Cañón del Azufre in Tres Vírgenes Volcanoes. To the *left*, the end of this canyon and Sierra de San Francisco on the back and to the *right*, pigment deposits

state of trance. The layers of human hair, the wooden effigies, the tables and ceremonial sticks, and the rock art, were elements of the ritual paraphernalia and served as substitute images of mythological heroes and remote ancestors.

The importance and intensity that had image production for the representation of the dead and ancestors, is the key to understanding the meaning and role that played some emblematic panels of Great Mural, those that are characterized by their huge dimensions and by the predominance of human figures, which showing a broad range of headdresses and colored patterns (Fig. 5). Detailed analysis shows that certain figures were repainted, possibly throughout centuries. What motivated this "reactivation" of the images? It is possible that the personages painted in these sites could represent founding ancestors of lineages and/or mythical beings; in this sense, the groups of images concentrated the collective memory of these groups, and, through the ritual of repainting, the people worshipped them, reaffirming at the same time their individual and group identities.

The functions of the rock paintings and the sites that contain them could have been numerous. By analyzing each of the categories of identified panels, we would be in a position to deepen the study around origin, function, and rhythms of the creation of the imagery, the places that contain them, and the resulting symbolic space. Meanwhile, what we can confirm from a general perspective is that the role that the Great Murals played as a codifying system of visual communication was very successful, because their consistency, expands propagation and the permanency of certain emblematic images tells us of the great ability that its makers had in the construction and consolidation of this landscape and the capacity of the society to decode their meaning, on more than one level, throughout the history of the region, and over vast territories of local and regional identities, pervaded with memory and feeling.

Sierra de San Francisco: Great Mural Rock Paintings, Fig. 5 Cuesta Palmarito, Sierra de San Francisco. This Great Mural panel is characterized by the human figures with a wide range of headresses and chromatic patterning

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Australian Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Kakadu National Park: Rock Art
- ▶ Maritime Contact Rock Art
- ▶ "Motif" in the Archaeology of Art
- ▶ North American Rock Art
- ▶ Pigment Analysis in Archaeology
- ▶ Sacred Traditions and "Art" in Hunter-Gatherer Contexts
- ▶ Serra Da Capivara National Park
- ▶ South American Rock Art

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Silbury Hill: Environmental Archaeology

Gill Campbell and Matthew Canti
English Heritage, Fort Cumberland, Eastney, UK

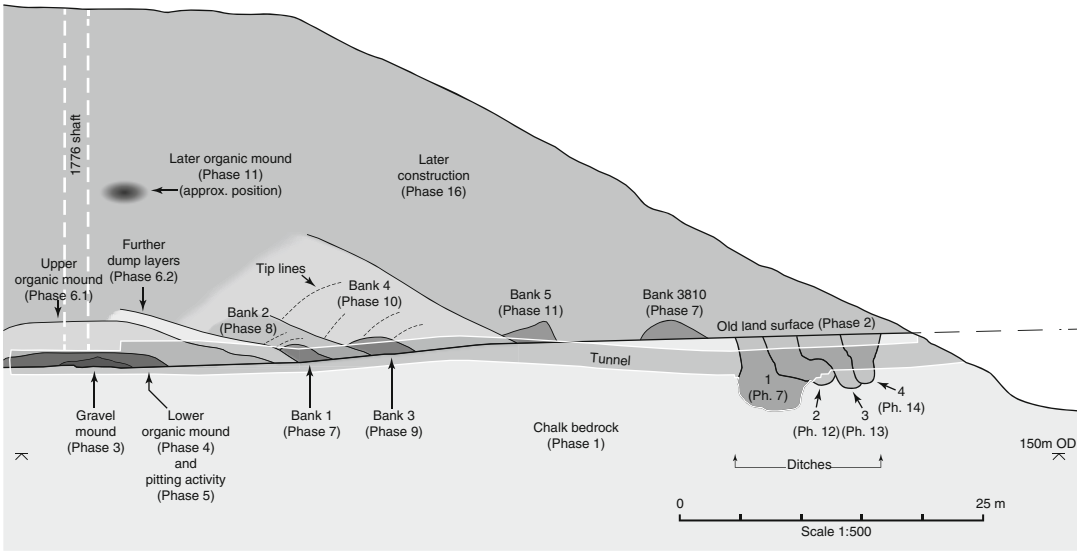
Introduction

Silbury Hill in Wiltshire, UK (NGR SU 100 685), is the largest prehistoric mound in Western Europe. Its lies at approximately 158 m OD

Silbury Hill: Environmental Archaeology, Fig. 1 Silbury Hill is in the top left of the picture. The village of Avebury (lying partly within the Avebury Henge) is seen in the foreground (©English Heritage)

close to the source of the river Kennet, on the western side of the valley bottom within a natural amphitheater formed by the surrounding chalk hills. It is one of a complex of early prehistoric monuments that comprise the UNESCO Avebury and Stonehenge World Heritage Site with Avebury Henge lying 1 km further up the valley to the north (Fig. 1), the West Kennet palisade enclosures 1 km to the east, and the West Kennet chambered long barrow occupying the first chalk ridge to the south east. Silbury Hill is a designated Scheduled Monument (National Heritage List for England 1008445; Scheduled Monument 21707; formerly County Number WI 2SAM 220743) and also a Site of Special Scientific Interest (SSSI) on account of the rare chalk grassland vegetation that grows on its slopes. The site is under the guardianship of the Secretary of State for the Department of Culture, Media and Sport and is managed by English Heritage on the U.K. government's behalf (Whittle 1997; Field & Leary in press).

Today, Silbury Hill takes the form of a flat topped cone 150 m in diameter and just under 31 m high when measured from the original land surface (37 m when the depth of the large external ditch surrounding the mound is taken into account). The mound itself is the result of multiple phases of activity and sits on a truncated old land surface (see below). At the center is a low gravel mound (maximum height 0.8 m, diameter 10 m) over which is a mixture of topsoil and turves, enlarging the central mound to just over 1 m in height with an estimated diameter of 22 m. A series of wooden stakes (recorded as stake holes) around the edge of this lower organic mound may have held the structure in place but could equally have been freestanding. Also believed to belong to this phase of activity are one or more smaller additional deposits



Silbury Hill: Environmental Archaeology, Fig. 2 Section through Silbury Hill showing the different phases of construction (Eddie Lyons ©English Heritage)

(mini-mounds) constructed around the central mound, again comprising turf and topsoil. Following on from this phase, pits were dug into the surface of the organic central mound, rapidly backfilled with turf and topsoil then built up, resulting in a central mound of some 35 m in diameter. This upper organic mound was additionally sealed by a series of further dumped layers made up principally of chalk and silty clay, around which at least five chalk and clay banks were constructed, gradually increasing the mound's size. Many of these banks may be associated with the cutting and recutting of a large ditch dug some 50 m out from the center of the hill. However, the first phase of the ditch is associated with a separate bank thrown up toward the center of the hill (i.e., on the internal side), suggesting that the mound may have, at one time, sat inside an enclosure with an internal bank. The later phases of the hill are less well understood because of the nature of the archaeological interventions (see below) but the deliberate backfilling of the ditch, followed by a series of recuts each slightly further out from the center of the mound, possibly continued until the final form of the ditch surrounding the hill was achieved. Similarly, while the piling of quarried chalk was used to expand the monument above and around the central mound and the surrounding deposits, at some stage a different procedure was adopted which entailed the construction of revetment walls of chalk rubble, behind which fine chalk dumps were built up. It is this technique which is evident from excavations on the summit of the hill (Leary, in press; Fig. 2).

The whole construction process is likely to have lasted somewhere between 55 and 155 years. The lower organic central mound and additional mound(s) are estimated to have been completed between 2460 and 2395 cal BCE with final completion estimated at between 2335 and 2270 cal BCE (Marshall et al. in press). The building of the hill thus falls within the same time period as major constructions at Stonehenge and Avebury.

Definition

The importance of Silbury Hill to environmental archaeology lies in the wealth of biological remains preserved within the organic mounds, and representing the early phases of the monument's construction. As the macroscopic

plant remains, mollusks, and insects are derived from the turf and topsoil incorporated into the organic mounds (and from materials laid down or surviving within the old land surface beneath the hill), they give a unique insight into the nature of the late Neolithic environment within an area of major monuments. The remains are preserved due to the anoxic nature of the deposits within the center of the hill. These preservation conditions result from a combination of reduction and limited gaseous exchange between the deposits in the center of the mound and the outside air caused by the sheer volume of the hill coupled with the results of the extra compression caused by "the enormous weight of the mound" (Evans 1972: 267; Canti et al. 2004; and the entry on Preservation of Environmental Archaeological Evidence in this encyclopedia).

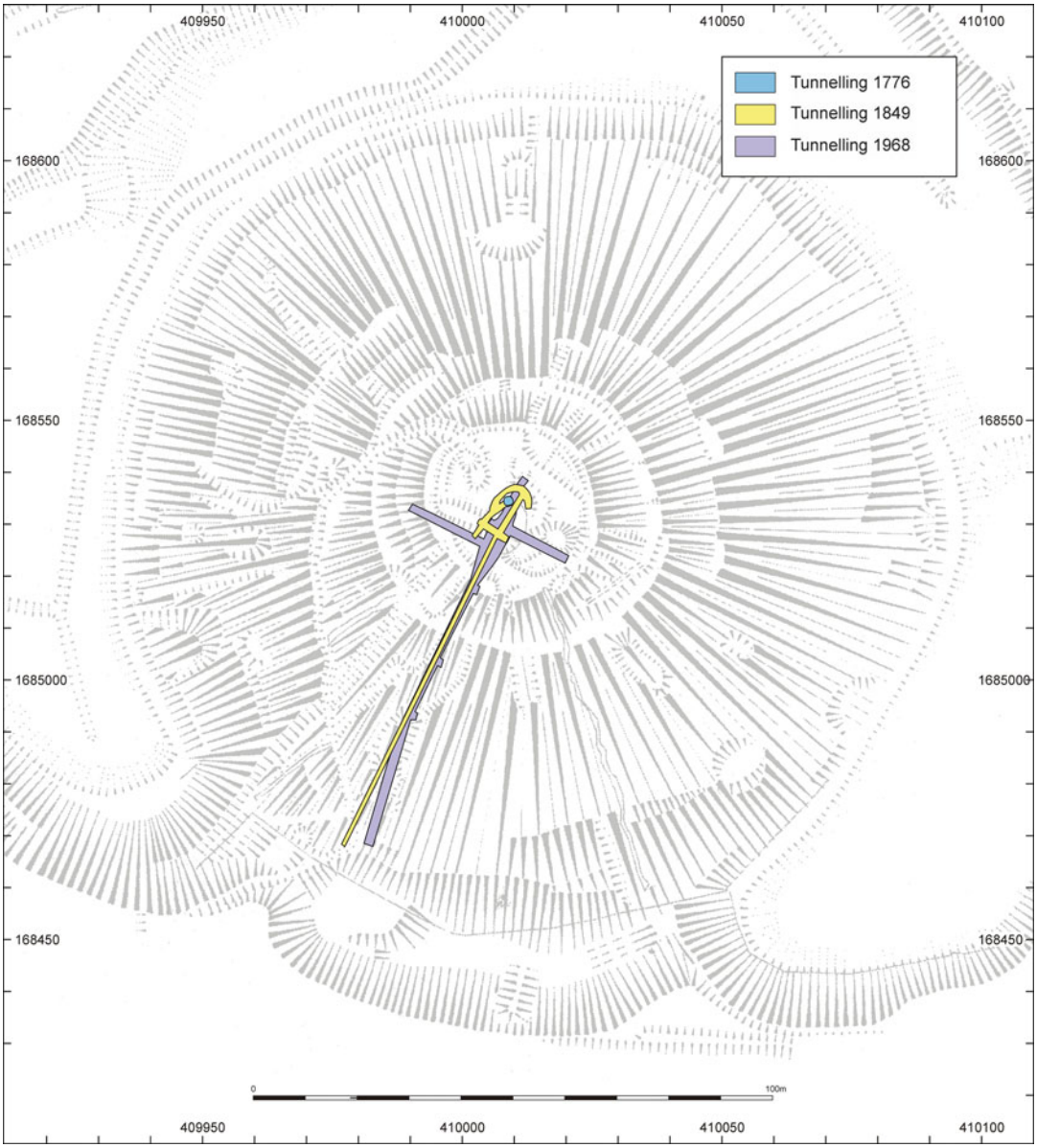
In addition to the delicate biological remains, two other areas of interest from Silbury are the nature of the old land surface and the use of antler as tools. Antler picks are one of the main cultural materials recovered from late Neolithic deposits at the site which generally produced very little cultural material, animal bone, or charred plant remains. This paucity of finds suggests that the site may have been deliberately kept clean (Campbell in press; Leary & Field in press).

Historical Background

There have been four major archaeological interventions into the center of Silbury Hill (Fig. 3). The first comprised the digging of a vertical shaft from the summit down to the center of the hill, carried out by Colonel Drax and the Duke of Northumberland in 1776. The aim of this endeavor was to recover the burial believed to lie under the center, but all that was recovered from the base of the shaft was single sliver of oak (Whittle 1997: 9-10; Leary & Field 2010). The second excavations took place in 1849 funded by the Archaeological Institute. A horizontal tunnel was dug into the center of the hill from the southwest side of the mound with further tunnel extensions excavated in the center. While this excavation also failed to find a central burial, it was the first to record the extraordinary preservation of biological remains deep within the hill. The Very Reverend J. Merewether, in his account of the 1849 excavations, notes both the freshness of the moss found on turves piled up in the center of the hill and also the presence of mollusks, beetles, and other plant remains (Merewether 1851).

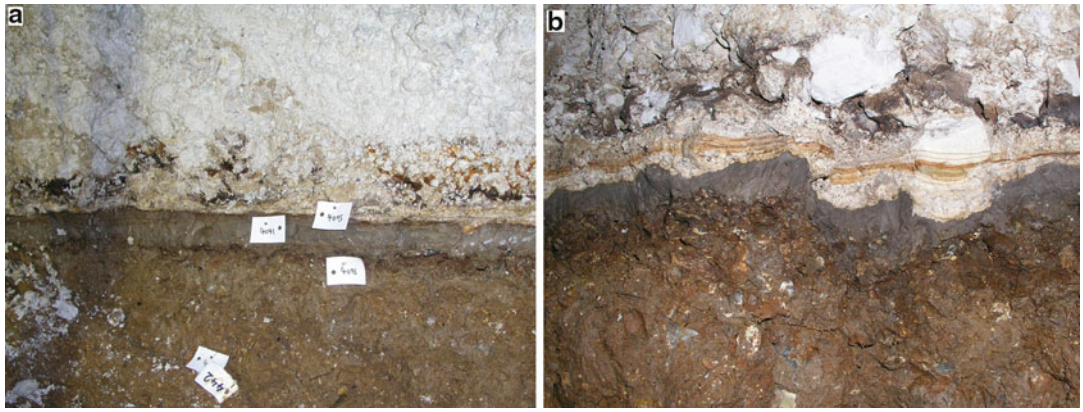
The huge potential of the environmental material only began to be realized following the next major intervention between 1968 and 1970 which was sponsored by the British Broadcasting Corporation (B.B.C.) and directed by Prof. R Atkinson. The tunneling works partly incorporated the footprint of the 1849 tunnels but extended further and included the excavation of two lateral tunnels to the east and west. Among the principal aims of this excavation was to gain an understanding of the composition and date of the monument and "to document its environmental setting" in the light of Merewether's findings (Whittle 1997: 11). To this end, a suite of pioneering environmental analyses was carried out on materials recovered from the tunnels including studies on soils, pollen, macroscopic plant remains (including mosses), insects, mollusks, and vertebrate remains (see Cornwall et al.; Dimbleby et al. respectively in Whittle 1997). While these analyses are a major source of information concerning the site, they suffer from a lack of information about where exactly the material came from, and it is not always possible to ascertain whether the assemblages were recovered from the old land surface or from one of the organic mounds, additional mounds, etc. Thus, while the results give a good overall picture, indicating the presence of open herb-rich grazed grassland in the immediate vicinity of the hill in the later Neolithic (Whittle 1997: 140), details concerning the nature of the old land surface and the different deposits making up the mound are lacking (Canti et al. 2004; Campbell in press).

The fourth major and most recent archaeological investigation at the site occurred during 2007–2008. The research took place as part of a major conservation project by English Heritage involving remedial works to the hill. These works were carried out in response to the discovery of



Silbury Hill: Environmental Archaeology, Fig. 3 Plan of Silbury Hill showing the 1776, 1849, 1968–70 interventions. The 2007–8 remedial works reused the 1968–70 tunnels from Leary et al. in press (Eddie Lyons ©English Heritage)

voids resulting from incomplete backfilling associated with the 1776 shaft, the 1849 tunnel, and the 1968–1970 tunnels. It was clear that the voids would continue to migrate up through the hill to eventually be expressed on the surface, disrupting irreplaceable archaeology: a problem first brought to light by the sudden appearance of a hole on the summit of Silbury Hill on the 29 May 2000, caused by the collapse of the deposits in the 1776 shaft. Thus, the decision was made to re-excavate the 1968–1970 tunnels and to directly backfill all the voids in order to conserve



Silbury Hill: Environmental Archaeology, Fig. 4 **a**) Typical example of the thin gray layer overlying clay-with-flints that forms the old land surface beneath the hill. **b**) Irregular upper surfaces of the layer overlying clay-with-flints (Matt Canti ©English Heritage)

the monument and prevent further damage to its archaeology. This work was accompanied by detailed archaeological recording, including extensive sampling of in situ and disturbed deposits encountered in the sides of the tunnels in order to recover artifacts, biological remains, and for geoarchaeological analysis. The results of this work are soon to be published in Leary et al. (in press). Some of the key findings from the environmental archaeology are discussed below.

Key Issues

The Nature of the Old Land Surface

Silbury Hill is situated on a 1–2-m deep layer of clay-with-flints drift overlying solid chalk, so the preconstruction surface of the chalk spur would have had a clay-with-flints soil profile over much of its area. Inside the hill, the old land surface was characterized by a relatively stone-free dense gray silty clay loam or silt loam layer formed at the junction between the chalk overburden and the underlying clay-with-flints. The layer was as little as 3 cm thick in some places (Fig. 4) but tended to gradually thicken downhill (toward the center of the mound) and was as much as 10-cm thick at some points. It mostly had a smooth interface with the chalk above it, but also sometimes showed irregular upper surfaces (Fig. 4b).

The gray clay layer often had a sharp boundary to the underlying clay-with-flints, usually including a marked gravelly band. Variants on this basic morphology were found in the main exposures to the south and in the lateral tunnels. Toward the center of the hill, the gray layer was less pronounced, and showed more gradual changes with depth. Comparisons with local soils on clay-with-flints showed clearly that, even allowing for redox-based color changes, a simple compression (as would occur if the hill was built straight onto the topsoil) could not generate the thin examples of the dense gray layer (Canti et al. in press).

The gray layer and underlying clay-with-flints were characterized using particle size analysis. This showed a strong relationship between the two materials. Although there was a wide variation amongst the samples, the gray layer could, essentially, be derived from the clay-with-flints if most of the stones larger than 2 mm were removed, and the clay content was reduced by 10 %.

Processes to effect this sorting were considered (including trampling and erosion), and some experimentation was carried out to try and simulate it. In the end, earthworm casting was thought to be the only feasible possibility. Earthworm action is capable of deep sorting (see, for example, Canti 2003, Fig. 7), and the Silbury soil represents a fairly intense example.

Although the process is commonly associated with more calcareous soils than those found on clay-with-flints, the unusual lowland position of the Silbury deposit and possible calcareous inputs from upslope would likely overcome any inhibition due to acidity.

The Silbury builders would, therefore, have found a well-developed worm-sorted topsoil on the chalk spur and deturfed it. They cut well above the stone layer in many cases, producing the old land surface examples with a deeper gray clay layer. Toward the south, perhaps stimulated by increasing distance from the turf stack, they tended to go deeper and arrived at just 2 or 3 cm above the stone layer, producing the profiles seen in Fig. 4. The grayness of the gray layer would arise from leaching of the iron compounds chemically reduced (and thus rendered soluble) by decay of the organic matter still left in the earthworm casts.

The Biological Remains from the Organic Mounds and the Nature of the Later Neolithic Environment of Silbury Hill

Turves that can be cut as soil blocks and used in construction only form under open vegetation types such as grassland, moorland and heaths. This is because, in order for the turf to hold together, there has to be dense vegetation cover and a mat of roots such that the topsoil remains attached to the surface vegetation (Hall 2003; Campbell in press). It is therefore not unexpected that the majority of the biological remains recovered from the organic mounds within Silbury Hill attest to open grassland habitats. However, there is considerable variation between different turf samples and different contexts. This partly results from the nature of the matrix making up the different mounds.

The central lower organic mound is principally composed of turves and topsoil formed on neutral to acidic clay-with-flints material, resulting in pollen being relatively well preserved. In contrast, the upper organic mound contains typically rendzina turves and calcium-rich topsoil, leading to excellent preservation of mollusks but the destruction of pollen evidence. Overall, macroscopic plant remains and insects are preserved well in both mounds (see ▶ Environmental Archaeological Evidence: Preservation). There is also a wide range of preservation states between different specimens, because some material was living or fresh when incorporated (for example, moss growing on the surface, seeds forming part of the soil seed bank, and whole beetles (Fig. 5)), whereas other material was either dead or decayed when incorporated (for example, dead grass, fragmented beetle remains, worn mollusk shells, and partly decayed seeds). These complex taphonomic factors impose limitations on interpretation but also present opportunities. Thus, the month in which a given turf was cut cannot be determined from the presence of the wings of the queen ant *Myrmica sabuleti* since these wings are bitten off following mating flights and would be plentiful around any

Silbury Hill: Environmental Archaeology, Fig. 5 Mangold flea beetle (*Chaetocnema concinna*) found squashed on the surface of one of the turves, scale bar 2.5 mm (Gill Campbell ©English Heritage)

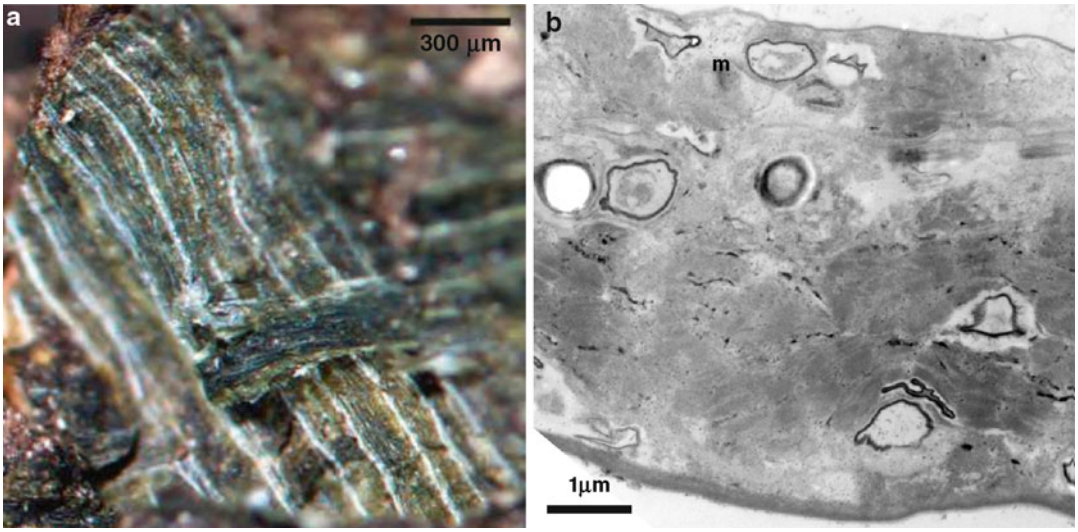
ant nests, surviving in the soil for some time (Robinson 1997: 41, 43; Robinson in Campbell in press). On the other hand, the presence of worn mollusk shells of species typical of woodland along with poorly preserved seeds of woodland plants such as *Mercurialis perennis* (dog's mercury) and *Rosa/Rubus* type (rose or bramble) thorns among well-preserved remains of mollusks indicating dry open grassland and well-preserved remains of *Ranunculus* cf. *bulbosus* (bulbous buttercup) within an individual turf can be used to reconstruct the history of the turf; it may have been cut from grassland developed following woodland clearance undertaken probably less than a century earlier (Campbell in press).

Bearing these factors in mind, the results from samples of individual turves from the central organic mounds within Silbury Hill indicate that turves were cut from grassland developed on at least two contrasting soil types, with different land-use histories and subject to varying degrees of wetness, disturbance, and grazing pressure. The moss remains in particular allow aspect (whether the turf was cut from a north or south facing slope) to be postulated (Williams 1976; Hall & Campbell in press) while the presence of *Lasius flavus* gp. ants which build ant hills in old grassland may suggest the harvesting of turves from mature grassland (Robinson in Campbell in press).

The results from the only mini-mound to be sampled gave somewhat different results than those of the central organic mound. Although a grassland element is present, indicators of woodland environments including propagules of *Taxus baccata* (yew), *Prunus spinosa* (sloe), and *Ajuga reptans* (bugle) along with some woodland beetles and well-preserved specimens of shade-loving mollusks such as *Clausilia bidentata* (common door snail) were recorded. Some cereal remains were also recovered, which given the evidence for animal dung obtained from the insect remains could be derived from the droppings of livestock fed on cereal chaff. At the same time, the few water beetles identified from this deposit (*Colymbetes fuscus*, *Helophorus* cf. *brevipalpis* and *Hydrobius fuscipes*) which was otherwise largely devoid of wetland species suggest the presence of temporary pools or puddles. Overall, these results give an impression that the material used to construct this mound may have been gleaned from the woodland edge, where cattle or other livestock sheltered, churning up the ground to create muddy pools (Campbell in press).

The contrasting environments represented in the materials used up to make the different organic mounds could all have been found within the immediate vicinity of the site, though this does not mean that elements could not have been brought from within the wider area of the Marlborough Downs. Indeed, the fact that different habitats were incorporated into different areas of the hill might be taken as evidence that the inclusion of different parts of the landscape into the monument held significance for those building the monument, as has been suggested for the inclusion of sarsens in the upper organic mound and for the monument as a whole (Leary & Field in press; Leary & Field 2010: 119-122).

However, probably more important from an environmental perspective is the clear evidence for the existence of a herb-rich chalk pasture in the environs of Silbury in second half of the third millennium BCE. This is indicated by the presence of plants such as *Sanguisorba minor* ssp. *minor* (salad burnet), *Linum catharticum* (fairy flax, and *Scabiosa columbaria* (small scabious), all of which were recorded both as plant macrofossils and during the first surveys of the vegetation growing on the monument in the mid-nineteenth century (Buckman 1864-66; Williams in Whttle 1997; Campbell in press). In addition, the numbers and percentage of remains of scarabaeoid dung beetles and meadowland weevils that feed mainly on grassland leguminous plants indicate grazing by domestic animals with stocking levels similar to those found in the area today (Campbell in press; Robinson 1997). This implies careful management of the environment by late Neolithic people with grazing rights controlled or negotiated within or between groups (Campbell in press).



Silbury Hill: Environmental Archaeology, Fig. 6 (**a**) Silbury green plant material as it appears in situ as thin strands with blue green to bottle green color, scale bar 300 µm (Margaret Collinson and Eddie Lyons, ©English Heritage) (**b**) Green plant material in TEM section, scale bar 1 µm (Margaret Collinson, Tony Brain and Eddie Lyons, ©English Heritage)

International Perspectives

The biological remains from Silbury Hill give very little evidence of human occupation, in contrast to sites such as early Neolithic La Draga (see this encyclopedia ▶ La Draga: Environmental Archaeology). Rather, the site provides a snapshot of a late Neolithic landscape with clear evidence for the managed grazing of livestock and the presence of herb-rich chalk grassland. The fact that some of the turves from the organic mounds contain evidence of past woodland strongly suggests that if grazing ceased or was reduced, much of the area would eventually revert to woodland. Indeed, where indicators of woodland were recorded, the taxa found are more typical of secondary rather than primary woodland. These results fit in with the regional picture. Some clearance of primary woodland is attested from the beginning of the fourth millennium cal BCE followed by increased human presence and further clearance. The end of the fourth/beginning of the third millennium cal BCE appears to have been marked by woodland regeneration with the advent of Silbury coming at the same time as evidence for renewed clearance (Whittle 1997: 140; Campbell in press). The presence of a generally wooded environment in the earlier Neolithic in the Avebury region contrasts with that for other areas of the southern chalk which seem to have been more open with larger areas, of grassland. Furthermore, it is suggested that in these areas, postglacial woodland may never have become fully developed and it is no longer valid always to assume that, prior to human influence, a given site would have been wooded (Allen & Gardiner 2009).

Analyses of biological remains present within turves (sods) used in the construction of mounds and other structures have been carried out at a number of other sites and provide valuable information on land-use history and the nature of the environment (Hall 2003; Karg 2008). Recent work on macroscopic plant remains in close conjunction with the geoarchaeological analysis of individual turves used in the construction of the Skelhøjthe mound, near Ribe, Denmark, has provided evidence of the management of heathland vegetation for grazing at around 1350 cal. B.C. The turves from beneath

the iron pan layer represent the first meter of the mound makeup and contained well-preserved plant and insect remains preserved as a result of anoxic conditions. *Calluna vulgaris* (heather) remains, including roots, stalks flowers, and seeds, formed the principal component of the surface vegetation on the turves along with other species indicative of dry grazed heathland. Within the turves charred remains of heather and other plants such as *Rumex acetosella* (sheep's sorrel), *Pimpinella saxifraga* (burnt-saxifrage), and *Carex pilulifera* (pill sedge) showed that the heathland had been previously burnt with the age of the heather and the nature of the surface vegetation, suggesting that this probably occurred between 3 to 10 years prior to the turves being harvested. The regular burning of heath increases fertility, prevents scrub encroachment, and ensures that heather flourishes at the expense of other species. Young plants and shoots of heather are also more nutritious than older growth. The results from the Skelhøj mound show that this traditional method of managing heath for grazing was already practiced in the fourteenth cal B.C (Karg 2008).

Future Directions

Green 'Grass' Remains

The reported evidence of "short grass with square ends" from within Silbury Hill (Whittle 1997: 140) along with descriptions of the vegetation retaining its green color (see, for example, Whittle 1997: 16) is one of the unusual features of the remains from this site. Pieces of green plant material were also recovered during the 2007/8 excavations at Silbury and the majority of these remains appeared at low magnification to resemble fragments of grass leaves or stems with some showing squared ends. However, when investigated further using transmission electron microscopy (TEM), this material was found to lack cellular structure consisting only of two thin outer membranes containing portions of chloroplast thylakoid membranes within an amorphous matrix (Collinson et al. 2011; Fig. 6).

In order to determine what this material might be, and to understand how its unusual preservation might have arisen, it was compared to a number of different modern plant derivatives including fresh, rotted, animal digested, and humanly processed material using TEM. Of the plant materials examined, partially fermented (couched) woad (*Isatis tinctoria*) most closely resembled the green plant material from Silbury Hill as all the others retained cellular structure. While it is not proposed that woad is present at Silbury, the results suggest that the green plant material consists of partially fermented higher plant tissue (further determination is not possible given the lack of diagnostic features). This fermentation may have occurred naturally during construction, but it is also possible that the green plant material was the waste product from some unknown process involving fermentation, with the by-product being placed or discarded into the mound. Further work is required involving the examination of experimentally fermented plant material from known species, as well as material cut, trampled, and then treated in a variety of different ways (Collinson et al. 2011, Collinson et al. in Campbell in press).

Antler

The 2007/8 excavations at Silbury Hill produced a small fragmented antler assemblage probably resulting from the use of antler picks as tools, though only five antler fragments showed wear that could not be attributed to deer behavior. In addition, a chalk block bearing strike marks from an antler pick was recovered during excavations on the summit. There are also a number of other finds of antler from the previous interventions, with these finds often referred to as deer horn in the early reports (Worley in press).

It is postulated that an antler pick can only be used as a tool for a single day during which time it can be used to dig out around 3 m^3 of chalk. Given that the volume of chalk making up Silbury Hill is estimated as somewhere between 236000 m^3 and 23900 m^3, this would mean that over 78000 picks would have been needed over the period of construction (see above), so something like 500 antler picks would be needed each year. While these figures only provide estimates, they do serve to illustrate that the

collection of shed antler would have been an important spring activity for people at this time, and that in all likelihood this commodity would have been traded or exchanged as a valuable resource. Antler could also have been harvested from deer killed for meat (Worley in press).

The small number of fragments retrieved from the various excavations into Silbury Hill, even taking into account the tiny proportion of the mound that has been excavated, suggests that the majority of tools or broken tools were not discarded on site. This could relate to the need to keep the site "clean" (see above) but might also mean that even broken fragments were reused or recycled into other items. This pattern of disposal might further indicate that those antler fragments that were found within the hill represent deliberately placed deposits. Similar practices have been noted at other ceremonial sites. The central zones of such sites (e.g., Avebury, Durrington Walls) tend to be free from antler tools whereas caches of antler picks have been recovered from their ditches where they are interpreted as offerings marking the completion of works (Worley in press).

The question of how and from where the antler picks used to build Silbury Hill were procured has become the subject of new research, funded by a grant from the British Academy. This project aims to discover whether strontium isotope analysis can be used on the antler from Silbury Hill to determine its provenance. If successful, the method could be applied to other sites and other antler artifacts.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Isotopic Studies of Foragers' Diet: Environmental Archaeological Approaches
- ▶ La Draga: Environmental Archaeology
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Radiocarbon Dating in Archaeology
- ▶ World Heritage List: Criteria, Inscription, and Representation

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Silverman, Helaine

Helaine Silverman
Department of Anthropology, University of Illinois at Urbana-Champaign, Urbana, IL, USA

Basic Biographical Information

Helaine Silverman received her B.A. at Queens College of the City University of New York, M.A. at Columbia University, and Ph.D. at the University of Texas at Austin. She holds the position of full professor in the Department of Anthropology at the University of Illinois in Urbana-Champaign where she is also the director of the university's Collaborative for Cultural Heritage Management and Policy (CHAMP). Prior to becoming involved in cultural heritage research, Dr. Silverman conducted many years of archaeological fieldwork on the south coast of Peru.

Major Accomplishments

Dr. Silverman's Nasca research in the 1980s and 1990s rewrote understanding of this ancient society, which previously had been known almost exclusively on the basis of its exquisite polychrome pottery and the countless tombs from which this material had been looted over the course of almost a century. She overturned the dogma that early Nasca had been organized as a state and that Cahuachi, the greatest early Nasca site, had been a city. Her fieldwork at Cahuachi and in several valleys of the Río Grande de Nazca drainage proved the lack of political centralization in early Nasca society and that Cahuachi had functioned, basically, as an "empty ceremonial center" animated by pilgrimage but without significant residential population. She also was the first scholar to contextualize the "mysterious" Nazca Lines (geoglyphs) within the society that produced them, identifying scores of geoglyph sites of various types on the hillsides of the valleys where the Nasca population lived and demonstrating the relationship between habitation sites and geoglyphs.

In addition to her own publications, Dr. Silverman has been a prolific editor of influential volumes on Andean archaeology: *Andean Archaeology* (Blackwell, 2004) and with William H. Isbell, *Andean Archaeology I: Variations in Sociopolitical Organization* (Plenum/Kluwer, 2002); *Andean Archaeology II: Art, Landscape, and Society* (Plenum/Kluwer, 2002); and *Andean Archaeology III: North and South* (Springer, 2006). She and Isbell also coedited the massive *Handbook of South American*

Archaeology (Springer, 2008), a state-of-the-art compendium and the first to tackle the continent since Julian H. Steward's *Handbook of South American Indians* in the late 1940s.

It was constant media attention to her Nasca investigations that led Dr. Silverman into the cultural heritage field. She became intrigued with public interest in the past and how the past was deployed by the tourism industry and constructed by the Peruvian nation-state. As part of this new work, she also conducted ethnoarchaeological work on modern Peruvian cemeteries and in museums.

Dr. Silverman's current research is a critical analysis of the cooperative and conflictual production of archaeological monuments as cultural heritage sites for visual, performative, economic, and political consumption as undertaken by national governments, regional authorities, local administrations, community stakeholders, and the global tourism industry. In this regard, she has been conducting a long-term study of the historic district of Cuzco, former capital of the Inca Empire and today one of Peru's foremost tourist attractions. She also has worked in Thailand where has been studying the impact of cultural tourism in Phimai, a small town in whose center towers a great ancient Khmer temple that is currently on the Tentative List and intended for inscription on UNESCO's World Heritage List.

Dr. Silverman is a member of Forum-UNESCO, an expert member of ICOMOS' International Scientific Committee on Archaeological Heritage Management (ICAHM), and an affiliate member of ICOMOS's International Scientific Committee on Cultural Tourism (ICTC). She serves on the editorial boards of *International Journal of Heritage Studies, Heritage & Society, American Anthropologist* and *World Art*. She is a former editor of *Latin American Antiquity* (2008–2010). She was the book series editor for "Critical Perspectives in Identity, Memory and the Built Environment" (Routledge) and currently edits the "Heritage, Tourism, and Community" book series (Left Coast Press) and coedits ICAHM's book series, "Multidisciplinary Perspectives in Archaeological Heritage Management" (Springer).

Cross-References

- ▶ Collaborative for Cultural Heritage Management and Policy (CHAMP)
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage Theory
- ▶ Heritage Tourism and the Marketplace
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ Sustainability and Cultural Heritage
- ▶ World Heritage List: Criteria, Inscription, and Representation

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Singapore: Cultural Heritage Management

John N. Miksic
Southeast Asian Studies Programme, National University of Singapore/Nalanda-Sriwijaya Centre, Institute of Southeast Asian Studies, Singapore, Singapore

Introduction

Singapore is a small, densely populated country. Five million people live on the main island, which covers about 650 km^2. Competition for land is intense. These considerations are often cited to explain the fact that Singapore is one of the few countries in the world where archaeological resources are not protected by law. There is no official archaeological department; archaeological research in this country has been mainly funded by donations from private sources, with some government grants for specific projects. Research has been conducted by university academics from the National University of Singapore and Nanyang Technological University, students, and unpaid volunteers.

Several official bodies have duties concerned with specific aspects of heritage conservation; these include the National Heritage Board, the Urban Redevelopment Authority, and the Preservation of Monuments Board. The National Heritage Board, and the National Museum which forms part of it, has contributed funds and some administrative assistance to archaeological research projects. Other funds have come from NGOs (the Lee Foundation and the Southeast Asian Ceramic Society) and corporations (Royal Dutch Shell, American Express).

In 2010, the Institute of Southeast Asian Studies established an Archaeology Unit under its Nalanda-Sriwijaya Centre. The Unit conducts research in Singapore and elsewhere in Southeast Asia. The National Parks Board has allocated funds for the construction of an outdoor display on an archaeological site in Fort Canning Park. This is one of Singapore's most important precolonial sites and provides visitors with an opportunity to see a display of artifacts and a preserved example of stratigraphy. The Singapore Heritage Society is a registered nongovernmental organization, and often speaks out on issues of heritage management. The Society publishes books on the subject, and comments on topics of concern to the local media.

Definition

In this entry, the term "cultural resources" is understood to mean all artifacts and man-made structures of the period before 1950, and all sites where concentrations of such artifacts can be found, whether in disturbed or undisturbed contexts. "Management" will be used to refer to efforts by official bodies to preserve or modify these artifacts and sites.

Key Issues

The Singapore government has exhibited a laissez-faire attitude toward its archaeological heritage. Excavations since 1984 have demonstrated that sites exist with artifacts dating from

the early fourteenth century, with some objects (Chinese coins) brought to the island at that time actually dating back to the Tang Dynasty (618–906). These sites consist of a fourteenth-century elite residential/craft zone on a hill now known as Fort Canning, and a settlement of artisans and traders on the left bank of the Singapore River which was occupied from the early fourteenth to the early sixteenth centuries. The government has sponsored archaeological research at these sites, one of which has been preserved and presented to the public as a semipermanent display. However, the government has not adopted proposed legislation which would have required contractors to stop work in case of the discovery of potential archaeological sites within the boundaries of the fourteenth-century urban area. There is no requirement that any impact assessments be conducted in advance of construction projects.

Conservation of individual buildings began in the 1970s when the Urban Redevelopment Authority (URA) and Preservation of Monuments Board (PMB) were formed. Controversies arose in the 1980s regarding the URA's focus on preserving individual building facades while neglecting districts and street life. The URA's policies have evolved as a result.

History of Archaeology in Singapore

Archaeological research in Singapore dates from January 1984, when the Singapore National Museum organized a test excavation at Fort Canning, a park where the museum staff suspected artifacts representing precolonial occupation might be discovered. The project succeeded in uncovering evidence of fourteenth-century occupation. In 1987, the Department of History of the National University of Singapore hired a lecturer to teach courses on archaeology and ancient history; the Parks and Recreation Department, the body which was then in charge of developing the park in which the archaeological site was discovered in 1984, hired the lecturer as a part-time archaeological consultant.

An excavation in 1987 was conducted as part of a sequence of archaeological workshops sponsored by the Association of Southeast Asian Nations (ASEAN). A total of 12 excavation projects has been carried out in Fort Canning Park, built on Fort Canning Hill (Miksic 1985, 2006). The name is derived from a British fort built on the top of the 45-m-high hill in 1859, then largely demolished in 1928 to build a reservoir. Other military structures were built on the hill's lower slopes at the same time.

The Fort Canning office of the Parks and Recreation Department (since 1990 the National Parks Board, NParks for short) has been very supportive of archaeological research. Although there is no requirement to do so, the management of Fort Canning Park often contacts an archaeologist when they discover remains during their normal maintenance activities, and when sizeable earth-moving is contemplated. For example, when handicapped access facilities are installed, they notify the archaeologist so that the location affected can be studied.

Public Archaeology on Fort Canning

In the 1990s, a number of projects were carried out to exploit the historical and cultural resources of the park. These include the redevelopment of a semi-historical, semireligious Muslim shrine called the Keramat Iskandar Shah; the construction of two Walks of History (one with signboards related to the fourteenth century and the other commemorating important sites of the British colonial period which began in 1819); and the development of a permanent display at a part of the archaeological excavation which revealed fourteenth-century artifacts in their original contexts.

The first project to be completed was the redevelopment of the Keramat, in 1990. In 1822, the jungle on the hill's surface was cut down and a number of brick ruins were found on the hill. According to a contemporary description (Crawfurd 1967 [1828]), these ruins were made of good quality brick, and were sufficiently numerous that they covered the greater part of the slope. Among the ruins were scattered Chinese and local pottery and Chinese coins dating from the Tang and Song Dynasties. A tradition rapidly arose, on what grounds it is not known, that the site was the final resting place of Iskandar

Singapore: Cultural Heritage Management, Fig. 1 Keramat Iskandar Shah

Shah, the founder of the kingdom of Malacca and one of the first Malay rulers to accept Islam. According to Chinese sources, he died around CE 1413. A series of new structures were built on the site by devotees upon its discovery. By the 1980s, nothing of the original structure remained.

NParks formulated plans to build a new structure on the site, to call attention to the historical character of the park. The few details noted in Crawfurd's description given just after the site's rediscovery in 1822, together with motifs used for early wood-carving, were combined to create the structure seen there now. A carved stone plaque records what is known of the history of the site and Iskandar Shah. It is one of the main stops on the fourteenth-century Walk of History. These walks are simple in concept: paths, in most cases preexisting, with appropriate plaques set up in suitable locations giving information about the historical significance of the site (Fig. 1).

The next major development was the erection of a roof with similar design to that over the Keramat to protect a partially completed excavation where dense evidence of fourteenth-century activities has been recovered. Dr. John Chen Seow Phun, Minister of State for Ministry of National Development and Ministry of Communications and Information Technology, officially opened the facility on 20 April 2001. Visitors can view an actual excavation which presents a soil profile with an early twentieth-century brick foundation in the top layer, beneath which is a layer of sterile red laterite soil, which changes at a sharply defined boundary to a dark brown loam containing a dense concentration of fourteenth-century artifacts. Around the pit, which measures 100 m^2, is a walkway with captions providing information on the general history of fourteenth-century Singapore, and explanations of general archaeological methods. Within an adjoining gallery are cases containing samples of artifacts excavated from the site, together with posters identifying the artifacts discovered and the methods used to recover and interpret them (Fig. 2).

NParks also conducts archaeology-themed events. These involve families who are given a chance to carry out mock excavations in sand boxes, using genuine artifacts found in the hill, and visiting the archaeological site near the Keramat.

Also in the early twenty-first century, reconstructed versions of colonial-period features were erected at the south end of the park. These include a flagstaff, lighthouse, and time ball. These are principal features of the nineteenth-century Walk of History. Further enhancements include installation of a sequence of carved cement reliefs depicting imaginary scenes from Singapore's history along the staircase at the south slope of the hill.

Singapore: Cultural Heritage Management, Fig. 2 Archaeological display, Fort Canning Park

Singapore: Cultural Heritage Management, Fig. 3 Gateway to Fort Canning Cemetery, 1848

Eleven structures from the British colonial period still stand on Fort Canning. These include six military structures: the main fort gate and a sally port, built in 1859, and the Underground Command Centre and three other military buildings dating from 1928. The other remaining features from the colonial period are part of Singapore's first cemetery, which was in use from 1822 to 1860; they include two gothic gateways built in 1846 (Fig. 3), a monument to the son of a prominent British resident of the colony who died in 1848, and two cupolas built as places for cemetery visitors to rest. These cemetery features have been well preserved, whereas the tombstones which once crowded the graveyard were removed in the 1960s and set into the brick wall surrounding the cemetery.

In 1992, the role of Fort Canning in World War II was commemorated by a short-term exhibition held in the Underground Command Centre, a very large command bunker. Public response to the short-term exhibition was so strong that it was decided to make plans for a permanent exhibition in the bunker. NParks

Singapore: Cultural Heritage Management, Fig. 4 Interior of Underground Command Centre before restoration

leased the bunker to a private firm for development: a bidder who won the right to develop another major British military structure on the hill into a country club. The structure had been the headquarters of the British high command in World War II, where Lieutenant General A.E. Percival, the General Officer Commanding Malaya, had his office.

The redeveloped bunker opened on 15 February 1997 (the 55th anniversary of the fall of Singapore to Japanese forces). The presentation utilizes techniques such as elaborate technology for simulating a bombing attack, narration broadcast over a local FM transmitter to which visitors listen through headsets, and animated wax figures of soldiers. The installation of these displays required the remodeling of the structure including the drilling of new doorways through walls and excavation of floors to facilitate the flow of visitors and installation of simulators. Displays were fabricated using surplus military equipment purchased in Britain, of types which were not used in Singapore. Mock-ups of some rooms were given functions used in other rooms; for example, the Fortress Plotting Room became the Gun Operations Room, while the real Gun Ops Room is used for the bombing simulation. Most of the original fabric and atmosphere have thus been lost (Fig. 4).

Other Archaeological Sites in Singapore

In 1993, a reconnaissance of a site designated for Singapore's new Parliament House Complex yielded evidence that an archaeological record of precolonial activity was preserved there. In 1995, an archaeological team was given two months at the beginning of the rainy season when no construction could take place to attempt to recover more data on early Singapore. This was later extended by another month.

The site occupied a location on the north bank of the Singapore River in a position which seemed likely to have been occupied by residents of the ancient Temasik mentioned in Chinese, Javanese, and Vietnamese sources in addition to Malay texts. Excavations there demonstrated that the site contained undisturbed fourteenth century remains.

Since 1995, ten other sites in Singapore have been excavated, some in order to recover more evidence of the fourteenth century, others to explore the material culture of nineteenth and early twentieth-century Singapore. Artifacts from these research projects are now on display in the National Museum, the Asian Civilisations Museum, St. Andrew's Cathedral, and the National University of Singapore Museum. Most of the artifacts were stored in the Fort

Canning Centre, a building on Fort Canning belonging to the National Parks Board, until 2008, when they were moved to the campus of the National University of Singapore, where cataloging and analysis are conducted by students and volunteers.

Other Singaporean Institutions Involved with CRM

In 2010, the Institute of Southeast Asian Studies announced the foundation of an Archaeology Unit under the Nalanda-Sriwijaya Centre. This unit was officially launched in August 2011. The Unit has no jurisdiction over archaeological resources; it will still have to seek permission to conduct research from the landowner. The Archaeology Unit works closely with the archaeological laboratory which was set up at the National University of Singapore in 2009. The university has not courses on archaeology, but a course on CRM in Southeast Asia has been taught annually since 1999. Several academic exercises and master's theses have been written for the Department of Southeast Asian Studies, which was founded in 1991 as a program, and became a department in 2011.

The National Museum of Singapore has passed through a number of phases since Singapore became an independent nation in 1965, after having formed part of Malaysia for three years, and a British colony since 1819. The museum's building was erected in 1887, and for the next 75 years, it amassed a collection of specimens of flora, fauna, and ethnographia, with a few archaeological remains, from the Malay Peninsula and neighboring areas. The new nation was content to leave the museum mainly as it was inherited until 1984, whereupon the museum's potential as a nation-building tool was acknowledged, and major renovations were instituted (Kwa in press).

In 1994, the works of art and the artifacts from other parts of Southeast Asia were removed from the National Museum's collection and divided among a new Singapore Art Museum and an Asian Civilisations Museum. In 2006, a new wing was added to the old National Museum, and an archaeological gallery was installed. This gallery has a permanent exhibition of artifacts from systematic excavations in Singapore, and an audiovisual presentation in a theater which lasts about 12 min. This presentation is unusually designed, because instead of providing one standard narrative, it compares the interpretation of precolonial sources on the basis of different sources (Malay, Chinese, Javanese, and Portuguese).

In 1995, a Chinese Heritage Centre was founded; it is housed at the Nanyang Technological University. It focuses on the recent history of the overseas Chinese and has no archaeological interest. In 2000, preparatory to the development of a Malay Heritage Centre in a nineteenth-century palace, the Istana Kampung Gelam, archaeological excavations were conducted in the Center's courtyard. Excellent results were obtained in the form of different types of artifacts representing life in the palace in the nineteenth and early twentieth centuries, a period for which very little written documentation exists. A small sample of these was exhibited in the Centre until 2010, when they were removed as part of a major renovation of the Centre. It is not known whether they will be reinstalled in future. They are now stored in the archaeological laboratory of the National University of Singapore (Fig. 5).

An Indian Heritage Centre is the next such institution to be constructed. Plans have been made for a three-week excavation at the site selected for the Centre in March 2012. If artifacts are found, they will be exhibited in the Centre together with artifacts of Indian origin found in fourteenth-century contexts elsewhere in Singapore.

Archaeology is gradually becoming recognized as a part of the Singapore story. One of the ways in which this field may make a deeper impression is connected with an online 3-D multi-player role-playing game entitled World of Temasek (www.worldoftemasek.com). This game was developed by the Media Development Authority of Singapore, the National Heritage Board, and an IT company, Magma Studios, and launched by the Minister for Information, Communications and the Arts, Lui Tuck Yew, on 3 March 2011. The game allows players to put themselves in the position of a character such as

Singapore: Cultural Heritage Management, Fig. 5 Istana Kampung Gelam excavation

a spice trader, a pirate, or a sailor in Temasek (the fourteenth-century name of the island). Illustrations in the game are taken from archaeological data, and levels of information and interpretation available in the game provide illustrations of artifacts, links to historical sources, and other materials.

The Urban Redevelopment Authority and the Preservation of Monuments Board are other governmental institutions with jurisdiction over cultural resources. These resources are defined in terms of buildings, either individually or in streets or districts. Their involvement in archaeology has been minimal, but these two bodies have developed an increasingly sophisticated strategy aimed at preserving examples of colonial period architecture and districts. The Singapore Heritage Society, an NGO, has often lent its support to archaeological projects and preservationist causes.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage Areas
- ▶ Heritage: History and Context
- ▶ Historical Archaeology
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Marketing Heritage
- ▶ Urban Archaeology in Twenty-First Century Perspective
- ▶ Uses of Heritage

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Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture

Jocelyne Desideri
Laboratory of Prehistoric Archaeology and Anthropology, Institut F.-A. Forel, University of Geneva, Geneva, Switzerland

Introduction

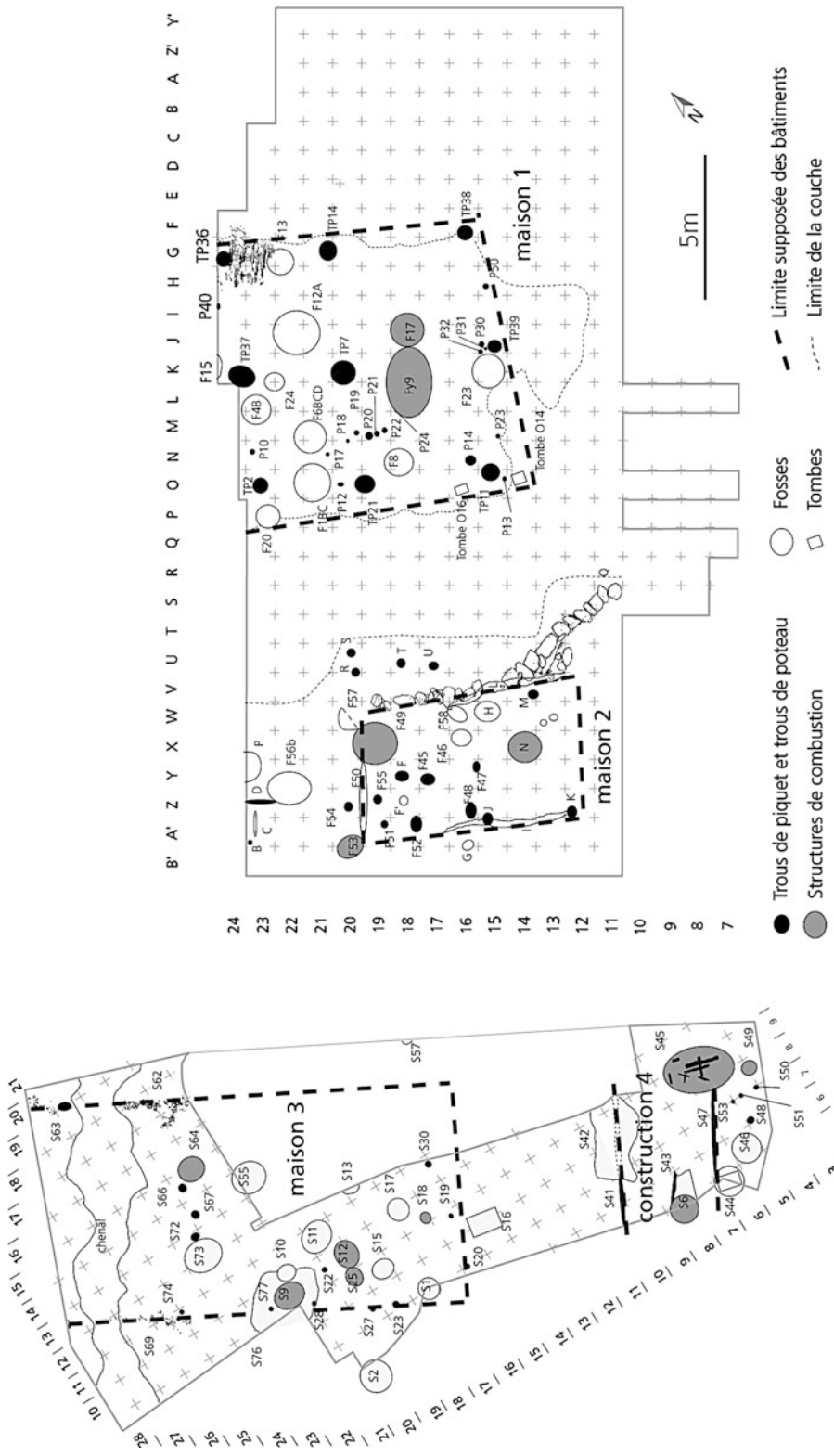
The canton of Valais contains one of the most important Swiss Neolithic sites: Petit-Chasseur in Sion. While this site is already internationally renowned for its megalithic necropolis dating from the Late Neolithic to the Early Bronze Age as well as for its beautiful anthropomorphic stelae, it also has occupation levels dating to the Middle Neolithic and burial sites of the Second Iron Age. The site of Petit-Chasseur was discovered in 1961, following the work of civil engineers in the heart of the city of Sion. It was extensively excavated by O. J. Bocksberger from 1961 to 1969 and by A. Gallay from 1971 to 1973. New interventions were carried out in 1987–1988 by S. Favre and M. Mottet, in 1992 by M. Besse, and in 2003 by M. Mottet.

Definition

Levels of Habitat in the Middle Neolithic

The Middle Neolithic occupations at Petit-Chasseur are subdivided into three phases (Besse & Piguet 2011). An early occupation phase dating to 4,500 BCE, and attributed to the Middle Neolithic I, was very poorly preserved, and no housing plan can be reproduced. A middle phase, situated between 4,000 and 3,800 BCE, attributed to the Middle Neolithic II – Cortaillod of the Petit-Chasseur type – reveals the best-preserved habitat. At this level, a hamlet composed of at least three housing buildings and a construction interpreted as a space dedicated to penning livestock have been identified (Fig. 1). Finally the third phase, dating from 3,800 to 3,600 BCE is associated with the Middle Neolithic II – Cortaillod of the Saint-Léonard type. This level presents at least two domestic units, but these are poorly preserved, preventing identification of the housing plans.

The homogeneity and the distribution of the remains found are in line with similar ways of life and similar choices of consumer products (Besse & Piguet 2011). Production activities were oriented toward goat breeding and cultivation of cereals (barley and wheat). Subsistence activities and crafts were controlled at the scale of the house. Diverse and varied influences are highlighted by the study of ceramics. The lithic industry was dominated by quartz used for domestic blade production. During the regional Middle Neolithic in general, the knapping of quartz took place off-site, near the sources (Besse & Piguet 2011).



Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 1 The structures of the stratigraphic series of Middle Neolithic II, Cortaillod type Petit-Chasseur and the supposed boundaries of the buildings (Besse & Piguet 2011: 64)

Excavations in the Middle Neolithic II habitation levels also revealed seven funerary structures (Besse & Piguet 2011). These are cysts of *Chamblandes* type, burial vaults formed of four slabs in a pit and, in general, a capstone. The chamber is covered with materials from the pit. Each cyst contains one or more individuals, usually buried in left lateral or supine position, with limbs bent. In domestic context, burials of this *Chamblandes* type contain mainly for juveniles (Desideri & Besse 2009).

The Megalithic Necropolis of Petit-Chasseur

The famous megalithic necropolis of Petit-Chasseur reveals an occupation that lasted for nearly 15 centuries. The magnificent collection of anthropomorphic stelae and funerary objects could be correlated to different chronological phases, thus enabling a seriation of several construction stages and use of the 12 monuments– MI to MXIII – of the megalithic area, from the Late Neolithic to the Early Bronze Age (Fig. 2).

Funerary Occupation During the Late Neolithic

The necropolis includes two monuments dating from the Late Neolithic, collective graves MVI and MXII. These are dolmens with a triangular base and antennas.

Dolmen MXII is the oldest megalithic area monument from Petit-Chasseur (Favre & Mottet 2011). It shows an occupation that lasted between five and seven centuries from 3,100 to 2,400 BCE and is the only tomb containing human remains in place for this period. The first phase of burials was completely reworked, and the remains piled northwest of the burial site. The second phase begins with the burial of an individual – in the middle position in the grave – in a slightly lateral right position. Next, those buried were spread in successive layers composed of three lines of two bodies, generally laid in supine or lateral position with limbs bent. Before a new occupation, a regular reorganization took place by leveling the ground and removing the bones disturbing the leveling. The skulls were moved and stored against a slab of the monument. The burial chamber contains at least 115 individuals.

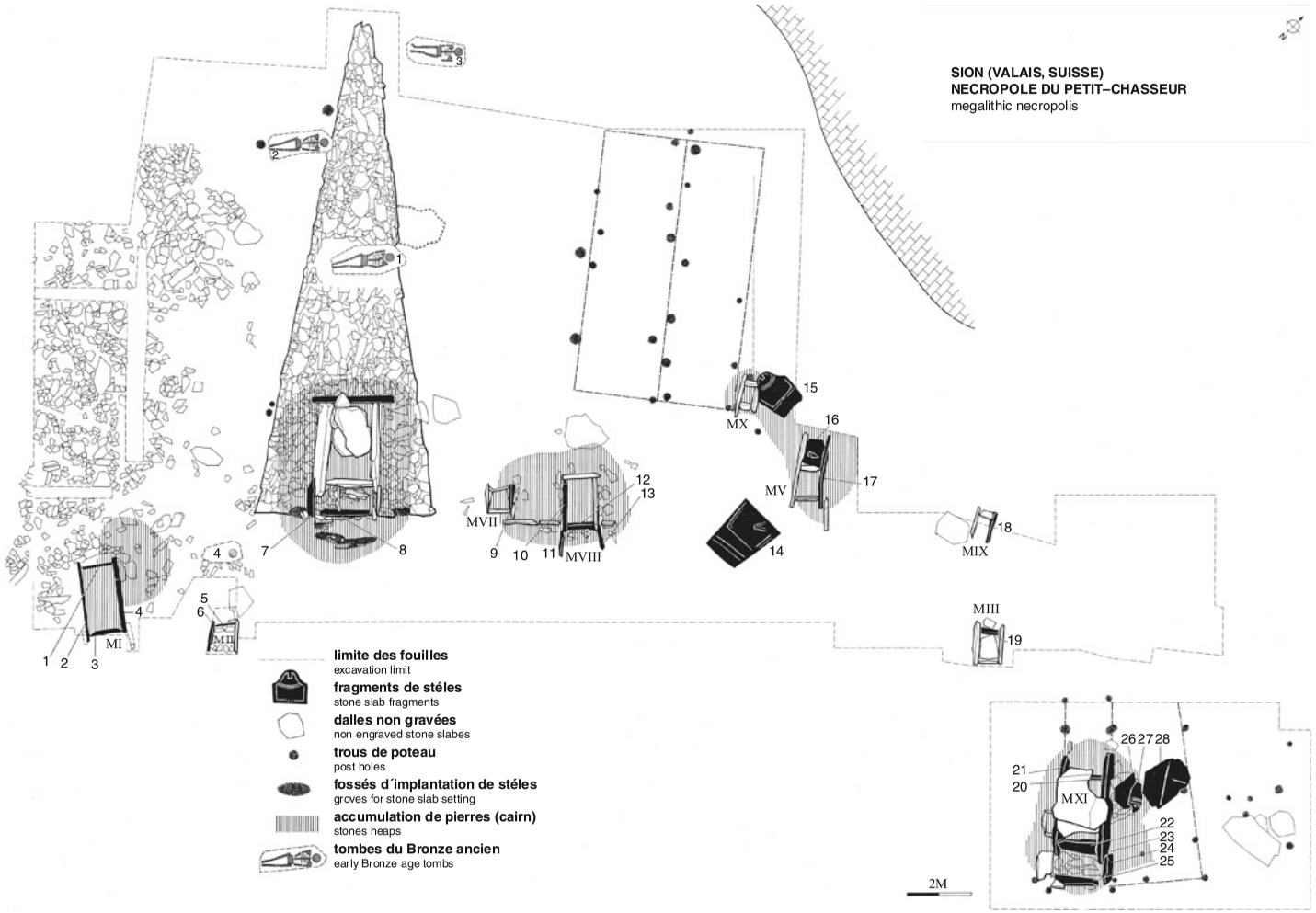
Dolmen MVI, meanwhile, reflects a more diverse history spanning about eight centuries, from the Late Neolithic to the Bell Beaker or from 3,000 to 2,200 BCE (Bocksberger 1976). This monument was erected after dolmen MXII. Three separate moments can be distinguished. The first occupation is Late Neolithic and corresponds to the initial phase of construction use, although information regarding the original position of those buried in the monuments is difficult to precisely determine. This difficulty is linked to the second occupation phase, because the Bell Beakers emptied the burial chamber. However, it was possible to inventory 33 individuals from the first occupation (Gallay 1986).

Funerary Occupation During the Bell Beaker Period

Within the megalithic necropolis of Petit-Chasseur, the Bell Beakers display both mixed and new behaviors, mixed because they both reused earlier monuments and built their own monuments (dolmens and cysts) and new because although the construction of cysts is known in the Bell Beaker cultural area, the construction of collective monuments remains an original behavior (Besse & Desideri 2005).

The Bell Beaker occupation begins with the construction of three dolmens at the side entry (Gallay 1986). Dolmen MI contains no bones, but the remains of five individuals were found outside of the building with Bell Beaker artifacts. Dolmen MV contains the remains of nine individuals. Dolmen MXI contains at least 15 individuals. A reconstruction of the position of those buried inside the monuments was not possible.

Later, the Bell Beakers removed the remains of the first occupation phase (Late Neolithic) from dolmen MVI and laid them outside the monument (Bocksberger 1978). While the skulls were given special treatment – they were found carefully aligned along the wall of the dolmen - the rest of the bones and associated material were thrown in a jumble. It is likely that the evacuation was carried out in a single event, since no refitting between bones inside the room and those outside



Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 2 Map of the megalithic necropolis of Petit-Chasseur (dolmen MXII and cyst MXIII located 100 m from the other monuments not shown) (Favre et al. 1986, plate 1)

could be done. The Bell Beakers thus had a new place to put their own graves. The contents of the inside of the monument were completely disturbed, which does not seem to be related to a single moment, but rather to ongoing and repeated Bell Beaker visits to the grave. There are 14 individuals (Gallay 1986).

Finally, the Bell Beakers built new small graves around ancient monuments, that is, cysts MII, MIII, MVII, MVIII, MIX, MX, and MXIII (Gallay 1986). Some of these did not contain bones, but other contained from one to seven individuals.

Anthropomorphic Stelae

Thirty-one humanoid stelae were recovered in the megalithic necropolis of Petit-Chasseur. Two types of stelae – A and B – were identified, respectively, attributed to the Late Neolithic and Bell Beaker. The stelae were all found in secondary position, being reused in the construction of monuments or simply lying flat next to the graves (Corboud & Curdy 2009).

The stelae of type A present sketchy anthropomorphic elements (limited to the drawing of arms, forearms bent at right angles, and opposing hands) and horizontal bands suggesting belts, double spiral pendants, daggers, and axes (Fig. 3).

The stelae of type B are lavishly decorated with weapons in their sheaths, clothes represented by geometric designs (tunics, loincloths, belts, bags, etc.). The appearance of the bow with a strap worn over the shoulder with one or more arrows can also be seen. Type B stelae can be separated into masculine and feminine stelae, the latter characterized by the absence of weapons (Fig. 4).

These stelae have been interpreted as representations of important people in the community rather than deities. Their discovery in secondary position, notably reused as raw material in the construction of funerary monuments, suggests a change in status and above all a loss in symbolic value associated with either social death (during one's lifetime or at death) or the natural death of the important person it represented (Gallay 2009).

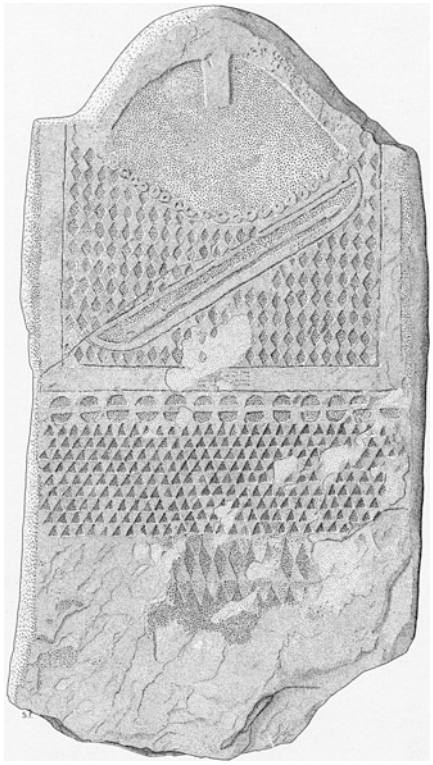
Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 3 Stela 24 of type A in reuse in the construction of dolmen MXI: height 193 cm, width 94 cm, 10–11 cm thick (Favre et al. 1986, plate 20)

Funerary Occupation During the Early Bronze Age

The latter occupation phase of the megalithic area of the Petit-Chasseur is attributed to the Early Bronze Age (Gallay 1986), during which we see the appearance of individual tombs. Earlier graves were pillaged and emptied, the human bones regrouped and incinerated. A female individual is buried in dolmen MXI, some juveniles were placed either inside old emptied tombs (MV) or outside in the adventitious cysts (MVI and MXI). Finally, several burial tombs were also recovered in which the bodies were placed on lie on slabs (Bocksberger 1978).

Burials of the Second Iron Age

The site of Petit-Chasseur also contains seven individual burials dating to the La Tène period (Curdy et al. 2009). The entire funerary during the Iron Age is not yet known, and the tombs



Sion, Petit-Chasseur (Neolithic–Bronze Age): Geography and Culture, Fig. 4 Stela 25 of type B in reuse in the construction of dolmen MXI: height 157 cm, width 86 cm, 10–11 cm thick (Favre et al. 1986, plate 21)

discovered demonstrate a relatively wide dispersal. The orientation of the graves is constant (NE/SW), and the dead are in supine position, with the head facing NE. The bodies appear to have been placed in wooden containers (dugouts [*monoxyles*] or planks). Funerary objects are abundant and include ceramics, swords, shield knobs, fibulae, and other ornaments.

Key Issues/Current Debates/Future Directions/Examples

The cultural sequence of Petit-Chasseur is one of the most comprehensive in the alpine area. The exceptional quality of the recovered archaeological remains and the system of field documentation make this site a key reference in understanding the history of Neolithic populations, not only in the Alps but also at a European scale.

The year 2011 marked the 50th anniversary of the discovery of Petit-Chasseur. It is clear that this group has been and still is the source of dozens of university theses (masters and doctorates) and a number of significant monographs; the results of successful collaboration between the three institutions responsible for its promotion (the Cantonal Service of Archaeology in Valais, the cantonal museums of Valais, and the Laboratory of Prehistoric Archaeology and Anthropology – formerly the Department of Anthropology and Ecology – at the University of Geneva).

Cross-References

- ▶ Megalithic Art: A Visual Repertoire for the Dead
- ▶ Tombs, Greek (Iron Age)

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Site and Artifact Preservation: Natural and Cultural Formation Processes

Margaret Beck
University of Iowa, Iowa, IA, USA

Introduction

One of the best-known archaeological sites in the world is Pompeii, a Roman town buried by the eruption of Mount Vesuvius in CE 79. The disaster stopped daily life in its tracks, felling residents who were unable to escape and covering everything with a thick layer of ash. Millions of modern tourists visit Pompeii each year, now able to walk its streets, inspect its art (and graffiti), and peer into shops and homes. The casual observer might therefore imagine that *most* places of past human activity remain as they were in use, perhaps simply buried under a thick layer of dirt or volcanic ash. In this view, an archaeological site – much like the abandoned home described by Philip Larkin in his poem "Home is So Sad" – "stays as it was left,/Shaped to the comfort of the last to go."

Of course, nothing stays exactly as it was left. All archaeological sites suffer the effects of time, climate, and organisms (including people). Organic materials at Pompeii that were not burnt, subsequently decayed. Remains of the unfortunate residents trapped in the town decayed and could only be reconstructed by pouring plaster into the voids in the ash left by their bodies. Some of those who escaped later attempted to salvage what they could find and remove it from the site. After the rediscovery of the site, the material record at Pompeii was heavily affected by both looting and archaeological investigation.

Looting, decay, disturbance, and other natural and cultural processes affect the archaeological record (Schiffer 1987 for the best overview). These processes do not render it meaningless, but they must be recognized so that we can consider their impact on our sample of sites and artifacts, spatial patterning, and other matters so crucial for interpretation (see also ► Bam: Archaeological and Social Investigations after the Earthquake).

Key Issues/Current Debates/Future Directions/Examples

Natural Processes of Decay (and Preservation in Different Environments)

Some materials survive the vagaries of time better than others (Sease 1994 for an overview). *Highly perishable organic materials* include

skin and soft tissue as well as wood and other plant remains. In most cases, these are very vulnerable to decay and hence do not survive in the archaeological record except under unusual conditions. As a result, at most sites we are unlikely to find baskets, textiles, wooden artifacts, leather, and any remains of people or animals other than bones or teeth.

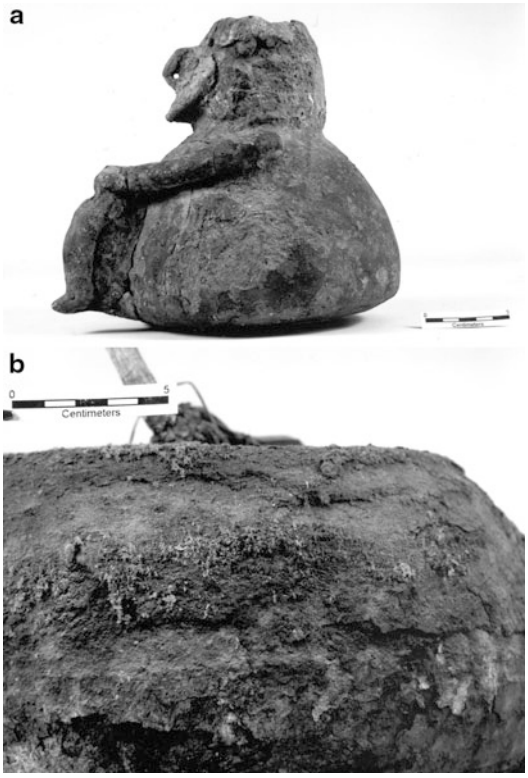
The exceptions generally occur in arid, frozen, or waterlogged environments, such as deserts, glaciers, and peat bogs, which prevent decomposition and are favorable for preservation. Famous examples of organic preservation come from desert sites such as White Dog Cave (a Basketmaker site in northern Arizona), with conditions that naturally mummified burials, and Cahuachi (a Nazca site in coastal Peru), with cotton and wool textiles; the frozen body of the "Iceman" in the Italian Alps; the waterlogged site of Ozette in Washington state, United States, with wooden houses and artifacts; and peat bogs, including sites from northwestern Europe with Iron Age "bog bodies." Burial by volcanic ash may also seal the environment and prevent decomposition, such as in some contexts at the Cerén site in El Salvador. Decomposition may also be retarded by associated materials; copper, salt, or oil around organic items has been observed to preserve the organic remains.

Organic materials may also be preserved through burning. Charcoal (carbonized wood) and other carbonized plant remains are crucial sources of information about diet and other plant uses. Whole loaves of bread have been recovered from Pompeii because they were completely carbonized and therefore could not decay. Carbonized organic material preserves well in a variety of environments, but it is physically fragile. *Less perishable organic materials* include bone, ivory, and teeth, all of which have both a calcium-rich mineral component and an organic component. (We may also include shell here because it is made of calcium carbonate, although shell has no organic component and does not decay.) All of these materials preserve best in soils with neutral or slightly alkaline pH, as acidic environments break down the calcium-rich mineral component. For example, almost no bone was preserved at the Sloan site, a cemetery in the southeastern United States dating to around 10,000 years ago on acidic terrain. As a result, burial locations could only be inferred through calcium concentrations (into which the bone had disintegrated) and artifact clusters. Bones are also damaged and altered during processing and consumption of the carcass. Damage from human butchery provides important cultural information, but it may also result from carnivore and scavenger activity (Binford 1987).

Nonorganic materials include ceramic, glass, metal, and stone artifacts. Porosity is one factor affecting the survival of these materials, because greater porosity increases vulnerability to wet-dry cycles, freeze-thaw cycles, and accumulation of salts in the burial environment – all of which will lead to periodic expansion and stresses within the body of the piece. For ceramics, firing temperature and temper type can significantly affect porosity and other attributes related to survival. Fiber-tempered pottery, which is the earliest pottery used in North America, is especially vulnerable to freeze-thaw action because of its high porosity. Calcareous temper, such as shell or limestone, will dissolve in acidic environments, leading to voids in the fabric. Such environments also cause acid leaching, or leaching of iron, lightening the color of the ceramic (Rye 1981).

The survival of glass and metal depends considerably upon its composition as well as the burial environment. Acidic soils are favorable for glass, but alkaline soils will cause leaching of the glass matrix. Pure gold resists corrosion from moisture and oxygen, but other metals (including those added to gold as part of the alloy) do not. Iron corrodes easily, producing reddish rust. Copper corrosion leads to a variety of colors, including green, and the chlorides in saline soils dramatically speed copper corrosion.

Stone generally survives well, but as with other material types, the structure and porosity is important. Mica, with its many thin sheets, is especially fragile physically. Limestone will erode or dissolve in acidic environments, as do other calcareous materials; this soft and porous rock may also suffer from erosion from wind,



Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 1 Damage from accumulated salts in (**a**) a prehistoric Hohokam effigy vessel from Arizona and (**b**) a modern flowerpot from Arizona. The modern flowerpot displays active growth of salt crystals (Photos taken by the author)

Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 2 Mottling indicating movement of soil through animal burrows (Photo courtesy of E. Arthur Bettis, Department of Geoscience, University of Iowa)

Site and Artifact Preservation: Natural and Cultural Formation Processes, Fig. 3 Root disturbance (Photo courtesy of E. Arthur Bettis, Department of Geoscience, University of Iowa)

water, and crystallization of salts. Some combination of these factors probably caused the damage visible on the famous limestone monumental sculpture in Egypt, the Great Sphinx of Giza. Salts are of special concern in arid regions, because if not removed, they may continue to damage artifacts, even during curation (Fig. 1).

Natural Processes That Move and Damage Artifacts

Natural processes can move artifacts and disturb features, sometimes so much so that the archaeological site is no longer a "primary" site (where the cultural deposition originally occurred) but a "secondary" site (where materials were redeposited). The effects of gravity seem obvious – for example, materials on slopes often move downhill – but materials deposited on level ground may also move around, up, and down. All of the processes that deposit, remove, and churn soils and sediments also affect soil within that matrix. Such processes include deposition and erosion from wind and water as well as the movement of particles by animals (faunal turbation; Fig. 2), plants (floral turbation; Fig. 3), freeze-thaw action (cryoturbation), and the shrinking and swelling of clay (argilliturbation). These natural processes, and their effects on

Site and Artifact Preservation: Natural and Cultural Formation Processes,
Fig. 4 Disturbance of a modern village midden by domestic animals in northern Luzon, Philippines (Photo taken by the author)

archaeological sites, are also studied by geoarchaeology (e.g., Goldberg & Macphail 2006).

Cultural Processes of Site Destruction: Scavenging, Looting, and Site Reuse

People frequently interact with material left by past activities, changing the nature of the evidence archaeologists will find. They may remove or alter traces of human behavior, soon after or long after the fact. This happens in a wide variety of ways at all stages of archaeological site formation, often motivated by a desire for the objects previously deposited or for the space these deposits occupy.

The process of reclaiming discarded or abandoned artifacts happens all the time in all societies, although it plays out differently in rich industrialized nations than in poorer ones. In the United States, the regular discard of usable, edible materials directly into the trash has spawned an entire movement known as "freeganism," in which adherents feed, dress, and entertain themselves from garbage deposits to protest against rampant consumerism and reduce environmental impact. In contrast, rural villagers such as Maya groups in Guatemala and the Kalinga of northern Luzon, Philippines, extensively reuse and recycle items before sending unusable scraps to a midden.

But these middens too may subsequently be modified: many are close to paths and activity areas, and may be dispersed by human and animal foot traffic at least along the margins. Children also collect things from middens for their play, and animals wander in to eat vegetable matter left over from food processing (Fig. 4). If trash deposits start to interfere with village needs (e.g., if they become too large or too smelly, or if they sit on land now desired for another purpose), they will be moved.

Abandoned residential sites may have more to offer in terms of reuse. Building materials are routinely scavenged from old dwellings for the new ones, either in the same community or a nearby one. If a dwelling or community was abandoned quickly or destroyed catastrophically, residents might have been forced to leave many items there, materials worth scavenging later. Some discarded items prove to be useful later for new reasons; for example, Hopi potters in the US Southwest are among those known to collect both sherds and pots to serve as models for designs and to grind up as temper.

Some collectors are looking for wealth, things of beauty, or souvenirs, and this type of collection – like other processes of cultural disturbance – happened thousands of years ago just as it does today. The tombs of Egyptian pharaohs were targeted by robbers long before excavators

such as *Belzoni* arrived in the early nineteenth century. Early visitors to archaeological sites often brought a shovel for souvenirs, a pattern common to many places including the eighteenth-century Spanish *presidio* in Tucson, Arizona, and nineteenth-century ghost towns in the western USA. Once materials have spent a certain amount of time in the archaeological record, many modern societies now have laws regulating their collection, although these laws are not always adequately policed. The illicit trade in antiquities continues, linking looters who dig up the items for sale to the museums who buy them (Watson & Todeschini 2007).

Archaeological sites are frequently reoccupied, reused, or affected by redevelopment and renewal. Boston's Central Artery/Tunnel Project or the "Big Dig" of the late twentieth century, while rerouting Interstate 93, displaced existing structures in use and also encountered abundant archaeological deposits. In the mid-twentieth century, Tucson, Arizona, demolished portions of the city from the nineteenth century, including the Spanish Convento and San Agustín chapel as well as its Chinatown, to make way for a convention center. Needs and values concerning the past change over time, and communities sometimes regret such land-use decisions. In awareness of the potential losses, the *Cultural Heritage Management* profession records sites before they are altered or destroyed to make way for the needs of modern living.

Conclusions

All archaeological sites have been altered in some way since their creation. The question is, how can we identify the types of disturbance and take account of them in interpretation? An understanding of decay processes, and of what we are unlikely to find in certain environments, is crucial for evaluating our sample of the material record. Geoarchaeology can be very helpful for assessing formation of natural and cultural strata, as can the study of artifact damage, fragmentation, and its *spatial analysis*. *Ethnoarchaeological* observations of historical and ongoing site formation processes provide invaluable clues about the range of possibilities we should consider. These alterations do not diminish the value of the archaeological record but add to its richness and complexity.

Cross-References

- ▶ Bam: Archaeological and Social Investigations after the Earthquake
- ▶ Burial Mound Dissection in Sweden
- ▶ Ethnoarchaeology: Approaches to Fieldwork
- ▶ Frozen Conditions: Preservation and Excavation
- ▶ Spatial Analysis in Field Archaeology

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Site Formation Processes

Alan P. Sullivan III[1] and William Flint Dibble[2]
[1]Department of Anthropology, University of Cincinnati, Cincinnati, OH, USA
[2]Department of Classics, University of Cincinnati, Cincinnati, OH, USA

Introduction

As core concepts in contemporary archaeology, site formation processes (SFP) are indispensable in building strong inferences about the cultural

past (Schiffer 1987). SFP are implicated at every level of archaeological inquiry, from designing research to interpreting variation in artifact form, assemblage composition, feature content, space modification, and landscape evolution. Without question, understanding the origins and significance of variability is fundamental to determining the suitability of certain kinds of archaeological phenomena for particular research questions.

A *formation process* is any event or situation involving the interactions of humans, surfaces, matter, and the environment that affects the characteristics of the archaeological record (such as its spatial extent, depth, surface expression, or content diversity). Such events create anomalies in natural ecosystems (often referred to as "traces") that register these interactions and subsequent modifications to them. In fact, as a contemporary phenomenon, the archaeological record can be considered the *current* expression of the cumulative effects of formation processes (Sullivan 2008a).

Theoretically, the study of the archaeological record is enabled by a consideration of formation processes because archaeologists are interested in understanding which factors have contributed to archaeological variability. These and other concerns are covered by *formation theory*, an integrated corpus of concepts that focuses on understanding how the archaeological record expresses the properties that it does (Shott 2006). As well, formation theory inspires the development of relevant methods for identifying and incorporating an understanding of SFPs and their effects in inferring the histories of archaeological phenomena.

Definition

Typically, SFP are distinguished on the basis of the agents involved in producing traces. Anthropogenic formation processes (AFP, also called "cultural" formation processes) register modifications to surfaces and matter caused by human activity. In contrast, environmental formation processes (EFP, also called "natural" formation processes) modify anthropogenic surfaces and arrangements of matter by the actions of earth dynamics, vegetation growth patterns, and animal behavior (Schiffer 1987).

Anthropogenic Formation Processes

AFP and their archaeological consequences can be discussed conveniently in terms of several classes. First, significant ethnoarchaeological and experimental research has concentrated on documenting the traces that arise on *specific types of artifacts* and how variation in their use-histories (from acquisition to discard) affects their form. The transformation (or flow) model of these processes has focused specifically on investigating how an object's attributes and performance characteristics are manipulated by humans, including variation introduced by discontinuities that arise among stages of artifact production, use, re-fashioning, and ultimately abandonment (Schiffer 2010). Archaeologically, provenance studies using strontium isotope ratios, for instance, have shown that the distances between the sources of ceramic materials (e.g., rock temper) and the locations of ceramic manufacture vary tremendously for different wares (Carter et al. 2011). With respect to organic artifacts, such as domesticated crops, isotopic studies have determined that the areas where such plants were grown differ dramatically and changed through time, from the contexts where they were processed and stored (Benson et al. 2009).

Second, equally consequential AFP studies have been conducted by ethnoarchaeologists and archaeologists on the formation histories of assemblages, that is, how variation arises and is registered by the accumulation, and ultimately the abandonment, of *different kinds of artifacts* on surfaces. Often referred to as "activity area" research, the investigation of these AFP is intended to provide a framework to infer the behavioral or organizational factors that are responsible for differences in the quantities, concentrations, and diversity of "floor-contact" artifacts (Enloe 2008). In addition, exploration of assemblage formation histories has promoted the development of "accumulations" research,

Site Formation Processes, Fig. 1 Bedrock cuttings in the cliff face for multiple-story structures opposite the Chateau de Commarque (twelfth to eighteenth century CE; photo by Jonida Martini)

which is designed to enable archaeologists to develop inferences about the amount of time it took for certain quantities of artifacts to build up in specific contexts (Varien & Mills 1997).

Third, the anthropogenic modification of space is a formation process that has a deep and broad history of investigation by architects, ethnographers, ethnoarchaeologists, and archaeologists (e.g., Nabokov & Easton 1989). In both ancient and modern contexts, studies of these AFP invariably entail consideration of the traces of construction activities – terrain modification, material acquisition, labor mobilization, and relative chronology – that are registered by surface anomalies (e.g., Burks & Cook 2011), stratigraphic relationships among surfaces (e.g., bonding and abutting relationships among walls), interfaces created by the installation of architectural features (e.g., postholes), and alterations to preexisting architectural forms (Harris 1979). In fact, the extent of earlier occupation, the degree of subsequent rebuilding, and even the sizes and shapes of razed structures can be inferred by mapping the traces of buried foundation trenches, the locations of displaced mud-brick fragments, or the remnants of bedrock modifications (Fig. 1).

Fourth, an increasing number of AFP studies, conducted by archaeologists and geoarchaeologists, has focused on determining the authenticity or integrity of "sites" and their contents. For example, in the case of Pompeii, despite the sudden eruption of Vesuvius and rapid burial of the city in CE 79, the integrity of the "snapshot" was greatly altered by post-eruptive anthropogenic activities, such as removal of valuable goods by the fleeing populace, later excavation and retrieval of objects by the Romans, and, much later, by the construction of a large drain in the seventeenth century (Allison 2004). Conversely, the presence of 17 wells completely filled with "typical" demolition debris, adjacent to and dating closely to the same period as the demolition of monumental structures, confirmed the authenticity of "Persian destruction" events that transpired in the Athenian Agora (c. 480/479 BCE [Shear 1993]).

Fifth, as archaeology itself has become institutionally mandated in regional planning studies, many archaeologists have turned their attention to landscape scales of analysis and, understandably, to understanding the formation histories of regional archaeological records. Such studies have become particularly attractive as archaeologists have become more deeply involved in climate change studies (Kirch 2005). In addition, many of the

Site Formation Processes, Fig. 2 The sixth-century CE basilica of San Nicola in Carcere, Rome (photo by Jonida Martini). The basilica was constructed over the foundations and incorporated the superstructure of three temples: the Temple of Spes (c. 250 BCE), the temple of Juno (second century BCE), and the Temple of Janus (CE 17)

Site Formation Processes, Fig. 3 Prehistoric (CE 700–1200) metate (grinding stone) installed as a grave marker in the twentieth-century public cemetery at Grand Canyon National Park, Arizona

millennia-old terrain modifications created by small- to mid-scale societies, such as now long-abandoned reservoirs and rock alignments, not only have resulted in permanent changes to drainages and ecosystems but provide, as well, sources of paleoenvironmental samples that register temporally sensitive rates of change in anthropogenic environments (e.g., McIntosh et al. 2000).

Finally, archaeologists worldwide have been documenting the historic and continuing extent of anthropogenic modifications to archaeological phenomena. For instance, it is not uncommon in prehistoric contexts for abandoned artifacts, such as sherds, to be reclaimed from their discard contexts and recycled as architectural elements; in these cases, the original design and performance characteristics of these ceramics have been "overprinted" and adapted for new purposes (Peña 2011). Similarly, in more recent contexts, ancient materials have been repurposed and given new meanings, as when Roman columns were incorporated in a medieval church (Fig. 2) and a prehistoric metate was installed as a grave marker in a modern cemetery (Fig. 3).

Site Formation Processes, Fig. 4 Modern, illegal woodcutting has altered the surface archaeology of prehistoric fire-cracked-rock piles (*lower left-center* to *upper right-center*), Kaibab National Forest, Arizona

Still, tragically, the vast majority of anthropogenic modifications to archaeological phenomena materialize as modern traces that significantly affect ancient ones. Some of these formation processes are intentional, but the effects are well understood and, hence, can be factored into archaeological interpretation, as in the case of "plow zone" assemblages (Hawkins 1998). Others, such as the effects of camping, hunting, and woodcutting on surface archaeological phenomena (Fig. 4), although inadvertent, are more difficult to incorporate in archaeological interpretation because their effects are just beginning to be studied systematically (Uphus et al. 2006). Of course, modern activities targeted specifically to relieve the archaeological record of "valuable" objects for the antiquities market are globally proscribed but represent, nonetheless, a major AFP that continues to affect the content and contextual integrity of archaeological records worldwide (Lazrus & Barker 2012).

Environmental Formation Processes

For each of the three broad classes of EFP – earth dynamics, vegetation growth patterns, and animal behavior – humans are uninvolved in the production of traces that affect the characteristics of the archaeological record (Schiffer 1987). These SFP add, alter, or obliterate traces involving matter, surfaces, and their relations that have accumulated in the archaeological record as a consequence of any of the aforementioned AFP. Often glossed by the term "turbations" (or disturbances), the study of these formation processes by geologists, geomorphologists, soil scientists, and archaeologists has accelerated significantly during the last two decades (e.g., Goldberg et al. 2001).

One category of earth EFP includes short-term, largely unpredictable events, such as earthquakes (Bottari et al. 2009), volcanic eruptions (Sheets 2006), and tsunamis (Cook & Abbott 2012), that can quickly and dramatically alter prevailing arrangements of matter, including architecture, as well as introduce matter to existing surfaces. Equally important, the fallout from these processes, over which humans have no control, can disrupt social systems, leading to widespread regional depopulation and profound ecosystem transformation (McIntosh et al. 2000). Although potentially devastating for local populations, these events often produce so-called "Pompeii" assemblages, which provide

a "snapshot" of activities at the moment they were discontinued. In these cases, although preservation is often enhanced because of rapid burial, it is unclear how far back in time such arrangements of artifacts and contents of features can be projected; hence, Pompeii assemblages are often considered to be "end-biased," short-term, though comparatively rich, samples of ancient human activity (however, as noted above, even in the case of Pompeii itself, post-destruction AFP can greatly alter the integrity of the "snapshot" of ancient activity).

A second category of earth EFP includes long-term and highly predictable modifications to abandoned objects and surfaces that arise as consequences of erosion or sedimentation. The major archaeological consequence of slope wash and stream action is artifact displacement, which can result in either "false" concentrations of artifacts or dispersal and redeposition of artifacts from their original discard contexts (Dibble 2008). Alleged "hearths" at the famous Paleolithic site of Zhoukoudian in China, for instance, once thought to be the earliest evidence of hominin-controlled fire, have now been determined to be accumulations of fluvial sediments (Goldberg & Macphail 2006). Similarly, in arid environments, deflation (removal of fine-grained sediments by wind) can cause commingling (settling) of objects originally deposited on asynchronous surfaces, thereby increasing artifact density and assemblage diversity (Schiffer 1987). Also, experiments have shown that both fluvial and aeolian processes can affect artifact form by "rounding" or "dulling" artifact edges and surfaces (Skibo 2012). Other studies have demonstrated that chemical changes can occur on abandoned objects when, for example, their ground-contact surfaces become locations for the development of "desert varnish" (Goldberg & Macphail 2006).

Originally developed by paleobiologists to understand the mechanisms by which animals come to be represented in the fossil record, the effects of taphonomic processes are being explored by archaeologists to understand how burial and fossilization may skew the content of archaeological samples (Gifford 1978). For instance, certain kinds of remains, such as soft plants or animal hides, generally do not preserve well, if at all, unless they are carbonized, desiccated, mineralized, or waterlogged (Miksicek 1987). In some depositional situations, therefore, archaeologists now proceed cautiously knowing that the absence of fragile material classes can be considered evidence of absence (i.e., indicative of human selection) only after carefully assessing taphonomic factors (Ward & Larcombe 2003).

The second major class of EFP pertains to traces produced by the dynamics of vegetation growth patterns (e.g., establishment, expansion, and contraction of plant communities). Abandoned archaeological sites, particularly those with architectural remains, provide highly productive microenvironments (composed of soft sediments that preferentially retain moisture) that encourage the development of abnormally dense vegetation, which has a number of consequences for the archaeological record. First, thick vegetation (such as impenetrable thickets in desert areas or jungles) may obscure the very remains that archaeologists are interested in locating either by pedestrian survey or by satellite remote sensing (Sullivan et al. 2012). Second, the presence of archaeological sites is often revealed by concentrations of "anomalous" species (e.g., deciduous trees in a conifer forest) that otherwise should not be present. Third, because of climate change, which can adversely influence ecosystem health (e.g., promote bark-beetle infestations), archaeological sites in conifer forests are highly susceptible to damage from wildfires, which can introduce charcoal to buried horizons, topple trees, and their rooting systems in abandoned structures (Fig. 5); encourage erosion of exposed (vegetation-free) surfaces; and accelerate artifact displacement by destabilizing the surfaces upon which the material reposes. Finally, a common problem worldwide is that of the "tree-throw" (or tree-fall), which has two expressions that can confound archaeological interpretation (Goldberg & Macphail 2006). The first type, rather benign, occurs when large trees are upended and their root balls become exposed to the elements (Fig. 6) Within a short period, rocks embraced by the root system become dislodged

Site Formation Processes, Fig. 5 Late nineteenth-century log cabin, probably affiliated with Navajo households, that has been affected by bark-beetle-infested pinyon trees, which have collapsed and become incorporated in the structure (Grand Canyon National Park, Arizona)

Site Formation Processes, Fig. 6 Exposed and eroding root ball of a windblown tree, Kaibab National Forest, Arizona. Note the wide variety of rock sizes in contrast to those of the fire-cracked-rock pile (Fig. 7 below)

Site Formation Processes, Fig. 7 Large fire-cracked-rock pile that has been affected by tree growth. Note that the rock sizes are relatively uniform in comparison to those exposed in the root ball and mound of the windblown tree (Fig. 6 above), Kaibab National Forest, Arizona

Site Formation Processes, Fig. 8 Destruction caused by a windblown tree whose roots have penetrated a prehistoric structure

from the root ball and accumulate as small mounds that mimic anthropogenic rock piles (however, because humans select rocks, size-class analysis should distinguish anthropogenic mounds (Fig. 7) from tree-throw mounds).

The second type, which is significantly more problematic, occurs when trees established in archaeological phenomena are uprooted, thereby bringing artifacts and other material from deeper levels to the surface (Fig. 8), creating pathways for the introduction of modern material to ancient surfaces, and exposing buried surfaces and perishable materials (which may increase the likelihood of their hastened destruction by exposure to natural forces such as freeze-thaw cycles or wet-dry cycles; Goldberg & Macphail 2006).

The last category of EFP, animal behavior, pertains to traces that are introduced to the archaeological record by virtue of the activities of burrowing (e.g., gophers, badgers) and non-burrowing vertebrates (e.g., deer, cattle, sheep, and carnivores). Burrowing animals tend to displace artifacts on surfaces, move ancient

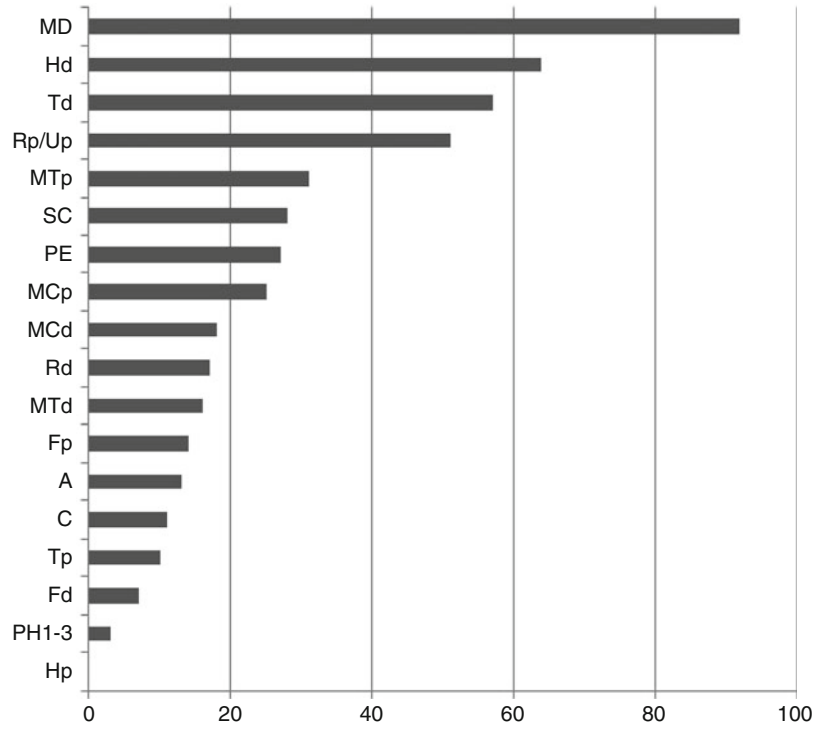
objects from subsurface to surface contexts (Fig. 9), introduce modern material to ancient surfaces (and vice versa), and create anomalous features in ancient deposits (tunnels or cavities of anomalously soft sediments referred to as "krotovina").

Large-sized non-burrowing animals, principally because of their numbers and "herding" characteristics, have the potential to affect surface-assemblage characteristics (artifact number and density) by trampling objects into ever-smaller pieces (Gifford 1978). Carnivores, such as coyotes, as well as most domesticated dogs and pigs, can consume significant amounts of zooarchaeological material. However, anatomical-element density and growth studies suggest that analyses of fragment frequencies can serve to identify such carnivore-ravaged assemblages (Fig. 10; Lyman 1994).

Site Formation Processes, Fig. 9 Ceramic and lithic artifacts brought to the surface of an archaeological site by a burrowing vertebrate

Historical Background

In many respects, consideration of SFP is as old as the discipline of archaeology itself (Lucas 2012). In both the Old and New Worlds, for example, explanations of the origins of some extraordinary archaeological phenomena (e.g., pyramids, crystal skulls, or "exotic" artifacts) entailed pre-scientific arguments of how the activities of extraterrestrial agents, trans-oceanic adventurers, or marginalized refugees from various population dispersion



Site Formation Processes, Fig. 10 Percentages of modern goat anatomical elements (MNI 64) that survived after being ravaged by domesticated dogs in a Hottentot village (data from Brain 1980). MD mandible, Hd distal humerus, Td distal tibia, Rp/Up proximal radius or proximal ulna, MTp proximal metatarsal, SC scapula, PE pelvis, MCp proximal metacarpal, MCd distal metacarpal, Rd distal radius, MTd distal metatarsal, Fp proximal femur, A Astragalus, C calcaneus, Tp proximal tibia, Fd distal femur, PH1–3 first through third phalanges, Hp proximal humerus

events were responsible for the formation of a fantastic, if not alien, archaeological record (Fagan 2005).

The centrality of SFP was elevated and became foregrounded in archaeological practice with the publication of Michael B. Schiffer's theoretical article entitled "Archaeological Context and Systemic Context" in 1972. This and subsequent publications (see Schiffer 2010) framed a discourse focused on understanding the properties, origins, and sources of variability of the archaeological record itself that created a vast literature, which continues to proliferate (Shott 2006). Nonetheless, the importance of SFP in archaeological research became forever institutionalized as a consequence of the attention they received in the context of three hotly contested controversies – the "Binford-Bordes" (1966–1970), "Pompeii Premise" (1981–1985), and "Grasshopper-Chavez Pass" (1984–1989) debates. These disputes pivoted around fundamental differences of opinion regarding SFP – do they produce an archaeological record that is a fossil imprint of human activity, a distortion of human behavior, or something else (Sullivan 2008a)?

With the benefit of several decades of research inspired by these and other controversies, archaeologists nowadays are far more inclined to approach variability by thinking in terms of determining the formation histories of archaeological phenomena rather than in terms of being constrained by the archaeological record's interpretive limitations that are inherently attributable to distortions, disturbances, fragmentary remains, or poor preservation (Bailey 2007). In fact, largely as a consequence of the introduction and wide adoption of geoscientific methods during the last 20 years, archaeologists now see what once were considered obstacles to interpretation as research opportunities to explain why artifacts have the properties they do (Weiner 2010) or to ascertain what accounts for differences in the sedimentary composition of occupation levels (Holliday 2004). Similarly, archaeologists have developed their own "internal" concepts and methods to hypothesize, for example, why some ancient settlements, when fully excavated, disclose many intact vessels whereas others have none at all (e.g., "abandonment-mode" analysis [Deal 2008]), and why some highly fragmented artifact assemblages can be reassembled rather thoroughly whereas others cannot (e.g., "refitting analysis" [Chapman & Gaydarska 2007]).

Key Issues/Current Debates

Now that the significance of SFP is firmly established in archaeological practice, it is clear that whatever knowledge and principles have been secured so far are barely sufficient to cover the vast majority of archaeological cases – familiar and unfamiliar – that are implicated by the investigation of increasingly sophisticated archaeological questions. Hence, archaeologists worldwide are exploring two major lines of inquiry that focus directly on expanding the study of formation processes with respect to the following questions: How is knowledge of SFP acquired, and how is that knowledge best applied?

The first line of inquiry for acquiring knowledge of SFPs is broadly *anthropological* and has two interrelated strands. One strand engages the ethnographic record and seeks to establish, for instance, statistical regularities among subsistence economies, environmental variation, and technology that serve as the basis for models whose implications can be independently tested with archaeological cases (Enloe 2008). The second strand is ethnoarchaeological research, which creates new data and empirical generalizations regarding material relationships among architecture, social organization, craft specialization, settlement systems, and ideology (David & Kramer 2001). Together, these strands, once fully developed, would constitute a middle range theory in archaeology that enables archaeologists to refer interpretations of archaeological phenomena and their formation histories to a highly confirmed body of cross-cultural principles.

The second line of inquiry is *archaeological* and has two principal strands, as well. The first strand is experimental, often referred to as actualistic research, where a "known" situation is created in the field using artifacts or other

objects, animal carcasses or bones, and experimental plots of plants, and modifications to the material and their locations are monitored over time, generally several months or years (e.g., Banning et al. 2011). The objective is to gain an appreciation for rates of decomposition, displacement, or changes in soil properties that can be used to interpret the effects of EFP on similar kinds of archaeological phenomena (e.g., Rösch et al. 2002). The second strand consists of investigations of archaeological phenomena that are intended to understand the effects of SFP that materialize over long periods of time (centuries or millennia) and, hence, cannot be studied experimentally. Examples of this line of inquiry include studies of artifact displacement involving measures of artifact orientation (Dibble 2008) and of the composition of "fill" deposits to ascertain whether "termination rituals," for example, were responsible for material that accumulated above the floors of abandoned ceremonial structures (Van Keuren & Roos 2013).

The issues raised by these two lines of inquiry involve considerations of hypothesis testing. For instance, application of SFP knowledge derived from the "anthropological" approach to archaeological phenomena largely entails analogical reasoning, which, depending on the relevance of the cases (and hence the strength of the analogy), can lead to Type I errors (falsely concluding that the same or similar cause of the variability documented in the "anthropological" case is responsible for the variability seen in the archaeological case). Essentially, this type of error prematurely closes consideration of alternative hypotheses for the origins of the archaeological phenomena being investigated, thereby narrowing our views of what the cultural past may have been like (which is a form of presentism or projection of current knowledge of the present into the past). In contrast, application of SFP knowledge developed by the "archaeological" approach relies far less on analogical arguments because it is based on either replicable (highly confirmed) experimental results or well-established geoscientific principles. In these cases, the likelihood of Type I errors is reduced, the biases related to presentism are largely eliminated, and the potential for discovering ethnographically unprecedented cultural pasts is amplified (Sullivan 2007).

A second issue in the study of formation processes involves the units of analysis by which AFP and EFP and their effects can be unambiguously identified. As sketched above, because early (1970s and 1980s) formation process studies sought to understand how the form and location of artifacts changed through time, it is not surprising that they focused on examining factors that contributed to coarse-grained differences in assemblage composition (inventories of complete vs. fragmentary ceramic vessels), provenience categories (fill vs. floor), or refuse categories (primary vs. secondary refuse). By the mid-1980s, it had become clear that the usefulness of these studies was constrained by the incorporation of interpretation-laden units of analysis, that is, the terms of the categories themselves, such as debitage types (e.g., primary flake or biface-thinning flake), room types (e.g., habitation or storage), site types (e.g., limited-activity or habitation), or settlement-system types (e.g., logistical or residential) biased conclusions regarding the origins and subsequent histories of the archaeological phenomena being studied (Sullivan 2008a). With this realization, archaeologists began developing interpretation-neutral units of analysis and more relevant methods, such as micromorphology, size-class analysis, assemblage refitting, and contextual analysis, to understand objectively how variability arises as a consequence of the tandem operation of different AFP and EFP (Matthews et al. 1997).

Another related issue is the extent to which information regarding the performance characteristics of artifacts, largely derived from experimental and replication studies, can be applied to archaeological phenomena (Schiffer 2010). Studies of total assemblages have now revealed that, in many cases, the most common artifacts – on occupation surfaces, in features, and incorporated in architecture – are fragments whose performance characteristics at the time they came to be deposited in those contexts or repose on those surface are largely extraneous to

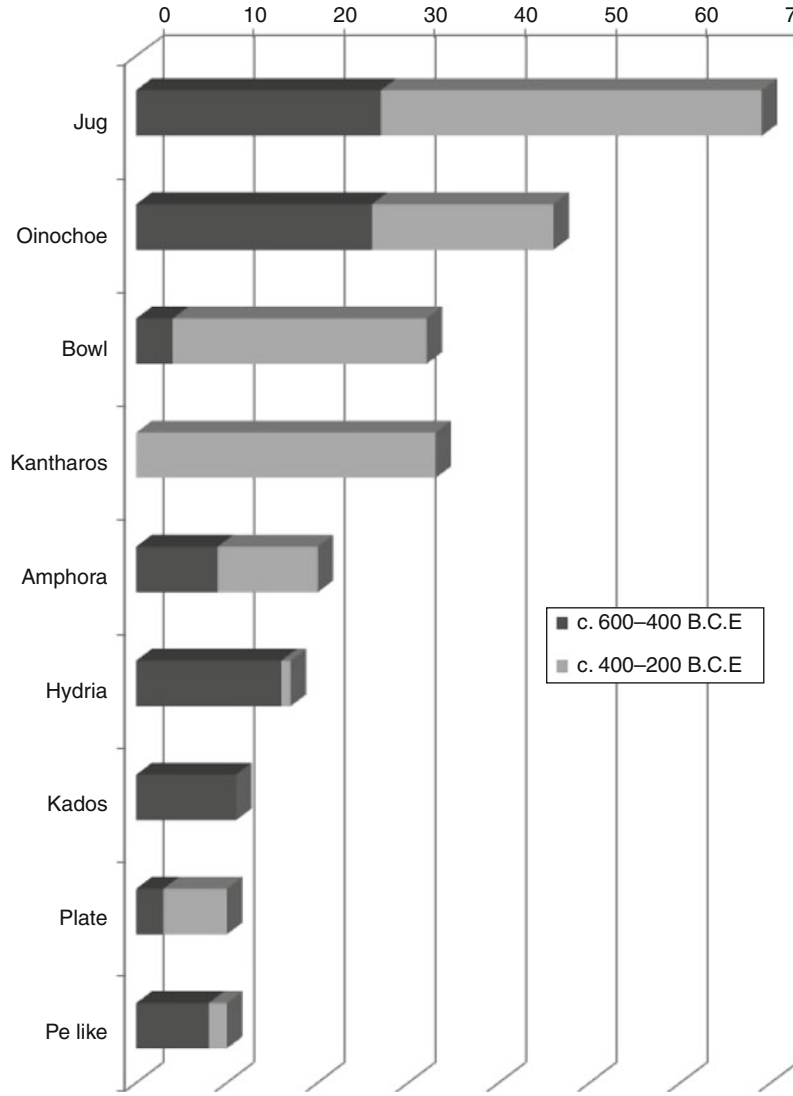
those that were designed-in at the time of artifact manufacture (Peña 2011). The scope of such widespread "de-correlation" between designed-in performance characteristics of intact artifacts at the time-of-manufacture and their post-manufacture use-contexts is beginning to be appreciated by archaeologists worldwide as a significant AFP affecting assemblage variability and archaeological interpretation (Chapman & Gaydarska 2007).

An emerging issue is renewed interest in the temporal scales at which SFP operate. Advances in the precision of independent dating techniques have alerted archaeologists to the disjunction between when events may have transpired (dated events, which are technique-specific) and how long it took for the phenomena (e.g., ancient matter, surfaces, features) associated with those dated events to materialize (target events), which are of archaeological interest. These considerations fall broadly under "time perspectivism" (Bailey 2007) and oblige archaeologists to reset their thinking regarding palimpsests, abandonment mode, and the significance of equifinality in archaeological interpretation. With respect to palimpsests, which refer to aggregate accumulations of objects, at least four types have been delineated depending on whether the same depositional contexts and surfaces are involved: true, cumulative, spatial, and temporal. Clearly, one "site" may be constituted of any number of these types, depending on its formation history, before it is ultimately abandoned, which raises profound issues for the methods by which archaeologists can infer artifact, surface, and feature contemporaneity (Sullivan 2008b).

An equally important and, surprisingly, unresolved matter raised by these concerns is whether abandonment mode invariably trumps occupation mode (which would mean that the archaeological record indeed is a massive "true and cumulative" palimpsest). That is, do the palimpsests and arrangements of matter on surfaces and in strata at the time of abandonment so thoroughly obliterate or obscure previous AFP traces that reliable inferences about pre-abandonment behaviors are utterly unattainable? Current research suggests that palimpsests actually may work in favor of archaeological interpretation because they serve as different kinds of clocks that measure the formation of the archaeological record in different ways. For example, cumulative palimpsests, such as "middens" (variably dense concentrations of ceramic fragments, lithic artifacts, and other materials), register elapsed "time-averaged" formation histories of entire settlements (and their aggregate discard patterns), whereas spatial palimpsests register "end-biased" formation histories of individual surfaces. Although far from fully confirmed and widely applied, these theoretical SFP concepts are valuable because they provide an interpretive framework for appreciating, and ultimately controlling for, the equifinal origins of the archaeological record (Sullivan 2007).

International Perspectives

With the theoretical maturation of the discipline since the 1970s, variability is no longer seen as something that is "monumentalized," that is, forever limiting the development of archaeological inferences because of the inherent distortions, biases, or incompleteness of the archaeological record itself. To the contrary, consideration of SFP is a global practice in modern archaeology involving the study of a wide variety of phenomena ranging from surface scatters of lithic artifacts in Western Australia (Fanning et al. 2009), flood-control sewer systems in ancient Rome (Aldrete 2007), buried villages in Ohio (Burks & Cook 2011), and the pollen record of historic period land-use patterns in pre-planned industrialized towns in Massachusetts (Kelso 1993). Moreover, SFP studies have evolved from largely theoretical exercises, which were not uncommonly dismissed as "cautionary tales" with little explanatory value or methodological potential, to rigorously tested and widely applied investigations that focus on specific problems involving human behavior and their archaeological consequences, such as determining the extent of prehistoric ecosystem management by fire in North America (Roos et al. 2010), distinguishing differences in the



Site Formation Processes, Fig. 11 Counts of published vessels by type found in "period of use" layers from the bottom of Athenian wells (c. 600–200 BCE). Identically shaped coarse-tempered jugs and fine-tempered *oinochoe* ["wine-pouring" jugs], both equipped with a single handle and a spout, dominate such assemblages

origins and uses of small-scale thermal features in Africa (Mallol et al. 2007), and resolving the geochemical signatures of household waste management practices in the Philippines (Beck 2007).

Also, SFP are being used to test and revise historical accounts, thereby resetting the long-standing tradition that texts are privileged, indisputable sources of information about the cultural past. For example, in Greek archaeology, fine-fabric and decorated ceramic vessels have been referred to as *oinochoe* [literally, wine-pouring jugs] because texts and images indicated that they were intended to be used exclusively at wine-drinking parties. However, because both *oinochoe* and identically shaped but undecorated coarse-fabric "jugs" numerically dominate ceramics recovered from "period of use" layers at the bottom of ancient Greek wells, it is reasonable to conclude that both types were used to fetch water (Fig. 11). Similarly, a reanalysis of the construction phases and brick stamps in the Pantheon in Rome suggests that the bulk of its design and reconstruction was completed during the reign of Trajan (CE 98–117) and not that of Hadrian (CE 117–138), despite numerous ancient

historical references in support of the latter interpretation (Hetland 2007).

Future Directions

After some initial indifference, incorporation of SFP in archaeological research is now standard practice worldwide. In fact, most archaeologists would agree that studying the origins, history, and interpretive significance of the archaeological record has the potential to reveal aspects of bygone behavior, social organization, subsistence economies, and land-use strategies that have not been observed or recorded by cultural anthropologists, ethnohistorians, or ancient historians. At the least, such inquiries encourage the development of hypotheses about evolutionary processes and anthropogenic landscape transformations that take generations to materialize and, hence, can be studied only with an archaeological record whose examination is informed by an understanding of how it formed and came to express the properties that it does (Lucas 2012). Hence, the role of SFP in future archaeological investigations is not only secure but will expand as archaeologists endeavor to reduce disciplinary ignorance regarding how information about the past is transmitted to and disclosed in the present (Sullivan 2007).

In fact, we predict that future SFP research will concentrate minimally on four problem areas. First, progress in understanding the AFP of common but poorly understood archaeological phenomena, such as artifact scatters, will occur with the adoption of interpretation-neutral units of analysis because experience has demonstrated that normative categories, such as limited-activity site or special-use site, obscure rather than reveal the origins of these deposits. Second, advances in the application of geoscience (Goldberg et al. 2001) will provide a basis for archaeologists to reassess interpretations of common archaeological phenomena whose formation was thought to be well understood, such as features (whose origins may be attributable more to EFP rather than AFP) and "fill" sequences of abandoned structures (whose origins may be attributable more to AFP than to EFP). Third, developments in appreciating the effects of long-ignored EFP that are widespread but not well understood at all, such as the deterioration and depositional consequences of multi-material structures and the extent of artifact commingling that arises because of pervasive inter-context (subsurface-surface-subsurface) artifact circulation, will emerge as interdisciplinary collaboration accelerates and becomes institutionalized (Killick 2008). Fourth, one persistent problem is understanding the extent to which, and the circumstances under which, variation in abandonment-mode overprints pre-abandonment (occupation) mode dynamics (i.e., determining the prevalence of "true" palimpsests). In contrast to the three preceding problem areas, solutions to this one may require inspiration from tightly controlled experimental studies in ethnoarchaeology and geoscience.

Professor Lord Colin Renfrew (1976: 2) boldly claimed that "every problem in archaeology starts as a problem in geoarchaeology." Updating the scope of his proclamation with the benefit of more than three decades of sustained research on the topic, no archaeologist would be uncomfortable with the friendly amendment that *site formation processes* could be profitably substituted for "geoarchaeology." Looking forward, the study of SFP is poised to accelerate the identification of problematic and unwarranted assumptions about the meaning of archaeological variability that, in turn, will empower archaeologists worldwide to challenge orthodoxy, to unconstrain their interpretations, and to become consequential in revealing the nature and diversity of the cultural past.

Cross-References

- ▶ Analogy in Archaeological Theory
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Ethnoarchaeology
- ▶ Middle-Range Theory in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes

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Site Stewardship Programs

Sophia Kelly
School of Human Evolution and Social Change, Arizona State University, Tempe, AZ, USA

Introduction

Archaeological site stewardship programs are organizations of volunteers who assist with the protection, preservation, and interpretation of archaeological sites. The structure of site stewardship programs varies based on the type of archaeological resources protected, landownership, and the position of stewardship activities within volunteer programs (Kelly 2007). These programs operate on both public and private landholdings. In most programs, volunteers help to monitor archaeological sites by documenting any changes to the condition of particular sites at regular intervals. Volunteers in some programs also assist in collection management, laboratory work, site interpretation, and even the excavation of some sites (Davis 1990).

Through careful monitoring, stabilization, and public education, site stewardship programs can be a highly effective means of preventing both natural and human-caused damage to archaeological sites. Archaeological sites are affected by

both environmental and human degradation. Environmental elements including erosion, wind, water, and sunlight can damage archaeological features and artifacts. Vandalism, looting, and unintentional damage inflicted on archaeological sites by humans can also destroy archaeological sites. Many programs report that site damage has decreased dramatically as a result of program initiatives (Kelly 2007).

Definition

Site stewardship programs represent a new movement towards public stewardship of archaeological resources (McManamon 1991; Thorne 1996: 2). State and federal protection strategies for archaeological resources originally limited public interaction with sensitive archaeological materials. In the mid- to late 1980s, however, federal and state governments adopted policies that relied on public education and active involvement in archaeological site protection. Most significantly, amendments to the Archaeological Resources Protection Act (ARPA) required federal land managers to "...establish a program to increase public awareness of the significance of the archaeological resources located on public lands and Indian lands and the need to protect such resources (1988 amendment to ARPA, Sec. 10c)." These new changes in attitude and legislation encouraged partnerships between federal and state agencies that resulted in the creation of the site stewardship programs in almost every region of the United States.

Most site stewardship programs function under a modest budget because nearly all labor is donated on a volunteer basis. Federal and state agencies support and manage some programs, while other programs operate as nonprofit organizations. Funds are typically used to hire a full- or part-time site stewardship coordinator and to pay for supplies related to monitoring or site stabilization activities. Funding sources for archaeological site stewardship programs vary depending on the resources protected and land ownership. Typical sources of monetary support include federal and state agencies, partnerships with local historical and archaeological societies and museums, and external grants.

The most important and sometimes only employee of site stewardship programs is the stewardship coordinator. The coordinator organizes volunteer labor, directs volunteer training and education, leads advertising and recruitment, and is each volunteer's main contact within the program. The coordinator's relationship with volunteers is the backbone of many programs. Regardless of the size of a stewardship program, consistent communication between coordinators and stewards is crucial to the efficient operation of the program and to the motivation of volunteers.

Attracting and maintaining good volunteers is essential to a successful volunteer stewardship program. Site stewardship programs must carefully recruit volunteers who will not divulge sensitive site information. Site stewardship programs often require extensive training for their site stewards to ensure that volunteers will not intentionally or inadvertently cause harm to archaeological sites or artifacts. In most cases, training includes both a classroom and fieldwork component. Through training, programs emphasize the necessity to keep site locations secret. Often programs do not allow site stewards to bring visitors on their monitoring trips and require that volunteers sign confidentiality agreements. These measures help to ensure that only trained persons will visit archaeological sites.

Successful site stewardship programs recognize the reasons why people volunteer and address these motivations in volunteer activities. In many programs, stewards are invited to attend program meetings and presentations as well as regional conferences. Stewards can also participate in other fieldwork activities under professional supervision, such as special recording projects (e.g., documenting rock art panels), site damage assessments, land surveys, and site stabilization.

Regular communication between site stewardship coordinators and volunteers greatly enhances the volunteer experience as well as the efficiency of the program. Interaction with professional archaeologists and other people trained in cultural resource management is one of the

most important things that volunteers seek and respond to in site stewardship programs. Coordinators should keep volunteers abreast of the progress towards program goals.

Volunteer recognition is a critical component of the recruitment and maintenance of site stewardship volunteers. Monitoring volunteers hours allows programs to recognize the contributions of individuals and to demonstrate that the program values the time that volunteers invest. Studies indicate that volunteer retention is higher in programs that monitor volunteer activities and reward volunteer service (Schwartz 1977; Field & Johnson 1993: 1629). In addition, many programs provide additional benefits to volunteers to demonstrate appreciation. For example, the Arizona Site Stewardship Program pays conference fees for volunteers to attend the Arizona Historic Preservation Conference. In programs such as the Nevada Site Stewardship program, volunteers have workman's compensation insurance as agency volunteers.

Many archaeological resources in the United States are related to the prehistoric and historic occupation of Native American tribes. The support and involvement of Native American groups in site stewardship initiatives is essential in areas where the majority of the archaeological sites are Native American. Site stewardship programs can help emphasize the connection between the protection and preservation of Native American archaeological resources and respect for native traditions. In addition, stewardship programs can facilitate interactions among Native American communities and archaeologists. For example, the Alutiiq Museum Site Stewardship Program in Alaska and the California Site Stewardship Program involve Native American communities as advisors, administrators, and stewards. These programs have also tailored program goals to fit those of local tribal governments. Finally, some tribal governments, such as the White Mountain Apache Tribe, have established site stewardship programs through their Tribal Historic Preservation Offices (Welch et al. 2009). These programs are directly run through the tribe for protection of archaeological resources within community boundaries.

Examples

The structure and operation of site stewardship programs depends on the landownership of archaeological sites and the resources that they serve to protect. Archaeological site stewardship programs can be a valuable component of protection plans for archaeological resources on both public and private lands. Programs that operate on public lands provide important assistance to land managers, who are often constrained by limited budgets and staff support. Site stewardship programs on private lands involve landowners in the protection of archaeological resources on private property.

Stewardship Programs on Federal and State Lands

Stewardship programs on public lands either are administered directly by agency land managers or function through nonprofit organizations that have allied with government land managers. Some of the largest site stewardship programs are part of volunteer programs established by major land management agencies. Volunteer programs that are associated with a federal agency and that involve a site stewardship component include the Forest Service's "Passport in Time" (PIT) program, the National Park Service's "Volunteers in Parks" (VIP) program, and the Tennessee Valley Authority's "A Thousand Eyes" program. Some federal agencies have also established independent site stewardship programs, such as the BLM's "Adventures in the Past" and the Forest Service's "Partners in Preservation" programs. State-sponsored site stewardship programs include the Georgia Underwater Archaeology Program, which involves both professional archaeologists and avocational scuba divers in the protection of Georgia's submerged archaeological resources (Burns & Crass 2006). Site stewardship programs can also operate through partnerships among several federal and state agencies. The New Mexico Site Watch program is one notable example of a collaboration among state and federal agencies. This program was established by the New Mexico State Historic Preservation Office in

partnership with the National Park Service, the Bureau of Land Management, and the Forest Service to monitor archaeological resources in various locations in New Mexico. Finally, many site stewardship programs that monitor archaeological sites on public lands are nonprofit organizations that collaborate with federal and state agencies. Examples include the San Juan Mountains Site Stewardship Program in Colorado and the stewardship program run through the New York State Submerged Heritage Preserves.

Site stewardship programs serve as "watchdogs" for archaeological sites. These programs can provide support to federal and state land managers in several critical ways. They can assist land managers by establishing long-term protection strategies for sites. With consistent monitoring, the effects of environmental and human degradation on archaeological sites can be controlled. Site stewardship programs that are external to public agencies can also serve as advocates for the protection of archaeological resources on state and federal lands. Land managers, who are often charged with a myriad of tasks, may not be aware of dangers posed to archaeological sites on particular parcels of land. Volunteers in these programs can provide local knowledge of these threats and can serve as liaisons between land managers and the community. Site stewardship programs can help emphasize the importance of archaeological resource protection while providing support for these safeguards. Many programs have noted that the intentional damage of sites, either through vandalism or looting, significantly decreased after the implementation of their programs (Kelly 2007). The knowledge that site stewards regularly patrol an area is often enough to deter would-be vandals and looters.

As liaisons, site stewardship programs facilitate interaction and collaboration among government agencies, resource managers, archaeologists, and the public. Agency employees may be viewed as outsiders, while site stewards can offer a local perspective on resource management within communities. Site stewardship programs also provide a conduit through which local law enforcement and archaeologists can reach out to the public about the protection of archaeological resources in a positive manner. In general, people do not respond to negative messages that emphasize sanctions against looting and vandalism (Hoffman 1991; Simon 1994).

The Arizona Site Stewardship Program is an example of a program that uses positive public messages to address site destruction. In particular, the program educates the public on the importance of preserving archaeological sites and artifacts in Arizona. The program also highlights the variety of archaeological sites and museums that offer tours and provide additional information about the historic and ancient past of Arizona. Through these initiatives, the Arizona Site Stewardship Program educates the public on the importance of preserving archaeological resources and provides them with a safe and fun way to learn more about local archaeology. Information and access to sites not only provides the public with a positive way to experience archaeology but deters would-be vandals and looters (Hoffman 1991).

Stewardship on Private Lands

Although the majority of site stewardship programs operate on public lands and waterways, some programs protect archaeological sites on private lands. These programs are generally run through the State Historic Preservation Office or through partnerships with other state and local agencies. Some programs use volunteer site stewards to monitor archaeological sites on private lands through agreements with the landowners. In other programs, landowners themselves agree to become stewards of archaeological sites on their land. Stewardship programs on private lands involve the cooperation of landowners who act as stewards of cultural materials on their own property. In most cases, private landowners sign an agreement with the local State Historic Preservation Office (SHPO) to protect archaeological materials.

Site stewardship programs on private lands play an important role in safeguarding sites and involving the public in cultural resource protection (Henderson 1989), because only a tiny fraction of the USA is under government protection. They demonstrate that archaeological sites can be

effectively monitored through a relatively small monetary investment and that site conservation does not always require land purchases. These programs will be increasingly important in the coming years as more land is developed and sites are put at greater risk. For instance, the Archaeological Conservancy, which protects archaeological sites on private lands, now includes parcels from across the country.

Studies have shown that site stewardship programs that actively involve landowners in the protection of archaeological resources on their lands are much more successful than those that do not. These programs rely on incentives from local and state governments to join the stewardship program. Sanctions and restrictions against landowners, nicknamed "big stick" methods of site protection, are often met with hostility and prove ineffective in the long run (Simon 1994).

Underwater Archaeological Site Stewardship Programs

Site stewardship programs devoted to the monitoring and protection of underwater archaeological resources play a vital role in comprehensive site protection (Elliott et al. 2000). Many underwater site stewardship programs were developed in response to the Abandoned Shipwreck Act of 1987 and its advisory guidelines. These guidelines encourage the development of shipwreck preserves and the cooperation of both government agencies and the public in the management and protection of shipwreck sites. Recreational and heritage tourism stimulated by shipwreck preserves provide much needed attention to underwater stewardship programs. In the case of the Rhode Island Marine Archaeology Program (RIMAP), the discovery of the HMS Endeavor was the catalyst for public concern over the protection of underwater archaeological sites in the region. For the stewardship program associated with the New York State Submerged Heritage Preserves, the discovery of the land tortoise initiated the development of a shipwreck preserve system. The Texas Historical Commission established its Marine Stewards Group as a result of diver public interest generated by the State's recovery of French explorer Robert Cavelier Sieur de La Salle's ship La Belle from the waters of Matagorda Bay.

Summary

Archaeological site stewardship programs have become an integral part of archaeological site protection in the United States. These programs use public education and the active involvement of nonprofessional archaeologists to prevent or reduce environmental and human impacts on sensitive cultural resources. The structure of site stewardship programs varies considerably and includes archaeological protection on both public private lands, of both terrestrial and underwater archaeological resources. Stewardship programs originate from new attitudes about site protection that recognize the importance of public education and involvement in safeguarding archaeological resources.

Cross-References

- ▶ Archaeological Stewardship
- ▶ Cultural Heritage and the Public
- ▶ Maritime Historic Site Management for the Public
- ▶ Public Archaeology, The Move Towards
- ▶ Stewardship, Concept of
- ▶ Volunteers in Archaeology

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Site Visitation and Interpretation: Management

Melanie J. Kingsley[1] and Douglas C. Comer[2]
[1]Department of Anthropology, Brandeis University, Waltham, MA, USA
[2]ICOMOS International Scientific Committee on Archaeological Heritage Management (ICAHM), Cultural Site Research and Management, Inc. (CSRM), Baltimore, MD, USA

Introduction

Typical archaeological and historical sites contain a multitude of resources about which they seek to preserve and inform the public. Archaeological resources, cultural landscapes, monuments, tombs, ethnographic resources, historic and prehistoric structures, and museum collections are some of the major categories that must be juggled and integrated into visitation and cultural resources management plans. Archaeological materials are nonrenewable and irreplaceable; these considerations should guide the management of archaeological sites.

Definition

Within the context of site visitation, *interpretation* of heritage serves to communicate information about the origin and purpose of natural or cultural resources. Interpretation provides the means by which to better appreciate and understand archaeological sites through experience and interaction. Interpretation is not simply presentation for that implies a planned arrangement of information providing a one-way form of communication from scholars, heritage professionals, and the like (Silberman 2006). Rather, interpretation goes beyond to consider the totality of activities, research, and general creativity generated by an interaction with a cultural site. The first goal of interpretation at archaeological

sites should be the preservation of archaeological materials at the site, and no interpretive activities that endanger archaeological materials should be permitted. Interpretation at archaeological sites must make visitors aware of site vulnerabilities and should build a constituency for the sustainable management of the site.

Key Issues/Current Debates/Future Directions/Examples

Interpretation

The presentation of archaeological, historical, and present-day heritage sites is incomplete without interpretation. Interpretation, as the term is used here, is provided for a public audience; it is a form of outreach that informs and, ideally, provokes contained interest and conversation. It is a means by which to better appreciate and understand the experience of visiting an archaeological site. Properly done, it is a guide to extracting meaning from the site, which provides the information needed to navigate the site in ways chosen by the visitor. Most importantly, it is a fundamental element in establishing and maintaining site sustainability.

The presentation of interpretation of historical context to a public also serves to highlight what is deemed significant and, through this act, can give strength to communities and provide a sense of place and belonging. Who creates such interpretation, however, raises question of ownership of heritage, social inclusion and exclusion, and the very politics of identity making. Interpretation gives voice to certain views of the past, and, in feasible and deft ways, these voices should be identified by reference to the scholarship and oral or written histories that have been used in preparing interpretive materials.

Site managers, archaeologists, and others seek to address three major questions in any interpretive plan: (1) How, when, why, and by whom was the site and surrounding landscape used in ancient times? (2) Why was the site a center of activity (in whatever manner that is defined)? (3) Why was the site important then, and why is the site important now? In order to disseminate such information, a master narrative is often created which serves as the basis for interpretation of all specific points of interest within the site. These narratives are then used as adaptable texts from which exhibits, brochures, training modules, and other interpretive devices are generated. However, all interpretive plans should accept that visitors have their own individual points of view and therefore should encourage dialogue.

Effective interpretive frameworks link specific tangible artifacts, buildings, and places with ideas, events, and concepts. Importantly, this interpretation should relate to wider social, cultural, historical, and natural contexts and settings (ICOMOS Ename 2007).

Role of Tourists

Clifford (1997) defines tourism as a contact zone, a place where identities are made and transculturation occurs. Archaeological and historical sites, therefore, become not only media through which cultures and events are presented but also where the experience of being a tourist changes one's sense of self. As a result, there are a multitude of protagonists who affect, shape, and delineate the tourist's experience. These actors include scholars and scientists, national governments and agencies, local governments, local indigenous groups, nongovernmental organizations (NGOs), property owners, and the visitors themselves. Tourists can be agents of destruction or support to an archaeological site; the interpretive program should be designed to encourage the latter role.

The Stakeholders

The creation of an interpretive plan should be a community activity so as to include the multitude of their voices and, simultaneously, be informed by archaeological data. As Byrne (1991) and Smith (2000) have noted, the operation of conservation in the heritage management industry has often promoted and maintained dominant colonial positions. The very linearity of how sites discuss past events gives precedence to Western scientific explanation. As a result, the management of sites and the creation of

interpretive plans create tension between national and local government agencies, indigenous groups, and property owners (Meskell 2001).

The ICOMOS Charter for the Interpretation and Presentation of Cultural Heritage Site (previously called the Ename Charter) is cognizant of these difficulties. This ICOMOS Charter was finalized in 2007 to highlight that role of interpretation and preservation. The Charter lays out the importance of taking into account the cultural contributions of all communities associated with a site, including minority groups as well as the interests of associated communities, property owners, governmental authorities, site managers, scholars, tourism operators, private investors, employees, and volunteers, and including them in the development of interpretive programs. The recent Statement of Menorca (2012), formulated by the International Council on Archaeological Heritage Management, expresses concern that archaeological sites, especially in developing countries, are increasingly seen as economic engines as opposed to being repositories of scientific and historic information or as places that enhance appreciation and understanding of human creativity and accomplishments. To correct this imbalance, it calls for the formulation of standards for the management and protection of archaeological sites, which should include the use of interpretation as a component of effective management. These standards should accommodate non-Western perceptions and thoughts about the meanings of material culture.

Recent scholarship by indigenous scholars and activists (e.g., Condori Mamami 1989; Cojti Ren 2006) demonstrates the, at times, systematic delinking of present indigenous groups to their past. As cultural heritage sites often remain important to current indigenous groups, traditionally associated groups to a site, therefore, should increasingly be permitted to pursue customary religious, subsistence, and other cultural practices at a site. Such continuing access to and use of traditional resources are often essential to the survival of family, community, or regional cultural systems, including patterns of belief, economic, and religious life. Due to the importance of such activities, however, site managers should not direct visitor attention to the performance of religious observances in particular unless these traditionally affiliated with the site lands or resources so desired.

Tourism Versus Protection

The difficulty faced by site managers is to balance tourism against the future protection of the site. Starting as early as the 1970s, researchers began looking at the impact of visitors on national parks and other protected areas (Flood 1982; Jacobs & Gale 1994; Forrest 1995). This research was amplified by investigations into artifact displacement as a result of agricultural practices or natural erosion (Cameron et al. 1990; Schofield 1991). It was not until recently, however, that some researchers turned their attention not just to the unintentional impact of specific categories of visitors on structural longevity but also to more active disturbances, movement, or outright removal of stone or other loose artifacts from sites by tourists. In their study, Migley and colleagues (1998) discovered that disturbance levels of artifacts did not decline evenly with an increasing distance from the central visitor area; as a result, the impact of tourism goes beyond the most traveled paths.

Comer (2011) argues that the most common and often the greatest threat to site preservation is from development associated with providing amenities to tourists. Such developments often change regional hydrology. At Petra, for example, construction of hotels, restaurants, parking lots, roads, and other impervious surfaces produces flooding that damages ancient structures by exposing them to chemical-laden floodwater, which washes away subsurface archaeological deposits. Other sorts of hydrological change produced by tourism can also be catastrophic. At Angkor, water pumped from the ground for use by tourists at hotels and restaurants is threatening soil stability and thus the foundations of the ancient monuments. Other threats arise from social discord promoted by competition among groups for economic gain associated with tourism. Such discord can ultimately promote political instability if multinational corporations eliminate economic

opportunities for local populations. Discord and political instability greatly reduce the capacity to effectively manage archaeological sites.

Signage, Walkways, and the Site Experience

Balancing the protection and long-term management of a site with daily tourists requires, among other things, well-delineated signage and walkways. It is important for walkways to be cleanly cut and maintained but also organized in such a way as to move visitors in and out of major throughways without producing erosion or encouraging tourists to sit on or rest against ancient structures. For this reason, benches or other seating, if possible in a shaded location, should be provided. Paths should never take tourists to remote, unobserved locations at archaeological sites where looting, vandalism (often in the form of graffiti, attempts to obtain rubbings, or even removal of architectural details), vending of looted antiquities, or use of ancient structures as ad hoc toilet facilities will eventually occur. The signage at any site should provide concise, well-worded text and associated images that provide a basic understanding of the meaning and significance of the monuments; limited text is fundamental to maintaining the movement of visitors while at the same time providing the educative material necessary for a pleasant and well-rounded visit.

In all, a comprehensive signage program includes way finding signs to help visitors identify the proper course, interpretive signs (wayside exhibits), orientation signs, trailhead information, consistent safety and warning information, and a Plan Your Visit sign at the entrance.

The site experience, however, begins before a visitor even arrives at the site in question. General information about the history of the site and how to visit it are often disseminated through a multitude of media, such as the Internet, or key hotels that educate individuals about coming to see the specific cultural heritage. This orientation includes maps, what to expect during the course of a visit, information about the services available to visitors, and a site bulletin highlighting points of interest of the specific tours or trails available. The Internet and individual site websites have become fundamental in this task; importantly, such websites manage visitor expectations by providing an introduction to interpretive themes, points of interest inside the park, and rules of behavior.

Site Management

The essence of site management is structuring visitor flow into a site so as not to exceed its carrying capacity. Carrying capacity can be concisely defined as the type and level of visitor use that can be accommodated while sustaining desired resource and social conditions. Visitation exceeds carrying capacity when it damages cultural or natural resources, renders the quality of the visitor experience less than that desired by either the visitor or management, or degrades the quality of life for the inhabitants of local communities.

Interpretation at an archaeological site is a tool of site management. Preservation of archaeological materials is paramount; other interpretive objectives, including generating income and providing an experience that produce shared memories which are important to the development of group identities, must be served in ways that do not damage archaeological materials. For that reason, most interpretive programs and activities should take place outside of the archaeological site, preferably in local communities that can then realize economic benefit from hosting such activities. The experience of visiting the site is as a rule best interpreted elsewhere.

The site experience should be unique to place, or at least exemplary of a type of place. Therefore, it is necessary to eliminate sensory experience incompatible with the experience of that location. This includes viewshed, sounds, smells, and light pollution. It also includes eliminating the press of crowds in locations that were in ancient times places of contemplation or at places that are conducive to contemplation today.

Commercial Uses

Outside of the typical tourist visit and the economic benefits they can bring, archaeological and historical sites also become centers of political, social, or artistic interest that bring

potentially high-impact activities to the site. These could include photography, filming programs, aircraft overflights, and recreational vehicles.

Film and photography of a site are important aspects of promoting protection, information, and general public enjoyment of cultural heritage resources. Managers of these resources may actively assist in filming and photography activities that serve this purpose and would not adversely affect the site. Entertainment interest in cultural heritage sites, however, usually exceeds these parameters. In such cases, a permit should be required for any filming or photography that (1) involves the use of a model, set, or prop; (2) requires entry into a closed area; (3) requires access to the site after normal working hours; (4) requires heavy equipment and its transport around a site. Securing a large performance bond is essential; despite stated intentions, no matter how sincere, it is common that archaeological and historical sites require substantial cleaning and even repair following filming. Film company budgets are often more depleted than anticipated by the film company after work on location.

Aviation is a necessary and acceptable management tool, but its uses go beyond site management and administrative purposes to include military, commercial, and general aviation. Noise and vibrations from touristic overflights can adversely affect a site's resources and values and interfere with visitor enjoyment. As such, these should be mitigated as much as possible.

Similarly, off-road vehicle use should be carefully planned and regulated due to their high impact on a landscape. Roads and areas may be designated for such vehicles only in locales in where studies indicate that there will be no adverse impacts on an area's natural, cultural, scenic, and esthetic values, and in consideration of other visitor uses. Such use should be carefully monitored and regulated. The use of off-highway vehicles by site managers should be limited to what is necessary to manage the public use of designated off-road vehicle routes and areas; to conduct emergency operations; and to accomplish essential maintenance, construction, and resource protection activities that cannot be accomplished reasonably by other means.

Cross-References

- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Interpretation (Including Historic Reenactments): Current Approaches
- ▶ Stakeholders and Community Participation
- ▶ Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana

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Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea

Yuri E. Demidenko
Crimean Branch, Institute of Archeology, National Ukrainian Academy of Sciences, Simferopol, Crimea, Ukraine

Introduction

From the 1920s until the 1990s, the Siuren I rockshelter was the only Crimean Paleolithic site with an archaeological sequence that was thought to represent almost the entire Crimean Upper Paleolithic industrial and chronological succession, additionally with an Early Upper Paleolithic component at its base. Siuren I was and is still considered to be a key site for the Crimean Upper Paleolithic. Some archaeologists have also interpreted many of the site's lithic assemblages as Aurignacian, making Siuren I a significant site among the few true Aurignacian sites in Eastern Europe. New excavations at Siuren I in the 1990s yielded both new data regarding the site's archaeological context and absolute dates.

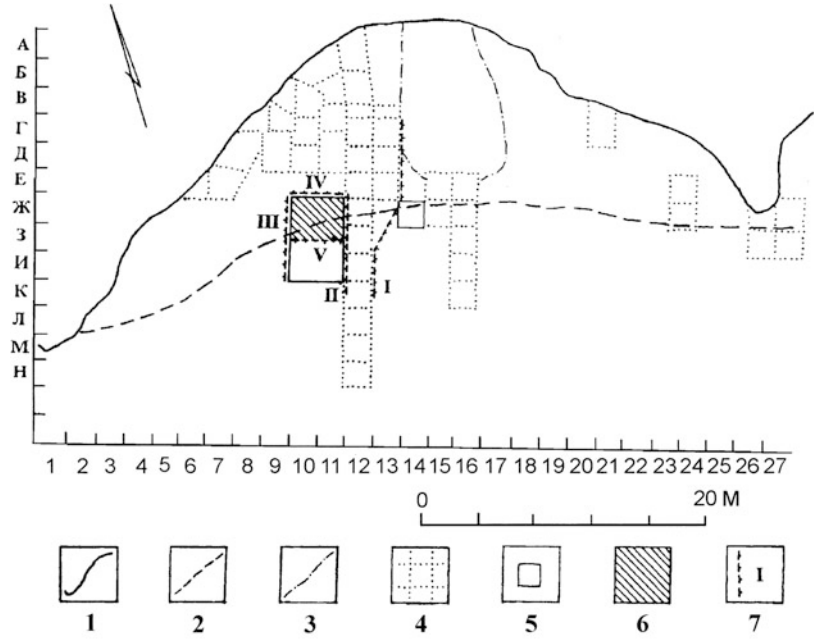
The site (44° 58′ N; 34° 08′ E) is situated near the high road from Bakhchisarai to Yalta, 0.5 km from Tankovoe village (formerly Biuk-Siuren) and 13 km south of the town of Bakhchisarai, in southwestern Crimea. It is one of two rockshelters (Siuren II is a Final Paleolithic site) located on the right bank of the Belbek River at its narrowest point ("Belbek Gate") where it cuts through the cliffs of the second range of the Crimean Mountains. Siuren I is a large south-facing rockshelter, 43 m wide, 15 m deep, and 9–10 m thick with an elevation of 15–17 m above the present-day level of the Belbek River.

Key Issues/Current Debates/Future Directions/Examples

History of Investigations at Siuren I and Its Archaeological Interpretations

The archaeological site at the Siuren I rockshelter was discovered and first excavated in 1879–1880 by the pioneer of Crimean prehistoric archaeology, K.S. Merejkowski (St. Petersburg). The excavations were carried out in the central part of the rockshelter near its back wall over an area of about 60 sq. m (Fig. 1). At the time, two Paleolithic layers were identified, although due to poor publications, Siuren I was considered as a doubtful site for more than 40 years (Bonch-Osmolowski 1934).

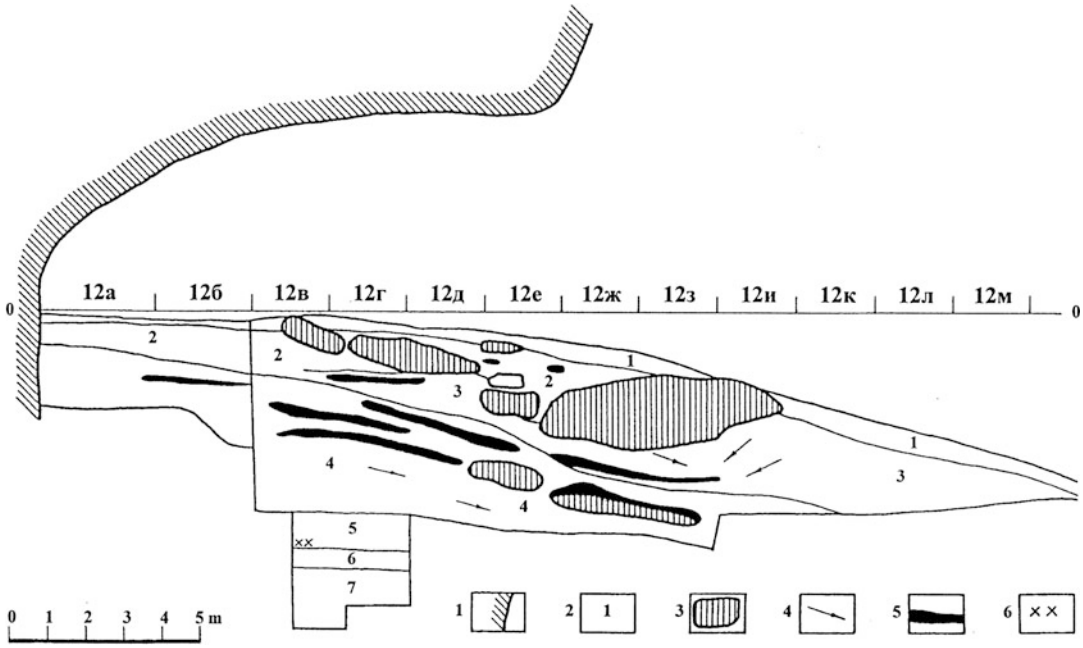
It was only after the 1926–1929 excavations by the then famous Soviet Paleolithic archaeologist Gleb A. Bonch-Osmolowski that the site was finally recognized as a key site for Crimean Upper Paleolithic. Up to 120 sq. m were excavated and three cultural layers identified within the deposits. These layers were separated by huge limestone blocks, resulting from different



Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 1 Siuren I. Map of the excavations (Modified after Vekilova 1957: Fig. 2 on p. 237). *1*: the rockshelter's back wall; *2*: drip line; *3*: Merejkowski's excavation area (1879–1880); *4*: Bonch-Osmolowski's excavation areas (1926–1929); *5*: Tarasov's excavation area (1981–1982); *6*: new excavation areas (1995–1997); *7:* main stratigraphic profiles

rockfall events from the shelter roof (Fig. 2). Although Bonch-Osmolowski distinguished several artificial horizons and even some hearth/ashy lenses within each layer during the excavations, he later combined the finds from each layer into three assemblages on the basis of the rather homogeneous industrial characteristics of the artifacts and his belief that deposition occurred rapidly. The three cultural layers defined by Bonch-Osmolowski (1934) represented, in his view, three stages of Aurignacian development: (1) lower layer (over 85 sq. m excavated) – "Lower Aurignacian" with some Mousterian-type artifacts, core-like end scrapers and numerous microliths with fine retouch; (2) middle layer (over 95 sq. m excavated) – "Middle Aurignacian" with carinated end scrapers and busked burins; and (3) upper layer (over 120 sq. m excavated) – "Upper Aurignacian" with Gravette points and numerous backed bladelets. Accordingly, he placed the Siuren I Upper Paleolithic into European context, finding similar complexes in Europe.

Such Aurignacian interpretations of the Siuren I assemblages were not, however, supported in Soviet archaeology. Instead, it was proposed that the rockshelter's layers showed the entire developmental sequence of the Crimean Upper Paleolithic with such "epochal dates": "*Aurignacian*" for the lower layer, "*time of Solutrean and possibly the beginning of Magdalenian*" for the middle layer, and "*time of Late Magdalenian and Early Azilian*" for the upper layer (Vekilova 1957). Siuren I and Crimea as a whole were also placed within the "*Mediterranean-African*" Upper Paleolithic zone although the Siuren I assemblages also have analogies in the southern Caucasus (Georgia) to the east. Vekilova's "chronological" interpretations for the Siuren archaeological context, demonstrating the whole Crimean Upper Paleolithic sequence, were widely accepted in Soviet archaeology. The Aurignacian attribution of the assemblages from the rockshelter's lower and middle layers was also lost, which is why they were later assigned to the unclear "*Aurignacoid route of Upper Paleolithic development in Eastern Europe*" and dated to the Last Glacial Maximum (c. 20–18,000 BP) (Anikovich 1992). On the other hand, Bonch-Osmolowski's Aurignacian



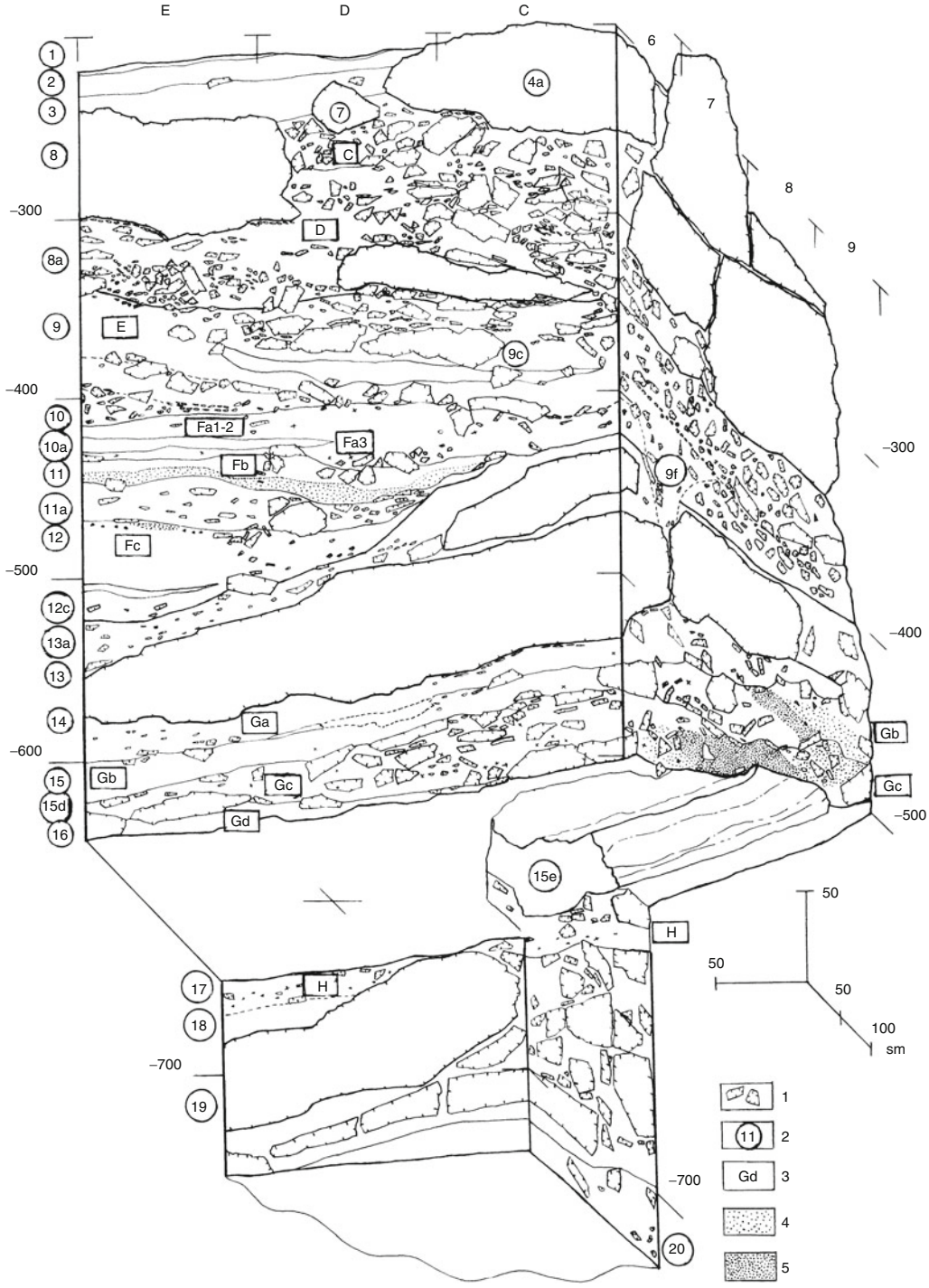
Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 2 Siuren I. Stratigraphic profile of Bonch-Osmolowski's 1926–1927 longitudinal trench (*squares* 12 A-M), eastern side (After Vekilova 1957: Fig. 4 on p. 240). *1*: the rockshelter's back wall; *2*: numbers of lithological strata (*2*: upper cultural layer, *3*: middle cultural layer, *4*: lower cultural layer); *3*: huge limestone blocks and slabs representing different rock fall phases from the roof of the rockshelter; *4*: direction of huge limestone blocks and slabs falls; *5*: hearth/ashy lenses; *6*: mammoth bone finds in archaeologically sterile lithological layer 5 (lower part)

definitions for the lower and middle layer assemblages were supported and developed by European archaeologists (since Peyrony 1948). Thus, there were two opposed interpretations of the lower and middle layer assemblages until the collapse of the USSR in the 1990s: mostly non-Aurignacian and simply an Early Upper Paleolithic attribution in Soviet archaeology and definite Aurignacian attribution in European archaeology.

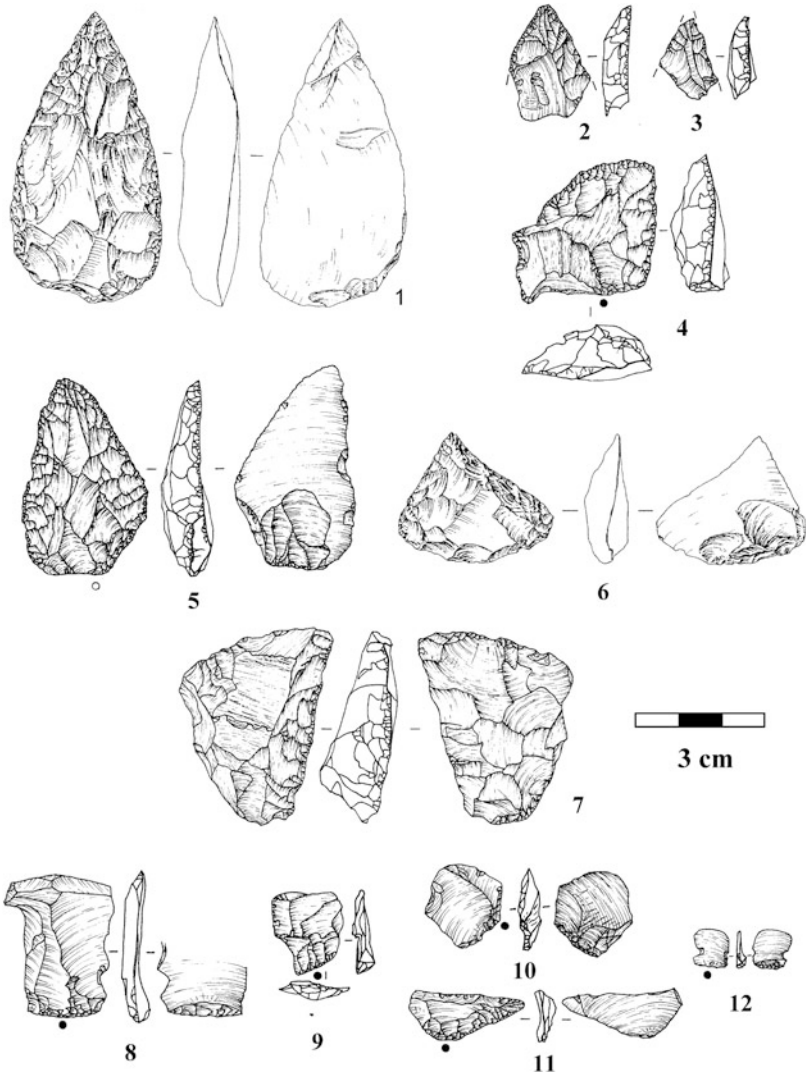
To resolve the non-Aurignacian/Aurignacian question for Siuren I, new excavations were undertaken at the site in 1994–1997 by a joint Ukrainian-Belgian team headed by V.P. Chabai and M. Otte. These took place in an area of 12 sq. m in the western part of the rockshelter (Fig. 1). Correlation between new stratigraphic units and Bonch-Osmolowski's layers could be made: the lower layer corresponds to Unit G, middle layer to Unit F, and upper layer to Units A–E. Additionally, a new unit (H) was discovered below Unit G.

Based on results from modern excavations, reanalysis of the 1920s assemblages, and evaluation of the information available for the original 1879–1880 excavation, the archaeological sequence of the site now includes seven different periods of human occupation from c. 31–30 to c. 12–11 ky BP (all dates discussed here are uncalibrated) within c. 6 m of deposits (Fig. 3). This stratigraphic sequence is represented by alternating limestone *éboulis* layers and sandy, silty-clay/clayey layers, where the rock layers account for more of the sequence than sedimentary layers (Demidenko et al. 1998; Demidenko 2000; Demidenko & Otte 2000-2001; Demidenko et al. 2012).

Assemblages from the 1920s lower layer/1990s Unit G (with stratigraphically distinct sublevels Gd, Gc1-Gc2, Gb1-Gb2, Ga) and lowermost Unit H represent two alternative occupations periods at the rockshelter no later than the Arcy Interstadial (c. 31–30,000 BP).



Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 3 Siuren I. Combined profiles # III and IV of the 1990s excavations. *1*: limestone slabs and *éboulis*; *2*: lithological strata defined in the 1990s; *3*: archaeological units and levels defined in the 1990s; *4*: charcoal pieces; *5*: hearth/ashy lenses



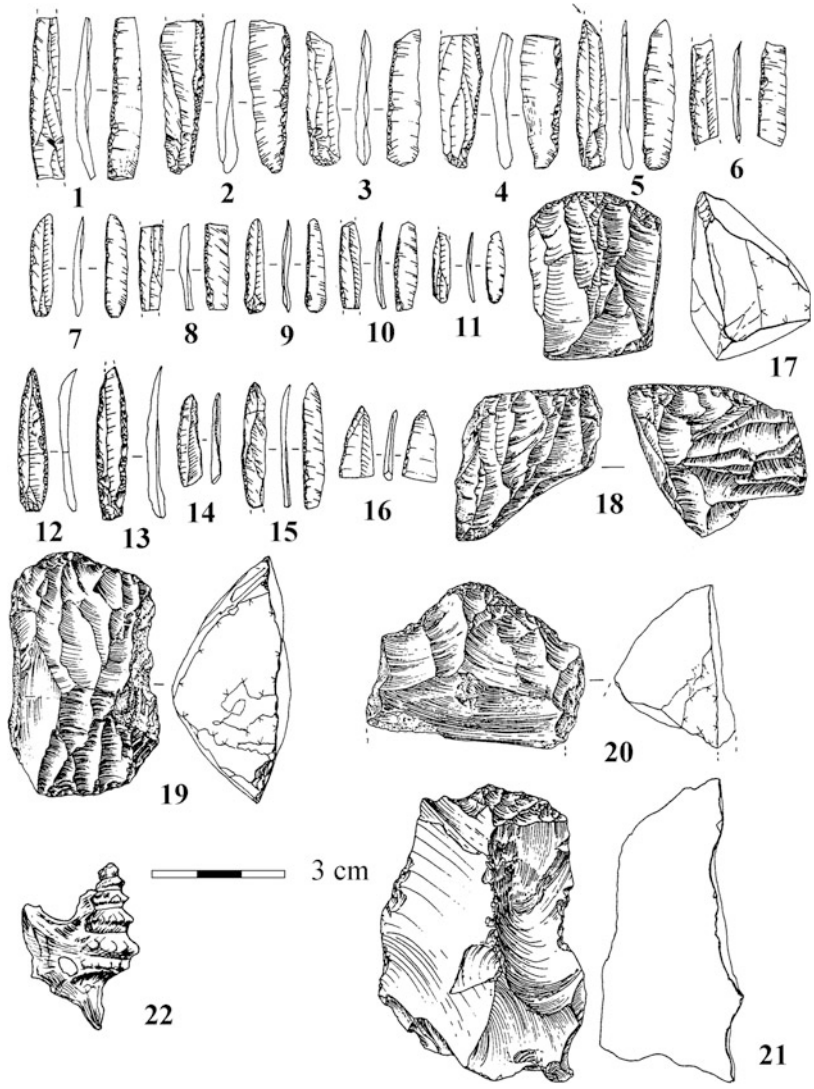
Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 4 Siuren I. Units H and G (1990s), Middle Paleolithic Crimean Micoquian Tradition (Kiik-Koba type industry) flint artifacts *1–7*: unifacial and bifacial convergent tools; *8–12*: retouch and rejuvenation flakes and chips from unifacial and bifacial tools secondary treatment processes

The first is attributed to the Middle Paleolithic (MP) Crimean Micoquian Tradition (Kiik-Koba type industry) produced by Neanderthals (Fig. 4), and the second to the European Proto-Aurignacian with Dufour bladelets produced by modern *Homo sapiens* (Fig. 5).

The 1920s middle layer/1990s Unit F (with stratigraphically distinct sublevels Fc, Fb1-Fb2, Fa3, Fa1-Fa2) contains assemblages attributed to the Late/Evolved Aurignacian with Roc de Combe bladelets during either the Arcy Interstadial (c. 31–30,000 BP) or the Maisières Interstadial (c. 29,000–28,000 BP) (Fig. 6a: 1–26).

In the 1920s upper layer and Units A–E, it is possible to identify four human occupation phases:

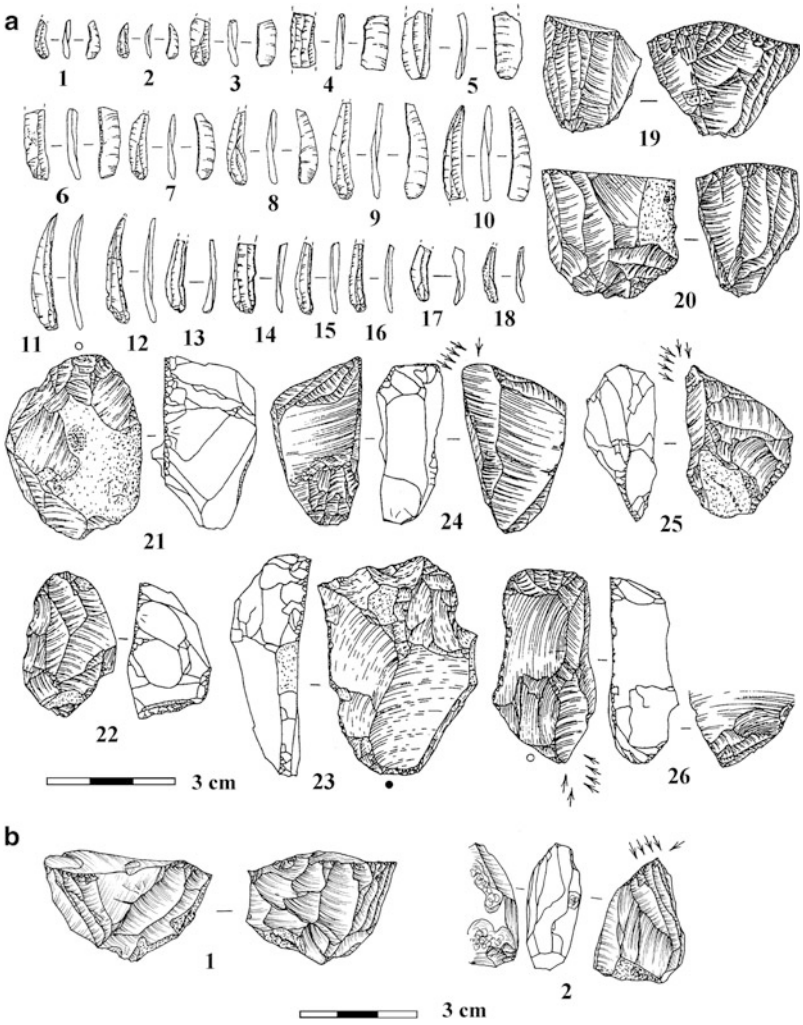
- Late/Evolved Aurignacian (c. 27,000 BP?): Unit E and part of the lowermost finds in the upper layer (Fig. 6b: 1–2)
- Late Gravettian (c. 24/23,000–20,000 BP?): Unit D and some finds in the 3rd "excavation horizon" of the upper layer (Fig. 7)
- Epi-Gravettian (c. 19–18,000 to 15,000 BP?): Unit A (not in situ), a few redeposited tools in humic deposits and most finds in the 1st and 2nd "excavation horizons" of the upper layer (Fig. 8a: 1–11)



Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 5 Siuren I. Units H and G (1990s), Proto-Aurignacian flint artifacts and a shell bead *1–11*: alternatively retouched Dufour bladelets and microblades of Dufour subtype; *12–16*: dorsally and alternatively retouched Font-Yves and Krems points; *17–19*: bladelet "carinated" cores; *20–21*: thick-shouldered end scrapers; *22*: *Apporhais pes pelicani* shell bead

– Final Paleolithic "Crimean Azilian" (Shan-Koba industry) (Allerød Interstadial – c. 12, 11,000 BP): western and eastern discrete "find spots"(c. 8 sq. m each) in the 1st and 2nd "excavation horizons" of the upper layer (Fig. 8b: 1–10)

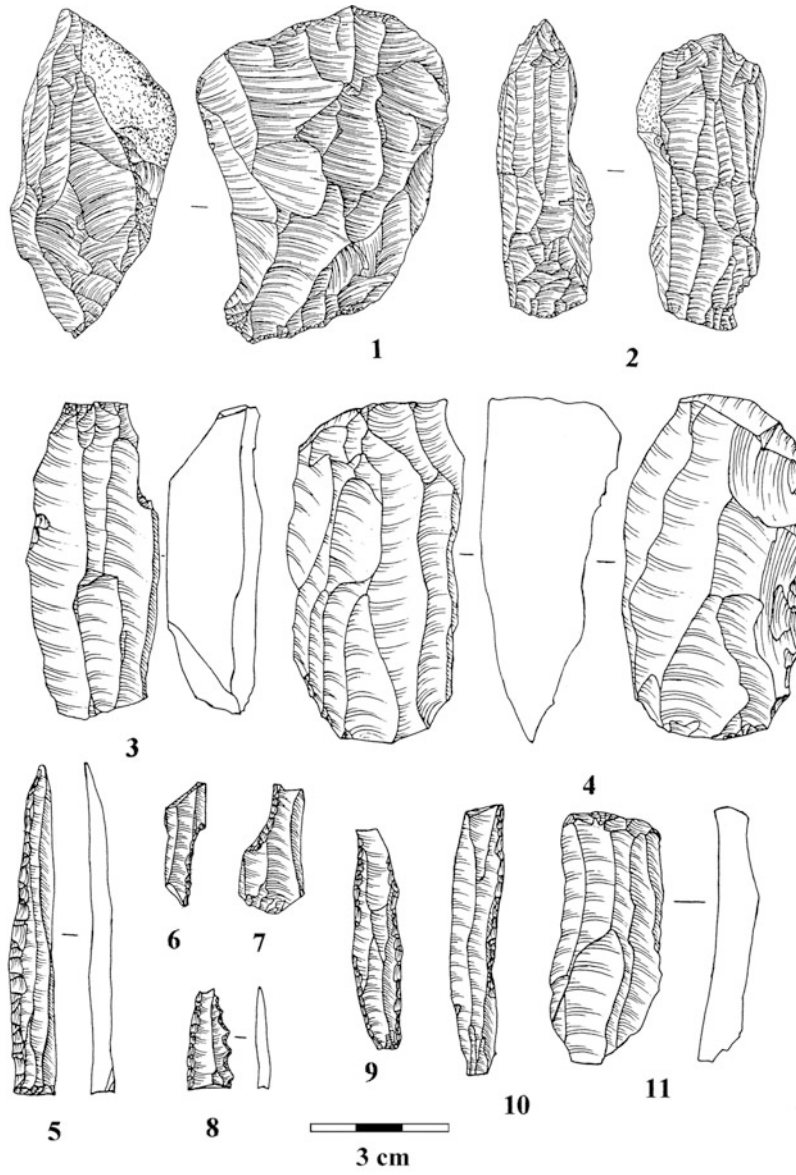
The proposed chronology for each occupation phase is based on three AMS dates on ungulate bones from Units H, G, and F (Unit H: 28,200 ± 440 BP (OxA-8249); level Ga, the uppermost level of Unit G: 28,450 ± 600 BP (OxA-5154); sublevel Fb2: 29,950 ± 700 BP (OxA-5155)), faunal data indicating a rather temperate climate during sediment deposition of Units H, G, and F (López Bayón 1998; Pettitt 1998) and industrial comparisons of the Siuren assemblages with techno-typologically similar and well-dated industries in Crimea and Europe. It should be also emphasized here that five other ungulate bone samples from Unit F (level Fb1-Fb2), Unit G (one sample from level Gb1-Gb2 and two samples from level Gc1-Gc2), and Unit H (one sample) were not dated by the Oxford radiocarbon laboratory because of collagen problems (Demidenko et al. 2012). At the same time, three dating attempts on charcoal samples by the Louvain-la-Neuve (Belgium) and Oxford laboratories were either too young to be Upper



Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 6 Siuren I. Units F and E (1990s), Late/Evolved Aurignacian flint artifacts (**a**) *1–26*: Unit F artifacts. *1–9*: ventrally retouched Dufour microblades of Roc de Combe subtype; *10*: alternatively retouched Dufour microblade of Roc de Combe subtype; *11–18*: dorsally retouched pseudo-Dufour microblades of Roc de Combe subtype; *19–20*: bladelet "carinated" cores; *21–22*: carinated end scrapers; *23*: thick-shouldered end scraper; *24–25*: bladelet narrow flaked single-platform cores/"carinated burins"; *26*: simple end scraper/carinated (busked) burin. (**b**): *1–2*: Unit E artifacts. *1* bladelet "carinated" core; *2* bladelet narrow flaked single-platform core/"carinated burin"

Paleolithic or had collagen problems, which is why subsequent dating attempts concentrated on ungulate bone.

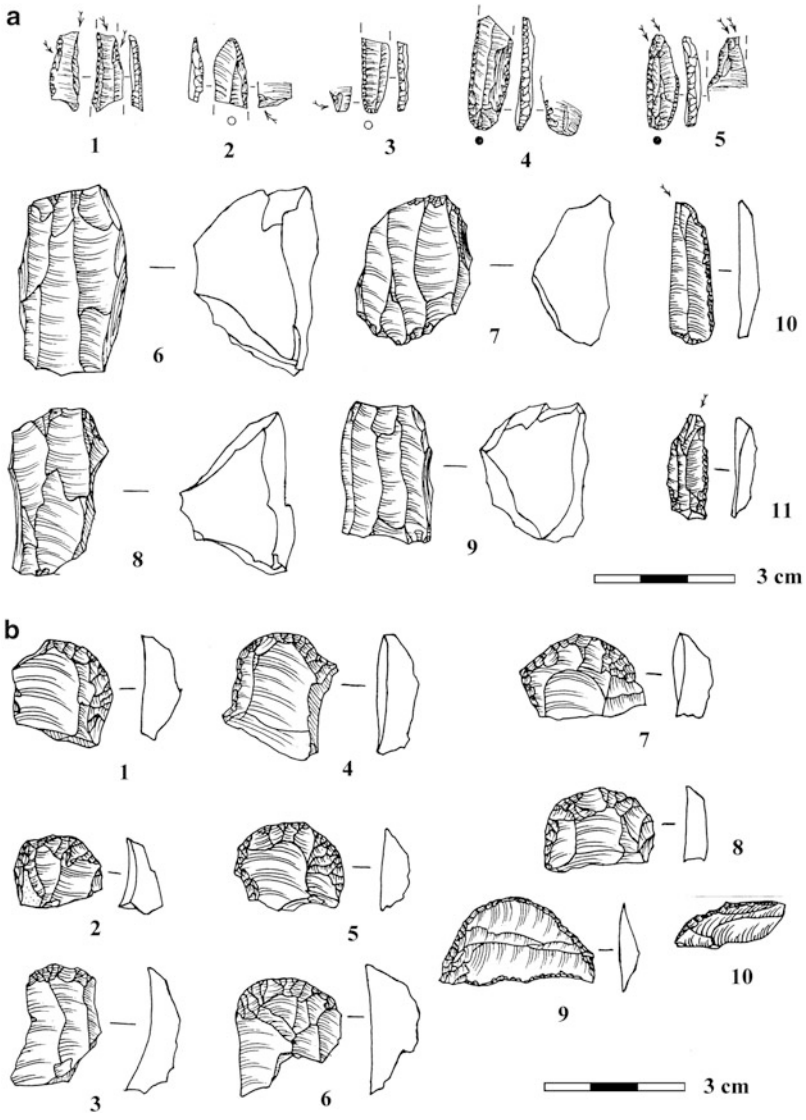
Interpretations of the chronology of the Siuren I industries have the following implications for the lower (Units H–G) and middle (Unit F) deposits. The co-occurrence of Micoquian and Proto-Aurignacian artifacts in Units H and G testifies to the geochronological coexistence of MP Neandertals and EUP *Homo sapiens* in Crimea c. 30,000 BP. A chronological gap between the Micoquian and Proto-Aurignacian assemblages (Units H and G) and the Late/Evolved Aurignacian (Unit F) is either nearly absent or quite short, making it possible for modern *Homo sapiens* with a Late/Evolved Aurignacian industry to quickly replace the previous inhabitants of Siuren I. As a result, this site not only occupies an important place within the MP-UP transitional period in Crimea but also serves to support both very late survival of Micoquian Neanderthals and the very late appearance of modern *Homo sapiens* and the Proto-Aurignacian here (Chabai 2000, 2003, 2004; Demidenko 2008). However, such a late Proto-Aurignacian Arcy Interstadial geochronology with AMS dates around 28,000 BP was not accepted by most European colleagues. In Western Europe, the Proto-Aurignacian is usually older, radiocarbon dated from c. 37–36,000 to 34–33,000 BP. The proposed Siuren I Proto-Aurignacian chronology could be too young,



Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 7 Siuren I. Late Gravettian flint artifacts. *1–2*: Unit D (1990); *3–11*: 3rd "excavation horizon" of upper layer (1920s) *1–4*: elongated blade/bladelet double-platform bidirectional cores; *5*: Gravette point with truncated base; *6–7*: shouldered/*pieces à cran* on bladelet and blade; *8*: backed bladelet microsaw; *9–10*: backed bladelets with elongated metric proportions and bidirectional scar pattern; *11*: simple flat end scraper

although the period of c. 30–28,000 BP is still within the broader Aurignacian time span. Therefore, it cannot be excluded that European Proto-Aurignacian *Homo sapiens* indeed penetrated into the south of Eastern Europe after occupation of southern and middle territories in Western and Central Europe. The Siuren I Proto-Aurignacian geochronological issue has also led to major debates on the Siuren I Late/Evolved Aurignacian and its significance for European Late/Evolved Aurignacian research. The Unit F assemblage not only perfectly fits the Western European Late/Evolved Aurignacian definition by having the "whole carinated piece package" (bladelet "carinated" cores and both carinated end scrapers and burins) and a single AMS date around 29,000 BP but also has the largest series of Dufour and pseudo-Dufour microblades of Roc de Combe subtype (68 specimens) in all of Europe.

Despite advances with the AMS dates obtained after the 1990s excavations, further



Siuren I Rockshelter: From the Late Middle Paleolithic and Early Upper Paleolithic to the Epipaleolithic in Crimea, Fig. 8 Siuren I. Epi-Gravettian and Final Paleolithic flint artifacts (**a**) *1–11*: Epi-Gravettian artifacts (1920s and 1990s excavations). *1–5*: non-in situ finds of Holocene humus sediments (1990s); *6–11*: 2nd "excavation horizon" of upper layer (1920s). *1–5*, *10–11*: backed bladelets with projectile damage; *6–9*: bladelet double-platform bidirectional cores. (**b**) *1–10*: The eastern Final Paleolithic "find spot" of 1st and 2nd "excavation horizons" of upper layer (1920s). *1–8*: simple flat shortened end scrapers; *9–10*: segments

dates were needed to provide additional support, leading to the very recent dating program for Siuren I.

Siuren I Dating Results in 2009–2011

From 2009 to 2011, a team of researchers (Yu.E. Demidenko, M. Otte, and P. Noiret (University of Liège) and Ph. Nigst and S. Talamo (Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany)) joined to systematically date ungulate bones from Units H, G, and F (Demidenko et al. 2012; Demidenko in press). In total, 25 samples were sent to the Oxford, Groningen, and Beta Analytic laboratories. The attempts were carried out on two groups of bone samples. One was composed of samples from eight bone tools: two Micoquian bone retouchers from Unit G, two Proto-Aurignacian points and an awl from Unit G, and two Late/Evolved Aurignacian tool production by-products and a point from Unit F. Dates obtained on these eight samples would ideally provide not only dates for human occupations on human-modified bone but also dates for both Micoquian and Proto-Aurignacian occupations at the rockshelter. The second group was composed of unmodified

ungulate bones: four samples from Unit H, nine samples from Unit G, and four samples from Unit F; their dating was intended to verify the other dates. The dating results, however, did not entirely meet expectations.

Unit F can be considered as successfully dated. All three samples of bone tools were dated by Oxford and ranged between 28.2 and 26.6 ky BP. Of the four ungulate bone samples, three dates were obtained by the three laboratories (30.9–29.4 ky BP) and only one sample had collagen problems. The latter set of dates is somewhat older than the former; although considering dates only for level Fb1–Fb2, the time span is narrower: 30.9–27.8 ky BP. On the other hand, only two dates for the Aurignacian time range were obtained, from Beta Analytic, out of the 18 samples for Units H and G: c. 30.5 ky BP for Unit H and c. 28.0 ky BP for level Gb1–Gb2. Moreover, no samples from the five Micoquian and Proto-Aurignacian Unit G bone tools had sufficient collagen. Four dates for Unit H and level Gb1–Gb2 were too young: 22–13 ky BP. The other six samples had also collagen problems and were not dated.

There is thus a significant difference in dating results obtained from the 1990s and 2009–2011 bone samples between Unit F and Units H–G. Below are data on samples with collagen problems, including those providing dates considered too young. Unit F has only 2 of 9 samples with collagen problems (22.2 %), Unit G 16 of 18 samples (88.9 %), and Unit H 4 of 6 samples (66.7 %). Combined, samples with collagen problems from Units G and H are 20 of 24 (83.3 %).

Such a high percentage suggests that something affected inner content of ungulate bone in Units G and H, causing most of them to have chemical content problems resulting in little or no collagen preservation. This may also explain the dates considered too young (22–13 ky BP). Moreover, with a few Aurignacian-like dates between 30.5 and 28.0 ky BP for Units H and G, statistically identical to the stratigraphically higher dates from Unit F (c. 30.9–29.4 ky BP for ungulate bones and 28.2–26.6 ky BP for bone tools), it is also possible to argue that the four Aurignacian-like dates (30.5–28.0 ky BP) do not represent a true age, being too young although not as recent as the four non-Aurignacian-like dates (22–13 ky BP).

Coming back to the uncalibrated AMS dates known in Europe for the Proto-Aurignacian with Dufour bladelets and Late/Evolved Aurignacian with Roc de Combe bladelets – c. 37–36 to 34–33,000 BP and c. 32–28,000 BP, respectively – recall that the two sets of Aurignacian units at Siuren I correspond well to these European Aurignacian industries. It is thus certain that Siuren I Unit F and its best archaeologically representative level (Fb1–Fb2) are attributable to the Late/Evolved Aurignacian with Roc de Combe bladelets, with six AMS dates around 30.9–27.8 ky BP, and corresponds well to the analogous European industry. On the other hand, the four existing "not too young" AMS dates for Units H and G (30.5–28.0 ky BP) do not at all fit into the known European Proto-Aurignacian chronology. Therefore, the suggestion of chemical content issues for the Units H and G ungulate bones appears more likely.

In sum, aside from the already proposed very late chronological position of Siuren I Proto-Aurignacian in Units H and G (c. 31–30,000 BP) within the European Proto-Aurignacian as a whole (c. 37–36 to 34–33,000 BP), an alternative hypothesis is now proposed that the existing Siuren I AMS dates for Units H and G are too young for their real uncalibrated C14 age. As a result, the Siuren I Proto-Aurignacian could join the European Proto-Aurignacian not only on the basis of artifact similarities but also probably their chronology. Moreover, if this is valid, then the Micoquian in Siuren I Units H–G is also not too late, meaning that Siuren I can no longer serve as a strong argument for late survival of Micoquian Neanderthals in Crimea.

Cross-References

- ▶ Crimean Late Middle Paleolithic to Early Upper Paleolithic Transition
- ▶ Crimean Upper Paleolithic
- ▶ Lithic Technology, Paleolithic

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Skeletal Biology: Definition

Douglas H. Ubelaker
National Museum of Natural History,
Smithsonian Institution, Washington, DC, USA

Brief Definition of the Topic

Human skeletal biology emphasizes the dynamic nature and complexity of the human skeleton. Research in human skeletal biology frequently focuses on human remains recovered from archaeological contexts. Topics of research generally relate to health, the relationships among ancestral populations as revealed in biological distance studies, and functional morphology through related evaluations of behavior and use of the skeleton. Interpretations within the field recognize the mechanisms of growth and development, bone remodeling, sexual dimorphism, adult age changes, and population variation. More specifically, research foci can include skeletal evidence for disease, chemical analyses relating to diet, the growth and maintenance of bones and teeth, demographic reconstruction, trauma, cultural affects, biomechanical adaptation, and postmortem alterations. The term human skeletal biology is frequently used synonymously with the terms human osteology and bioarchaeology.

Cross-References

- ▶ Ancestry Assessment
- ▶ Bioarchaeology: Definition
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Bone: Chemical Analysis
- ▶ Bone, Trauma in
- ▶ Dental Anthropology

▶ Human Remains Recovery: Archaeological and Forensic Perspectives
▶ Osteology: Definition
▶ Pathological Conditions and Anomalies in Archaeological Investigations
▶ Sex Assessment

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Smith, Claire

H. Martin Wobst
Department of Anthropology, University of Massachusetts-Amherst, Amherst, MA, USA

Basic Biographical Information

Claire Edwina Smith was born on July 15, 1957 in Sydney, Australia, as the 2nd of three daughters, to James Alexander Smith and Annette (nee Jones) Smith. She spent her youth in Booragul, near Newcastle, NSW, with her working-class parents, of Scottish and Irish background, inculcating her with empathy for the disadvantaged, tolerance toward others, valuing action rather than class or wealth, and respect for learning and progressive causes. Her interest in archaeology was inspired by a first-year course in economic prehistory at the University of Newcastle in 1983 while enrolled in a degree in Economics. It challenged her stereotypes about past and present Australian Aboriginal populations. She transferred to an Arts degree at the University of New England in Armidale, NSW, with a focus on Australian Aboriginal art, mentored by Mike Morwood and Jane Balme. She completed her Bachelor of Arts degree there in 1990, with First Class Honors and the University Medal with the thesis: *Designed Dreaming: Assessing the Relationship Between Style, Social Structure and Environment in Aboriginal Australia*.

Her doctoral work, also with the University of New England at Armidale, focused on style in Aboriginal rock art, in theory and practice. It was based on extensive fieldwork with and for Aboriginal people of the Barunga region, Northern Territory, Australia, and mentored by Jane Balme, Betty Meehan, and Mike Morwood. It culminated in her 1996 Ph.D. dissertation *Situating Style: an Ethno-Archaeological Study of Social and Material Context in an Australian Aboriginal Artistic System*. Following an Australian Research Council Postdoctoral Fellowship, she was appointed to the faculty of the Department of Archaeology at Flinders University as Lecturer (1998), Senior Lecturer (2001), Associate Professor (2005), and Professor in 2010. Presently, she is serving as Head of the Department. She has been the recipient of a Fulbright Postdoctoral Fellowship, hosted by American University and Smithsonian Institution National Museum for Natural History, Washington, DC, in 2000–2001. She has held academic visiting appointments at Columbia University, Lock Haven University, Pitzer College, and the University of Denver in the USA, the University of Cape Town in South Africa, and the University of Newcastle, NSW, Australia. Dr. Smith is married to anthropologist Gary (Jacko) Jackson, the coresearcher for many of her publications and the co-fighter for many of the causes that Dr. Smith has championed. They reside in Blackwood, South Australia, with their son Jimmy and, always, a number of visitors from Barunga and further afield (Fig. 1).

Major Accomplishments

Dr. Smith's scholarship is focused on the art, archaeology, heritage, present conditions, and deleterious outside interventions among postcolonial populations in general and specifically the Aboriginal Barunga community of the

Smith, Claire, Fig. 1 Claire Smith at Barunga, Northern Territory, 2012. With Danielle Bulumbara, Ester Bulumbara, and Nell Brown. Christine Camfoo and Wendy Willika in the background

Northern Territory, Australia. In addition, she has carried out fieldwork with Indigenous groups in India and Indonesia. Also among her research interests are rock art and the teaching of archaeology and cultural heritage, and how that teaching affects students, and also the future of Aboriginal populations and public understandings of the sophistication of Aboriginal cultures (e.g., she was the Instigator of the report: *A Past for all Australians: Archaeology and Australia's National History Curriculum*, submitted to the Australian government as input to the national history curriculum).

Very few people have been as intimately engaged with, and for, the people at the focus of their research as Dr. Smith. She has carried out fieldwork in the Aboriginal community of Barunga in the Northern Territory for more than 20 years now and with the Ngadjuri people in South Australia for more than a decade. Dr. Smith's goal is first and foremost to benefit Aboriginal communities and Indigenous communities in general. This is manifest in Dr. Smith's research and scholarship, in her teaching, and in her prodigious service and outreach.

She has been most visible internationally in her many roles in the World Archaeological Congress, particularly her 11 years as the President of the World Archaeological Congress (2003–2014). In this capacity she worked to transform interpersonal relations in world archaeology. She has worked actively to democratize world archaeology by breaking down the "old-boy" English-speaking network that controlled the field and increasing opportunities for Indigenous peoples and for archaeologists and archaeological students from low-income countries to share their knowledge with their peers and to obtain new knowledge in world conferences and through publications, including the *Encyclopedia of Global Archaeology*. She was the organizer and co-organizer of two WAC congresses, WAC-5 in Washington, DC, in 2003 and WAC-7, at the Dead Sea, Jordan, in 2012 (Fig. 2). The latter conference provided substantial support for 440 participants from disadvantaged groups and low-income countries. In addition, she instigated many of WAC's new ventures including *the Global Libraries Program* (in support of disadvantaged institutions), *Archaeologists without Borders* (an international faculty exchange), *Archaeologies* (its international journal), and its web presence, and she reinvigorated its publication programs (with five book series), its topical Inter-Congresses, and its championing of ethical practices within the archaeology and related disciplines.

Smith, Claire, Fig. 2 Claire Smith in Amman, Jordan, 2012, with student volunteers for WAC-7: Eman Alghrabli, Fatma Darawad, Rania Ali, Hanin Bitar, Rawan Abusakha, Faten Habarneh, and Hadeel Alturk

Both in her academic and administrative functions, she is frequently voicing concerns in the public arena about policies deleterious to the archaeological record and its cultural custodians, particularly in postcolonial contexts. In Australia, and internationally, she frequently speaks out, and publishes academically and in popular media, about how governments and governmental and nongovernmental organizations can interact with Indigenous populations in a culturally sensitive, fair, and just manner. She is often asked to advise, consult, and help academic institutions, foundations, research museums, and Indigenous governmental bodies with that dimension of their work. Her research has been supported by grants from the Australian Research Council, the Australian Academy for the Humanities, the Fulbright Commission, Wenner-Gren Foundation, Australia Youth Foundation, Australian Institute of Aboriginal and Torres Strait Islander Studies, and Ian Potter Foundation, among others, and has generated considerable corporate support for the causes she champions.

Among her numerous publications, Dr. Smith has completed nine books and more than 40 refereed articles and chapters (in English and in Catalan, German, Japanese, and Spanish), as well innumerable reports, blog pieces, films, interviews, news releases, and more than 20 key note addresses at international professional venues (Argentina, Australia, Brazil, Canada, England, Japan, New Zealand, Nigeria, Portugal, and the USA). Many of her publications have been written with her close colleague, Dr. Heather Burke.

But it is not just in her publications that Dr. Smith has helped to transform her profession. She has been a tireless worker behind the scenes, creating alliances, jumpstarting new cooperative research ventures, and helping along and mentoring young professionals, students, and people from disadvantaged populations. She has been one of the prime movers in the field of Indigenous archaeologies, in the safeguarding Indigenous intellectual properties and cultural knowledges, and in the decolonization and empowerment of Indigenous heritage. She is a passionate fighter for community-controlled research that increases opportunities; improves community control over community resources, knowledges, and patrimony; and leads to more sensitive and constructive treatment of community members by outsiders, be they academic, corporate, or governmental. She has worked ceaselessly to train students in these directions, to facilitate international and interdepartmental

collaboration toward these ends, and to support young professionals from previously underrepresented populations, as in her support for the closet chickens (a mutual support group of Indigenous scholars and their friends). She also was a prime mover behind the massive international cooperative research project, *Intellectual Property Issues in Cultural Heritage* (funded by the Canadian Social Sciences and Humanities Research Council's Major Collaborative Research Initiatives program), and she has organized a number of international conferences to further this agenda, including the Fulbright Symposium "Indigenous Cultures in an Interconnected World" (1997, Darwin, Northern Territory), "Cultural Heritage and Indigenous Cultural and Intellectual Property" (2006, Burra, South Australia), and "Cultural Heritage, Social Justice and Ethical Globalisation" (Adelaide, South Australia).

Her many honors include the Jawoyn Aboriginal kin name, Lamjerroc, being given to her son Jimmy in 1990, a number of prestigious teaching awards including the Carrick Award for Teaching (team category, held jointly with Dr. Heather Burke) and the Prince of Wales Award, appointment to the Australian Research Council's College of Experts, election to Fellowship in the Society of Antiquaries (London), and the frequent invitations to lend her insights and reflections as discussant to international symposia in anthropology, archaeology, Indigenous Studies, Heritage Studies, and other fields. There are few if any people of her generation who have had a greater catalyzing influence on archaeology and related disciplines, to help them break out of narrow disciplinary molds and to direct them to projects that honor not only the past, but also do justice and improve the conditions of the descendant populations who are the rightful custodians of that past today.

Cross-References

- ▶ Australian Rock Art
- ▶ Burke, Heather
- ▶ Closet Chickens
- ▶ Community Archaeology
- ▶ Ethics in Archaeology
- ▶ Indigenous Archaeologies
- ▶ Intellectual Property Issues in Cultural Heritage (IPinCH) Project
- ▶ World Archaeological Congress (WAC)

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Smith, Laurajane

Jessica Harrison
Department of Anthropology, University of Illinois Urbana-Champaign, Urbana, IL, USA

Basic Biographical Information

Laurajane Smith earned her B.A. and Ph.D. from the University of Sydney. She has held positions at Charles Stuart University (1990–1995), the

University of New South Wales (1995–2000), and the University of York (2000–2009). At the University of York, she directed the M.A. program in heritage studies. She moved to Australian National University in 2010 and is an ARC Future Fellow there.

Major Accomplishments

Dr. Smith specializes in heritage studies. She is renowned for the concept of "Authorized Heritage Discourse" (AHD), which she featured in her 2006 book, *Uses of Heritage*. AHD is the "dominant Western discourse about heritage… that works to naturalize a range of assumptions about the nature and meaning of heritage" (Smith 2006: 4). AHD focuses on "things" and is dominated by "concepts of monumentality and aesthetics" (p. 4). Dr. Smith is the editor of the *International Journal of Heritage Studies*, coeditor of Routledge's *Key Issues in Cultural Heritage* series, and founder of the Association of Critical Heritage Studies, whose inaugural meeting was held in 2012.

Cross-References

- Community Archaeology
- Cultural Heritage and Communities
- Heritage and the Need for Theory
- Heritage Theory
- Intangible Cultural Heritage
- International Journal of Heritage Studies
- Uses of Heritage
- World Heritage and Human Rights

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Smith, Mike

Alan N. Williams
Fenner School of Environment and Society,
The Australian National University, Canberra,
ACT, Australia

Basic Biographical Information

To my generation, Mike Smith seems one of the godfathers of prehistoric archaeology in Australia. Following in the footsteps of the Australian archaeology greats, like Rhys Jones, John Mulvaney, and Norman Tindale, Mike, a polymath by inclination, has been at the forefront of Australian archaeology debate since the 1980s. In over 30 years of research, Mike has been involved in research exploring the early colonization of Australia; the timing and composition of arid zone prehistoric occupation; the extinction of, and human interactions with, megafauna; the antiquity and mechanics of prehistoric seed grinding; and the late Holocene "intensification" debate. He has been instrumental in the application of new techniques to Australian archaeology, including geochemical

Smith, Mike, Fig. 1 (1986 Puritjarra) – Mike at excavations of Puritjarra Rockshelter 1986

provenancing of ochres, the use of thermo- and optically stimulated luminescence dating, and the routine inclusion of paleoclimatological and paleoecological analysis into excavations. Internationally, Mike is well known within the South American and South African archaeological communities and is regularly invited to participate in conferences and research on both continents.

Mike grew up in Adelaide and much of his early career showed an ongoing interest in South Australia. His early fieldwork experience was pivotal and included Roonka, on the lower Murray, where he joined the museum's excavations in 1971 while still a school boy. Later he worked at Koonalda Cave with Sandor Gallus in 1973 and at Wyrie Swamp with Roger Luebbers, in 1974 prior to starting university. Both his B.A. (hons) and M.A. theses were undertaken at The Australian National University (ANU) and focused on sites in South Australia. His honors research involved a detailed faunal analysis of excavated materials from Devon Downs rockshelter, a 5,000-year-old site located in the Lower Murray River. This site has a long history of investigation, originally excavated by Norman Tindale in 1930, who obtained some of first radiocarbon dates in Australia from this site in 1965, and most recently excavated by Mike himself in 1977 when he reopened part of the old trenches as part of his honors research. Mike's MA involved the systematic survey and investigation of Plumbago historic reserve (near Manna Hill) and was one of the first formal applications of probabilistic sampling techniques to an archaeological field survey.

At the beginning of 1980s, Mike took a job as the field archaeologist with the Northern Territory Museum, with a brief "to survey, record and excavate archaeological sites across the Northern Territory." Initially based in Darwin, Mike soon transferred to an office in Alice Springs and began a 30-year relationship with the prehistory of Central Australia. By the late 1980s, Mike had already surveyed and excavated a plethora of sites across region (Tjungkupu 1 and 2, Wanmara, Illarari kulpi malu tjukurr, Rrewurlpmurlpme Kweke, Kweyunpe 6, Urwemwerne, ORH16, Urre, Intirtekwerle, and Therreyererte), and importantly he had discovered one of the most significant sites in Australia – Puritjarra, a massive rockshelter in the Cleland Hills (Fig. 1). With the data from these sites, Mike completed a Ph.D. thesis (University of New England, 1988) and produced a number of seminal publications (see below), on the timing and pattern of prehistoric occupation of Central Australia. His ideas were critical in the formation of models on the colonization and abandonment of inland Australia during the Last Glacial

Maximum. These studies were also the first to characterize the antiquity of seed-grinding processes in the desert and the first to explicitly explore the archaeology of a desert totemic center. Although his work highlighted the extent of economic intensification in the desert during the last millennium, Mike never formally entered the social intensification debates of the 1980s and 1990s preferring to decouple social and economic changes and empirically track these separately in his analyses.

Puritjarra was a key focus of Mike's research for several decades – with over 10 publications on the site in the last 20 years, each exploring a key theme in desert research. He has recently (Smith 2010) published the complete body of works on the site. It still remains one of the most comprehensive studies of an archaeological site in Australia.

Mike had met Rhys Jones, another key figure in Australian archaeology, on the Wyrie Swamp dig in 1974 and later sought out Rhys as an advisor and mentor on his Ph.D. panel. This developed into a strong partnership when Mike became a research fellow at ANU in 1989 and with Rhys and Bert (RG) Roberts undertook a number of nationally significant excavations at rockshelters in Arnhem Land, Northern Territory. These excavations, at Malakunanja II and Nauwalabila I, provided some of the earliest dates for the colonization of the continent (55 ± 5 ka). And even today, these sites still remain the earliest evidence of human occupation in Australia. This work in Arnhem Land – and that at Puritjarra – was the earliest deployment of luminescence dating at Australian archaeological sites.

Since 1996, Mike has worked for the National Museum of Australia (Canberra), as a Senior Curator and Research Fellow. While his main interests remained focused on Central Australia, the Museum provided a platform for broadening the scope of research to include other parts of the arid zone: looking at Genyornis nesting sites on the west coast with Gifford Miller (Fig. 2), mapping millstone quarries in the Strzelecki Desert, and using pack camels to explore the eastern margins of the Simpson Desert (Fig. 3). Key outcomes of his time at the Museum include his research (with June Ross) on the archaeology of the Glen Thirsty site, and the direct dating of Panaramitee style rock engravings in Central Australia (showing them to be much younger than previously believed); excavations at Lake Gregory (with Peter Veth and Jim Bowler) demonstrating early evidence of Aboriginal occupation; and the application of time-series analysis to explore human-environment interactions across dry lands in both Australia and South America.

Smith, Mike, Fig. 2 (2007 Kallakoopah) – Mike excavating a fragment of megafauna on the Kallakoopah River 2007

Most recently, Mike has brought the growing body of evidence from the arid zone together in a major synthetic book from Cambridge University, which has recently been published (Smith 2013).

Major Accomplishments

- Royal Society of South Australia's Verco Medal for outstanding contributions to the archaeology of Australia's deserts (2010)
- Contributing author to the Royal Zoological Society of New South Wales' Whitley Medal for "Boom and Bust" (2009)
- Australian Public Service Australia Day Achievement Medallion (2009) for outstanding performance relating to special projects or core duties
- Fellow of Society of Antiquaries (2007)
- Fellow of the Australian Academy of the Humanities (2006)
- Rhys Jones Medal for Outstanding Contribution to Australian Archaeology (2006).

Smith, Mike, Fig. 3 (2010 Simpson) – Over the years Mike (*right*) has become a keen cameleer. Inadvertently, this has given him far greater access into the interior of many of the deserts of Australia

- Member, National Committee for Quaternary Research, Australian Academy of Science (2010–)
- Commonwealth Government nominee, Strehlow Research Centre Board, Museums and Art Galleries of the Northern Territory (2010–2013); The Australian National University (2010–present)
- Board of Directors and Research Advisory Panel, Australian Desert Expeditions (2008–present)
- Steering Group, International Geological Correlation Program 413 (Understanding future desert changes from past dynamics), UNESCO (1996–2003)
- Technical and Scientific Advisory Committee, Willandra World Heritage Area, Department of Environment, Commonwealth Government of Australia (2000–2006)
- Advisory Board, Centre for Research into Language Change, The Australian National University (2002–2006).

Cross-References

► Australian Deserts: Extreme Environments in Archaeology
► Australian Rock Art
► Dating Techniques in Archaeological Science
► Geoarchaeology
► Hunter-Gatherers, Archaeology of

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Smithsonian Institution

David Tutchener
Department of Archaeology, Flinders University, Adelaide, SA, Australia

Introduction

The Smithsonian Institution is a broad-based cultural institution situated in Washington DC, USA, and offers free entry to all visitors. It was founded by a bequest from James Smithson (1765–1829), a British scientist who left his estate to the United States to establish "at Washington, under the name of the Smithsonian Institution, an establishment for the increase and diffusion of knowledge." Smithson's bequest amounted to more than 100,000 gold sovereigns (Smithsonian Institution Website 2012). Since its establishment as a trust by President James K. Polk on August 10, 1846, the Smithsonian Institution has become the world's largest combined museum and research complex, with 19 museums, the National Zoo, and nine research facilities. The institutions of the Smithsonian house over 137 million objects and have over 7.4 million digitized objects (Smithsonian Institution Website 2012) (Fig. 1).

Definition

The Smithsonian Institution considers its mission as being instrumental in the increase and diffusion of knowledge. It also promotes its vision as "Shaping the future by preserving our heritage, discovering new knowledge, and sharing our resources with the world." The values of the Smithsonian are Discovery, Creativity, Excellence, Diversity, Integrity, and Service (Smithsonian Institution Website 2012).

As a national body, the Smithsonian Institution covers a large range of cultural interests which are reflected in the large amount of museums and research centers that operate under its umbrella.

The museums and research centers that are incorporated as part of the Smithsonian Institution (Smithsonian Institution Website 2012) are as follows.

Museums

- National Museum of African American History and Culture
- National Museum of African Art
- National Air and Space Museum
- Smithsonian American Art Museum
- National Museum of American History
- National Museum of the American Indian
- National Museum of the American Indian George Gustav Heye Center
- Anacostia Community Museum
- Arts and Industries Building
- Freer Gallery of Art
- Hirshhorn Museum and Sculpture Garden
- National Zoological Park
- National Portrait Gallery
- National Museum of Natural History
- National Portrait Gallery
- National Postal Museum
- The Renwick Gallery of the Smithsonian American Art Museum
- Arthur M. Sackler Gallery
- Smithsonian Institution Building (The Castle)

Research Centers

- Archives of American Art
- Conservation Biology Institute
- Environmental Research Centre
- Marine Station at Fort Pierce
- Museum Conservation Institute
- Smithsonian Astrophysical Observatory
- Smithsonian Institutional Archives
- Smithsonian Institutional Libraries
- Tropical Research Institute

Smithsonian Institution, Fig. 1 Smithsonian Institution Building also known as The Castle (Smithsonian Institution Website 2012)

Key Issues

While all the Smithsonian Institution are funded in part from the original Smithson endowment, most of the financial support for the Smithsonian comes from the US Federal Government. In 2011 the Smithsonian Budget Request for the financial year 2012 requested over $850 million dollars (The Smithsonian Institution Fiscal Year 2012). To offset this cost, some funding bodies have questioned the free entry to the Smithsonian Institution. However, free access by the general public was a condition of the Smithson bequest and is unlikely to change. These museums generate indirect income through the tourists they attract.

Modern museums function in a number of ways that manage to both preserve and absorb material culture while also disseminating culture and knowledge. This complex communication is managed through a number of different functions including acting as keeping places, functioning as research centers, and providing publicly accessible interpretation of collections in the form of exhibitions.

As a national institution, the Smithsonian has had a number of high-profile controversial exhibitions. The political views put forward in some exhibitions have caused some issues for the institution. These controversial exhibitions have since been used to help explore the role of museums in society and were later the subject of a study by the museum (Gavaghan 1995).

Enola Gay Controversy

A major controversy that arose around the Smithsonian's National Museum of American History's exhibition of the Enola Gay, the plane that dropped the first atomic bomb that was used on humans at Hiroshima, Japan, during the Second World War was at the center of much debate. The planned exhibit caused controversy over the interpretation of the events and the historical significance of the Enola Gay (Gavaghan 1995). The proposed exhibition was accused of being anti-American propaganda (Sowell 1995). Subsequently, the exhibition was altered to show only the plane and some film footage with minimal interpretation.

Life and Land Arctic Exhibition

The exhibition of photographer Subhankar Banerjee's work at the Smithsonian National Museum of Natural History was moved to a less prominent space at the institution under what is perceived as political pressure regarding climate change and oil drilling in Alaska. The artist

was also asked to make several revisions to a book that was based on the exhibit, which included any reference to the Smithsonian. The author was told that the work was "just too political" (Bailey 2003).

Publications

The Smithsonian contributes and disseminates knowledge not only through its museums and institutions but also through a number of publications.

Begun in 1970 the *Smithsonian* is a monthly magazine that is aimed a broad selection of topics including the arts, environment, sciences, history, and popular culture. The *Smithsonian* is the official journal of the institution that is based around communicating issues related to the Smithsonian collections and exhibitions.

The magazine *Air and Space Smithsonian* has been produced by the museum of the same name since 1986 and covers topics related to the advancement of technology related to aviation and space exploration.

The Smithsonian has its own *Online Encyclopaedia* that is divided into several sections including Art and Design, Science and Technology, History and Culture, and Kids Favourites.

Cross-References

- ▶ Museums and Memory Experiences
- ▶ Museums and the Distortion of Archaeology for Political Purposes
- ▶ North America (USA and Canada): Museums

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Luis Fondebrider
The Argentine Forensic Anthropology Team (Equipo Argentino de Antropología Forense, EAAF), Buenos Aires, Argentina

Basic Biographical Information

Clyde Collins Snow was born in Fort Worth, Texas, on January 7, 1928. He grew up in Ralls, Texas, where his father was a country doctor. From his early years, he followed his father, who introduced him into the world of science, disease, life, and death.

After graduating from junior college at the New Mexico Military Institute in Roswell, New Mexico, he received his Bachelor's Degree in Biology at Eastern New Mexico University, a Master's Degree in Zoology from Texas Tech University, and his Doctoral Degree in Anthropology from the University of Arizona.

In 1960, he joined the staff of the Federal Aviation Administration's Civil Aeromedical Institute (CAMI) where, over the next two decades, he conducted research in factors influencing survivability in aircraft accidents. In this role, he participated in the investigation of major air disasters, specializing in the identification of the victims. He also served as a pro bono consultant to medical examiners, coroners, and law enforcement agencies throughout the United States in cases involving the identification of skeletal remains. In this latter conjunction, he published the first scientific paper containing the term "Forensic Anthropology" (Snow & Luke 1970).

Major Accomplishments

Among his varied research projects was a long-term study of the Tarahumara Indians of northern Mexico who are among the world's most famous endurance runners. Its objective was to determine the factors contributing to their remarkable

physical conditioning. It entailed a number of long trips to their remote villages in the *Barranca del Cobre* (Copper Canyon) over whose rugged terrain they run races of 24–48 h. He and his colleagues studied the physique and diet of the runners and telemetrically monitored their cardiac performance on treadmills and during actual races (Balke & Snow 1965; Snyder et al. 1969; Paredes et al. 1970). He also performed research on factors contributing to survivability such as age, sex, and seat location in major aircraft accidents (Snow et al. 1970) as well as anthropometric surveys of aviation-using populations (Snow 1965; Snow et al. 1975). The last commercial aircraft accident he helped investigate was the crash of an American Airlines DC-8 in Chicago on May 25, 1979 where he supervised the identification of the 273 victims. He also served for 2 years in the late 1970s on the panel of experts called to review all the evidence concerning the assassination of President John F. Kennedy for the US House of Representatives' "Special Committee on Assassinations" (Snow et al. 1979).

In late 1979, he retired from federal service and launched a second career as a full-time forensic anthropology consultant. As such, he was consulted on all skeletal cases from Oklahoma. He was also contracted by the Cook County Medical Examiner to examine all skeletal cases from Cook County which includes Chicago and its suburbs. One of his early Chicago cases was that of the notorious John Wayne Gacy who killed 33 young men and boys, burying 29 of them under his house. Along with the work in Oklahoma and Chicago, he was frequently called on cases in other states, including the "Green River" serial killings in Washington (Haglund et al. 1987) and that of Polly Klass, a 12-year-old girl kidnapped from her home in Petaluma, California, in 1993 and whose case attracted nationwide attention. He also used his skills in the analysis of remains found in historical contexts such as the bones of soldiers killed at the Battle of the Little Big Horn (Snow & Fitzpatrick 1989).

In 1984, his career took another turn when he was called to Argentina to help in the investigation of the thousands of Argentine men, women, and children who had been murdered during the military's self-proclaimed "Dirty War." These victims, the *desaparecidos* ("disappeared ones"), had been kidnapped, held in secret detention centers under torture and interrogation, and, finally, extrajudicially executed with their bodies being buried in clandestine graves scattered throughout the country. Between 1984 and 1990, he spent over 2 years in Argentina helping in these investigations, periodically returning to the USA to carry out his regular case work. During this time, he also recruited a small group of Argentine anthropology and medical students whom he trained up to carry out these investigations. In 1985, that group, the *Equipo Argentino de Antropologia Forenses* (*EAAF*) and Snow were called upon as expert witnesses to present some of their early findings in the trial of the nine members of the military dictatorship which resulted in the sentencing of three of them to life and another three to lesser terms. The trial was a forensic landmark since it was the first in which the testimony of scientific experts was used in a human rights case.

Later that year, he was called to Brazil where he headed the Simon Wiesenthal team, which along with other experts from Brazil, the USA, Germany, and Israel identified the skeleton of Josef Mengele, the infamous Nazi SS physician responsible for the deaths of thousands of Jews (Snow 1986).

In 1988, Snow and the *EAAF* were asked to come to Chile, which had its own *desaparecidos*. There they recruited and trained a team of Chilean anthropology students to help recover and identify the bones of the disappeared in their own country. Later, the Argentines, Chileans, and Snow journeyed to Guatemala and Peru where they formed similar forensic anthropology teams. By the early 1990s, the successes of these teams in their own countries had attracted international attention, and they were being asked by the United Nations and international human rights organizations to help in the investigation of war crimes, crimes against humanity, and human rights violations in other countries.

He has presented his findings as an expert witness in courts and international tribunals at The Hague, Ethiopia, El Salvador, Peru, Mexico, and other countries. In 2006, he went to Baghdad where he testified as a prosecution witness in trial of Saddam Hussein for his genocidal "Anfal" campaign against the Kurds. His testimony was based on investigations of several mass graves that he and the Argentine, Chilean, and Guatemalan teams had excavated in 1991–1992.

Dr. Snow's statistical analyses of the patterns of disappearances have contributed significantly not only to the location and recovery of the desaparecidos but also on the overall modus operandi of repressive regimes (Snow & Bihurriet 1992; Snow et al. 2008).

Through his work in many countries from Argentina to Zimbabwe, Dr. Snow has helped develop forensic anthropology as a key discipline in the investigation of human rights violations. His work has also inspired many young forensic scientists in these countries, particularly Argentina, Chile, Peru, Columbia, and Guatemala. The endeavors of these teams have brought solace and healing to the families of the disappeared in over 30 countries by repatriating their missing loved ones and bringing justice to their oppressors.

Cross-References

- Archaeology: Definition
- Bioarchaeology: Definition
- Forensic and Archaeological Analyses: Similarities and Differences
- Forensic Anthropology: Definition
- Forensic Anthropology: Investigating Human Rights Violations
- Human Remains Recovery: Archaeological and Forensic Perspectives
- Osteology: Definition
- Skeletal Biology: Definition

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Soares, Joaquina

M. Joaquina C. Soares
Museu de Arqueologia e Etnografia do Distrito de Setúbal, Universidade Nova de Lisboa, Setúbal/Lisboa, Portugal

Basic Biographical Information

Joaquina Soares (Fig. 1) was born in 1953. She obtained her Ph.D. in Prehistory from the Universidade Nova de Lisboa in 2011. The title of her doctoral thesis was *Social Transformations in the Third Millennium BC in Southern Portugal: The Settlement of Porto das Carretas*. She was an archaeologist in Gabinete da Área de Sines, from 1972 to 1988, and between 1988 and 2000, she worked in the Natural Park of Sudoeste Alentejano e Costa Vicentina. She has been director of the Museum of Archaeology and Ethnography of the District of Setúbal since 1974. Besides, she has been co-director of the archaeological review, *Setúbal Arqueológica*, since 1974 and editor of the cultural review, *Musa. Museus, Arqueologia e Outros Patrimónios*, since 2004.

Joaquina Soares lectures in prehistory and protohistory at the Universidade Nova de Lisboa and is an associate member of the Archaeological Center (UNIARQ) of the University of Lisbon.

Throughout her carrier, she has produced more than 100 publications.

Joaquina Soares and her husband, Carlos Tavares da Silva, were the first professionals working full time in field and theoretical archaeology in Portugal, starting with the project of the regional development of Gabinete da Área de Sines from 1972 to 1988 (Tavares Da Silva & Soares 1981).

Major Accomplishments

Joaquina Soares has directed and co-directed more than 100 archaeological excavations based on research projects and rescue programs over the last four decades. From 1997 to 2002, she worked on the largest rescue archaeological project of Southern Portugal, in Alqueva (dam of the Guadiana River). Along with Carlos Tavares da Silva and José Manuel Mascarenhas, she also conducted an archaeological and cultural heritage survey for the evaluation of the environmental impact of the dam construction in the phase preceding construction in 1984 and 1985.

Soares, Joaquina, Fig. 1 Joaquina Soares. Southwest Portuguese Coast, August 2012

Since 1975, Joaquina Soares had been dedicated to establishing a new concept of museology oriented to research and regional development in the Museum of Archaeology and Ethnography of the District of Setúbal, Portugal. Since 2003, she has promoted the first Portuguese regional network of museums, the Fórum Intermuseus do Distrito de Setúbal. Joaquina Soares combines research with social interactions and educational and information purposes. She has convened a number of conferences, workshops, and several international symposia, including the following: "Prehistory of wetlands. Landscapes of salt" held in 2011 and "Production and commerce of salted fish and fishsauces from the Atlantic Coast of the Iberian Peninsula, during Protohistory and the Roman Age" in 2004.

She has been the director of several research projects including the archaeological rescue project "Medida A" of the Alqueva dam, the

urban archaeology research "Preexistencias of Setúbal," and the archaeological excavations on the pre- and protohistorical settlement of Chibanes in the region of Arrábida that is in the process of the classification as a World Cultural Heritage by UNESCO.

Joaquina Soares has played a significant part in the development of Portuguese urban archaeology, mainly in the cities of Setúbal and Sines. With Carlos Tavares da Silva, she organized the first national congress on this matter: *I Encontro Nacional de Arqueologia Urbana* (1985). Her main research contributions in archaeology are in the areas of (I) cultural evolution of the Chalcolithic from Portuguese Estremadura, with Carlos Tavares da Silva; (II) identification of the first Chalcolithic fortifications from the III millennium cal BCE in Southern Portugal, with Carlos Tavares da Silva; (III) the Neolithization process in the Southwest Portuguese Coast (Soares 1996, 1997); (IV) the emergence of complexity in the III millennium cal BC on the Southwest of Iberia (Soares 2003, 2008a; Soares, & Tavares da Silva 1998, 2010a, b); (V) prehistoric salt exploitation in the Portuguese Coast (Soares 2008a); (VI) settlement strategy of the Middle Bronze Age of SW Iberia (Cultura do Bronze do Sudoeste); and (VII) urban archaeology in Setúbal (Soares 2008b).

Cross-References

- ▶ European Mesolithic: Geography and Culture
- ▶ Europe: Mesolithic-Neolithic Transition
- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Heritage Museums and the Public
- ▶ Material Culture and Education in Archaeology
- ▶ Social Archaeology
- ▶ Tavares da Silva, Carlos
- ▶ Urban Archaeology
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- ▶ Western Roman Provinces, Archaeology of the

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Social Archaeology

Craig N. Cipolla
School of Archaeology and Ancient History, University of Leicester, Leicester, UK

Introduction

Societies and social relations have always garnered attention in archaeology. What has changed over the years are the ways in which practitioners define, prioritize, and integrate *the social* into their work. With the emergence of new forms of archaeology (e.g., processual, feminist, public), the significance of the discipline's social dimensions mutates and grows, the term "social archaeology" broadens in scope, and archaeologists' relations to non-archaeologists creep towards the forefront of our professional concerns. All of these trends stem from the complexities of working on the past in the present. The myriad of research projects and publications over the past decade, including the founding of the *Journal of Social Archaeology* in 2001, point to the growing importance and diversity of social archaeologies. In this entry, I offer a working definition for social archaeology, particularly as it pertains to the archaeologies of Native North America; however, I only do so with the acknowledgement that definitions are contextual and in a constant state of flux. In addition to this broad definition, I also provide some historical background and an example of social archaeology from a recent multi-sited research project in northeastern and midwestern North America.

Definition

The introductory editorial statement from the inaugural issue of the *Journal of Social Archaeology*, now a decade old, provides a fitting start for any definition of social archaeology in the twenty-first century. The editor succinctly noted the dual nature of social archaeology, stating, "Our challenge is to understand past societies in terms of their social contexts and lived experience while, at the same time, to remain cognizant of how the knowledge of the past that we produce is used in the present" (2001: 9). Like all archaeologies, social archaeologies maintain a general concern with those that came before. Their specific foci on past social relations, identities, and discourses – as seen in the material residues left behind by past peoples – often lead them in new theoretical directions and sometimes differentiate them from other forms of archaeology. It is, however, the second component of the editors' statement – the cognizance of archaeology's social impact in today's world – that truly defines social archaeology. Given this entry's placement in the *Political and Social* section of the encyclopedia, I focus solely on this important facet, which continues to both challenge and strengthen contemporary archaeology as a whole. In this sense, I see social archaeology as any form of archaeology that takes its potential impacts on the present and future just as seriously as it takes its interpretations of the past. Archaeologies so described range greatly in form. Issues of representation of the past for non-archaeologists, integration of descendent communities into archaeological research, and simply striving to improve the modern world with archaeological knowledge all encompass the spirit of social archaeology. While their specific research objectives vary, most forms of social archaeology

concern issues of cultural heritage and the relationships between archaeologists and the many "stakeholding" publics that surround them.

Historical Background and Key Issues

I limit my discussion of historical background to four interrelated forms of archaeology: public, Indigenous, postcolonial, and applied/pragmatic. I see each of these trends as the key contributors to contemporary social archaeology in North America.

Public Archaeologies

As defined by Charles McGimsey in 1972, public archaeology was originally conceived of as *archaeology by the state*. Since the 1970s, however, the scope of public archaeology has broadened to encompass any process of professional archaeologists – academic or state-funded – managing archaeological sites for the general "public" (Merriman 2004). This transition extended public archaeology to include public-interest archaeology in addition to publicly funded archaeology. Recent developments in the field deal with the public's direct involvement in the archaeological process. Shadla-Hall (1999: 147) defines this more recent version of public archaeology as "any area of archaeological activity that interacted or had the potential to interact with the public." Merriman (2004: 5) sees this new form of public archaeology as primarily concerned with ethics and identity: "Public archaeology is inevitably about conflict over meaning…This broader definition of public archaeology opens up a space in which to discuss not just archaeological products (such as educational programmes, museum displays and site tours) but the processes by which meaning is created from archaeological materials in the public realm." Two models emerged within this concentration in archaeology: the *deficit model* and the *multiple perspectives model* (Merriman 2004). The deficit approach seeks to inform (and perhaps convince) the general public of the relevance of archaeological research. The multiple perspectives approach suggests that Western academic knowledge is only one of many types of knowledge and seeks to incorporate the general public's views on the past. Within this spirit of public archaeology, practitioners question the relevance of their research for the communities it impacts (Mapunda & Lane 2004). Such considerations lead to new methods of incorporating non-archaeologists in various aspects of the archaeological process. This includes directly integrating community needs and interests into the research (e.g., Potter 1994; Cipolla 2013), a key component of other forms of social archaeology, including the many Indigenous archaeologies discussed next.

Indigenous Archaeologies

North American Indigenous archaeologies stem from the Indigenous rights movements of the 1960s (see Atalay 2006). Activists like Vine Deloria Jr. critiqued the discipline of anthropology for what he saw as its exploitation of Indigenous peoples. Indigenous communities critiqued archaeologists mainly for the ways in which they treated Indigenous burial grounds and human remains. This discontent eventually took the form of protests at archaeological sites and other types of social activism, which led (and sometimes forced) archaeologists to begin listening more closely to the concerns of Indigenous communities. In some instances, these early consultations and collaborations were legally mandated by federal and state laws passed in the 1980s and 1990s to help protect Indigenous rights to cultural heritage. In other cases, researchers such as Janet Spector and Larry Zimmerman readily embraced American archaeology's changing relationship to Indigenous communities, embarking in new forms of collaborative archaeology (McGuire 2004). Of course, these new approaches also drew influence from postprocessual archaeologies, which emphasized the fluidity of meaning and the importance of multivocality in understanding the past. Finally, Indigenous people began earning degrees in archaeology, further diversifying the discipline and pushing archaeological research in novel directions.

Although defining North American Indigenous archaeology is a difficult task (see Watkins 2000;

Atalay 2006), many practitioners embrace the definition offered by George Nicholas and Thomas Andrews (1997: 3) as archaeology conducted with for and by Indigenous peoples. Among the many different forms of Indigenous archaeology are tribal archaeology, covenantal/reciprocal archaeology, and collaborative archaeology (Preucel & Cipolla 2008). One of the key variables in these different forms is the presence and role that outsides (non-Indigenous) play in the research (cf. Bendremer & Thomas 2008; Silliman & Sebastian Dring 2008). Some argue for the importance of multiple cultural perspectives in such research while others see Indigenous archaeology as archaeology conducted only by Indigenous people for Indigenous people. It is best to consider the distinctions between the different types of Indigenous archaeology as differences of degree rather than kind since all share common interests in decolonizing methodologies (Smith 1999). Of note, it is the more diverse research strategies in Indigenous archaeology – those that incorporate multiple stakeholders (descendants, non-descendant community members, archaeologists) – that I see as firmly situated within the realm of social archaeology. I provide an example of such research below with my discussion of the Brothertown Archaeology Project.

Postcolonial Archaeologies

Postcolonialism refers to a broad series of critiques of the Western cannon by scholars such as Edward Said (1978), Gayarti Spivak (1988), and Homi Bhabha (2004). In its varied forms, postcolonialism defies definition in many ways. Yet, as Matthew Liebmann (2008: 2) explains, at the most basic level, "postcolonial approaches challenge traditional colonialist epistemologies, questioning the knowledge about and the representation of colonized 'Others' that has been produced in colonial and imperial contexts." These critiques and challenges focus largely on the ways in which colonial populations represent colonized peoples and their histories (Liebmann & Rizvi 2008). Although much of the literature focuses specifically on modes of representation in parts of Asia and Africa, North American archaeologists have begun to draw influence from postcolonial studies. For example, postcolonial theory shares common themes with many iterations of public and Indigenous archaeology discussed above. From the perspective of social archaeology, engagements with postcolonial theory offer archaeologists new means of detecting the Western biases embedded in their practices, creating new spaces in which to redress the injustices of colonialism and the appropriation of Indigenous histories by nonnative archaeologists.

Applied and Pragmatic Archaeologies

Jeremy Sabloff's (2008) recent volume, *Archaeology Matters*: *Action Archaeology in the Modern World*, provides many fitting examples of how archaeological research can be used to solve social problems in the contemporary world. Sabloff draws upon a diverse set of archaeological studies in order to demonstrate how archaeological data speak to contemporary issues of sustainability, warfare, urbanization, and more. Efforts that strive to use archaeological research to serve contemporary social needs are part of a broader trend in archaeology that Robert Preucel and Stephen Mrozowski (2010) label "the new pragmatism." Pragmatism is a broad philosophical framework that concerns itself with the effects that knowledge production has in the world. At the heart of their essay, Preucel and Mrozowski thus ask about the differences that archaeology can and should strive to make in today's world. Those archaeologists working in the spirit of applied and pragmatic research thus recognize that their work does not take place in a vacuum devoid of political and social implications. Simultaneously, they seek out new ways of using their work to solve problems in the present.

Case Study: Social Archaeology at Brothertown

The Brothertown Archaeology Project, a collaborative endeavor between the *Brothertown Indian Nation* and the author of this entry (Cipolla 2013), provides a fitting example of the ways in which archaeological research is becoming more social, incorporating the interests, sensitivities, and needs of more than just archaeologists.

The project was designed to investigate Brothertown history and the legacies of colonialism in Native North America via the lens of collaborative historical archaeology. Since 2006, students, volunteers, and archaeologists, both tribal and nontribal, have worked together on an archaeological survey of the two Brothertown settlements, including an intensive survey of Brothertown cemeteries. For the purposes of this entry, I focus mainly on the implications of this work for the Brothertown Indians and other stakeholding publics. I begin with a brief summary of Brothertown history before moving on to discuss the dynamics of social archaeology at Brothertown.

The Brothertown Indian community formed in the late eighteenth century when Christian factions of several Algonquian tribes from Rhode Island, Connecticut, and coastal New York moved west together in hopes of escaping the politics and corrupting influences of colonial culture on the East Coast. The community settled in central New York State for a time but relocated once again to current-day Wisconsin in the 1830s, where it remains centered today. Also important for this entry is the fact that the *Brothertown Indian Nation* was recently denied federal recognition after spending more than three decades preparing their petition. As I discuss below, archaeology has the potential to speak to social issues and needs such as this.

The research project embodies social archaeology in the sense that it resulted only from the interaction of multiple stakeholders. The collaborative process informed everything from research design and data collection to analysis and interpretation. For example, the project's focus on grave markers emerged through continued dialogue and interaction with tribal members. In fact, it was several tribal elders who first suggested that the research focus on their historic cemeteries. We continued discussing this possibility over e-mail in the months that followed, and I eventually visited a tribal council meeting to discuss the idea with the entire council. The *Brothertown Indian Nation* officially approved the cemetery research after we talked through our respective questions, concerns, and expectations.

In addition to shaping the research design, the collaborative process also informed my interpretations. My understandings of the contemporary Brothertown community influenced me to work towards a deeper understanding of colonial culture and Native American identity politics of the eighteenth, nineteenth, and early twentieth centuries. Like that of all communities making their places in the modern world, Brothertown culture is comprised of things, practices, and ideas that did not originate solely from within the Brothertown community. As the name "Brothertown Indian Nation" implies, however, the Brothertown Indians still make distinctions between insiders and outsiders. Within the shared cultural milieu of the modern world, the Brothertown Indian Nation has its own political organization and communal gatherings. Brothertown Indians recognize and celebrate their unique communal history and their ties to sacred sites. And members continue to work towards maintaining and preserving the community and its future, clearly demonstrated by their 30-year quest for federal acknowledgement. Along with my interactions with members of the Brothertown community and the tribal council, these general observations emphasized the need to move beyond the dichotomous tropes often evoked in archaeologies of culture contact and colonialism. The Brothertown community – past and present – is much more complex than the differences between Native American and European, colonist and colonized, or accommodation and resistance.

Recursively, the research also had practical effects within the Brothertown Indian Nation itself. The cemetery project collected information from a large portion of Brothertown grave markers, including their text inscriptions, imagery, and locations. This is particularly useful for those stones whose text inscriptions and imagery are beginning to fade away. This information is now preserved in electronic and hardcopy catalogues of the stones. A complete catalogue of the stones is available online for all members of the tribe, including those that no longer live in the vicinity of the historic cemeteries. Furthermore, a ground penetrating radar survey of the

largest communal cemetery in Brothertown, Wisconsin, revealed the locations of several unmarked Brothertown graves. At least one member of the community is currently using this information to protect these once-lost graves, and the community may decide to formally remark these graves in the future.

Nonnative landowners and residents of both Brothertown settlements were also exposed to new perspectives on the places and spaces in which they currently live via the archaeological fieldwork. The archaeology emphasized the Native presence in the landscapes of both Brothertown settlements. By interacting with archaeologists and members of the Brothertown Indian Nation in the context of the archaeology project, local landowners and residents were endowed with new senses of their everyday surroundings. More broadly, these experiences also help to challenge widely accepted stereotypes of "Indian-ness" and myths of the vanishing Indian. By confronting contradictions of these tropes, such as stories of the Brothertown Indians building the first Methodist Church in Wisconsin territory or constructing the very roadways that the residents drive on every day, the current inhabitants of Brothertown renegotiated their understandings of Native communities, past and present.

The case of the Brothertown Indian Nation's petition for federal acknowledgment provides one final example with which to consider the future of social archaeology. In December of 2009, Kathleen Brown-Pérez, chair of the *Brothertown Indian Nation Federal Acknowledgment Committee*, contacted me regarding the comment period following the publication of the *Office of Indian Affairs*' negative proposed findings against the Brothertown Indians' petition for federal acknowledgement. During this period, all interested and informed parties were invited to comment on the proposed findings, either supporting or refuting the claims.

As I reviewed the proposed findings, I was surprised to learn that my work had been misconstrued and misappropriated by the authors of the report. For example, the report (United States Department of Interior – Indian Affairs 2009: 12) states that, "Scholarly archaeological excavations, even of sites in Wisconsin, do not provide evidence that any historical observer made a contemporaneous identification of an existing Indian entity (Cipolla 2007)." While the bibliography of the report lists the source of this statement as "Cipolla 2007, Brothertown Indian Nation Archaeology Project," its origin remains unclear since the project had just begun in 2006 and no findings had been published by 2007. This experience served as a harsh reminder of archaeologists' responsibilities to the publics that they impact, intentionally or not. My responsibilities on site went hand in hand with my duty to point these fallacies out to the federal government.

Beyond the poor scholarship that went into the report, however, lies a much deeper issue concerning the relationship between archaeological data and the federal acknowledgment process. In direct contrast to the above quotation, the Brothertown cemeteries that we studied do indeed provide evidence of outsiders identifying an "existing Indian entity" in Brothertown. The spatial distribution of Brothertown and non-Brothertown graves in the cemeteries illustrates this point precisely. In the largest cemetery in Brothertown, Wisconsin, nearly all Brothertown grave markers sit in the southern half of the cemetery, which is known locally as the "Indian half." In other words, the Brothertown Indians consistently chose to bury their loved ones in close proximity to other Brothertown Indians, while Euro-Americans consistently chose to bury their loved ones in close proximity to other Euro-Americans. The importance of this pattern should not be understated. Brothertown Indians and Euro-Americans alike recognized the disparities between their two groups. Other cemeteries surveyed as part of the project provide similar examples of these historically recognized social and cultural distinctions. The fact that local Euro-American residents continue to refer to the southern half of the cemetery as the "Indian half" also suggests that it was known as such since the 1850s, when Euro-Americans and Brothertown Indians began sharing the landscape of Brothertown, Wisconsin.

Although these facts do not change the Brothertown Indian Nation's current political standing, they do highlight an under-explored social use of archaeological data (Mrozowski et al. 2009). One of the criteria that petitioning tribes must demonstrate in order to become federally recognized is that a large portion of its members lived together as an identified Indian community, distinct from other groups (Office of Federal Acknowledgement 2011). Archaeological histories sometimes speak directly to these issues, particularly in cases where the communities in question did not speak and write in the English language as the Brothertown Indians did. In these cases, archaeological remains may represent core pieces of evidence, but archaeologists have yet to fully apply their work in such instances. This is just one direction in which archaeologists can further decolonize archaeology and partially redress the injustices of colonialism in the general spirit of social archaeology.

Future Directions

This brief discussion of North American social archaeology points to three interrelated directions for the future. First, archaeologists will continue to work towards incorporating multiple perspectives on the pasts that they study. This will take place as public and Indigenous archaeologies continue to flourish. Second, the discipline will continue to diversify as it attracts and hopefully welcomes more individuals from underrepresented groups into the field. In the spirit of postcolonialism, this diversity will lead to further scrutiny and correction of the discipline's imperialist roots and colonial biases (i.e., decolonization). Third, the expectation for archaeologists to produce socially relevant (applied and pragmatic) work will increase. Each of these trends suggests that archaeology is in an interesting state of metamorphosis from a discipline solely focused on discovering, classifying, and synthesizing a past for a small and homogenous group of professionals to one that articulates with the diverse social world of which it is a part.

Cross-References

- ▶ Critical Theory in Archaeology
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Journal of Social Archaeology
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives

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Social Identity in Historical Archaeology

Heather Burke
Department of Archaeology, Flinders University, Adelaide, SA, Australia

Introduction

Since the late nineteenth century, archaeologists have attempted to interpret widely recurring patterns of material artifacts in terms of a sense of distinctive identity. Linking such patterns explicitly to notions of social identity has become almost commonplace in contemporary historical archaeology in the last two decades, rendering it "the most pervasive theoretical term of the last few years" (McGuire & Wurst 2002: 85).

Definition

Psychologist Erik Erikson (1959) is generally credited with introducing the concept of identity to describe a person's psychological development over their lifetime: personal identity, despite periodic crises, is self-sameness, or self-stability, over time. Conceptions of the self, or the set of meanings that are tied to the self as an individual (personal identity), only arise in social interaction within the larger context of society; therefore, individuals are generally thought also to have social identities (Hogg 2006). Such a perspective connects identity with many other measures of social position around which social relations are organized, such as age, gender, occupation, religion, wealth, or education and the relative benefits and costs of each.

Historical and other forms of archaeology tend to approach the concept by assuming there is at least some potential to infer aspects of past social identities through material culture. There are two senses of the construction of social identity that are relevant here: the construction of it in the past, by people living their day-to-day lives in particular social and historical circumstances, and the reconstruction of it in the present by archaeologists relying on material proxies for this behavior (artifacts). A notion of personal identity (and, by extension, group identity) is not a property but a process; like the present, it always "is" and is never completed. Both are politically determined and are always in the process of being created; they cannot be reified as a category or a possession, even though, as archaeologists, we are forced to study them through the possessions of past people and the static patterns of material artifacts.

Historical Background

The study of social identity as a stand-alone goal of archaeology in the late twentieth and early twenty-first centuries has been spurred by four developments in archaeological theory and practice: studies of style as social strategy; the search for, and conceptualization of, agency in past human behavior; Marxist-derived critical archaeology that called for illumination of the origin of contemporary social circumstances; and its contemporary (although less overtly ideologically positioned) derivative – the social justice movement in archaeology.

Deriving from structuralism, analyses of style in the 1970s and 1980s gave an explanatory lift to the concept of social identity by linking it to social, rather than merely physical, strategy. In a now well-worn formula, material artifacts were viewed as part of a strategic process, used by different groups in different ways. Style functioned at the borders of groups to define difference, and inside groups to signal similarity. In this sense, patterning was argued to have both a group and a personal identity dimension, while still operating within the confines of what was socially and culturally possible.

While style brought a personal dimension to studies of social identity, agency perspectives, deriving as they did from sociology, deliberately sought to understand the conscious, creative, and collective practices of generic individuals within the limits imposed upon them by historical process and established social structures (Dornan 2002). Cultural theorists such as Pierre Bourdieu, for example, illuminated the constructed nature of taste to show how social reputation (and regulation) depends on struggles for prestige and position that employ material culture as markers. In the historical archaeological literature, agency is often presented as the local-level contrast to the global processes of capitalism, colonialism, or globalization. The central issues are the extent to which class, status, and other social axes constrain human behavior and to what extent people can operate outside these with material consequences, as well as the extent to which the construction of the individual (and notions of personhood and the self that tie deceptively easily to acceptance of Erikson's concept of identity) and class are in themselves ideological (Patterson 2005).

A strong Marxist strand in historical archaeology in the 1980s focused discussion around issues of how social differences are given particular sets of meanings in the construction and discourse of social identity. Rather than treating identity as a categorical entity, we should use it as the lens though which to view society in a larger sense, since it is within this larger structure that important social processes (such as domination and resistance, power, class and inequality, or poverty and community building) are embedded. Notions of agency, society, and the individual should all be problematized rather than reified, and the many ways in which human action embedded in social relationships are exposed (Barrett 2000: 62).

The fourth and last strand is the increasingly apparent trend within contemporary archaeological practice to contextually justify itself, often through the application of various "action" labels. The current literature abounds with adjectives reflecting both sides of the practice experience: the approach of the archaeologist (applied, engaged, ethically engaged, activist, advocate) and the involvement of some form of community (collaborative, participatory, embedded, public). This trend, and the strong social justice agenda it supports, has widened the search for social identity to encompass the material patterns of contemporary community politics often expressed through processes of cultural heritage management and to a lesser extent of the practice of archaeology as a middle-class activity (Matthews 2005).

Key Issues and Current Debates

The construction of social identity in the past was both a symbolic process and a slippery one; the reconstruction of it by archaeologists in the present is similarly complicated. Exploring notions of social identity highlights four key tensions within contemporary archaeology: the degree to which material patterning in groups of artifacts is

a passive reflection or an active construction of past identity; the degree to which such patterning is produced consciously or unconsciously by the participants; whether or not it is ever possible to understand the individual as a social unit in archaeology, particularly for ordinary people; and the nature of the relationship between human choice and wider social structures.

Social identity operates at both the level of the individual and the collective. For every person there will be facets of their individual identity that are important to their material choices, as well as facets of their family and household identity. For the same individual, there may be a geographic community in which they live that influences their notion of identity (whether suburb, neighborhood, town, or village), various social communities of which they are a part (whether church, union, or social club), a work community (which can sometimes blend both the geographic and the social through the use of planned communities or company towns), and a range of other potential social categories that may well be beyond their individual control. While a person may be able to choose which church they belong to, for example, they cannot similarly choose whether or not to be female or black.

Trying to understand the slippery, contextual, and fluid nature of identity at any of these scales is the challenge of historical archaeology. Many historical archaeologists have used the notions of choice and autonomy that underlie the agency-social identity nexus as a means to reconstruct the lives of particular individuals as a way of personalizing the past. This has often been linked to the narrative turn in archaeology, so that connecting a person's identity to various facets of the material record from a site which they inhabited becomes a tale told of past lives. In historical archaeology, of course, there may be insufficient historical records from which to construct a profile of a particular person or household, and households as recovered archaeologically may or may not represent families, depending on the type and rate of occupancy for a particular building. At this personal level, studies have tended to focus on individual actors, despite the fact that agency as a theoretical paradigm disavows study of the individual per se (see Barrett 2000). Many Marxist studies would go further to argue that social identity should not be concerned with focusing on the individual, even with the best historical records, because our notion of the individual is itself an ideological concept. In this light seeing objects as the conscious creations of individuals or as part of the micro-histories of individual households is in fact dangerous (see, e.g., Johnson 1999: 128; McGuire & Wurst 2002).

At a community scale, archaeologists have focused on how identity is expressed through kinship networks, different modes of land distribution between generations, religion, notions of public and private space, or processes of community building and collective memory. A community can be as simplistic as a collective of individual households that may or may not be geographically bounded, a political construct, or a group of people linked by shared experience, daily interaction, and common class relations.

The ways in which material artifacts function as signifiers of identity in any of these contexts are equally as diverse. Many researchers have noted a distinction between the rapidly changing identity markers associated with the body (chiefly clothing, hairstyles, and language) and more stable markers, such as architecture, that endure and are able to convey a sense of permanence over the long term (see, e.g., Goodwin 1999; Mann & DiPaolo Loren 2001). Rapidly shifting markers are able to signal subtle shifts in political and social statements and in some contexts may have been more symbolically important than domestic goods contained within the private domain of the home (Steen 1999). The ideological value of more stable markers lies in their ability to retain patina (McCracken 1990), which verifies claims to status because it materializes longevity (Goodwin 1999: 144).

In between lie the many other material domains of domestic life. Historical archaeology, by necessity, most commonly approaches questions of social identity through the analysis of particular fields of material culture, such as the form and decoration of tablewares (e.g., Wall 1994);

the political, gender, or class associations of clay pipes (e.g., Beaudry & Mrozowski 2001); meals and dining patterns (e.g., Shackel 1993); alcohol use (e.g., Reckner & Brighton 1999); choices in headstones and cemetery furniture (e.g., Mytum 2006); or the use of items of personal adornment (White 2005). The possession and use of such items was in many ways as important as their cost in terms of what they signified. Several studies of the identity constructs that accompanied the rise of gentility in the middle of the nineteenth century across the Western world (see, e.g., Young 2003) have noted how closely the expression of social identity could be bound to the possession of behavioral knowledge (rules of behavior), as much as the economic ability to acquire specific material forms.

Future Directions

Social identity as a concept under which to cast various aspects of people's material choices is clearly very alluring to archaeologists. Linked to the strength of the concept of style in archaeology as a means to explain certain aspects of social dynamics and to various bases underlying contemporary archaeological practice that demand a more socially accountable archaeology, social identity has become a popular box in which to place many different aspects of past human behavior. At best, it can become a means to highlight the tensions between individual subjectivity and the structuring constraints of broader social and historical circumstances; at worst, it can become diffused beyond the point of serving as a useful analytical category. The challenge lies in understanding both correspondence and variation in material traces as more than just similarity or difference between groups and asking more difficult questions, such as how variation might be the result of, and create, social unity (Chenoweth 2011: 336–7), as well as its opposite, or how material similarity might mask social difference along other axes of identity. McGuire and Wurst (2002) remind us that shared identity is not necessarily the basis for shared action, any more than common goals derive from shared essential identities. The search for social identity hinges on seeing artifacts as parts of a process, not simply as finished end products, and on contextualizing patterning within a wider set of influences.

Cross-References

- ▶ Agency in Archaeological Theory
- ▶ Community and Archaeology
- ▶ Consumption, Archaeology of
- ▶ Critical Historical Archaeology
- ▶ Death, Burial, and Commemoration in Historical Archaeology
- ▶ Engendering Historical Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Households and Domesticity: Historical Archaeology
- ▶ Marxist Archaeologies Development: Peruvian, Latin American, and Social Archaeology Perspectives
- ▶ Practice Theory in Archaeology
- ▶ Social Archaeology
- ▶ Structural Archaeology

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Social Memory in Archaeological Theory

Julia A. Hendon
Department of Anthropology, Gettysburg College, Gettysburg, PA, USA

Introduction

Social memory has been studied by historians, sociologists, psychologists, and anthropologists from many different angles. It has been described as a transdisciplinary concept with no single definition. While this varied interest has generated much insight, it has also made it important for researchers to be clear as to how they are approaching the concept. Archaeologists, not surprisingly, have been most interested in the relationship between social memory and the material world of ancient and historic societies.

Definition

Archaeological studies of social memory have centered on how monuments, buildings, objects, burials, and other material traces of human activity and practice create, reflect, or shape a group's social memory. Archaeologists have also been interested in how contemporary groups incorporate these material traces into their understanding of their history and identity.

Historical Background

Any discussion of social memory in anthropology must begin with Maurice Halbwachs (1877–1945), the French sociologist who wrote foundational works on memory in a social context. Originally published in France as *Les cadres sociaux de la mémoire* (*The Social Frameworks of Memory*, first published 1925) and *La topographie légendaire des évangiles en terre saint* (*The Legendary Topography of the Gospels in the Holy Land*, first published 1941), his ideas are best known to English-speaking scholars through the translations of Lewis Coser published as *On Collective Memory* (Halbwachs 1992). A third work, unfinished at the time of Halbwachs' death, *La mémoire collective*, was published posthumously in 1950. The original French edition was translated into English as *The Collective Memory*, but a more recent revised and corrected French edition has appeared and should be consulted (Halbwachs 1997).

Halbwachs argued for an essentially social approach to memory in contrast to existing approaches which saw memory as a function of

the individual mind. He noted that people's memories are shaped by the social context in which they live and the social groups of which they are a part. What an individual remembers depends only in part on his or her lived experiences. For Halbwachs, more important were the events, relationships, places, and things that the collective group wished to remember. Central to his approach is the recognition that memory provides groups with a sense of identity, a sense of belonging, and a sense of history. *The Legendary Topography*, in particular, highlights a connection between place and memory, both in the way that places become memory cues and in the way that places become meaningful through their association with memory. One of Halbwachs' insights is that collective memory is not only social but can transcend the lived experience of any individual. In a striking illustration of this, he discusses how his first experience of London was shaped by his familiarity with Dickens and other authors as well as by conversations with friends. Halbwachs made it clear that memories are made, not just stored and retrieved, an insight since affirmed by social psychological research. He argued that the process of memory making was something that happened through or as part of social interactions. Consequently, people who interacted together regularly were most likely to be involved in this process of memory making. Missing from Halbwachs' work is much of any discussion of conflict or how competing or contradictory collective memories might be resolved. In light of this, more recent work has preferred the term social memory, emphasizing its political as well as social aspects.

Paul Connerton has offered one way of understanding social memory in different types of societies that has been influential in archaeology because he dealt specifically with societies with and without writing (Connerton 1989). He also represents the move towards acknowledging the interplay between individual and social as a counterpoint to Halbwachs' emphasis on collectivities (reflecting Halbwachs' debt to Emile Durkheim). Connerton wants to find ways to recognize and study social memory independent of and in addition to what he calls inscription. The most familiar form of inscription is writing and the production of texts designed to transmit information. Connerton suggests that other ways of remembering exist. He focuses on commemorative ceremonies and bodily practices as forms of remembering that all societies make use of. Central to his argument is the efficacy of ritual in preserving and passing on memories that groups want to remember. This is a performative approach and a practice-based one – it is through performances of ritualized actions that people create a context for the passing on of traditions, beliefs, and what Connerton calls social habits. Bodily practices thus loom large in Connerton's model. These practices help produce what he calls habitual memory. In contrast to inscription, incorporation represents the bodily practices through which habitual memory is developed. Ultimately, Connerton's argument is evolutionary in that he sees a change over time from societies that rely on incorporating practices to those that rely on inscribing ones. This element of his model allies him with the notion that some societies have a sense of history and others do not. Nevertheless, his efforts to move beyond a reliance on texts have been fruitful for archaeologists, especially prehistorians or those interested in social memory created by social groups who, even in literate societies, did not typically inscribe their histories. Michael Rowlands provides one archaeological application of Connerton's ideas by looking at the role of monuments and burials in European prehistoric societies (Rowlands 1993). He argues against the usefulness of separating literate and nonliterate societies along an axis with inscription at one end and incorporation at the other. He also argues that certain kinds of material culture can result from acts of inscription. This latter point has been one that other archaeologists have emphasized, finding the distinction between inscription and incorporation too limiting. Landscapes, the ways they are shaped by people's actions, can be seen as a form of inscription and incorporation.

Another debate that archaeologists must address centers on the relationship between history and memory. Perhaps not surprisingly, many historians want to differentiate the two. Memory

is individual, history is collective; memory is unreliable and mutable, history is as accurate as possible and subject to change through new information but not through new or different perceptions; memory is what nonliterate or non-Western societies have, while the literate Western societies have history – these are all aspects of the debate. Older theoretical perspectives in anthropology such as structuralism accepted this division between those with and without history as exemplary of hot and cold societies. The French historian Pierre Nora's massive project on *les lieux de mémoire* has been influential on archaeologists who have not always perceived the degree to which his concept draws on such structuralist framing. The rendering of *lieux de mémoire* as "sites of memory" in an early translation of his writing (a translation rejected by Nora in the later, more authoritative publication from Columbia University Press) was too tempting for archaeologists to ignore, and the term began to appear in discussions of social memory. However, for Nora, it is only modern societies, because they possess an historical consciousness, that create *lieux de mémoire*, foci of remembering that may be places but may also be songs, books, and other cultural products. Older societies, even "peasants," examples of groups without an historical consciousness, have no history and therefore do not create *lieux de mémoire*. Instead, they create *milieux de mémoire* which allow the repetition of certain ideas and relationships through ritual but do not constitute history (Nora 1996).

Key Issues/Current Debates

More recent anthropological work on the subject has rejected the distinction between societies with and without a sense of history even as this work has endeavored to explore the different ways that remembering occurs. An example is the edited volume, *Making Alternative Histories*, which includes contributions from Latin American, African, and North American scholars assessing the interplay between anthropology, archaeology, and the politics of identity and heritage as part of their efforts to overcome the kinds of dichotomous thinking that reserves history to the West (Schmidt & Patterson 1995). In this endeavor, archaeologists have been joined by historians interested in the variability of social memory and its consequences for social interaction, political control, and cultural change. In the process, anthropologists have both undercut the idea that history can only take one form (that of specific events tied to particular dates) and that there is ever a pure or perfect historical narrative. Peter Schmidt, for example, examines the relationship between history, oral tradition, and memory in *Historical Archaeology in Africa*. In the process, he destabilizes the notion of prehistory or societies without history (Schmidt 2006). In *Houses in a Landscape*, Julia Hendon argues that alternative histories develop through the repeated actions of daily life and ritual at home that provide a counterpoint to the political histories produced by Maya rulers commemorated through monuments with hieroglyphic texts (Hendon 2010). These communities of memory provide localized histories tied to domestic places. Burying the dead at home and engaging in life-cycle rituals tied to the passage of time are two kinds of practices that took place in these domestic settings. These practices are ones that most archaeologists would recognize as ritual and likely to be productive of social memory. Hendon extends the ways that memory is produced, however, by arguing that domestic activities, which are ritualized in their own way, provide additional ways of making connections tied to particular places that endure over time.

Archaeologies of the Pueblo Revolt (Preucel 2002) and *History Is in the Land* (Ferguson & Colwell-Chanthaphonh 2006) explore the persistence of alternative perspectives on historical events by examining Native American (Hopi, Zuñi, Apache, etc.) expressions through oral tradition, art, and material culture of their views on their experiences with colonizers, Euro-American settlers, government officials, as well as with one another, ancestors, and other Native American groups. Archaeologists thus have solid support for applying social memory as a kind of history – or a history-making practice – to all societies. What is at issue is not whether or not

a society has history or an historical consciousness but rather how that consciousness is expressed; how it relates to identity, politics, social relations, and even economy; and to what extent social memory is contested within society.

Recognizing memory as a social process has three important implications: First, as Adrian Forty and Susanne Küchler have argued, memory is as much about what is forgotten as it is about what is remembered (Forty & Küchler 1999). This is not a deficit but rather part of how societies use memory. Second, as *Houses in a Landscape* makes clear, it is more productive to focus on practices of remembering and forgetting rather than on social memory as a reified entity. Third (as already suggested by the first point), remembering and forgetting are inherently social and political. Social memory intersects with other aspects of society that archaeologists have long been interested in studying, especially politics, identity, and social relations.

Archaeologists working on literate societies, whether ancient Rome or the ancient Maya, have found that moving beyond the documentary record to a broader perspective on how social memory develops and what role it plays allows them to contextualize the statements of elites and leaders in the larger social setting. For those archaeologists working without documentary records, recognition of the ways that social memory can be inscribed in the material record has provided insight into the kind of history that leaders, elites, or others in society wished to make their authority visible and permanent. Thus, in *Archaeologies of Memory*, editors Ruth Van Dyke and Susan Alcock divide the chapters between those studying societies with text and those studying societies without (Van Dyke & Alcock 2003). Despite the obvious differences between the two groupings, what is striking is the degree to which the contributors converge on a set of things to study and agree on the role of social memory. Alcock's earlier work on social memory in the classical world, *Archaeologies of the Greek Past*, makes a strong argument for the value of studying social memory from material evidence as well as from textual sources (Alcock 2002). Her three case studies demonstrate how landscapes and monuments become enmeshed in the construction of group identities.

Landscape, burials, and monuments constitute three of the commonly invoked material traces around which social memory coheres. Thus both the edited volumes, *Social Memory, Identity, and Death* (Howard 2003), and *Archaeologies of Remembrance* (Chesson 2001), take the practice of burying the dead or other kinds of rituals related to the dead as emblematic of how groups use social memory to create identities that continue over time, connecting the living and the dead. The recognition that it is the living who decide how to bury the dead is central to the case studies in these volumes. Rather than seeing burials as some fixed and essential reflection of status or individual identity, the contributors consider how mortuary rituals allow the living to reinforce or emphasize those aspects of identity important to their own identity and relationships.

Landscapes have been studied as complex palimpsests, using Barbara Bender's term, of deliberate and habitual actions that shape the land itself and people's understanding of their relationship to the world around them (Bender 1998). The degree to which places, monuments, and buildings – in other words features of the natural and build landscape – persevere beyond the individual human lifespan means that they provide solid, substantial anchors for remembering, a point first made by Halbwachs in his discussion of religious landmarks in Jerusalem and other Holy Land locations. It is this ability to seem permanent that led Rosemary Joyce and Julia Hendon to argue that Connerton's concept of inscription was too limited if confined only to documents or texts (Joyce & Hendon 2000). They used placemaking in the lower Ulua Valley of Honduras to exemplify how long-term relationships and meanings can be inscribed on a landscape. Unlike Rowlands, though, Joyce and Hendon also argue that incorporation and inscription can merge in the meanings ascribed to landscapes. Patricia Rubertone makes a similar point in *Archaeologies of Placemaking*, bringing the process of inscription into the present through her focus on the tension between public

commemoration or acknowledgment of a Native American presence in North America and how those commemorated view these monuments (Rubertone 2008). Here, as with *Archaeologies of the Pueblo Revolt*, *History Is in the Land*, and Martha Norkunas's *Monuments and Memory* (Norkunas 2002), about preservation efforts in Lowell, Massachusetts, the political aspects of social memory become part of present-day attitudes and play into decisions about how to represent that past in public or official contexts.

Inherent in many of the treatments of social memory making discussed so far has been a focus on ritual. Connerton made this explicit in his discussion, arguing that rituals are well suited to remembering because they are less subject to change. Archaeologists have both embraced the importance of ritual and questioned it. Richard Bradley has pointed to its importance and has used evidence of ritual action to understand the construction of social memory in European societies that lacked writing (Bradley 2002). Nevertheless, as Hendon as noted, too strong a reliance on rituals runs the risk of neglecting the history-making potential of daily life at home or away. A more productive approach is that taken by Hendon and the contributors to *Memory Work*: *Archaeologies of Material Practices* (Mills & Walker 2008). Without rejecting the importance of ritual, *Memory Work* and *Houses in a Landscape* focus on *practices* through which people created or deposited or modified places and things. Some of these practices fit a standard anthropological definition of ritual but not all. The focus in both books is on the depositional practices that leave behind traces of actions designed to inscribe on the landscape aspects of identity, significant action, and in the process memories. By shifting the focus to practices, archaeologists have a way to continue to acknowledge the importance of ritual while also recognizing the potential significance of all actions and practices in remembering and forgetting. Social memory does not develop only through specific kinds of actions. The decision to foreground or privilege certain kinds of action or practices is in fact a political one, on the part of either people in the past or researchers in the present.

International Perspectives

The study of social memory has become common throughout the discipline of archaeology. Specialists working on prehistoric, ancient, and historic societies in many different geographic regions have incorporated the concept into their research. As the references and suggestions for further reading at the end of this entry suggest, Mesoamerica, the Andean region, Africa, Mesopotamia, Europe, and North America have been particular sites of social memory research, but the concept is even more widespread than this list suggests. Issues of heritage and identity are not limited to the Americas, and historical archaeologists in particular have addressed the controversies and values surrounding the construction of social memory in many postcolonial contexts. Although this review has emphasized the English-language literature, scholarship on social memory is not restricted to Anglophone archaeologists or to those publishing in English. Latin American and European archaeologists have contributed to the discussion of *la memoria social or la mémoire social* as well.

Future Directions

At this point social memory is well integrated into the conceptual framework of many contemporary archaeologists. Studies of social memory-related practices will continue to appear. Like such other important social facts as gender, power, hierarchy, and heterarchy, social memory should also become incorporated into more general or broader studies as part of what one needs to address if one wishes to understand how past societies made sense of the world in which they lived. Debates about whether or not a group has social memory are no longer enlightening. Likewise, debates over the veracity of texts, oral traditions, or the material practices through which social memory is produced and reproduced are of less interest. What needs to be addressed are the how and why of remembering and forgetting in specific social and historical contexts.

Cross-References

- ▶ Museums and Memory Experiences
- ▶ Practice Theory in Archaeology

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Social Movements and Archaeology

Ivana Carina Jofré
Comunidad Indígena Warpe del Territorio del Cuyum, Colectivo de Arqueología Cayana, Escuela de Arqueología, Universidad Nacional de Catamarca, San Fernando del Valle de Catamarca, Catamarca, Argentina

Introduction

With the aim of presenting a contemporary and yet generalized definition of archaeology in relation to social movements, it is necessary to situate both as two fields with origins that are dissimilar, but not necessarily opposing, and increasing in mutual collaboration. The first field, archaeology, is found to be historically bound to the production of academic knowledge around the discipline of the past, usually in agreement with the political interests of the Administrators of the colonies and the modern Nation States. The second, social movements, is linked to emerging collective action and is about eminently practical orientations aimed at broadening the areas of participation in decisions of collective interest. And as such, it primarily contains and promotes, over all, a political meaning.

Archaeology has produced collaborative works with social movements that even gave origin to specific lines of work within the discipline; this is the case, for example, with Feminist Archaeology (e.g., Colomer et al. 1999) and Gender Archaeology (e.g., Gero & Conkey 1991; Gilchrist 1999) which were originally characterized by their questioning of the male-centered standards involved in the production of knowledge within the discipline and the cultural and politically construed character of essentialist categories employed by the discipline to approach the explanation and interpretation of the subject and data of the past. Such work renewed discussions of the subjective position of archaeologists in academic production and their political and social stakes within the social movements in their own societies.

But it was the postcolonial theorists who focused the attention of the discussions on the predicament and political role of the intellectuals starting from the subjective position of the researcher; they based the problem of discursive displacement that the new academics and professionals coming from the old colonies were beginning to produce at the interior of the Humanities and Social Sciences. As Castro Gómez & Mendietta (1998) aptly explain it, the postcolonial theories produce knowledge in a kind of "discursive translocation" starting from a crisis that is produced at the core of these theories. However, the postcolonial intellectuals' realization of their own hegemonic position, in academia and outside of it, necessitated the review of the paper that anticolonial and Third World narratives assigned historically to "critical intellect," a situation that also demanded the redefinition of the relation between theory and practice (Castro Gómez & Mendietta 1998). It is in this way that postcolonial theories, also in archaeology, were characterized by the appearance of these tensions of identity belonging to an era in which local knowledge interacted with global projects in a dynamic and changeable way, blurring the cultural frontiers.

Bound to political outlines of a postcolonial nature, the so-called Indigenous Archaeology, currently considered a subdiscipline within

archaeology, was also developing during the last decades of the twentieth century as part of the agenda of work of various archaeologists especially in countries such as Australia, the United States, and Canada, and in response to the demands put forth by the movements of communities and nations of Indigenous peoples. George Nicholas (2008: 1660) has referred to Indigenous Archaeology "as a form of archaeology where the Indigenous people are involved in the care and excavation of the cultural and corporal remains of their ancestors." However, this definition does not specify a line of work, not exclusively of Indigenous subjects, and that in a broader plan it hopes to be a project of decolonization of the practice of archaeology the world over. That is to say, it deals with a redesign that occurs at the interior of the discipline of the ethical and political role assumed by archaeologists and the form in which they plan their research in relation to the communities with whom they interact (e.g., Ucko 1989; Watkins 1999, 2001, 2003; Endere & Curtoni 2003, 2006, 2007; Smith & Wobst 2005; Atalay 2006a, b, 2007a, b; Smith & Jackson 2006; Smith & Burke 2007; Burke et el. 2008; Bruchac et al. 2010; Jofré et al. 2010a; Nicholas 2010).

The Colombian archaeologist Cristóbal Gnecco (2008) referred to Indigenous or Native Archaeologies as "archaeologies of local meaning" or "reactionary political practices" to the dominant cultural rationale. These new archaeological practices, closer to emerging social movements, promote and contribute to the construction of plural areas and are also, as Alejandro Haber (2008) sustains, displacements that the discipline carries out to rise up in its colonial relation with the local communities. Pedro Funari (2001, 2004) has for his part adhered to the denomination of "Public Archaeology" to refer to these new pluralisms that occur in the field of scientific archaeological practice. He understood them as horizontal expressions and not hierarchical in difference, in terms of political economy like interpretation, that which implicates archaeologies with publics, protagonists, and broader purposes. These collective, public, and plural archaeologies can be conceived "as a coproduction in which the involved sectors collaborate, learn and produce history together, although not without productive conflict" (Gnecco 2008: 101).

Key Issues and Current Debates

International View: Archaeology and Social Movements in South America

To speak of archaeology and social movements, we should refer ourselves to the type of relation initiated between this discipline and the conflicts, interests, and orientations that these social movements pose and or manifest. An always complex and delicate field is that of the processes of patrimonialization in which archaeology is generally implicated as the controlling agent of the State. However, as suggested earlier when I referred to the Indigenous Archaeology, there currently exists a number, fortunately ever-growing, of collaborative works between archaeologists and sectors of society historically passed over in its rights, such as the Indigenous peoples or communities of decedent Indigenous population that acknowledge other types of meanings and values in the remains of the past. In these cases, the archaeological patrimonialization of the remains of the living memory of a people can become the imposition of foreign values on these communities and the exposure can become the expropriation by means of legal mechanisms of intervention operated by state agents, multilateral organizations, private companies, etc. They offer an interesting debate with respect to distinctive archaeologists of the South closely reflecting the implications of the processes of patrimonialization in different ex colonial countries of the world (*Diálogos del Sur* 2007). As for example, Zimmerman contends:

> Academic archaeology should learn to live in the real world and acknowledge that not everybody considers the past public heritage. Many people that are not archaeologists consider archaeological heritage as their own, not as belonging to archaeology; they want to protect it and interpret it themselves or, they strongly wish for it to be left alone (*Diálogos del Sur* 2007: 14).

Patrimonialization is an "act of memory" in which the forces of political conflicts are

implicated, whose finality is the production of a significant heritage for the State, and through which determined social actors try to conserve particular memories of their past. For this motivation, the processes of patrimonialization are accompanied by emerging processes that can be called contra-patrimonialization. These last processes would be something like the contra-hegemonic powers produced in and for the hegemonic conflicts for the definition and establishment of the heritage of a people or nation. From my own experience as an Indigenous archaeologist working in the Republic of Argentina, I offer a case for analysis as a current debate, in which I try to demonstrate how we can think of possible relations between archaeology and the emerging social movements from the perspective of patrimonialization. The case I refer to is, of course, subject to the local peculiarities, but it serves as an example of a situation largely generalized in South American countries today.

The Political Role of Archaeological Heritage in the Demand of the Social Movements of Citizens Assemblies in Argentina

The change of the capitalist accumulation model in Latin America during the last decades of the twentieth century witnessed the expansion and intensification of a project tending toward the control, extraction, and exportation of natural goods (Svampa & Antonelli 2009). This emerged in the 1990s at the height of the era of the politics of privatization, when the majority of South American countries started a profound reform of their regulatory frameworks to benefit the establishment of transnational companies in this region of the world (Svampa & Antonelli 2009). These constitutional and legislative reforms that institutionalized the self-exclusion of the State as a productive agent were stimulated and supported by international organizations (World Bank, Inter-American Development Bank, among others). In this way, Argentina, as in other places in South America, awarded full exclusivity to the private sector to exploit the (inaptly named by capitalist jargon) "natural resources" (Buiteaar 2001; Power 2002; Schiaffini 2004; Clark & North 2006; Ortíz 2007; Bebbington 2007; Solanas 2007; Svampa & Antonelli 2009). In these conditions, the Nation State put into action, under the proposed expansion of a national development model, the suppression of the local economy, consistent in the exploitation of the so-called non-renewable "natural resources" by transnational actors and local partners (Ortíz 2007; Solanas 2007; Svampa & Antonelli 2009).

Only in the province of San Juan (located in the mountainous zone of central eastern Argentina) were more than 20 mega-mining projects put into place (Giovannini et al. 2009) which can be found in different phases of work; among these, the two most important projects belong to the transnational company *Barrick Gold Corporation*. This company possesses the Mina Veladero project, active since 2005, a deposit of gold and silver located more than 4,000 m above sea level in the Andean mountain range in the Departments of Iglesia and Pascua-Lama; the first binational mega-mining project which is also located in the high Iglesian mountain range on the Argentinian side. Another important mega-mining project for the extraction of silver and copper, known as Gualcamayo, is located in the vicinity of the river of the same name in Jáchal. These grand-scale exploitation projects are located near the natural glacier springs and the former mountain pathway used intensely at one time by the communities for cross-mountain activity like shepherding, trafficking of products, and communication that served as local modes of social, cultural, political, and economic integration with varying levels of autonomy throughout local history. The archaeological remains of these distinct territorial occupations that were happening throughout history in this geographical space allow us to today account for the existence of multiple "places of memory" (Nora 1984), or significant spaces of the collective memory, coexisting by way of palimpsest in which they impose long-standing historic meanings (Jofré et al. 2010b).

These transnational extractive economic projects transform the state geographies of inclusion and exclusion. The city biases, and other identities subordinated to the construction of

territorial sovereignties, begin to be reconfigured giving way to processes of confirmed supranational integration (that involves as many processes of inclusion as those of exclusion) for the Binational Argentine-Chilean Pact.

The symbolic conflicts that give transnational or supranational context call on forces of homogenization as well as heterogenization, and they attend to the processes of re-territorialization of the productive processes of flexible capitalism implicating, at the same time, de-territorialization of the social and cultural memory in which local identities have been constituted historically (Jofré 2013). On this point, scientific narratives like those of archaeology play a fundamental role in the installation of these true regimens in which the politics of knowledge oriented to the details of the appropriation-expropriation of territories is imposed (Jofré et al. 2010b).

Over a certain period, archaeological heritage came to be integrated within the heritage of the people threatened by an eminently extractive economic model with high environmental and sociocultural impact, above all, without social license. The increasing installation of mining undertakings in the rural areas with greater archaeological sensitivity in provinces, like San Juan, Catamarca, Tucumán, Salta, Chubut, and Neuquén, generates conflicts that, in some cases, have had greater visibility for their capacity to permeate in social tactics, achieving diffusion in the public media sphere. The case of "Proyecto Navidad" in the Department of Gastre of the Province of Chubut (Claps 2010; Gómez Otero et al. 2010) is a paradigmatic example since, from being located in an Indigenous Community, it had to oppose the distinct logics of territorialization of the social and cultural memory of communities with more than a millennium in the region.

In response to this situation of territorial pillaging instigated by their own State, a heterogeneous sector of the population began to organize social movements of protest throughout the lower part of the country, a new form of assembly. The Citizens Assemblies are new self-convened forms of social organization of citizens that began to crystallize in Argentina from the year 2001. It deals with a process of collective reproduction about the current forms of emancipation; its immediate antecedent is represented by the "picketing groups" who, like the Citizens Assemblies, brought to the public table new forms of social protagonism at one time dismissed from the traditional political process (Colectivo Situationes 2002). Currently, the self-summoned Citizens' Assemblies of neighbors have diverse location and demands throughout the length and breadth of our country, among these stand out the Assemblies that struggle against the undertaking of agricultural businesses, paper mills, and mega-miners. In short, these social movements have been adapted through new forms of discussion, coordination, and collective thought by all who have decided to organize themselves outside of the classical political forums. Something very interesting about these new social organizations is that they crystallize new ways of constructing social links and they are above all active in the demands for work, food, and rights. It could be said that their struggle is for justice and social change, and in this sense, the Citizens Assemblies are a place of practical research because knowledge and new forms of sociability are being created there (Colectivo Situaciones 2002).

Among the claims carried out by the new organizations of the Citizens Assemblies in Argentina, archaeological heritage was notably missing in the initial concerns of these social movements, but with the flow of these in the last few years, they began to incorporate the concern for the remains of the living memory of the people more and more in their demands for the defense of the water and the land. This currently affects the momentum of the emergence of contra-patrimonialization processes to repel scientific discourse and de-historicizing "places of memory" considered "sacred" to Indigenous peoples. This type of learning began to be more evident within the Citizens Assemblies of places such as Catamarca, San Juan, Tucumán, Neuquén, and Chubut, where these social movements began to interact and work well with the claims of Indigenous peoples that were being newly threatened and stripped of their ancestral territories.

Claims for the return of the bodies of our ancestors, taken to museums by university or state commissioned archaeologists, to the land, today reignites the struggle for the land in a broader sense of the term, as a way of reaffirming our identities in a place belonging to history. Clearly, this discourse promotes a political sense of territory, potentially performative of the social relations of domination that made the establishment of highly questioned transnational projects in the region possible, and the exacerbated concentration of lands in the hands of agricultural industry landowners in Argentina.

In the same struggle for land, only a few months ago, in the province of San Juan, the Indigenous Community of Warpe of the Cuyum territory, in collaboration with the cosignatory of archaeologists and social organizations, presented a petition to the National University of San Juan soliciting the application of the recently regulated National Law 25.517 that protects and regulates the right of the Indigenous peoples to demand mass return of human bodies considered to be antecedents and ancestors. Today these bodies are in the hands of a museum dependent on this university, with motives of research and public exhibition in display cabinets and refrigerated coolers. This document states a demand for the return of the bodies to the land, avoiding the possibility that the State, by means of science, would implement the return of these human bodies as a hidden way of exchanging "bodies for land." From the original world view that territory comprises of an encompassing vision of the land and the beings that inhabit it: "We are land, the land is everything, the land is our life." Under this kind of statement, our Indigenous leaders question not only the universities but also the President of the Nation, Cristina Fernández de Kirchner, as previously done on May 20, 2010 (with motive of the Bicentenary of the Argentinian Nation). During that opportunity, the leaders that mobilized a mass protest of 20,000 people asked the President for concrete solutions for the evictions suffered by the Indigenous Communities throughout the length and breadth of the country: in short an historic reparation to meet the demands of the people dispossessed by the Nation State.

This petitionary case carried out by the warpes communities in San Juan, like other similar cases that are happening in our country, highlights the political symbolism that the bodies of ancestors acquired in the field of these social conflicts that face different ontologies of the relations between communities and their lands, at the same time that it also redefines the place that archaeology holds in these movements (Jofré 2010).

Conflicts like those on which I have commented here raise meanings that are incompatible, and sometimes juxtaposed, from the traditional, the modern, the local, and the global, resulting in disastrous consequences due to the imposition of new forms of extreme, disproportionate, and limitless exploitation of the environment and the irreversible destruction of the local ways of life. As retaliation of this situation of extreme injustice, "Water is worth more than gold," in the case of the Republic of Argentina, represents the current determination of the communities and people that is similar to other sectors of South America, where they are rising up against the supposedly generous promises of the extractive models of global capitalism, imposed with the compliance of the serving government.

Future Directions

Possibilities of the Collaboration Between Archaeology and Social Movements: The Right to One's Own History

Today, the common point of intersection between archaeology and social movements is a work of innovative coproduction originating in the context of decolonization projects of the archaeological discipline. In countries in South America, for example, these new collaborative works markedly began in the 1990s as a response to the profound change in global world order connected to the processes of expansion of flexible capitalism. These processes began to take shape in the 1970s, and recently, in the 1990s they acquired a social visibility, crystallized in new conditions of planetary coexistence known now as:

transnationalism, globalization, situations directly related to a new type of neoliberal governability (Gordon 1991). This last condition was characterized by the "rolling back of the State" or privatization of responsibilities through the outsourcing of key social services, and with the consequent concession of regional autonomies as part of an adjustment to new dependency models.

The deep undercurrent of these new scenarios of conflict in South America is the "dispute for land." These countries with colonial history today are threatened by tyrannical and violent endo-colonialisms supported by their own Nation State acting in service of the private transnational capitals mobilized by the economic monopoly of the global market. Disciplines like archaeology see themselves inevitably questioned by emerging social movements that burst, in a truly visible way, onto the public order in the twenty-first century demanding changes in the political-economic agendas of the Nation Sates.

In this way, in current South American contexts, and emerging from a long-standing historical conflict, the disputes for land comprises of claims for the acknowledgement of ethnic difference for the returning of lands, the reestablishment of the subjects' and Indigenous peoples' rights over their cultural and natural heritage, and the defense against the indiscriminate advancement of exploitations with high ecological and social impact carried out on the part of foreign capitals with license from the States. These conflicts generate heated discussions of interest regarding the political, social, cultural, and economic importance of archaeological heritage in these scenarios, and over all, present new reflections around the possibilities of resistance and change that the communities possess in the conflicts facing the States and the new actors in the global market. All this is exacerbated in the Bicentenary of the South American Nation States, where they celebrate their colonial "independence." Now is the time to return to focus on the unavoidable topic of national heritage and calls for the urgent revision of different agreements. This happens in the face of local trajectories marked by the violent silencing of cultural differences, absorbed by the homogenized projects of the modern republics. This is a critical moment and as such it is decisive to rethink the conservationist traditionalisms and strengthen the active social values that archaeological heritage has acquired in the long histories of pillaging and expropriation (Jofré 2010).

The collaboration between a discipline with a colonial history such as archaeology and the social movements of today must be submitted to necessary questions and revised in a global political scenario; in this course, it is strategically unviable to continue defending the autonomy of the communities in terms of the cultural relativism of conservationist intervention. The right to difference in these relativist terms has promoted the perception of a substantive, stable, and permanent cultural heritage. So in this form, culture and its heritage had to be perceived as the result of a historic process, the product of an accumulated historic experience captured like something stable through the concept of culture (Segato 2011).

Contrary to cultural relativism, the accompaniment of the social movements, and this is the challenge for a discipline like archaeology that is accustomed to intervening from a place of power and privilege, anticipates the acceptance of historical pluralism, the right to "*one's own history*." Each people plot their history passing, the inconsistency of their own cultural discourse, overcoming their contradictions, and above all choosing their alternatives, interacting within the heterogeneous index of the nation. Following Rita Segato (2011), this means accepting at least two principles: (a) that the collective subjects of this plurality of histories are the people, and they possess the deliberative autonomy to produce their own historic process; (b) that this collective subject, this living people, is not a stable cultural heritage with fixed and unchanging contents throughout time and space, rather it is the self-perception on the part of its members of a shared history that comes from a past and is directed toward a future.

It remains to be said that this accompaniment and collaborative experience between archaeology and social movements to achieve a successful association founded in common objects toward

the decolonization is more and more compelled to find ways to reinforce and defend the autonomies of the people, therein lies the political and social predicament of the discipline in these times.

Cross-References

- ▶ Decolonization in Archaeological Theory
- ▶ Indigenous Archaeologies
- ▶ Latin American Social Archaeology
- ▶ Public Archaeology, The Move Towards

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Social Zooarchaeology

Nerissa Russell
Cornell University, Ithaca, NY, USA

Introduction

Zooarchaeology, the study of animal bones from archaeological sites, began with a straightforward concern with diet, later expanded to include subsistence strategies. The post-processual turn in archaeology eventually filtered into zooarchaeology, bringing a concern with social and symbolic aspects of human-animal relations. This approach seeks to understand the full range of these relations in past societies. While it has roots in earlier work, it has largely come into existence in the last 15–20 years, initially as very much a minority approach. Early concerns included feasting and meat sharing, as well as animal symbolism exhibited by structured deposition of taxa or body parts. At least some recognition of social and symbolic factors now inflects nearly all zooarchaeological work.

Definition

Social zooarchaeology is the manifestation of social archaeology within zooarchaeology, the study of animal bones from archaeological sites in order to learn about human behavior. Social zooarchaeology explores aspects of human-animal relations beyond the dietary and human-human relations negotiated through animals, including the value of animals as wealth and symbols, sacrifice and other ritual use of animals, taboo, and the overvaluation of meat and its use in transactions of status and relationships through meat sharing and feasting.

Key Issues/Current Debates/Future Directions/Examples

Given the rich variety of roles that animals and their products have played in human society, many topics fall within the purview of social zooarchaeology, although some have received more attention than others. Animals serve as key symbols in all societies, intriguingly similar to humans yet different from them. The most obvious evidence of prehistoric animal symbolism is their portrayal in art, from the Early Upper Paleolithic on. There has been a century of debate over the interpretation of hunter-gatherer rock art: is it hunting magic, information transfer about game animals, art for art's sake, or does it depict ritual, myth, trance visions, or animal deities? Zooarchaeology can contribute where there are associated animal bone assemblages and invariably shows that the frequency of species in the art does not match the frequency of those hunted (e.g., Altuna 1996), thus ruling out straightforward explanations of art as hunting magic or teaching aid. Not uncommonly, a florescence of hunting art and elaborate hunting equipment occurs at times when actual hunting contributes less than previously to the diet, suggesting a performative aspect of hunting related to (gender) identity rather than subsistence.

Zooarchaeology can also contribute to classic debates about taboos, where proscriptions on killing or eating certain animals mark social distinctions (gender, age, religion, ethnicity, reproductive status, etc.). While it is always difficult to argue from absence, ethnoarchaeological work has

shown that traces of taboo animals do occur in the archaeological record, but they are restricted spatially and limited in body part selection (Politis & Saunders 2002). Thus, careful attention to rare taxa may reveal the contours of animal taboos and indicate whether the taboo is total or applies only to a segment of the population. Hesse and Wapnish (1998) provide a sterling example of social zooarchaeology in their interdisciplinary treatment of the Israelite pig taboo. Drawing on textual analysis, anthropological ethnicity theory, and zooarchaeological evidence, they show that Israelite ethnic identity was originally based on ties to place, but these were disrupted by the exile in Babylon. Afterward, the pig taboo and other food proscriptions help to construct a more portable ethnic/religious identity.

Many ritual practices incorporate animals or animal parts. Burial rites are the best studied, with careful attention to placement, body part selection, and butchering and cooking traces helping to distinguish among funerary sacrifices, the remains of mortuary feasts, and food provisions for the afterlife (e.g., Méniel 1992). Outside of funerary contexts, sacrifice has received little attention except where historical records attest it, but ethnography suggests it would have been common in most societies with domestic animals. Zooarchaeology has the as yet unrealized potential to resolve the question of whether all meat from livestock in classical Greece derived from temple sacrifices and hence the extent to which sacrificial demand shaped herding practices. An exemplary study (Isaakidou et al. 2002; Stocker & Davis 2004) of animal bone deposits and associated deposits in the Mycenaean Palace of Nestor at Pylos not only establishes that burnt offerings already occurred in this period (a point of controversy based on textual evidence) but also reveals a previously unknown practice in which palace accountants recorded or archived vouchers of sacrifices/feasts (bones, weapons, and drinking cups) prior to the proper disposal of the bones in discrete pits.

Hunting is crucial to the survival of foragers, but a social perspective would argue that hunters might seek prestige as well as protein and calories. In addition to the evidence from rock art and artifacts discussed above, ethnoarchaeological and zooarchaeological studies of various times and places suggest that hunters often target large game even when smaller animals would provide more meat (e.g., Hildebrandt & McGuire 2002). Domestication is a particularly intense human-animal relationship. A long-standing debate concerns how and why domestication occurred (intentionally or through the gradual development of mutualism) and indeed what it is (morphological changes in the body or appropriation as property). Thanks to advances in genetics and the work generated by the famous Russian fox farm experiments, we have a better understanding of the mechanics of domestication, with selection for tolerance for humans the key factor that sets in motion genetic, endocrine, and developmental changes in animals' bodies and behavior (Zeder 2012). This explains how a similar result can be obtained from the rather different paths various species take to domestication, as is increasingly apparent. Recently, social zooarchaeologists have shifted the focus from the exploitative to the caring aspect of human relations with domestic animals (e.g., Oma 2010).

Human-animal relations are not limited to hunting and herding, however. Pet keeping is widespread and both wild and domestic animals can be pets. Studies of the surprisingly common prehistoric human translocation of animals to islands reveal a complex array of relations. While some cases appear to be a matter of bringing domestic animals when settling islands and others are probably stocking islands with game, animals such as wildcats and foxes do not fit comfortably into either category and may have been brought so they would be available for ceremonial requirements. Cyprus has been particularly well studied in this regard (although the earliest phases of human occupation are still being clarified) and exhibits instances of all three of these categories as well as probable commensal hitchhikers such as mice and shrews (Vigne et al. 2011).

Domestic animals provide meat and sometimes secondary products such as milk and wool, but they are also property and therefore can serve as wealth. At the least, animal property

can be exchanged or gifted like objects but with the additional feature that they can reproduce and thus increase the flock. Ethnographically, livestock are very often important stores of wealth and used to create and maintain human relationships through a wide variety of transactions. These include inheritance to perpetuate wealth, contributions to feasts, fines to resolve disputes, and most importantly bridewealth to transact marriages and affiliate the children to the father's lineage. Bridewealth requirements affect the demography of herds and need to be modeled along with productive strategies that maximize meat and milk or minimize risk when interpreting mortality profiles (the age and sex kill-off pattern produced by culling decisions). Animal wealth and particularly bridewealth are powerful inducements to adopt herding and to invest labor in raising as many animals as possible. This expansionary tendency may help explain the spread of agriculture through the Old World following the domestication of herd animals. Animal wealth is also particularly susceptible to raiding and may be associated with an increase in warfare. Most of the zooarchaeological work that explicitly addresses wealth has been done in southern Africa, where livestock arrived in the Iron Age and ethnography attests to the practice of bridewealth. Drawing on mortality profiles and other evidence such as dung accumulations, current evidence suggests that cattle became more important as wealth through time and that this process may have been regionally variable.

Meat is excellent food, a compact source of protein, fat, and vitamins. However, people seem universally to value meat beyond its nutritional contribution. The act of incorporating other creatures into our bodies is fraught with guilt and symbolism: meat makes special meals. In particular, meat is often the focus of sharing, especially when derived from wild game. Hunters are usually obligated to share large prey, at least, beyond their immediate family, according to rules that vary among societies. There has been considerable debate concerning whether meat sharing is a kind of delayed reciprocity, a risk-reducing strategy, a way to gain prestige (and mates), meant to benefit relatives beyond the nuclear family (differentially directed at kin), or a means of building and maintaining social relationships. Evidence suggests that all these functions may occur in different places, sometimes in combination. Archaeologically it is possible to detect the circulation of meat through careful contextual analysis, especially at sites that were occupied for relatively short lengths of time, so with higher resolution. Depending on the rules, sharing may produce skewed body part distributions. Refitting or conjoining studies that match articulating bones or right and left sides from the same animal can also reveal sharing. In some circumstances zooarchaeologists can determine not only whether sharing occurred but whether it was symmetrical or uneven, which helps to sort out the models outlined above (Enloe 2003).

Feasting is another kind of sharing, with the meat distributed after cooking instead of before. The social dynamics are somewhat different, however, with a generous host gaining prestige from a well-executed feast, while hunters are usually enjoined to modesty about their kills. Feasting has received considerable attention in archaeology in the last 20 years, largely thanks to the work of Dietler and Hayden (2001) that assigns it an important place in transforming human societies and creating inequality. The performative aspect of feasts makes them relatively easy to detect archaeologically. Large or fancy serving vessels may mark a feast, for example. Meat (along with alcohol) is often the centerpiece of feasts, so large concentrations of animal bones, often less processed and cooked in larger pieces or unusual ways, can signal feasting remains. Both because the large amount of waste is more problematic and because it may carry ritual power (feasts often forming part of ceremonies), the bones may also receive different or more formal disposal treatment. Recently, some have argued that there has been too much focus on feasting and too great a dichotomy drawn between feasts and ordinary meals. Rather, all meals carry symbolism and varying degrees of ritualization, and there is usually a range of scale and formality (Hamilakis 2008).

While social zooarchaeology tends to be associated with interpretive approaches typical of postprocessual archaeology, in fact it is not limited to a single theoretical school. Adherents of human behavioral ecology are increasingly including social factors in their models, often characterized as costly signaling (performance of behaviors that demonstrate the superior fitness of the signaler by showing they can afford to put themselves at risk). Zooarchaeologists are increasingly recognizing that the social values of animals and meat are key to understanding past behaviors. For the most part, social zooarchaeology does not require new methods: mortality profiles, body part representation, and traces of butchering and cooking contain much social information. Most social questions do require a contextual approach, however, and frequently integration with other lines of evidence. The real key is to build models that take social values into account along with economic values.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Post-processual Archaeology
- ▶ Social Archaeology
- ▶ Zooarchaeology
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Society for American Archaeology (SAA)

William Lipe
Department of Anthropology, Washington State University, Pullman, WA, USA

Basic Information

The Society for American Archaeology (SAA), founded in 1934, is "an international organization dedicated to the research, interpretation, and protection of the archaeological heritage of the Americas" (http://www.saa.org/). It has more than 7,000 members, including professional, student, and avocational archaeologists, and publishes two scholarly journals – *American Antiquity* and *Latin American Antiquity* – as well as a members' magazine, *The SAA Archaeological Record*. Its annual meeting regularly draws more than 3,000 registrants. Policy is set by officers and a board of directors elected by the members of the society, and a professional staff is employed at its office in Washington, DC.

Major Impact

Guidelines for Ethical Practice

Protection of archaeological sites from looting and destruction has been a concern of the SAA since its beginning. In the first issue of *American Antiquity*, the society's first president, Arthur C. Parker, wrote that one of the new organization's goals was "...the conservation of sources. The fact that anyone with a spade has had the right to excavate ancient sites and hawk relics as a commercial venture has had baneful results" (Parker 1935: 3). In 1961, "Four Principles for Archaeology" were adopted by the SAA membership and published in *American Antiquity*. These set forth some broad guidelines for methods, ethics, and training and stated that "collecting practices which destroy data" were to be avoided and that "state and federal statutes regarding preservation of antiquities and permits for excavation must be scrupulously observed" (Champe et al. 1961: 137).

The SAA's current eight "Principles of Archaeological Ethics" (Lynott & Wylie 2000) were adopted in 1996; they place cultural heritage management (CHM) concerns at the heart of archaeological ethics. Principle 1 – stewardship – gives archaeologists an active responsibility to work for long-term protection of the archaeological record and for using that record for the benefit of all people. The second principle – accountability – requires a commitment to consult and attempt to establish working relationships with descendants and other groups affected by archaeological work. Principle 4 urges archaeologists to engage in public outreach and education with the aim of improving the preservation, protection, and interpretation of the archaeological record. The statements describing the other principles, which have to do with commercialization, intellectual property, reporting, records, and training, also point out their implications for stewardship and public benefits.

CHM Outreach and Educational Activities

Currently, the SAA has a number of programs, committees, and task forces that further its goals in CHM. The Education and Outreach Program produces and distributes materials that help archaeologists and educators bring information about archaeology and cultural heritage to students at all levels and to the general public. The "Archaeology for the Public" web site serves as a clearinghouse for a large variety of educational resources. The SAA Public Education Committee provides leadership and advice to the board in

this area, and committee members assist SAA staff on specific projects.

Separate committees are in charge of annual awards for excellence in public education and for outstanding efforts to enhance public understanding of archaeology through the media. There is also a committee charged with encouraging improved coverage of archaeology in the print and visual media; this committee oversees a press office at the annual meeting.

The SAA Government Affairs Program employs a full-time manager, who works with the SAA Board and the Government Affairs Committee to represent the archaeological community on issues of federal-level legislation and policy that have the potential to affect archaeological conservation and/or the practice of archaeology. Monthly bulletins regarding current governmental issues are circulated to members, and collaborations are pursued with colleagues and organizations in the broader historic preservation – cultural resource management community. ("CRM" is a predominantly US term broadly equivalent to "CHM," as used internationally).

The SAA Committee on Native American Relations works to increase understanding by archaeologists about issues of concern to Native Americans and to promote better relationships between both groups. A repatriation committee deals with topics related to the repatriation of archaeological materials to descendant groups under federal, state, and international laws. The SAA maintains an endowment to fund scholarships in archaeology or heritage management for Native American students, and the Native American Scholarships Committee is tasked with overseeing this program and selecting the scholarship recipients.

Publications, Conferences, and Sponsorships

Although the SAA's two peer-reviewed journals are devoted primarily to presenting research results, its magazine – *The SAA Archaeological Record* – regularly publishes articles on topics broadly related to CHM–, e.g., Native American collaborations, collections preservation and access, public education and media treatments, digital data-sharing, and career and professional development.

The program of the SAA Annual Meeting is dominated by paper and poster presentations, but the conference also serves as a locus for meetings of committees and related groups, including federal and state agency CRM staff. For example, the 2011 Annual Meeting featured extended workshops and conferences for managers from the US Forest Service, Park Service, Army Corps of Engineers, Natural Resources Conservation Service, and the Association of Transportation Archaeologists. The annual meeting features an award for excellence in Cultural Resource Management, with the recipient designated by a committee assigned that task. The program also regularly includes a number of forums and symposia that relate to the method, theory, and practice of CRM.

In the mid-1990s, the Society of Professional Archaeologists was transformed into the Register of Professional Archaeologists (RPA), under the sponsorship of SAA, the Society for Historical Archaeology, and the Archaeological Institute of America; subsequently, the American Anthropological Association also became a sponsor. The RPA consists of professionals who have met basic educational and experience requirements and who agree to abide by the RPA Code of Ethics and Standards of Research Performance. Registrants also agree to take part in a formal grievance process if a credible complaint about their professional performance is filed with RPA. The SAA encourages its professional members to register, and a very substantial percentage has done so. Although many archaeologists in academic settings have registered, the majority of RPAs are employed as consultants or managers in the CRM segment of the field.

In summary, the SAA plays a vital role in the establishment and practice of CHM in the Americas.

Cross-References

- ▶ American Anthropological Association (AAA) and Ethics
- ▶ Archaeological Institute of America (AIA)
- ▶ Register of Professional Archaeologists (RPA)
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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Society for American Archaeology (SAA): Committee on Ethics

Joe Watkins
Native American Studies Program, University of Oklahoma, Norman, OK, USA

Basic Information

Committee History

In 1991, in response to growing concerns about the state of the Society for American Archaeology's body of ethics, the SAA's Executive Board created a task force on ethics in archaeology, naming Mark Lynott and Alison Wylie as its cochairs. In November 1993, with funding from the National Science Foundation and the National Park Service, Lynott and Wylie convened a three-day workshop in Reno, Nevada, attended by diverse members of the Society and nonmember individuals to discuss the then-current state of ethics in archaeology. The workshop participants crafted six draft principles of archaeological ethics; eventually, two more were added to create eight principles which were seen to provide a strong basis for continuing development of a stronger archaeological ethics program. Since these were considered "draft" principles, they were presented to the SAA membership in various methods and comments solicited: in position papers at the April 1994 meeting of the SAA in Anaheim, California; as a Special Report of the SAA (with comments from non-workshop attendees) in 1995 (Lynott & Wylie 1995); in numerous presentations at regional archaeological or anthropological conferences; in the SAA *Bulletin*; in two discussion sessions held by Lynott at the 1996 meeting in Milwaukee; and in an *American Antiquity* article by Lynott (1997). After the adoption of the Principles of Archaeological Ethics by the SAA's Board of Directors in April 1996, a second, revised version of the SAA Special Report (Lynott & Wylie 2000) was produced to increase the educational utility of the process and to encourage discussion of ethical issues in the practice of archaeology.

The Committee on Ethics became a standing committee of the Society in 1997, charged by the SAA's Board of Directors with promoting discussion and education about ethical issues in archaeology, and proposing revisions, as necessary, of the Principles of Archaeological Ethics. The committee is not charged with enforcement powers or responsibilities, and therefore does not enforce or oversee claims of ethical misconduct.

Major Impact

Education Programs

The Committee on Ethics maintains an active web presence as a means of fulfilling its educational mission. Its website offers resources for students on codes of ethics promulgated by other archaeological and anthropological organizations, as well as information regarding ethics as a general field of philosophy. In addition to these general resources, the Committee offers another program aimed at including student involvement with the concepts inherent in the ethical practice of archaeology.

One of the primary programs of the Committee on Ethics' educational outreach has been the Ethics Bowl, modeled on a similar program developed by the Association for Practical and Professional Ethics in 1995. The Society's first Ethics Bowl was held at the 2004 annual meeting in Montreal, Canada, and it has been included in the Society's annual meeting since then. Each year, the Ethics Bowl organizers compile hypothetical cases that describe archaeological

dilemmas which contain an ethical dilemma. These cases are used to initiate discussion about archaeological ethics and situations, and teams of college students use a debate-style competition to explore the ethics of archaeological practice. The competition is based on the abilities of the student teams to effectively communicate their arguments, to tie the ethical dilemmas to the legal and social frameworks which influence the discipline, and their ability to analyze the impact of those issues on the discipline as well as non-archaeological stakeholders. The Committee also encourages the use of the Ethics Bowl cases in classes relating to ethics in archaeology and anthropology.

The Principles of Archaeological Ethics has become a foundation upon which archaeological ethics has rested. They have been cited and quoted as a new generation of archaeologists has entered the field. But, while they have been viewed as a semipermanent document, their original authors viewed them as living documents subject to change as need arose. Therefore, the Society is open to revisiting and revising the Principles of Archaeological Ethics as its membership sees the need to do so, and the Committee on Ethics will continue to maintain an active role as a provider of resources and educational material relating to the ethical practice of archaeology in the contemporary world.

Cross-References

- ▶ Ethics in Archaeology
- ▶ Ethics of the Archaeological Record
- ▶ Society for American Archaeology (SAA)

References

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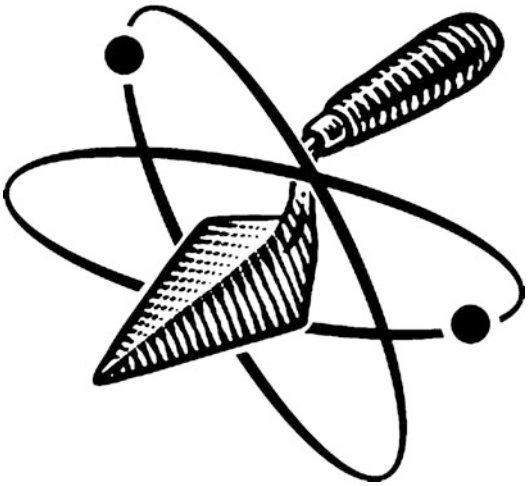
Society for Archaeological Sciences (SAS)

Robert Sternberg
Department of Earth and Environment, Franklin & Marshall College, Lancaster, PA, USA

Basic Information

The Society for Archaeological Sciences (SAS) is a professional society for those involved and interested in physical and natural science applications in archaeology and paleoanthropology. The purposes of the society include establishing a forum from which current issues and advancements in archaeological science and archaeometry may be presented and discussed; promoting awareness and providing information for archaeologists, anthropologists, and other professionals about the potential and the problems involved in the application of techniques from the physical and natural sciences to archaeological scientific research; and maintaining an active program for the promotion and implementation of interdisciplinary research in archaeology. The current SAS logo is shown in (Fig. 1).

During the International Symposium on Archaeometry and Archaeological Prospection in 1977 at the University of Pennsylvania in Philadelphia, five members of the acting executive board met to lay the groundwork for the formal organization and development of the SAS. The first issue of the *Newsletter* of the Society for Archaeological Sciences was produced in the summer of 1977. The founding SAS acting executive board consisted of Rainer Berger,



Society for Archaeological Sciences (SAS), Fig. 1 Logo for the Society for Archaeological Sciences

Karl Butzer, James B. Griffin, P. Edgar Hare, Richard L. Hay, Vance Haynes, Robert Maddin, George Rapp, Jr., Max Saltzman, and R. E. Taylor. The articles of incorporation for the Society for Archaeological Sciences were filed in 1979.

SAS had about 100 charter members. Membership cost $5 US per year. The first meeting was held on April 25, 1979, at the Society for American Archaeology (SAA) meeting in Vancouver. Annual business meetings of the SAS now alternate between being held at the SAA and at the biennial International Symposium on Archaeometry (ISA). Membership for the past decade has hovered around 300, with about one-third being from outside the USA. The basic membership rate is currently $20; the quadrupling over the last 35 years is consistent with the increase of the US Consumer Price Index.

The presidents of the society have been (in chronological order) Karl Butzer, R. E. Taylor, Jonathan Ericson, John Weymouth, George Rapp, Jr., Rainer Berger, Joseph Michels, Joseph Lambert, Jeffrey Dean, Garman Harbottle, Doug Price, Suzanne DeAtley, James Burton, Erv Garrison, Pat Martin, Rob Sternberg, Chris Prior, Arleyn Simon, Greg Hodgins, Aaron Shugar, Thilo Rehren, Sandra L. López Varela, and currently Patrick Degryse. The last three presidents have all been from outside the USA.

The office of the general secretary was established in 1981, with R. E. Taylor assuming the post. All business affairs, including the maintenance of the membership files, membership renewals, elections of officers, and archiving of legal records, are organized by the general secretary. R. E. Taylor held this position for more than 20 years until it was taken over by Rob Sternberg in the summer of 2002. The society can be contacted through the general secretary (the author of this contribution, with contact information given above).

Major Impact

The official organ of the SAS has been its *Newsletter*, becoming the *Bulletin* with volume 12. The current annual volume number is 35. These publications have generally been issued on a quarterly basis. Some other milestones are the following: the first stapled issue was volume 7. Bitnet email addresses first appeared in volume 10, with more than half of the officers and editorial staff showing email addresses by volume 12. A CD-ROM containing the first 30 volumes of the *Newsletter/Bulletin* is currently available from the general secretary's office. Those who have served as editors of the *Newsletter/Bulletin* are (in chronological order) R. E. Taylor; Suzanne De Atley, George Rapp, Jr., Pat Martin, Rob Sternberg, Chris Nagle, Rob Tykot, Christian Wells, and currently James Vanderveen.

Members of SAS are also eligible for discount subscription rates to several significant journals of archaeological science.

Plenum Press and then Kluwer Publishers, now Springer, in cooperation with the SAS, published five volumes in the book series *Advances in Archaeological and Museum Science*. Volumes to date are Mulholland and Rapp (1992), Taylor and Aitken (1997), Shackley (1998), Williamson and Nickens (2000), and Ambrose and Katzenberg (2001). The editorial board for this series has included Martin J. Aitken, Edward V. Sayre, R. E. Taylor, and Robert H. Tykot.

The SAS has sponsored archaeological science sessions at the SAA meeting since 1982.

The R. E. Taylor Poster Award competition was established in 1998 to reward outstanding student posters presented at the SAA and ISA meetings. The SAS Student Research International Travel Award was started in 2012.

James Burton initiated the internet activities of SAS, starting with the electronic bulletin board ArchSci in 1991. This morphed into the listserv SAS-Net and the ftp site SAS-Depot later in 1991. The SAS web site went up in 1997 and can now be found at the domain name www.socarchsci.org. The listserv and web site are still active. In addition, an SAS blog was started in early 2009 by Rob Sternberg, Rachel Popelka-Filcoff, and Destiny Crider, and a wiki containing announcements related to archaeological science was also brought online in 2009 by Rob Sternberg.

Cross-References

► Archaeometry: Definition

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Society for Historical Archaeology (SHA) (Cultural Heritage Management)

Douglas D. Scott
Department of Archaeology, University of Nebraska-Lincoln, Lincoln, NE, USA

Basic Information and Major Impact

Historical archaeology is the archaeology of the modern world. The field is global in scope and deals with all groups of people, not simply those of European descent, although most historical archaeologists focus on the period after the fifteenth century.

The Society for Historical Archaeology (SHA) is an educational not-for-profit organization established to promote scholarly research and the dissemination of knowledge concerning historical archaeology and to exchange information in this field. It holds an annual conference to discuss problems of mutual interest relating to the study of historical archaeology and to have members and invited guests present topical papers, discuss new or shifting paradigms, and present results of recent research activities. The Society is very active in keeping informed of legislation, policy, rules, and regulations which effect cultural resources in the United States and worldwide. SHA has a long-standing relationship with the Advisory Council on Underwater Archaeology, which shares the society's annual conference in January.

SHA has its beginnings at a conference held in 1967 at Southern Methodist University in Dallas, Texas. The society almost immediately began publishing the journal *Historical Archaeology* which is currently a quarterly publication. A newsletter followed in 1969 also published

quarterly. Special publications have grown as have topical and specialty on-demand publications. The Society maintains a website – http://www.sha.org/ – which contains a variety of information including names of officers, committee chairs, annual conference information, lists of publications, a members area, a research resource area, a link to the Advisory Council on Underwater Archaeology's website, and other relevant information on historical archaeology.

SHA is governed by elected Officers and a Board of Directors. The governing body is composed of a president, president-elect, secretary, treasurer, two publications editors, six directors, and the chair of the Advisory Council on Underwater Archaeology. The officers serve for a 3 year term. The Society is funded by membership dues and other sources including donations and grants.

Today the Society for Historical Archaeology is the largest organization in the world dedicated to the archaeological study of the modern world and the third largest anthropological organization in the United States. Parallel organizations exist in Great Britain, the Society for Post-Medieval Archaeology; Continental Europe; and Australasia, the Australasian Society for Historical Archaeology.

Cross-References

- ▶ Archaeology and the Emergence of Fields: Historical and Classical
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Critical Historical Archaeology
- ▶ Ethics in Archaeology
- ▶ Historical Archaeology
- ▶ Industrial Archaeology
- ▶ International Journal of Historical Archaeology
- ▶ North America (USA): Historical Archaeology
- ▶ Post-Medieval Archaeology (Europe)
- ▶ Society for American Archaeology (SAA)
- ▶ Society for Industrial Archeology (SIA)
- ▶ South and Southeast Asia: Historical Archaeology
- ▶ Southern Africa: Historical Archaeology
- ▶ Urban Archaeology in Twenty-First Century Perspective

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Society for Historical Archaeology (SHA) (Historical Archaeology)

Vergil E. Noble
Midwest Archeological Center, U.S. Department of National Park Service, Lincoln, NE, USA

Basic Information

The Society for Historical Archaeology (SHA) is a scholarly organization devoted to the investigation, interpretation, preservation, and management of archaeological sites associated either directly or indirectly with a literate tradition. SHA's primary period of interest starts with the spread of European peoples into other parts of the world during the late fifteenth century and continues through to the present day, though its subject matter is not limited to European cultures.

SHA traces its origins to a Central States Meeting of the American Anthropological Association held at St. Louis in 1965. Several archaeologists investigating Historic-period sites met there informally and concluded that a new society should be established to promote historical archaeology as a distinct discipline. Edward B. Jelks hosted the founding meeting at Southern Methodist University, in Dallas, Texas, during the first week of January 1967. About 100 attended the "International Conference on Historic Archaeology," which had 17 presentations on the program.

A Special Committee, chaired by Jelks, met there to lay the groundwork for what would become SHA. In conjunction with the formal proceedings, several business meetings convened to discuss the committee recommendations. Critical actions included votes for organization of the new society and the election of officers. Also set in motion were the processes of writing a constitution, publishing a new journal, and planning for the first actual SHA meeting at Williamsburg, Virginia, in 1968. John L. Cotter, then of the U.S. National Park Service, was elected to serve as SHA's first president. Society membership that first year was slightly over 200, including 13 in Canada, and one each in England, Mexico, Chile, and Australia.

For much of its history, the SHA was governed by a board consisting of a president, president-elect, immediate past president, secretary-treasurer, editor, newsletter editor, six directors, and the chair of the Advisory Council on Underwater Archaeology (ACUA), an independently chartered organization whose mission is to advocate, promote, and provide advice on responsible stewardship of underwater cultural heritage. A 2006 amendment to the Constitution and Bylaws increased the presidential term from 1 to 2 years, eliminated the board seat of immediate past president, and divided the position of secretary-treasurer. A more recently approved change, yet to be implemented, will replace the positions of editor and newsletter editor with an editor for research (either the journal editor or co-publications editor) and an editor for communications (either the newsletter editor or website editor), respectively.

To date, there have been 43 presidents of the SHA; 35 of those individuals are still living. The incumbent president at the time of writing, Paul Mullins, will be succeeded by the current president-elect, Charles R. Ewen, in 2014.

Major Impact

Today, with over 1,700 members, SHA has become the largest scholarly organization dedicated to understanding the modern world through excavation and study of material remains. It is also the third largest anthropological society in the United States. Although based in the United States, with most of its members living and working there, the society is now truly international in its constituency. Its geographical scope correspondingly has broadened from a focus on the New World to a global perspective.

SHA has a large contingent of underwater archaeologists and, through the terms of a Memorandum of Agreement, maintains formal cooperative ties with the ACUA. This close relationship is reflected in the fact that, since 1987, SHA's annual meeting has been officially called the Conference on Historical and Underwater Archaeology. The long-standing alliance between the two organizations also figured in accreditation of both SHA and ACUA as nongovernmental organizations (NGO) for consultation and collaboration in the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage.

In addition to its quarterly journal, *Historical Archaeology*, SHA publishes a quarterly newsletter, occasional special publications, readers, technical briefs, and proceedings. The society also holds agreements with certain academic presses (e.g., the University Press of Florida and the University of Nebraska Press) for the joint publication of books relating to the discipline. Other important activities include informing government policy makers and educating the general public about historical archaeology and cultural resource management. Much of its public outreach is accomplished through the official SHA website, http://www.sha.org/, which includes more detailed information about the society and discipline.

Cross-References

- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Historical Archaeology

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Society for Historical Archaeology (SHA) (Modern World Archaeology)

James Symonds
Department of Archaeology,
University of York, York, UK

Basic Information

The Society for Historical Archaeology (SHA) promotes the study of the archaeology of the modern world (CE 1400 to present). It was founded in 1967 and has grown to become the largest international society of its kind, with a business office in the city of Rockville, Maryland. The majority of the SHA's members work in North America and focus on the archaeology of the post-Columbian New World; however, the society's geographical scope extends to the study of colonial encounters between indigenous peoples and Europeans in other continents, especially Africa and Asia. Over the years the society has collaborated with the Society for Post-Medieval Archaeology in the UK and the Australasian Society for Historical Archaeology. It has also embraced underwater archaeology, in addition to terrestrial archaeology, and co-hosts a joint conference in January each year with the Advisory Council on Underwater Archaeology.

The development of the SHA mirrored the growth of professional archaeology in twentieth-century America and was closely tied to advances in legislation to protect historic sites and to the rise of cultural resource management in the late 1960s and 1970s. The origins and history of the SHA have been succinctly described by Richard Veit (http://www.sha.org/about/history.cfm). Veit identifies a number of key academic meetings which contributed to the establishment of the SHA. These included the 1958 meeting of the American Anthropological Association in Washington, DC, where a symposium was organized on the "Role of Archaeology in Historical Research" (Cotter 1993), and an "International Conference on Historical Archaeology" held at the Southern Methodist University of Dallas, Texas, in January 1967 (Schuyler 2001: 1177). The first meeting of the SHA took place in the heartland of colonial historical archaeology in the United States, in Williamsburg, Virginia, in 1968.

Major Impact

In the 46 years which have passed since its inaugural meeting, the SHA has published a large number of specialist monographs, in addition to the quarterly peer-reviewed journal *Historical Archaeology*, which publishes articles and reports on research methods, theories, and findings from global historical archaeological. The SHA has played an important role in popularizing modern world historical archaeology and has actively disseminated the results of archaeological investigations to a wide range of educational and public interest groups. It has also worked tirelessly to lobby for the preservation of historic resources, including both tangible and intangible heritage assets, in political circles.

All members of the SHA and those who participate in SHA activities are asked to adhere to a 7-point ethical policy which serves to protect archaeological resources from needless destruction and highlights obligations to the archaeological record, colleagues, employers, and wider public audiences. The SHA has also sought to raise professional standards and reward individual excellence by presenting

a number of awards at annual meetings. The most prestigious of these awards is the J.C. Harrington Award, for lifetime achievement and scholarship, which was first awarded to Charles H. Fairbanks, in 1983.

Cross-References

► Australasian Society for Historical Archaeology (ASHA)

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Society for Industrial Archeology (SIA)

Patrick Martin
Department of Social Sciences, Michigan Technological University, Houghton, MI, USA

Basic Information

Probably the most important group focused on industrial heritage in North America is the Society for Industrial Archeology (SIA). Founded in 1971, this membership organization was created "to encourage the study, interpretation, and preservation of historically significant industrial sites, structures, artifacts, and technology." Inspired by the example of a similar group in the UK, the Association for Industrial Archaeology, and purposefully separate from the contemporary Society for Historical Archaeology, the founders included archaeologists, museum curators, government preservation officials, architects, engineers, planners and historians, academics, and avocational enthusiasts alike. While there has always been a small core of international members, the base remains within North America. The use of the term "archaeology" is based on the principal attention given to the physical evidence of industrialization, but not limited to the use of the traditional archaeological techniques. This terminology has been both a blessing and a curse; while it widens the scope and appeal of the enterprise beyond a focus on buildings and/or history, it also confuses some who respond to the term "archaeology" in its most narrow connotations referring to excavation and/or antiquity. Increasingly in North America, the term "industrial heritage" is used to refer to this area of interest and activism, consistent with practice in much of the remainder of the world, and recognizes the combination of attention to both the research enterprise and the preservation/management dimension of the field.

Major Impact

Throughout its history, the SIA has combined a scholarly approach to the study and understanding of industrial heritage with an enthusiast, preservationist ethic. As an organization that includes significant membership from both professional and avocational ranks, this dual focus is a major defining characteristic. SIA publishes a peer-reviewed journal, *IA*, along with a quarterly *SIA Newsletter,* and a website rich with information. SIA holds two meetings annually in shifting locations to feature a mix of scholarly presentations and highly popular tours of both historic industrial facilities and active production and infrastructure sites. SIA runs occasional international study tours, as well, to showcase exemplars of preservation practice and remarkable site survivals in other countries. In addition, SIA includes several affiliated local and regional SIA chapters that serve as a focus for regional activities and preservation advocacy.

The chapters hold seminars, conduct tours, publish newsletters and websites, and participate in campaigns to recognize the value of industrial heritage resources in their communities.

SIA is a community of like-minded individuals and groups that share an interest in the industrial heritage in its many forms. Increasingly the members communicate via electronic social media, though many traditionalists cling to the more familiar venues of print and direct personal interaction. Publications are shifting to online sources at the same time that ink is laid on paper. To learn more about the SIA, visit http://www.sia-web.org.

Cross-References

- ▶ Arqueologia Industrial
- ▶ Association for Industrial Archaeology (AIA)
- ▶ Industrial Archaeology
- ▶ Industrial Heritage Association of Ireland (IHAI)
- ▶ Ironbridge Gorge Museum Trust (IGMT)
- ▶ Ironbridge Institute

Further Reading

Society for Industrial Archeology. n.d. Available at: http://www.sia-web.org.

Society for Medieval Archaeology

Sally M. Foster
Department of Archaeology, School of Geosciences, University of Aberdeen, Aberdeen, UK

Brief Definition of the Topic

The Society for Medieval Archaeology exists to further the study of the period from the fifth to the sixteenth century CE. It does so by publishing *Medieval Archaeology* (a journal of international standing dealing primarily with archaeological evidence), a monograph series, and by other means of communication such as its newsletter and website, holding regular meetings and arranging conferences.

Medieval archaeology did not exist as a discipline in its own right at the time of the establishment of the Society in 1957, at the initiative of J. G. Hurst and D. M. Wilson. From the outset, this energetic Society has played an active and critical role in establishing and shaping medieval archaeology in Britain and Ireland (a special focus) and beyond. This is reflected in the contents of *Medieval Archaeology*. From the beginning, the journal has been central to the work of the Society and in many senses can be taken as a barometer of the development of the academic discipline and the challenges and opportunities existing in working within an inherently interdisciplinary and fragmented domain, where medieval archaeology has arguably lacked the confidence to establish its "own discipline's ability to write distinctive narratives" (Gilchrist & Reynolds 2009: 5-6). That the subject has expanded and matured across Europe is, for example, reflected in the birth of French, German, and Italian equivalents that in varying degrees have modeled themselves on the Society and its publications: *Archéologie medieval*, *Zeitschrift für Archäologie* des *Mittelalters*, and *Archaeologia medievale*. The iterative relationship between the development of the subject and of the Society is discussed directly and indirectly in two Society-edited volumes, *25 Years of Medieval Archaeology* (Hinton 1983) and *Reflections: 50 Years of Medieval Archaeology, 1957-2007* (Gilchrist & Reynolds 2009); see also Gerrard (2007).

As part of its 50-year celebrations in 2007, the Society made volumes 1–50 of *Medieval Archaeology* available free online to everyone, and the newsletters are also accessible on its website. Subscribing individual and institutional members receive the journal *Medieval Archaeology* (in hard copy and electronically), and individual members also receive hard copies of the all-color newsletter.

Since 1966, the Society has produced over 30 monographs dealing with particular aspects of the archaeology of Britain and Ireland between CE 400 and 1600, ranging from excavation reports to

thematic overviews. Nearly half of these appeared in the last 10 years under the editorship of Christopher Gerrard.

A new development is the inclusion of a postgraduate student on council to represent the interests of students in general and to help promote activities particularly beneficial to them, notably student conferences reflecting the full breadth of interests in the Middle Ages, and careers advice days.

The Society's presidents reflect the interdisciplinary outlook of the Society: R. L. S. Bruce-Mitford (1957–1959), W. A. Pantin (1960–1962), J. N. L. Myres (1963–1965), Eleanora Carus-Wilson (1966–1968), C. A. Ralegh Radford (1969–1971), A. J. Taylor (1972–1974), D. B. Harden (1975-1977), C. E. Blunt (1978–1980), J. G. Hurst (1981–1983), H. R. Loyn (1984–1986), A. C. Thomas (1987–1989), Helen Clarke (1990–1992), M. W. Thompson (1993–1995), M. Biddle (1996–1998), C. Dyer (1999–2001), R. A. Hall (2002–2004), Roberta L. Gilchrist (2005–2007), Leslie Webster (2008–2010), and Mark Gardiner (2011–2013).

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► Medieval Archaeology

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Society of the Ship

Richard A. Gould
Department of Anthropology, Brown University, Providence, RI, USA

Introduction and Definition

The social order of ships occurs in both closed cultural systems that operate within the confines of the vessel at sea and open systems that interact simultaneously with the shore-based community that produces and supports them. The same can be said for shipwrecks as physical units of contemporaneity at the time of loss (so-called time capsules) versus the ways they are embedded in the context of ongoing natural and cultural processes that affect the postdepositional character of the archaeological record.

For our purposes, shipboard societies can be defined as floating communities that operate out of sight of land over variable distances and time. The ship itself can be small, like an ancient Polynesian voyaging canoe – a concept archaeologist Patrick V. Kirch called "the society of the canoe" in the 1980 PBS video production, *The Navigators* (Low 1980) – or it may be an ocean-going warship manned by hundreds of officers and sailors, such as the great eighteenth-century English line-of-battle ships described by historian N.A.M. Rodger in *The Wooden World* (1986). Size is not necessarily important, but the circumstances under which the vessel and its crew operated are. Modern maritime behavior can provide useful comparisons with the archaeological record at shipwreck sites and serves as a source of testable hypotheses. The goal,

however, is to find out "what happened" in the past to account for shipwreck remains that may belong to any culture, including non-Western ones, and to be prepared to recognize situations in the past that may have no modern counterpart.

Key Issues/Current Debates/Future Directions/Examples

One could hypothesize generally, for example, that the need for making decisions and acting on them quickly aboard ships at sea, especially under stress, requires a hierarchical social order and degrees of absolute authority not always found on land in the same society. Many historic examples exist of authoritarian conditions on ships, and these are sometimes encoded as regulations – in the case of naval vessels – or as contracts, in the case of merchant ships. Rodger's (1986: 210) account, however, notes a multitude of ways: "The peculiar nature of seafaring gave to ships at sea a natural cohesion unknown ashore, and perhaps permitted the Navy a legal code which. . .was remarkably lenient by the standards of its day." Rodger's account reveals the complexities of authority aboard eighteenth-century Royal Navy ships and in shore-based institutions like the Admiralty. He cautions against hypotheses that could oversimplify the nature of the social order at sea.

The archaeological record is not always specific enough to provide a detailed characterization of social life aboard ships at sea, but some important connections are at least possible and can be explored. Although isolated at sea, sometimes for long periods, shipboard societies are not hermetically sealed off from land-based institutions. Archaeology can often posit robust connections between land and sea in such cases. There are contemporary practices in maritime behavior that have become institutionalized and can serve as models for comparison when analyzing shipwrecks, especially in maritime commerce. For example, *flags of convenience, preference trading*, and *barratry* are established practices with the potential to produce recognizable archaeological signatures at shipwreck sites that characterize the conduct of maritime commerce in the context of Western, mercantile capitalism:

- *Flags of convenience* involve registering ships in nations which themselves do not have significant merchant fleets of their own, mainly as a way of evading safety rules, manning requirements, or other regulations by major maritime nations that can be costly, especially for shipowners operating on narrow profit margins.
- The *preference trade* is a protected form of commerce in which a nation requires that only ships that are registered in that country can operate legally between that nation's ports.
- *Barratry* is a term that covers various ways shipowners and/or captains intentionally wreck a ship for personal or corporate gain. Many of these wreckings are "insurance jobs," but this can also be good way to get rid of a ship that has become uneconomical or unprofitable to operate, especially when the cargo is more valuable than the ship.

All of these practices have evolved into social institutions in Western maritime commerce that can be hypothesized to produce recognizable patterns in the archaeology of shipwrecks. Flags of convenience and the preference trade, for example, both encourage shipowners to push their vessels one more voyage beyond their intended use lives – something that maritime archaeologist Larry Murphy (1983) refers to as the "one-more-voyage" hypothesis. This kind of behavior can produce shipwrecks that show extreme efforts at repairs to keep the ship in service. For example, large amounts of hardened mastic cement were found in the bilges of the nineteenth-century wooden cargo vessel labeled archaeologically as the "Barrel Wreck" at Loggerhead Reef in the Dry Tortugas, FL (Gould & Conlin 1999). This was a common expedient for ship operators of that period to plug leaks and fill in rotting timbers to keep an otherwise worn-out ship in service. The location of shipwrecks in areas of high risk such as reefs and shoals or in locations dangerously exposed to bad weather and strong currents – termed "ship traps" – can also be a clue to this kind of behavior.

In more modern ships, the resale of supertankers and their continued use at sea under flags of convenience past their roughly 5-year designed use life reveals this same kind of risky behavior – often without regard for the safety of the crew or the environmental consequences of oil spills (Mostert 1974). It may be hard to distinguish to what degree flags of convenience or the preference trade accounts for these archaeological patterns, since they can both produce these effects, but such institutions are as much a part of the wrecking process as the proximate conditions of the vessel's loss.

The physical patterning that results from barratry can be harder to detect, since there may be efforts by the shipowners to conceal their activities. Forensic-like investigation of shipwrecks, however, can identify such behavior as the most parsimonious explanation for such patterning, as happened in the case of the iron barque *North Carolina*, wrecked in Bermuda on New Year's Day, 1880 (Gould 2005). Barratry and these other institutionalized behaviors are all products of mercantile capitalist commence in Western or Western-related cultures. But what about non-Western societies?

As the classic (1922) study by anthropologist Bronislaw Malinowski in the Trobriand Islands of the southwest Pacific showed, maritime commerce may operate in non-market-based economies involving movement and exchange of prestige goods between lifelong trading partners on different islands (termed *kula*). This kind of behavior cannot be explained with reference to Western models of market-based exchange, even though there is evidence that *kula* exchanges and voyaging included large amounts of goods in trade, as opposed to prestige (Gould 2011: 164–170). The canoes used by such voyagers are unlikely to produce identifiable wrecks, but this example and others like it make it clear that archaeologists cannot rely exclusively on Western models of maritime commerce for their hypotheses about ancient trade.

As maritime archaeologists explore shipwrecks of non-Western origin, they must be prepared to account for situations in the past that may have no modern counterparts, even in extant non-Western cultures. For example, how did our species make its way initially from Southeast Asia to Australia/New Guinea at least 40,000 years ago? Land-based evidence shows that this was the earliest known case of oceanic voyaging in human history, but no direct evidence in the form of boat or raft remains has been found archaeologically. Historic and modern watercraft produced by Australian Aborigines were lightly constructed and were poor candidates as models for this kind of voyaging. Similar issues concern the social groups that attempted such early voyaging. They were a colonizing population as well as the vessel's crew, so their size and composition need to be considered along with the implications for provisioning such voyages. We do not yet have the answers to these questions, and in such cases the present cannot serve as a direct guide to the past. It may be the differences rather than similarities to the contemporary society of the ship that will direct archaeologists to what really happened in the past.

Cross-References

- ▶ Ethnoarchaeology
- ▶ Historical Archaeology
- ▶ Indigenous Peoples and the Challenges of Genetic/DNA Studies
- ▶ Indigenous Peoples, Working with and for
- ▶ Pacific Ocean: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ United States: Cultural Heritage Management

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Society of Vertebrate Paleontology of China (SVPC)

Ying Guan
Department of Palaeoanthropology,
Institute of Vertebrate Palaeontology and Palaeoanthropology, Beijing, China

Basic Information

The Society of Vertebrate Paleontology of China (SVPC) is an international organization dedicated to the promotion of research and the protection of the paleontological and paleoanthropological remains of China. The society is affiliated with the Institute of Vertebrate Paleontology and Paleoanthropology of the Chinese Academy of Sciences. In October 27 of 1984, more than 150 paleontologists and paleoanthropologists, representing more than 70 institutions, gathered in Laiyang of Shandong Province, where the famous duck-billed dinosaur *Tsintaosaurus spinorhinus* was discovered, and held the inaugural conference of the SVPC. On that meeting, paleomammalogist Min-chen Chow was elected the president and paleoichthyologist Meemann Chang the deputy president. The secretariat office information is as followed:

Address

142 Xizhimenwai Street, Beijing, 100044, China.
The official website: http://www.ivpp.cas.cn/jgsz/gkxh/gjzdwxh/
Tel: 86-10-68351363
Fax: 86-10-68337001
E-mail: bgs@ivpp.ac.cn

Major Impact

Vertebrate paleontological investigations and studies had been carried out for many years around China before the establishing of the SVPC, and the researchers are well represented throughout the country. There was an increasing need for an organization by vertebrate paleontologists and paleoanthropologists in China for many years. The founding of the SVPC has played this role well, and it has been dramatically promoting the study of vertebrate paleontology, paleoanthropology, and paleolithic archaeology in China and continually impacting these fields in the international academic field.

Since 1984, which was the year of naissance of SVPC, 12 annual meetings have been held in different cities in China. Currently, the SVPC comprises more than 300 members. The official language of the SVPC is Chinese and English. The biyearly meeting is held every 2 years, with participants mainly from China and some Asian countries but is now attracting more and more participants from the United States and Europe.

The date and location of these 12 annual meetings are as follows:

The 1st annual meeting: 1984 October 17–24, the city of Laiyang, Shandong Province.
The 2nd annual meeting: 1987 February 22–27, the city of Suzhou, Jiangsu Province.
The 3rd annual meeting: 1989 October 19–24, the city of Beijing.
The 4th annual meeting: 1992 August16–22, the city of Dalian, Liaoning Province.
The 5th annual meeting: 1994 November 24–December 1, the city of Chengdu and Zigong, Sichuan Province.
The 6th annual meeting: 1997 June 1–4, the city of Beijing.
The 7th annual meeting: 1999 April 25–30, the city of Yuxi, Yunnan Province.
The 8th annual meeting: 2001 November 2–6, the city of Shenzhen, Guangdong Province.
The 9th annual meeting: 2004 November 19–22, the city of Nanning, Guangxi Province.
The 10th annual meeting: 2006 November 20–22, the city of Sanming, Fujian Province.

The 11th annual meeting: 2008 September 20–23, the city of Taiyuan, Shanxi Province.
The 12th annual meeting: 2010 September 13–15, the city of Pingyi, Shandong Province.
The 13th annual meeting will be held in the city of Erenhot, Inner Mongolia Autonomous Region.

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▶ Animal Paleopathology
▶ Zooarchaeology

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Soil Pollen Analyses in Environmental Archaeology

Rob Scaife
School of Geography, University of Southampton, Southampton, UK

Brief Definition of the Topic

Pollen liberated by flowers and spores from non-flowering plants contributes to the atmospheric pollen rain. After settling on the land surface, most is destroyed through oxidation and/or microbial and microfaunal activity. In fortuitous circumstances, pollen may be preserved in certain types of soil and can be extracted to provide data on past vegetation and environment. Pollen analysis is usually associated with lacustrine sediments and peat mires where the upward accumulation of sediments may provide a record of the changing vegetation and habitats at a local and more regional scale. Soil pollen analysis differs in that pollen and spores settling on suitable land where microbial decay is inhibited may be preserved through progressive incorporation into the developing soil profile. Such conditions occur where soils are of an acid character with no faunal (earthworm), mixing such as found on heathland, podzolic soils. In these circumstances, there is a general downward movement of pollen aided primarily by water flow, largely rain. Pollen and spores, however, do not move downward as individual grains but are locked in humic colloids. The downward movement is, therefore, slow and the breakdown and release from colloids depends on various pedological conditions. This results in a crude stratification of pollen within the soil profile with the oldest, irrespective of size, at the base of the profile. A soil pollen profile is, however, not truly stratified and while the youngest pollen is largely at the top and oldest lower down, at any particular level, there may be pollen of various ages (Dimbleby 1985). Longer residence in soils, the effects of bacterial action, and physical and chemical decay reduce the number of pollen grains present, resulting in differential preservation in favor of the most robust types. In Britain, this is often Lactucoideae (dandelion types) and fern spores. In acidic soils, with no faunal mixing, the highest absolute pollen numbers are in the upper levels, decreasing with depth. Thus, calculation of absolute pollen frequencies is an important tool in interpreting soil pollen data/assemblages coupled with knowledge of the differential preservation/resilience of various pollen types (Havinga 1964, 1985) in different soil and sediment types. Long-term study into taphonomic processes has been carried out to aid interpretation of palaeo-pollen spectra (Jewell & Dimbleby 1966; Dimbleby in Evans & Limbrey 1974; Havinga 1985). Interpretation of such stratified soil pollen thus requires a different approach to that of peat and lacustrine sediments

The only principal contradiction to this is in soils where there is a buildup of a surface humus horizon as in a podzolic heathland soil (Ah) and woodland mor humus. Here, there may be a stratigraphical accretion of pollen upward as humus continues to accumulate. High biological

activity and breakdown of plant cellulose is carried out by microorganisms and fungal activity. With the former, ingested pollen is excreted to form *copromor* and the latter, *mycomor* (Stockmarr 1975). Changes in woodland structure through human activity may result in a change of the type of mor humus and rate of accumulation (Iversen 1964; Aaby 1983). In such mor humus, pollen may be remarkably abundant.

Historical Background

Soil pollen studies have been widely used to correlate vegetation history with soil profiles and development (e.g., Iversen 1964; Vuorela 1982). Professor G.W. Dimbleby pioneered and carried out numerous soil pollen analyses throughout Britain especially relating to archaeological contexts (Dimbleby 1955, 1957, 1985). When applied to soils buried (palaeosols) and preserved under archaeological sites, burial mounds, banks and by colluvium or other sedimentation, the technique has proved exceptionally useful in providing records of the vegetation prior to burial and information which may be directly relevant to the site occupation. The decrease of pollen down the profile can also be used to identify the old land surfaces where they are not visible in the overall profile and also to identify turves which (often inverted) were used to make up a funerary mound.

Dimbleby (1962) demonstrated that depletion of brown earth soils developed under deciduous woodland on sandy substrates initially had no pollen preservation. With increasing human activity (woodland clearance and agriculture), they became progressively more acid, resulting in heathland podzolic soil and consequent pollen preservation. Such pollen profiles frequently show an initial phase of scrub woodland (often hazel) with occasional traces of the preexisting woodland which was replaced by heathland vegetation on true podzolic soils. While such (podzolic) acid soils are favored for soil pollen analysis, in some circumstances, useful data can be obtained from calcareous soils developed on limestone lithology. This has proven valuable in establishing the vegetation and environment of the substantial areas of the chalklands of southern England through the analysis of prehistoric, subbarrow soils in this region (Dimbleby & Evans 1974). In such soils, due to faunal (largely earthworm) mixing, pollen may be distributed evenly throughout the soil. Absolute pollen numbers are generally small, and the potential for differential preservation and overrepresentation of taxa which have a robust pollen wall (exine) is substantially greater.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Dimbleby, Geoffrey W.
- ▶ Environmental Archaeological Evidence: Preservation

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Somaliland: Cultural Heritage Management

Sada Mire
School of Oriental and African Studies, University of London, London, UK

Introduction

The Somali peninsula has a rich heritage relevant to the world. Many ancient world civilizations have left their mark on this area, a connection facilitated by the region's strategic location, connecting Arabia, Africa, and Asia through the Red Sea Coast, the Indian Ocean and hinterland routes to North Africa, and the Swahili Coast. Ancient long-distance trade is confirmed by archaeological finds from Ras Hafun that demonstrate a Greco-Roman trade affiliation (Chittick 1975; Smith & Wright 1988). Furthermore, historical sources in Greek, *The Periplus of the Erythraean Sea* (translation Schoff 1995), and Chinese (Freeman-Grenville 1962) also verify long-distance trade, and Somali's own seafaring traditions in different prehistoric periods (Hourani 1995) attest to contacts with India, China, North Africa, Arabia, Persia, and Eastern Africa, with which Somalis share Swahili culture (Chittick 1969). Arabic (Gibb 1962) and Portuguese sources provide accounts of medieval coastal towns such as Muqdisho, Merka, Baraawe, Berbera, and Saylac. The commercial and cultural contact network in the hinterland is reflected both in archaeological remains (Smith & Wright 1988) and other sources such as oral tradition and historical records. Recent unpublished archaeological discoveries show links with ancient Egypt, Roman, and Greek world, South Arabia, India, and Ming and Yuan dynasty China. It is therefore clear that the region is a cultural crossroads.

Key Issues/Current Debates/Future Directions/Examples

In the last two decades, a man-made disaster has led to the destruction of an entire people's heritage. Somali cultural heritage property has become one of the irreplaceable victims of the longest recorded civil war in the world (Brandt & Mohamed 1996; see also Jama 1996; Abungu 2001). The commencement of the civil war triggered looting of the museums. The Garesa National Museum in Mogadishu and the Hargeisa Regional Museum have both long been emptied. Warlords commission systematic illicit digging of sites. Also the intangible heritage has recently been threatened by strict interpretations of Islam which prohibit the traditional performance arts, dances, songs, and dresses. Somali tangible and intangible heritage continues to suffer the ongoing civil war.

The failed state of Somalia is officially under the UN-backed Transitional Federal

Government, but the country has in fact since 1991 been divided into at least three parts; the northwestern region is reclaiming independence in a quest for re-recognition of Somaliland (a country that existed for a week in 1960 when it gained independence from Britain and joined Italian Somalia voluntarily). Somaliland is now a de facto state and enjoys peace and security. Puntland is semiautonomous but is devastated by piracy, and South-Central Somalia is mostly controlled by Islamist groups.

In addition to the war, however, other factors have also contributed to the neglect of Somali tangible heritage both by Somalis and the international community (Mire 2007). One major issue is the approaches to cultural heritage before the war. Prior to the war, Somali tangible heritage was not managed properly. The Italian colonial administration set up the first sub-Saharan ethnographic museum in Somalia, but after the Italians left, this museum was allowed to deteriorate. The reason seems to be that Somalis did not understand the need for an ethnographic museum when most of the population was living still with the objects that the museum displayed. One of the former directors of this museum suggested that content was "backward" objects from the countryside, things that his grandparents were still using (Mire 2007). This is confirmed by Italian exhibition publications of the time, such as Caroselli (1934) and the exhibition catalogue *Museo della Garesa*. More recently, UNESCO tried to develop this museum by providing museum development experts (e.g., Posnansky 1979; Crespo-Toral 1988), but UNESCO's approach was not endorsed, and its recommendations were neglected by the Somali government. UNESCO failed to understand that the Garesa Museum was not a self-representation of the Somali people. It displayed objects from the nomadic lifestyle as the only identity of the Somali, and this approach was not popular in a time of struggle against colonial mentality and rule. Also the Somali dictatorship failed to ratify the 1972 UNESCO World Heritage Convention, and it did not draft any national heritage laws or policy. Heritage legislation was far from sufficient and in fact almost useless (see Jönsson 1983 for examples; Brandt & Mohamed 1996; Mire 2007). Also archaeological research material was taken out of the country with no reports (Jönsson 1983). Only a few people (Curle 1937; Chittick 1969; Brandt 1986, 1988, 1992) had attempted systematic archaeological survey before the current civil war. A few Somalis (External institutions that made effort to train local archaeologists were too few (see bibliography for references to the Swedish Aid Agency, the SAREC project 1982–1990 by Jönsson 1983; Broberg 1986, 1990, Broberg & Säfvestad 1988).) were involved with archaeological work (e.g., Jama 1996), but it seems all eventually ended up leaving the discipline altogether. All of this contributed to the lack of engagement of Somalis with the significance of their tangible heritage.

There was no infrastructure put in place for dealing with the notion of a museum and its local potential. Furthermore, archaeological research remained almost totally alien as very few locals were involved in it before the war. Hence, one of the reasons for the failure to preserve Somali tangible heritage over the few last decades is also due to the fact that Somalis do not associate archaeology with their heritage and identity. When studying Somalis' views on cultural heritage management and the significance of archaeological remains, it was noted Somalis have their own perceptions of heritage and methods of preservation. Somali have a knowledge-centered approach to heritage and its preservation (Mire 2007, 2008a, 2011). Understanding of this indigenous local approach to heritage and its preservation is paramount to any future and current involvement. Intangible and tangible heritage has been preserved through oral traditions and oral transmission of knowledge. Since there was no writing until 1973, Somalis have developed profound skills in transmission of knowledge and traditions through oral means. Somalis have strong intangible knowledge flowing from their

experience in the landscapes in which they live. All aspects of life – cultural, social, and ritual – are maintained and developed through oral history, poetry, traditional performance art, and crafts production. Somalis regardless of where they reside (countryside, city, and diaspora) seem to keep their knowledge and skills acquired through experience as their heritage. To understand why Somalis do not preserve objects and monuments, it is important to understand their lifestyle. As nomads are always on the move, people carry very little, and instead it is vital to have the knowledge and skills to produce things when needed, to know the landscape and where to find raw materials, and so on. Hence, preservation of objects is not important if one knows how to make these objects. This knowledge helped Somalis when they become refugees and fled their comfortable houses in the city and found themselves in the nomadic landscape. They were able to build portable organic huts and find water as well as use their ethnobotanical knowledge to treat illnesses. This holistic approach to heritage preservation as knowledge is key to Somali nomadic culture.

In post-conflict Somaliland (Mire 2008a, b), cultural heritage is key for development. The Knowledge-Centered Approach is used here to engage communities in heritage management (Mire 2011). Although archaeology is alien to them, through this Knowledge-Centered Approach, Somali communities have a role to play in the preservation of both their tangible and intangible heritage. However, the main obstacles in Somaliland are institutional capacity building and policy and strategy development. Since Somaliland is not a recognized state, it cannot sign or ratify the 1972 World Heritage Convention. Hence, heritage in Somaliland is suffering this lack of status. However, on a national level, cultural heritage is being put into the national agenda by the creation of the Department of Tourism and Archaeology which has a number of programs for implementation and development of heritage management strategies and for sustainable development. This involves, among other things, cultural resource management for sites, monuments, and development of museums.

The Local Education and Safeguarding Program (LESP) aims to assist communities and government staff to acquire basic knowledge of the significance, protection, and preservation of cultural heritage. The Department of Tourism and Archaeology has recruited local people in various areas, particularly to safeguard the most prominent archaeological sites. The program provides capacity building for the staff and communities based in different areas of Somaliland. The Knowledge-Centered Approach is critical here, because it assists in the acknowledgement that the locals possess knowledge about their heritage and can provide insights to its preservation. This empowers locals and after having established mutual interest in a particular site, the government appoints a local person as a custodian of the site. These local ideas are recorded and incorporated into the actual work taking place at the sites.

There is also the National Inventory List (NIL) program in which both tangible and intangible elements and history of the sites are recorded. Recent archaeological interest in Somaliland has produced important sites including the rock art sites of Laas Geel (Gutherz et al. 2003), Dhambalin, Haadh, and Jilib Rihin (Mire 2008b). However, except for conventional surveys of sites, the Knowledge-Centered Approach has facilitated the investigation of what the locals see as significant heritage. Many times there are sites and features in the landscape that the archaeologist does not recognize as something important, such as mountains, springs, or even trees. Such seemingly insignificant landscape features are often more significant to the locals than archaeological sites. When carrying out archaeological survey of selected areas of Somaliland provinces, local people are often involved in the initial creation of data about the sites.

The Department of Tourism and Archaeology runs public education and heritage awareness media programs. Since the Somali culture is

basically oral culture, media such as radios, television, and recently the Internet play an important role in the awareness raising. Through TV programs, the department explained the problem of illicit diggings of archaeological sites and the archaeological excavation process to demonstrate the damage being done to archaeological context and how this impacts the results and history writing of the Somali past. Particular attention was given to the possible benefits of archaeological sites for local populations and measures that stakeholders (governments, communities, business people, etc.) need to take to safeguard cultural property. Photographs are used to show the Somali people the destruction inflicted on their heritage by fellow Somalis. Also, international media have recently been given a role to spread the information about Somali heritage and the work taking place in Somaliland. Awareness films featuring the department's work have been televised by Somaliland National News as well as international news agencies such as National Geographic TV, CNN, and BBC.

The Department of Archaeology and Tourism invests in training of its staff in tourism management. Although infrastructure is poor in Somaliland, the department managed to profile sites near the main cities to become tourist sites. In particular, rock art sites provide a ready resource for income generation through tourist activities. Somaliland receives cultural and environmental tourism, although in small groups. Also the department has students in universities in the Horn of Africa who will be joining the department after completion of their studies. The Department of Tourism and Archaeology's strategy for protecting sites prone to looting is by engaging the elders of the villages in awareness programs. Such awareness programs have prompted the elders to take up their own search of stolen objects. One example of such local initiative is some stolen decorated stelae near the town of Burco that were returned by the locals on their way to Boosaaso to ship the material to the Gulf and sold on the black market.

However, since there are no museums currently in Somaliland, most objects are recorded and documented by the department, and local people are registered as the official custodians of the objects until there is an official museum. The lack of museums contributes to the disappearance of artifacts. Potential collection- and artifact-repatriation projects as well as archaeological-rescue projects are extremely challenged by this lack of storage and research space. The Hargeisa Museum building is awaiting development, although it has been utilized as a hospital since the war. Also in Sanaag region, there are a couple of cultural educational centers. The Department of Tourism and Archaeology has hired some of the local women artists and craftswomen for these educational centers. This enables the local people to engage with their heritage and transfer skills and knowledge to the younger generations. Also the women produce material culture which they can sell to generate their own income. Recently, Horn Heritage Organization, a nongovernmental organization, has been set up to promote awareness and preservation of Somali heritage.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Cultural Heritage Management and Poverty
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Outreach
- ▶ Cultural Heritage Objects and Their Contexts
- ▶ Experiencing Cultural Heritage
- ▶ Heritage: History and Context
- ▶ Heritage: Public Perceptions
- ▶ Intangible Cultural Heritage
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Tangible Heritage in Archaeology

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South Africa: Heritage Management

Katherine Cash
Campus Honors Program at the University of Illinois at Urbana-Champaign, Urbana, IL, USA

Introduction

South Africa is the southernmost country in Africa. It covers 1,219,090 sq km, with 2,798 km

of coastline (Central Intelligence Agency (CIA) 2010). South Africa possesses a dominantly semiarid climate, with a subtropical climate along its east coast (Central Intelligence Agency (CIA) 2010). South Africa has a population of 49 million, with four predominant ethnic groups: black African (79 %), white (9.6 %), coloreds (8.9 %), and Indian/Asian (2.5 %) (Central Intelligence Agency (CIA) 2010). South Africa has twelve official languages, with IsiZulu being the most widely spoken, followed by IsiXhosa and Afrikaans (Central Intelligence Agency (CIA) 2010).

South Africa was first "discovered" by Dutch traders in 1652 and was used as a stopover point for trade routes between the Netherlands and the Far East; it was during this time that Cape Town was founded (Central Intelligence Agency (CIA) 2010). The English took control of the Cape of Good Hope in 1806, causing many of the Dutch settlers (Boers) to move further north (Central Intelligence Agency (CIA) 2010). Discovery of gold and diamonds in 1867 and 1886 caused a greater influx of people and the increased degradation of the native peoples (Central Intelligence Agency (CIA) 2010). The Boers resisted the further-reaching control of the English but were defeated in the Boer Wars in 1899–1902 (Central Intelligence Agency (CIA) 2010). The Boers, now the Afrikaners, and the English established a rule together in 1910 as the Union of South Africa (Central Intelligence Agency (CIA) 2010). In 1948, the National Party instituted apartheid, and soon thereafter, South Africa was declared a Republic (Central Intelligence Agency (CIA) 2010). The African National Congress (ANC) opposed apartheid. After global pressure and years of turmoil in the country, the in-power regime negotiated a peaceful transition to majority rule (Central Intelligence Agency (CIA) 2010). The first multiracial elections were held in 1994, officially ending the apartheid and beginning the ANC's rule (Central Intelligence Agency (CIA) 2010).

In the years since, South Africa has been struggling with issues created or exacerbated by apartheid, including housing and education inequalities, poverty and health-care issues, as well as ANC infighting (Central Intelligence Agency (CIA) 2010).

Key Issues

Heritage Management Infrastructure

Heritage Laws

South Africa has one law that governs all heritage management in the country: the National Heritage Resources Act (NHRA) of 1999. This document serves multiple purposes including establishing a system for the management of heritage resources; encouraging good governing of these resources and empowering society to take a role in this governing for future generations; laying out principles and norms for the management of all heritage resources; creating a system for identifying, assessing, and managing heritage resources; establishing the South African Heritage Resources Agency (SAHRA); controlling the export of heritage resources and the illegal import of culturally significant items; allowing provinces to play a role in managing heritage resources of certain types; and creating laws and allowances for local authorities to protect heritage resources (Republic of South Africa (RSA) 1999).

This law takes special care in defining heritage resources, using an entire section to list all possible forms of a heritage resource (Republic of South Africa (RSA) 1999: Section 3). Most simply, heritage resources refer to any place or object of cultural significance (Republic of South Africa (RSA) 1999: Section 2.xvi). This law also mentions multiple times that any type of heritage resource should not be tampered with in any way without prior approval from SAHRA (Republic of South Africa (RSA) 1999: Sections 28–37). This document identifies the responsibility of heritage management as belonging not only to the government but also to the common person, for the sake of future generation (Republic of South Africa (RSA) 1999: Section 5.1.b). Though it does not state this explicitly, this law

also acknowledges the existence of and the need to involve all stakeholders; it declares that heritage should be managed so that it acknowledges the right of affected communities to be consulted and to participate in the management of pertinent heritage resources (Republic of South Africa (RSA) 1999: Section 5.4) and that all relevant cultural values and indigenous knowledge should be taken into account as well (Republic of South Africa (RSA) 1999: Section 5.7.a). NHRA also acknowledges the role that tourism plays in heritage management. This law states that heritage resources contribute to tourism and should be developed and presented for this purpose (as well as for the purposes of research and education) (Republic of South Africa (RSA) 1999: Section 5.5); it also states that the identification, assessment, and management of heritage resources should contribute to economic development (Republic of South Africa (RSA) 1999: Section 5.7.d).

Though this law encompasses many ideas that are crucial to good heritage management, it appears to fall short on some accounts. The document as a whole seems more concerned with the bureaucracy behind the heritage management, rather than the methods and needs of heritage management; it spends a great deal of time describing what permissions are needed from owners and organizations, rather than explaining the government's stance on methods, techniques, and authenticity. It also does not provide enough guidelines for the extent to which all stakeholders should be involved.

Heritage Institutions: Public

The main heritage management institute in South Africa is the South African Heritage Resources Agency (SAHRA). This agency was established by the National Heritage Resources Act (NHRA) in 1999 and is the government agency that is charged with the protection and administration of South Africa's heritage (Association of Southern African Professional Archaeologists (ASAPA) 2010). This agency is based out of Cape Town and has a regional office in each province (Association of Southern African Professional Archaeologists (ASAPA) 2010). SAHRA is run by an interdisciplinary council appointed by the arts and culture minister for South Africa and the chief executive officer; this position is currently held by Lynette Sibongile Van Damme (Association of Southern African Professional Archaeologists (ASAPA) 2010).

As the governmental agency for heritage management, SAHRA has a variety of duties, which are laid out on the home page of their website: "to coordinate and monitor the identification of our national heritage; to set a norm and standards and maintain the management of heritage resources nationally; to encourage and facilitate the development of provincial structures; to control export and import of nationally significant heritage resources; to develop policy initiatives on the promotion and management of our heritage; to nurture an holistic celebration of our history; to set national policy for heritage resources management, i.e. formal protection, general protection and management; and to develop an integrated and interactive system for the management of the national heritage resources" (South African Heritage Resources Agency (SAHRA) 2010a: home page). SAHRA provides protection and management guidelines to all types of heritage resources in South Africa, including archaeological sites, paleontological sites, meteorites, wrecks, burial grounds, and graves (South African Heritage Resources Agency (SAHRA) 2010b). They also supervise the creation of registers that are used to identify heritage resources and the creation of heritage areas (South African Heritage Resources Agency (SAHRA) 2010b).

Other governmental agencies include smaller regional ones, like Amafa aKwaZulu-Natali, which handles heritage resource management in KwaZulu Natal (Association of Southern African Professional Archaeologists (ASAPA) 2010).

Heritage Institutions: Private

The private or nongovernmental organizations (NGOs) in South Africa cover a wide variety of concerns and goals, from the integration of Black heritage and business strategy to the management of heritage resources that are not considered as such by the government to providing free consulting for heritage management groups and NGOs.

One such NGO is the Cape Town Heritage Trust, a private-sector, nonprofit organization. This organization was established by Cape Town's city council to take care of historic buildings and streets in Cape Town (Cape Town Heritage Trust (CTHT) 2010). Their website describes their mission as the conservation of the architectural, cultural, and natural heritage of Cape Town and its environs for the benefit of the inhabitants of the city and of the nation at large (Cape Town Heritage Trust (CTHT) 2010). This NGO works with the city council and the owners of buildings to improve and preserve historic buildings and other pieces of cultural heritage (Cape Town Heritage Trust (CTHT) 2010).

Other heritage NGOs include Nzumbululo Heritage Solutions (www.hessa.co.za), the Africa Heritage Society (www.africaheritage.com), and a number of province- or town-specific organizations that deal with natural heritage.

Examples

Part 1: Heritage Sites

South Africa's first entry onto the World Heritage List was in 1999, with the listing of Robben Island, iSimangaliso Wetlands Park, and the Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai, and Environs (UNESCO World Heritage Center 1999a, 1999b, 1999c). Since then, another five sites have been added to the World Heritage List, along with twelve sites on the Tentative List. At the present, none of these sites are marked by UNESCO as being "at risk."

Sites on the World Heritage List

Of the eight sites South Africa has on the World Heritage List, four are cultural sites, one is a mixed cultural/natural site, and the remaining three are natural sites. My focus is on the cultural sites. The sites are described in the order in which they were inscribed on the World Heritage List.

- *Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai, and Environs*

This site was listed in 1999. It encompasses a variety of sites in Gauteng, Limpopo, and the Northwest Province. These sites contain evidence of early hominids, including the Taung Skull site, where the skull of an *Australopithecus africanus* was found, as well as the Makapan Valley site, where there are archaeological traces of human evolution, such as specimens of early hominids, such as Paranthropus, dating to between 4.5 million and 2.5 million years ago, and traces of human occupation, specifically the domestication of fire dating back to between 1.8 million and 1 million years ago (UNESCO World Heritage Center 1999a).

These sites meet two of the World Heritage criteria for possessing Outstanding Universal Value. The first met criterion is Criterion (iii): the archaeological evidence found here is an exceptional testimony to an extinct species while shedding light on our origins (UNESCO World Heritage Center 1999a). The second criterion met is Criterion (vi): these sites provide a vast reservoir of scientific data that will aid in the study of ancient humans (UNESCO World Heritage Center 1999a).

- *Robben Island*

This site was listed in 1999. Robben Island is a small island off the coast near Cape Town that has been in use since the seventeenth century as a hospital for socially unacceptable groups such as the mentally and terminally ill, a prison for both criminal and political prisoners, and a military base during World War II (UNESCO World Heritage Center 1999c). The prison on Robben Island held a variety of notable figures, including Nelson Mandela, who was incarcerated there for 20 years (Robben Island Museum 2009).

The prison was closed in 1996, and the island has been developed as a museum and nature conservation area since then (Robben Island Museum 2009).

Robben Island fulfills two of the criteria for possessing Outstanding Universal Value. Criterion (iii) is met by the testimony it provides for the history of South Africa (UNESCO World Heritage Center 1999c). It also fulfills Criterion (vi) because it symbolizes the triumph of freedom, democracy, and the human spirit (UNESCO World Heritage Center 1999c, 2010).

- *uKhahlamba/Drakensberg Park*

This is a mixed cultural/natural site that was listed in 2000. This park stretches across KwaZulu Natal and the Eastern Cape Province and is known for its impressive geography and geology, as well as the concentration of native and endangered species, both flora and fauna, that this area is home to (UNESCO World Heritage Center 2003b). This park also contains many caves and rock shelters that hold the largest group of rock paintings found south of the Sahara. These paintings reflect the life of the now extinct San people (UNESCO World Heritage Center 2003b). The paintings show many aspects of San life, including hunting, dancing, food gathering, fighting, and ritual scenes (UNESCO World Heritage Center 2003b).

The uKhahlamba/Drakensburg Park meets four of the criterion for possessing Outstanding Universal Value. It meets Criterion (i) for the rock paintings – they are representative of a masterpiece of human creativity – and it meets Criterion (iii) because these rock paintings were recognized as a unique or exceptional testimony to a vanished culture (UNESCO World Heritage Center 2003b, 2010). The other two criteria met are Criteria (vii) and (x) for natural World Heritage Sites (UNESCO World Heritage Center 2003b).

- *Mapungubwe Cultural Landscape*

This is a cultural site that was listed in 2003. This landscape in the Northern Province at the confluence of the Shashe and Limpopo rivers was once home to the largest kingdom in the sub-Saharan continent, reaching the height of its power between CE 900 and CE 1300, before it was abandoned in the fourteenth century because of a rapid change in climate

(UNESCO World Heritage Center 2003a). This landscape contains the nearly untouched remains of the palace sites and the surrounding settlement and two earlier capital sites (UNESCO World Heritage Center 2003a).

This landscape meets four of the criteria for possessing Outstanding Universal Value. Mapungubwe fulfills Criterion (ii) because the site provides evidence for the exchange of values that created cultural and social changes in Southern Africa during the height of their power; in the same vein, it also fulfills Criterion (iv) because the period of Mapungubwe's height of power and the effect of the cultural and social changes were part of a significant stage in the subcontinent's history (UNESCO World Heritage Center 2003a, 2010). The archaeological evidence found in this area provides a surprisingly complete testimony of Mapungubwe's rise and fall, fulfilling Criterion (iii) (UNESCO World Heritage Center 2003a, 2010). Finally, this landscape fulfills Criterion (v) by showing the impact of climate change and Mapungubwe as a culture that was vulnerable to irreversible change (UNESCO World Heritage Center 2003a, 2010).

- *Richtersveld Cultural and Botanical Landscape*

This is a cultural site that was listed in 2007. This landscape in the Northern Cape Province is home to the seminomadic, pastoral Nama peoples. Their pattern of life has persisted for over two millennia and includes the building of portable rush-mat houses, the only area in which this is still done, and seasonal migrations to grazing grounds (UNESCO World Heritage Center 2007). This way of life reflects old traditions that were once widespread, but no longer are (UNESCO World Heritage Center 2007).

This cultural landscape meets two of the criteria for possessing Outstanding Universal

Value. The Nama peoples' way of life demonstrates a way of life that, when it was still a widespread way of life, played a major role in the history of South Africa; by this explanation, Richtersveld fulfills Criterion (iv) (UNESCO World Heritage Center 2007, 2010). Additionally, Richtersveld fulfills Criterion (v) because this area is one of the few remaining places were transhumance pastoralism, or the seasonal movement of people with livestock, is still practiced; this is an example of a traditional human land use that is now vulnerable (UNESCO World Heritage Center 2007, 2010). das könnte 2007 sein

Part 2: Sites on the Tentative List

South Africa currently has 12 sites on the Tentative List, many of which were added to the Tentative List in 2004 or 2009. Eight of these are proposed as cultural sites; four are proposed as natural sites (UNESCO World Heritage Center 2009a). The cultural sites are, again, listed in the order they were proposed.

- *Pleistocene Occupation Sites of Klasies River, Border Cave, Wonderwerk Cave, and Comparable Sites Relating to the Emergence of Modern Humans*

  This cultural heritage site was proposed in 1998 and fulfills Criteria (ii), (iii), (iv), (v), and (vi) (UNESCO World Heritage Center 1998).
- *Kimberley Mines and Associated Early Industry*

  This cultural heritage site was proposed in 2004 and fulfills Criteria (i), (ii), (iv), and (vi) (UNESCO World Heritage Center 2004a).
- *Pilgrim's Rest Reduction Works Industrial Heritage Site*

  This cultural heritage site was proposed in 2004 and fulfills Criteria (i), (ii), (iv), and (vi) (UNESCO World Heritage Center 2004b).
- *The !Xam Khomani Heartland*

  This cultural heritage site was proposed in 2004 and fulfills Criteria (iii), (iv), (v), and (vi) (UNESCO World Heritage Center 2004c).
- *Liberation Heritage Route*

  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iii), and (vi) (UNESCO World Heritage Center 2009b).
- *The Cape Arc of Meridian*

  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iv), and (vi) (UNESCO World Heritage Center 2009c).
- *The Cape Winelands Cultural Landscape*

  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iii), and (iv) (UNESCO World Heritage Center 2009d).
- *The Namaqualand Copper Mining Landscape*

  This cultural heritage site was proposed in 2009 and fulfills Criteria (ii), (iii), and (iv) (UNESCO World Heritage Center 2009e).

Discussion of Sites on the World Heritage List and Tentative List

The sites inscribed on the World Heritage List for South Africa are perhaps indicative of what the South African government sees as important in the country's history. The cultural sites on the list favor themes such as the birth of the human race, precolonial civilizations, and the celebration of South African independence. None of these sites acknowledges the role colonialism and Europe played in developing the country. Whether or not these influences were considered unwanted or useful, all parts of a country's history should be considered equally when heritage is created. The omission of the colonial history is also an omission of those who live in the country who are descendants of the Dutch and English colonizers.

However, as the Tentative List suggests, heritage management in South Africa is beginning to acknowledge their colonial period. The Cape Winelands Cultural Landscape, suggested in 2009, acknowledges the role that colonialism, England, and the Netherlands played in the development of the wine industry there, as well as in the vernacular architecture (UNESCO World Heritage Center 2009d). In addition to

this, there are three other sites that have been added onto the Tentative List since 2004. Kimberley Mines and Associated Early Industry, Pilgrim's Rest Reduction Works Industrial Heritage Site, and the Namaqualand Copper Mining Landscape are industrial heritage sites and acknowledge the role that England and the Netherlands played in starting off the industrial revolution of South Africa (UNESCO World Heritage Center 2004a, 2004b, 2009e).

The order in which sites were added to the World Heritage List is also interesting. The first three sites, the Fossil Hominid Sites, Robben Island, and iSimangaliso Wetlands Park, were all added in the same year. These sites reflect, perhaps, a desire to be recognized by the world as a capable country; these sites establish the importance of South Africa to the rest of the world as the "Cradle of Humanity," as a free, self-governed country and as being wealthy enough to pay attention to issues that are a luxury, such as environmental conservation (UNESCO World Heritage Center 1999a, b, c).

Current Debates

Heritage Management Problems

Overall Problems

The predominant issues in heritage management for South Africa are laid out neatly in Colette Scheermeyer's (2005) article "A Changing and Challenging Landscape: Heritage Resources Management in South Africa." The first issue is one of balancing differing views of the same event. People in South Africa have bad memories of the apartheid, but good memories of their neighborhoods, social interactions, and lives during this period of time. It is the responsibility of those who practice heritage management to take both views and represent them fairly, without interference from their personal views or judgments (Scheermeyer 2005). So, despite the desire to portray the apartheid as entirely bad, one has to acknowledge that the injustices of the apartheid did not penetrate every aspect of life.

The second issue is the balance between the tangible and intangible. One must ensure that the intangible cultural aspects of a site are maintained along with the tangible, but on the flipside, the integrity of the site cannot be sacrificed while promoting the intangible heritage (Scheermeyer 2005). This problem manifests itself in the desire of communities to continue using culturally significant sites for ritual purposes.

The third predominant issue focuses on stakeholders. This problem is one that faces every heritage resource around the world. A holistic and fair approach to managing these cannot be achieved unless all stakeholders are identified consulted and involved (Scheermeyer 2005).

Site-Specific Problems

There are few sites with glaring difficulties in the heritage management. The most pressing problem is facing Wonderwerk Cave, one of the sites on the Tentative List. This cave, and the rock paintings within, is currently being threatened by erosion and the possibility of the cave collapsing (UNESCO World Heritage Center 1998).

Future Directions

Heritage management in South Africa is, by no means, an easy task. The presentation of heritage is plagued by negative heritage, conflicting views, and unwanted stakeholders. Despite these problems and inner turmoil, the South African government has made a strong, honest attempt at the competent management of their heritage. Their heritage management law tries to fairly address many of the issues that arise in heritage management, such as stakeholder claims and heritage preservation, though it does this at the expense of in-depth instruction on conservation. The South African government agency for heritage management is set up in an effort to include as many relevant disciplines as possible in heritage management.

However, some would argue that the effort and funding that is being put into heritage management and the World Heritage Sites and nominations is misplaced, given the staggering poverty rate of the country (around 50 %) and the prevalence of HIV/AIDS and other infectious diseases (Central Intelligence Agency (CIA) 2010).

Cross-References

- ▶ African Stone Age
- ▶ African World Heritage Fund (AWHF)
- ▶ Heritage and Archaeology
- ▶ Heritage Conservation Training

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South Africa: Maritime Archaeology

Jaco Boshoff
Social History Department, Iziko Museums of South Africa, Cape Town, South Africa

Introduction

South Africa has roughly a 3,000 km long coastline scattered with an estimated 3,000 historically recorded shipwrecks dating from the fourteenth century right up to modern times. According to the South African Heritage Resources Agency database, the resource represents 38 different nationalities. Shipwrecks concentrated in "hot spots" like harbors or rough stretches of coastline mostly because the southern tip of Africa was the gateway to the east for the European colonial powers before the construction of the Suez Canal. This heritage is dominated by Portuguese, Dutch, and British shipwrecks. The Portuguese opened up the sea route from Europe to the east, the Dutch colonized the Cape in the seventeenth century, and the British prevailed over the Dutch in the early nineteenth century. Academic interest in historical shipwrecks is a twentieth-century phenomena as in the previous centuries the economic value of salvage was the foremost motive for investigating the remains of old ships.

Definition

Maritime archaeology as a subdiscipline, has had a checkered existence in South Africa. Maritime archaeology arguably started in the late 1980s with the appointment of a maritime archaeologist at the University of Cape Town. There was however an awareness of the importance of the underwater cultural heritage from quite early on with sporadic archaeological interventions. As with most countries with a coastline and shipwrecks, the inevitable scourge of treasure hunting reared its head and a large part of the history of maritime archaeology in South Africa has to do with how this dilemma was handled by heritage bodies in the country. This, of course, implies the development of legislative efforts to control the resource. Although important in understanding the development of maritime archaeology in South Africa, it is not the focus of this review, as it will be discussed elsewhere in this publication (see the entry on ▶ South Africa: Maritime Legal Management in this encyclopedia). This entry will rather look at the development of the subdiscipline at museums and universities, in particular at Iziko Museums, as well as describe some of the archaeological interventions mentioned above. The development of maritime archaeology will also be discussed in the context of a change in the political climate prevalent in South Africa at various times.

Historical Background

The South African Museum as the oldest museum in sub-Saharan Africa did not play a major role in the early years of shipwreck exploration in South Africa. In 1956, however, the director of the SA Museum, Dr. A.W. Crompton, offered the museum's assistance to the legendary physical "culturalist," strong man, and treasure hunter Tromp van Diggelin in his bid to recover "treasure" from shipwrecks in Table Bay (SACHM D1/4). The museum was willing to help with the identification of the items recovered as well as providing display area. An article in the Cape Argus in July 1956 estimated a fortune of 30 million pounds to be found on shipwrecks in Table Bay. Fortunately, not much came from this endeavor.

The situation changed in the 1960s when the South African Cultural History Museum (SACHM) was formed in 1964 by the splitting of the "European" collections from the Natural History and Ethnography collections of the South African Museum. This overtly political move from the Nationalist government of the day would, in the formation of the New South Africa in the 1990s, have an important impact in the direction taken by maritime archaeology in the museum world as will be discussed later in

this entry. As an institution with its focus on European and therefore colonial history, the SACHM's interest in shipwrecks became apparent early on. This could be ascribed to the increased access to the underwater world due to the availability of scuba gear and with the founding of underwater clubs. As an example, the Atlantic Underwater Club (formed in 1953 in Cape Town) became more interested in shipwrecks with the publication by the Johannesburg Public Library's chief Librarian, R.F. Kennedy (1955), titled "Shipwrecks On and Off the Coasts of Southern Africa." It is interesting to note that not much note was taken of the work done by George Bass in the 1960s possibly because shipwrecks were still equated as sources of treasure and interesting artifacts.

This is typified by the SACHM obtaining a Customs and Excise license for the salvage of shipwrecks in 1965. The director of the newly formed SACHM, Dr. G.A. Wacha, mentions that his predecessors in the South African Museum tried several times in the past to obtain a salvage license (SACHM D1/4). This unfortunate association with salvage created an image of the brave divers "rescuing" valuable artifacts from the clutches of the ocean. Still the museum was trying to gain more control of the shipwreck scene, especially with lucrative salvage attempts like that of the British East Indiaman Fame (1822) taking place at the time by members of the Atlantic Underwater Club in Table Bay. A large amount of gold and silver coins, silver spoons and forks, gold jewelry, watchcases, nails, and a broken ship's bell were salvaged from the Fame (Turner 1988). The divers did donate about 299 items to the fledgling museum, starting the SACHM's shipwreck collection.

In 1966, Dr. W. Schneewind, replacing W.A. Wacha as director of the SACHM, contacted the Western Province Underwater Union and the Atlantic Underwater Club in an attempt to salvage artifacts from the wreck of Dutch East India Company 1697 wreck of *Het huis te Crayestein* under the museum's salvage license. The divers did remove several items from the wreck but gave the museum a trifle of what was actually taken out. In a letter to the chairman of the Atlantic Underwater club, Dr. Schneewind asked for more "showy" (sic) objects to arouse the interest of the board of trustees and the government (SACHM D1/4).

Schneewind was aware of the lack of standards and in particular the lack of protection. He wrote to the secretary of Cultural Affairs in 1968 suggesting strict legislation modelled on the Swiss civil code and Danish Legislation (SACHM D1/4). He also realized that public support was lacking. In a letter to Miss M. Shaw, secretary of the South African Museums Association, he suggested the creation of a specific expedition to draw the attention of the public and the government. Not much came of this however.

The South African Museums Association (SAMA) did, however, enter the debate. In 1971 at their Western Cape branch meeting, SAMA voiced concern about the plundering of shipwrecks (SACHM D1/4). Several important recommendations were made:

- Wrecks older than 100 years to become the property of the State.
- Wrecks should be protected like other archaeological sites.
- Permits should be made available through the National Monuments Council.
- Some control measures were also suggested:
  - A special directive should be issued to the police to help control the pillaging of wrecks.
  - A social conscience should be cultivated with the public.
  - Funds to be made available to purchase equipment and employ personnel to investigate and recover material from wrecks in a systematic manner with the voluntary assistance of weekend divers.
  - Not to purchase wreck material from dealers.

Dr. Schneewind was appointed as chair to approach the Department of Customs and Excise with these suggestions. These suggestions were later on referred to the Department of Cultural Affairs.

A reply from the Committee of Enquiry into the Protection of Cultural Treasures, appointed

by the Minister of National Education, came in 1972 enquiring as to the desirability of controlling the export of cultural treasures. In the case of shipwrecks, Dr. Schneewind suggested again the implementation of legislation similar to the Danish model that included some of the suggestions of the SAMA committee, like the protection of shipwrecks older than 100 years. The governments' efforts apparently stopped here for the time being. In a March 1977 (SACHM D1/4) letter, Professor E. Axelson wanted to know what happened to the above suggestions to the government as he was at that moment inundated with calls from the press concerning the looting of the wreck of the *Sacramento*. In his reply, Dr. Schneewind again stressed his awareness of the need for protective legislation for shipwrecks.

In 1977, the Natal Museum's archaeology department (focusing mainly on the South African Iron Age) became interested in early shipwrecks because survivor's accounts contained the earliest descriptions of the southeastern seaboard and its inhabitants. Consequently, they started a project attempting to identify and locate some of the early sixteenth-century Portuguese shipwreck sites. They located and tentatively identified two of these very scattered wreck sites that of the *Sao Joao* (1552) and the *Sao Bento* (1554), but unfortunately did not take the research much further than this (Auret & Maggs 1982; Maggs 1984).

Another development in the 1970s was the discovery of a shipwreck during the excavations for the foundations of the new Civic Centre in the Cape Town foreshore in 1970. The Cape Town foreshore was created by large land reclamation projects in the 1930s and in the process, many shipwrecks were covered unknowingly. Fortunately, for posterity, a City of Cape Town engineer, R.A. Lightley, an avid ship model builder, immediately recognized the timbers being uncovered. He managed to obtain permission to study the remains and eventually tentatively identified it as the remains of the Dutch East India Company ship *Nieuw Rhoon* scuttled in 1776 (Lightley 1976). This project produced the first proper site plan of a shipwreck in Southern Africa as well as a heretofore unmatched technical study of ship construction in the subcontinent.

Mention should probably be made here of the efforts by Graham Bell-Cross in locating several early Portuguese shipwrecks often working with divers and homeowners finding remains of survivor's camps in development of their beach homes (Bell-Cross 1988) along the Eastern Cape seaboard. Although Bell-Cross approached the study systematically often with the help of leading historians and sometimes archaeologists, the result did not go further than purely descriptive work of artifacts found and statements as to the identification of the various possible shipwreck sites.

Meanwhile, the exploitation of shipwrecks continued unabated with recoveries from the Dutch East India Company ship *Meresteyn* (1702) on the Cape West Coast (Marsden 1976) and more troubling the recovery of bronze and iron guns from the seventeenth-century Portuguese wrecks of the *Santissimo Sacramento* and *Nossa Senhore Da Atalaia do Pinheiro* with most of these guns from the famous Bocarro foundry in Macao being sold for scrap. Some of the better examples did, however, find their way to the Port Elizabeth Museum and was probably the reason for the appointment of a curator responsible for shipwreck material in 1980. The other consequence was the amendment of the Heritage Legislation of the day in the form of the National Monuments Act of 1969, which was amended in 1979 by giving the relevant minister the power to declare any wreck older than 80 years as a National Monument (Gribble 2002).

Key Issues

In the 1980s, legislation was improved, the first in 1981 proclaiming wreck sites older than 100 years (Abrahams 1987). The National Monuments Council now issued permits only for wrecks that were scattered and without identifiable structure or stratification. Conditions were that accurate recording techniques of an archaeological standard should be applied and

that 50 % of the artifacts had to be lodged at a collaborating museum.

This attempt of regulating shipwreck exploitation was by no means the solution of the problem as it was difficult to enforce these regulations with almost no funding and a desperate lack of personnel. The treasure-hunting community reacted in naming themselves "salvers" and not treasure hunters. This unfortunate association with salvage created an image of the brave divers "rescuing" valuable artifacts from the ocean.

Archaeologists started to voice their concerns about the exploitation of shipwrecks along the South African coastline possibly because of the changing legislation that brought the low standards and inability of museums to cope with the influx of permit applications, to the fore. At the SACHM, the shipwreck collection came under archaeological control with the appointment of a historical archaeologist in 1981 (Abrahams 1987). The shipwreck collection, however, was more of an onerous duty than a promising field of research as the museum had to respond to requests from divers for letters of cooperation. These letters most often took the form of one-liners promising cooperation with no conditions attached other than that the stipulations of the National Monuments Act need to be followed. The result was a very imbalanced collection as the museum seldom received or asked for the 50 % of recovered artifacts. In fact, of 144 permits issued since 1982, the museum had letters of cooperation for 42 shipwrecks with only 3, 000 artifacts dating from the sixteenth to the nineteenth centuries (Boshoff 2006). No specialized conservation unit existed and the museum was often reliant on the treasure hunters conserving the artifacts received.

The SACHM was however attempting to get the investigation of shipwrecks on a more professional footing as proved by the organizing of a "Symposium on Maritime Archaeology" with a combination of archaeologists, treasure hunters, historians, and heritage specialists as speakers in July 1984 (SACHM D1/4). This was in response to projects like the exploitation of the treasure wreck of the British East India Company wreck of the *Joanna* (1682) that produced numerous artifacts especially silver coins that was sold into the public on the open market and even in diving magazines (Turner 1988). In hindsight, it is almost as if there was a naiveté from museums and heritage bodies in attempting to control treasure hunting by trusting that the treasure hunters would do the "right" thing. The excuse often aired was the lack of funding and qualified personnel at institutions like museums and universities.

The formation of the South African Historical Shipwreck Society in the 1980s was meant to bridge the gap between the academic world and the euphemistically named salvers. They tried to initiate several projects unsuccessfully and unfortunately seemed only to legitimize the activities of treasure hunters. They did however help promote the general amnesty declared by the National Monuments Council in 1986 (Abrahams 1987). The amnesty was an attempt from the NMC to start with a clean slate. The idea was that divers would declare any objects illegally removed from shipwrecks and would be exempt from prosecution. At the end of the amnesty, any items not declared would make the possessor liable for prosecution. The most useful outcome from the amnesty was the files with data on the collections in private hands that could now be used for comparison with what museums have in their possession. This resource was however never utilized until later when the author analyzed the collections (Table 1) of the SACHM in relation to the records in the amnesty (Boshoff 2006).

In 1983, the University of Cape Town instigated a project on the British East India Company ship *Arniston* (1815). Amongst the students was I.H. Gericke, a well-known treasure hunter. Under the supervision of Prof. A.B. Smith Gericke and another student, J. Jobling probably started the first attempt at a scientific investigation of a shipwreck in South Africa (Jobling 1982). Unfortunately, the project was marred by the fact that it did have a profit incentive even though it does seem that Gericke was keen to get archaeologists and treasure hunters working together. This would eventually lead into Gericke

South Africa: Maritime Archaeology, Table 1 Comparison of total artifacts in museums collection with artifacts reported in amnesty

Shipwreck name	Amnesty artifacts	Museum artifacts
Athens 1865	206	3
De Visch 1740	215	0
Fame 1822	165	299
Het Huis te Crayenstein 1697	18	16
Maori 1909	334	5
Meresteyn 1702	287	30
Trafalgar 1839	194	40

sponsoring the post for a maritime archaeologist in the form of the Dutch archaeologist, Bruno Werz, appointed in 1988 in a dual position at the University of Cape Town and the SACHM.

The 1980s would end with the formation of the South African Maritime Museum as a satellite of the South African Cultural History Museum and the appointment of Bruno Werz as alluded to above. At the same time, the curator of the new Maritime Museum, Tom Graham, started an honors degree at the University of Cape Town. He was following up a previous 1984 workshop on the practice of seal hunting in the nineteenth and twentieth centuries on the subantarctic island Marion (annexed by the South African Government in 1947), by doing an in-depth study of historical documentation and visiting the island to record the sites reported archaeologically (Graham 1989). Under very trying circumstances, Graham managed to do two small excavations and record some of the sites. Although he did not manage to return to the island and continue the project, mainly because of his increased responsibilities at the South African Maritime Museum, he did plant the seed for a future project developing another possible direction for maritime archaeology in South Africa. The focus, however, would remain on shipwrecks steered by Bruno Werz. As the first person appointed as a maritime archaeologist, Werz had a huge task in front of him. Whether the strategies he followed to establish maritime archaeology on a firmer footing was successful is a tale of the 1990s and stills a matter of debate. It is interesting to note that Werz's appointment was counter to the academic boycott against the apartheid government.

Werz shared a position at the SACHM and University of Cape Town. He was also consulting for the National Monuments Council. This arrangement however was problematic from the start. The institutions were constantly vying for the loyalty of the maritime archaeologist. This was because the ground rules for this shared arrangement were never properly established. It is pointless to speculate who was at fault and what part internal politics played. Maybe if an infrastructure of some kind had been established before the appointment of a maritime archaeologist, matters would have been different.

Werz however attempted to start with project-oriented research with the investigation of the Dutch East Indiaman, *Oosterland*, wrecked in Table Bay in 1697 as part of his maritime archaeology Project Table Bay (Werz 1999). This wreck was discovered by three local divers who reported it to Werz. An agreement was drawn up between Werz and the treasure hunters regulating the conduct of the project (SACHM D1/4). One important condition was that the archaeologist would have an opportunity to study the artifacts before the division between the museum and the treasure hunters. Although under archaeological control to a measure and not overtly acknowledged, it was, however, still a treasure-hunting project. It seems as if the lessons learned from the Arniston in the 1980s were not properly heeded as in the mid-1990s the project spiralled into disagreement and effectively stopped.

Another important project started in 1991 was Operation Sea Eagle under the archaeological direction of Werz, but more importantly incorporating other bodies like the South African Navy providing the logistical support (Werz 1993). This project was to record all the shipwrecks around Robben Island and was quite successful in the end, but ironic as the island was still a political prison at the time. Unfortunately, the divergent nature of Werz's appointment at the University and the Museum and the various disagreements with museum management as to

the parameters of his position resulted in the museum not renewing his contract. The museum however decided to continue with the post by appointing the author first on a contract basis and then later in 1992 on a permanent basis.

Werz continued his association with the University of Cape Town and during this period produced a number of honors students and two Masters Students. This continued up to 1999 when his association with the University of Cape Town came to an end. He did however also start a project on the wreck of the *Bato* (1806) in Simon's Bay in 1996 and started the South African Institute of Maritime Archaeology (SAIMA) in 1999. After a short stint as a consultant for Archeonautas SA in Mozambique in 2000, Werz started to focus on the activities of SAIMA but has not had much impact on maritime archaeology in South Africa subsequently.

Meanwhile at the SACHM, stricter controls were put in place for permit holders from 1992 onwards. Instead of giving a one-line letter of cooperation, the museum now required a proposal with a clear research rationale. The screening of projects for substantive content saw a sharp decline in applications. With this strategy, the museum started moving away from cooperation with commercially motivated projects counter to the existing legislation and charted a new direction for the future. The museum also started a small conservation laboratory prompted by receiving a collection from the British East India Company ship *Colebrooke* (1778). A large part of this collection consisted of wine bottles with the content still intact and in dire need of stabilization.

In 1993, the National Monuments Council contracted Lynn Harris from the University of South Carolina to compile an electronic database of the shipwrecks around the South African coastline, combining several of the existing paper-based databases in existence at the time. Another major task Harris undertook was the introduction of the Nautical Archaeology Society (NAS) courses to South Africa (Boshoff 1998). With the assistance of the author, courses were run in most of the major coastal cities in South Africa and even one in Namibia. One of the outcomes of the NAS program was the investigation into the British East India Company ship *Brunswick* (1805) lead by the author. Most of the participants in this project were volunteers and it was the first noncommercial underwater investigation into a shipwreck in South Africa.

Although Harris' position at the National Monuments Council was a contract position and she left after a year, the post was retained and T. Durden was appointed on a contract. In 1994, Boshoff, Durden, and Werz together with a group of businessmen formed the Save Our Shipwrecks Trust to promote the running of the NAS courses as well as starting a shipwreck route along the Cape coastline. The trust was mostly successful with the continuation of the NAS courses, but dissolved upon the death of one of the founding members (David Meaker) and with Durden leaving for greener pastures. When Durden left, J. Gribble was appointed on a permanent basis at the NMC. This would put the management of shipwrecks on a firmer footing and continue the partnership between the National Monuments Council and the South African Maritime Museum. In 1997, Boshoff and Gribble visited Australia to investigate the state of maritime archaeology in that country. They also investigated some of the premier maritime museums in Australia but, more than that, presented papers at the Australian Institute of Maritime Archaeology's annual conference. One of the outcomes of this visit was the invitation by the Queensland Museum to Boshoff and Gribble to join the 1999 field season on the wreck of the HMS *Pandora* on the Great Barrier Reef. This gave them the opportunity to gauge their skill levels on a first class large-scale underwater project.

The year 1997 also saw the resumption of the Marion Island project when Boshoff was invited by the National Monuments Council to be the archaeologist. The focus was to complete the inventory of sites started by Graham in 1989. This was largely successful with the archaeological documentation of thirteen sites as well as making recommendations for the future management of the sites (Boshoff et al. 1997). A second

visit to Marion in 1999 saw the documentation of further three sites as well as the excavation of a small boat washed up on one of the beaches (Boshoff & Van Schalkwyk 1999). Unfortunately, changes in the heritage industry would overtake this project and put a temporary halt to it.

International Perspectives

In 1985, H.J. Deacon, head of the department of Archaeology at the University of Stellenbosch, visited Australia on a fact-finding mission concerning maritime archaeology. He was especially interested in the Australian legislation and the agreement made with the Dutch government about Dutch East India Company ships on their coastline. Deacon started to get some of his students interested in maritime archaeology although this was difficult as the facilities at the University of Stellenbosch were not as conducive to marine sciences as at the University of Cape Town that had a Research Diving Unit training students in the scientific mysteries of the underwater world. The author, however, is a product of that program even though it was short-lived and inadequate.

The 1980s in South Africa was, however, politically quite a turbulent time as the struggle against the apartheid government went into overdrive. This was the worst possible timing as maritime archaeology was starting to get serious attention from Universities in this period. In the archaeological world, the academic boycott was instigated against South Africa at the World Archaeological Congress (WAC) in 1986. This was in part brought on by a motion tabled at the 1983 meeting of the Southern African Association of Archaeologists that asked for the condemnation of apartheid and other forms of discrimination by the Association. The motion was never put to a vote and delegates from Mozambique and Zimbabwe resigned in protest (Shepherd 2002). In a sense, this was the end of innocence for archaeology in South Africa as the WAC of 1986 demonstrated that politics could not be separated from the practice of archaeology. This would have a serious influence on the development of maritime archaeology in South Africa.

This naiveté would however take some time to break down and would take a new government in 1994 with the first democratic elections in South Africa before change started to filter through and archaeologists adapted to a new direction in archaeology. This "innocence" was still evident in 1988 at another shipwreck symposium organized by the National Monuments Council, the South African Cultural History Museum, and the South African Historical Wreck Society (SACHM D1/4). Speakers were a mix of treasure hunters and archaeologists. Unfortunately, it seemed as if the divers still regarded archaeology as a technique of approaching shipwrecks rather than a way of interpreting the past (Smith 1988). Archaeologists tried to explain the rudiments of archaeology (Deacon 1988), but it still did not seem as if the treasure hunters took this to heart as no projects by the treasure hunters following on from the conference attempted to address the issues raised there. This conference was further evidence of the complete disregard of the political situation in the country at the time by archaeologists and treasure hunters. One could expect this of the latter as their main motivation was profit, but it seems in hindsight that the archaeological community involved with shipwrecks at the time could have at least attempted to address the future in this context as the writing was on the wall with the many riots taking place in South Africa. Maybe it was an indication of the standing of maritime archaeology in South Africa at the time as a fledgling subdiscipline eating away at the conscience of the mainly precolonial archaeology community with the overt focus on saving a cultural resource from the economic threat of treasure hunting.

In 1999, an important event occurred for South African archaeology as the World Archaeology Congress was held that year at the University of Cape Town. For maritime archaeology, it was the first World Archaeology Congress with a session devoted to maritime archaeology. Although small and only taking place on one day, it would lay the foundation for the larger and more

complex sessions on maritime archaeology at the following World Archaeology Congress in Washington, DC in 2003.

Future Directions

From the first democratic elections in 1994, changes were on the horizon for the heritage industry. Frantic national meetings started in 1995 and many projects were put on hold. In the museum world, this would culminate in the formation of several large national institutions by amalgamating existing ones. In Cape Town, this resulted in the birth of Iziko Museums in 2000. This was a joining of the South African Museum, the South African National Gallery, the William Fehr Collection, and the South African Cultural History Museum. Of this group of museums, the South African Cultural History Museum completely lost its identity and was totally assimilated into the group. The young South African Maritime Museum became the Iziko Maritime Centre moving to much smaller premises after a losing battle with the property owner, the Victoria and Alfred Waterfront. For the next 3 years, the growing pains of the new institution caused a hiatus in new projects. For maritime archaeology at the museum, this will end with new strategic directions and new opportunities.

One of the main foci for the new Iziko Museums was to redress the imbalances of the past. The way this was approached in terms of maritime archaeology was to start an investigation to find the wreck of the Dutch East India Company slave ship *Meermin* (1766) (Boshoff 2003). Another feature of this project was that it was one of the first maritime archaeology projects funded by the National Lotteries. The other major project funded by the Lotteries was the National Survey of Underwater Heritage around the coastline initiated by the successor of the National Monuments Council, the South African Heritage Resources Agency (SAHRA).

The *Meermin* project eventually evolved into a partnership with George Washington University, the US National Park Service's Submerged Resources Center, and SAHRA as the African Slave Wrecks project funded at the start by the Ford Foundation (Lubkemann et al. 2008). Besides looking at slave shipwrecks, the project also investigated ways in which archaeology could be sustainable in the developing world mainly by considering the implementation of the SAVE (Scientific Academic Volunteer Experiential) tourism concept developed by George Washington University. The *Meermin* project also produced the first travelling exhibition on maritime archaeology in South Africa as well as a documentary, *Slave Ship Mutiny*, produced by Off the Fence Productions and screened on PBS network in the USA. Currently (2011/2012) the African Slave Wrecks project is moving into a new phase with the addition of new partners in the form of the National Association of Black Scuba Divers and the Smithsonian's new Museum of African American History by investigating what is believed to be the Portuguese slaver *Sao Jose* (1794) (NCD 1794).

In 2005, John Gribble left SAHRA and was ably succeeded by Jonathan Sharfman. Another important development at SAHRA was the creation of a second permanent post. Sharfman negotiated successfully funding from the Dutch government and with their representative, the Centre for Heritage Activities, started a skills development project to promote Underwater Cultural Heritage. This project uses the Nautical Archaeology Society courses as the basis for running annual field schools.

As the new century progress, there is much hope for maritime archaeology in South Africa. The resumption in 2011 of old projects like the investigation into seal hunting sites on Marion Island and the training of new young nonwhite female archaeologists undertaken by Iziko and SAHRA helps to steer maritime archaeology in South Africa into new and exciting directions that will hopefully establish a unique niche in the world of archaeology.

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South Africa: Maritime Legal Management

John Gribble[1] and Jonathan Sharfman[2]
[1]Sea Change Heritage Consultants Limited, Hale, Hampshire, UK
[2]African Centre for Heritage Activities, Cape Town, South Africa

Introduction and Definition

The management of maritime and underwater cultural heritage in South Africa has come a long way since legal protection was first given to historical shipwrecks in the late 1970s. Legislators and managers have learned to deal with thorny issues related to the ownership, relevance to changing heritage management priorities, public perceptions and expectations of maritime and underwater cultural heritage, and the significance (real and relative) of this heritage asset's constituent parts.

Shipwrecks have been the objects of particular official and popular attention and exploration since vessels were first wrecked on the South African coast. As early as the late seventeenth century, for example, the Dutch authorities at the Cape were involved in efforts to recover silver and other cargo from the wrecks of the English

East Indiaman Joanna and the Portuguese vessel Nossa Senhora dos Milagros, both lost near Cape Agulhas. Much of this early interest was focused on contemporary shipwrecks and was salvage in the traditional sense of the concept. These historical salvage undertakings set a precedent for the next two centuries and had the effect of birthing and nurturing a popular perception among South Africans of shipwrecks, in general, as exploitable commercial resources. This perception drew no distinction between recent, contemporary wrecks and older sites with historical and archaeological value or significance, and the idea that historical wrecks had a wider meaning and value as precious archaeological windows into our common past did not appear on the national radar until well into the 1970s.

Historical Background

A Rich Heritage Resource

South Africa owes its rich underwater heritage to its geographical position on the sea route around Africa from Europe to the East. More than 2,200 recorded shipwrecks, representing 36 different nationalities are recorded in South African waters. In addition to shipwrecks, South Africa's maritime heritage includes thousands of pre-colonial shell middens, numerous coastal cave sites, and, along the south coast, an assemblage of stone fish traps. A small collection of contact period rock art depictions of sailing vessels, which are believed to have been painted by the indigenous San and Khoi peoples, link European travelers and traders with South Africa's indigenous populations, while shipwreck survivor camps and maritime infrastructure like lighthouses, harbors, and boatyards attest to the extensive and varied European maritime activities in the region.

Treasure and Tribulation

The VOC salvage operations of the seventeenth and eighteenth centuries were superseded in the nineteenth century by treasure hunting and the development of a common view of wrecks as a source of curiosities and saleable "treasure." If anything good can be said about both this early salvage work and treasure hunting, it is that the recovery of artifacts was limited and that the majority of wrecks around the South African coast remained out of reach of the available diving technology, undiscovered and undisturbed. This changed with the birth of the aqualung in the 1960s and widespread plundering ensued as divers were quick to harness the new technology to find and exploit the commercial potential of many wrecks. In a 20-year period prior to the mid-1980s, a number of wrecks with rich cargoes of specie, Eastern exports like porcelain, or nonferrous metals were found and salvaged. Collectively, these discoveries and the resulting recovery of often spectacular artifacts, coupled with the tales of treacherous diving conditions and not a few great white sharks, captured and fed the public imagination, reinforcing the perception that shipwrecks were no less than a source of treasure, to be recovered by those daring and intrepid enough to go out and help themselves. The significance of the wrecks plundered during these years, in as much as it was considered at all, was measured almost exclusively against their commercial potential. The absence of an argument for the heritage value of these sites simply entrenched South African public perceptions of the meaning and value of wrecks further.

The legal position of wrecks for much of this period was a further contributing factor in molding and entrenching the public and official view of shipwrecks. By 1969, coastal and maritime-related pre-colonial archaeological sites were protected by the National Monuments Act, by the inherent ethics of modern archaeological practices, and by virtue of them having little commercial value, but legislative protection for wrecks as a heritage asset was still some way in the future. Although a variety of domestic legislation did apply to historical wrecks, it can be argued that it was aimed primarily at dealing with contemporary or modern wrecks and was only incidentally applicable to historical wrecks (Van Meurs 1980). Nowhere was it "stated or suggested that any significance should be attached to wrecks known to be of historical

and/or archaeological interest, or that such wrecks should be specifically protected" (Van Meurs 1980: 3).

For archaeologists, the immediate impacts of this period of rapid exploration and the discovery of many wrecks were negative. There was no professional archaeological diving capacity in South Africa and archaeologists had no access to these sites or material, except where they were above the water or when material had been recovered by divers. Although some divers did involve archaeologists and museum scientists in their projects (Jobling 1982; Maggs 1984), this was the exception rather than the rule and in most instances was aimed primarily at obtaining advice on artifact identity, and hence value, rather than because there was a real interest on the part of the divers in the archaeology of the sites in question. Acceptable archaeological standards of excavation and recovery were generally not employed, detailed site recording was seldom carried out, site records were not generally made, and the publication of results seldom occurred (and then usually only selectively).

It would be disingenuous to completely disregard research carried out by salvage divers. Many did undertake historical investigations into their sites of interest, but this research was usually limited and generally fell into two broad categories, neither of which addressed the archaeological interest or significance of the sites concerned: initial research centered on identifying the location of a particular wreck, which usually fell short of examining the contemporary historical context in which the events occurred or the wider impacts of the wreck itself or the individuals involved on South African history, and research which revolved around the recovered artifacts. This was also limited and generally stopped short of examining relationships between artifacts or drawing inferences about the people or life aboard the ship and was purely descriptive.

In the final analysis, these activities were like any commercial operation, driven by profit. This meant that only certain shipwrecks and object types were targeted by divers. Wrecks that did not fall into the "treasure ship" category – slave ships, local coasting traders, or whaling vessels, for example – were unlikely to be profitable and were largely ignored. The same was true for artifacts forming the archaeological assemblages on "treasure ships." Only those of potential commercial value were of interest. The rest were ignored or discarded on site or, where recovered, offered to museums. The net result of much of the interest in South Africa's historical shipwrecks between the 1960s and late 1980s was the unquantifiable loss of archaeological and historical material and information as sites fell victim to often indiscriminate commercial salvage. In addition, the significance of this national maritime heritage was being shaped and determined by the small group of individuals who were seeking to profit from it, and this reinforced the already-skewed picture of South Africa's maritime history and heritage and its real significance to the nation and the world.

Legal Protection: National Monuments Act

As the scale of the hugely cosmopolitan underwater archaeological record in South African waters gradually became clear to archaeologists and historians during the 1970s, an appreciation of its true significance and heritage value began to coalesce. This was particularly the case among those working at coastal museums who were the first to see what was being recovered as divers approached them for artifact identification and valuation (Bell-Cross 1980; Gribble 1998). Archaeologists were slower to act on the potential of shipwrecks. The traditional preeminence in South African archaeology of pre-colonial studies meant that with few exceptions (e.g., Jobling 1982; Maggs 1984; Smith 1986), little archaeological interest was shown in colonial period (post-CE1652) archaeology and what lay beneath the waves until the mid-1980s. The national statutory heritage body, the National Monuments Council (NMC) was also slow to engage with underwater heritage and, in the absence of a stated national policy of cultural heritage protection, appeared unwilling to confront the Pandora's Box of legal, ethical, and heritage-related issues the escalating

discovery and commercial exploitation of shipwrecks had opened.

Broad national heritage legislation had been introduced in 1969 in the form of the National Monuments Act (28 of 1969). The Act contained the seeds of a national policy of cultural heritage conservation, but it was not until a decade later, in 1979, that a national cultural heritage policy that was "morally and legally justifiable" (Van Meurs 1980: 6) was crystallized, defined, and made plain in an amendment to the Act. This amendment stated that: "The object of the [National Monuments] Council shall be to preserve and protect the historical and cultural heritage, to encourage and to promote the preservation and protection of that heritage and to coordinate all activities in connection with monuments in order that monuments will be retained as tokens of the past and may serve as an inspiration for the future" (Section 2A, National Monuments Act No. 28 of 1969). This amendment (Act 35 of 1979) also included the introduction of protection for historical shipwrecks. Section 10 gave the relevant minister the power to declare as a national monument any wreck over 80 years of age which was considered to be of aesthetic, historical, or scientific value or interest (Deacon 1993).

Although the process for declaring wrecks proved to be flawed and difficult to implement, the 1979 inclusion of historical wrecks within the National Monuments Act was a critical moment in underwater heritage management in South Africa. For the first time wrecks could be legally protected. More importantly, however, this was the moment when the legal position and heritage view of historical wrecks shifted and they gained a new status and significance as heritage assets. Ironically, it was political pressure from a group of commercial salvors to protect their rights on two historical wrecks – the Santissimo Sacramento and the Dodington, both found near Port Elizabeth in the late 1970s – that was the catalyst for the introduction of this first legislative amendment, and the drafting of what was the first heritage position paper on historical shipwrecks, by the historian at the Port Elizabeth Museum (Nash 1977). This was also the moment when shipwrecks became a contested resource in South Africa. Until then, archaeological interest in wrecks had been minimal and the salvage and diving communities felt that they had both legal and moral primacy on the wrecks around the South African coast. They felt that the amendment constituted an intrusion of heritage interests into their previously exclusive domain.

Despite the inclusion of protection of shipwrecks in national legislation, there were still no diving archaeologists in South Africa, and the salvage community were quick to point out that archaeologists had no experience or understanding of the often challenging physical realities of working on underwater sites on the South African coast. They also accused archaeologists of being out of touch with reality, with rarefied and unrealistic views of what wrecks represented born of too much time spent in their academic ivory towers. In many instances this view still prevails within the South African salvage community. It has also been argued that modern South Africa has historically always tended to look inland and that, as a result, the national psyche has never fully engaged with South Africa's maritime history and underwater heritage. This influenced the nature of activities directed at the shipwreck record and may be responsible for the attitudes displayed by many South Africans towards historical shipwrecks (Brown 1987). These public sentiments and attitudes have, to some extent, guided the actions of the National Monuments Council and the policy frameworks developed for the management of South Africa's historic shipwrecks.

The NMC Grapples with Significance

Establishing and promoting the archaeological and historical significance of South Africa's underwater heritage was a major challenge for the heritage sector during the period between the 1960s and the late 1990s, and it is clear from documents of the period that the NMC was grappling with its own view of wrecks and their significance. For example, shortly after 1979, while acknowledging that the cultural value of wrecks increases with their age, the NMC also expressed the view that the wrecks around the

coast were generally not part of South Africa's cultural heritage but that of the flag state concerned, such as Portugal, the United Kingdom, or the Netherlands (Rudner 1986). Furthermore, the NMC argued, the majority of these wrecks were wooden ships smashed to pieces during violent storms and that they therefore consisted only of scatters of artifacts spread over large areas of seabed. Therefore, went the argument "only the objects themselves are of value and should be salvaged before they are completely destroyed by chemical action, sand abrasion, ... or by treasure hunters who constitute the greatest danger to them" (Rudner 1986: 2). In the NMC's view, therefore, the significance of these sites was tied firstly to "the objects themselves, [and] secondly, with the distribution on the seabed" (Rudner 1986: 2). Encouragingly the NMC did, at this stage, identify treasure hunting as a key threat to shipwreck sites.

From the contradictory nature of the elements of the NMC's de facto policy towards wrecks, it seems clear that the Council was battling to get to grips with this new and unfamiliar heritage asset. It was struggling to reconcile heritage conservation objectives with pragmatic day-to-day management considerations, all within a foggy legal landscape, and was having its first experience of the sort of unhappy salvage versus conservation balancing act that has and still does characterize national shipwreck management policies in many parts of the world. Not surprisingly, the NMC's position on the value of the underwater cultural heritage was opposed by archaeologists and historians who viewed wrecks as sensitive archaeological sites and an important national cultural asset. As far as they were concerned, the investigation of maritime archaeological sites had to proceed on the same terms that applied to terrestrial archaeology (Deacon 1985) and argued that no disturbance of these sites should be permitted by the NMC until adequate national maritime archaeological expertise was in place (Rudner 1986).

During the late 1970s and early 1980s, the repeated use in official documents of terms like "salvage" and "scientific salvage" in relation to activities on, or aimed at wrecks, including archaeological work, is a clear indication that wrecks were not yet being considered to be archaeological sites by the authorities. At the same time, it is evident that after 1979 a clearer view of the nature and importance of South Africa's archaeological record, including wrecks, was developing within the NMC and the South African heritage sector. For example, it became clear from the Parliamentary debate on the 1979 amendment to the National Monuments Act that the legislation proposed did not deal comprehensively with the issues relating to wrecks. As a result, an interdepartmental Government Committee was appointed by the Cabinet to "investigate the preservation and protection of shipwrecks and their contents with a view to possible new legislation ..." (Department of Transport 1983: 1). The Committee had the best interests of shipwrecks at heart and certainly did a good deal to ensure their protection. However, it was composed exclusively of government bureaucrats with non-archaeological views of what contributed to the significance of underwater cultural heritage sites. It is revealing that in one instance the Committee stated: "It is unacceptable ... that a wreck which is still lying on the seabed or even on rocks or on the shore ... be declared a national monument. The wreck cannot be attended to in such a condition, neither (sic) can it be cleaned, repaired or safeguarded and above all, it cannot be of value to the general public" (Department of Transport 1983: 21). This view of what constituted a national monument is clearly based on the traditional definitions of such monuments, drawn from the built environment.

Site significance also did not drive the NMC's attempts to protect underwater heritage in the 1970s and 1980s. Exerting control over activities aimed at wrecks drove protection, rather than the heritage significance of the sites themselves (Brown 1987). This changed in a NMC policy decision in the early 1990s in terms of which the date 1850 "should be taken as the date to divide the ships of higher historical and cultural interest from the later, less significant iron ones" (Brown 1987: 1). Although this division has its

obvious flaws, it can be read as a genuine attempt to engage with the archaeological asset and make a clear statement of value about the remains of earlier, wooden sailing vessels. Following this decision, the NMC only issued permits for activities on pre-1850 wrecks in exceptional circumstances.

Archaeology Begins to Make a Mark

For much of the period discussed above, archaeological interest and involvement in underwater heritage-related work was reactive, driven by the need to have archaeological oversight and guidance on what were, in essence, licensed salvage projects. Only during the late 1990s did a change occur, partly the result of a fledgling maritime archaeological capacity but also because of tighter legislation and the NMC's engagement with, and commitment to, managing historical wrecks as part of the nation's cultural heritage. South Africa's first maritime archaeological appointment was a teaching and research post created at the University of Cape Town in the late 1980s. At about the same time, the former South African Cultural History Museum (now part of the IZIKO Museums of Cape Town) also employed its first maritime archaeologist. The NMC followed in 1993 when it began the compilation of an inventory of historical shipwrecks in South African waters (Gribble 1996). A temporary post of maritime archaeologist was created to develop this database and 3 years later the Council confirmed its commitment to underwater heritage by making the post permanent.

This small core of professional maritime archaeologists was the catalyst for a number of research and conservation initiatives, like "Operation Sea Eagle," a major interdepartmental underwater survey of the waters within one nautical mile of Robben Island undertaken in 1990/1991. This early foray into the holistic management of shipwreck sites took place under the joint auspices of the government departments then responsible for the management of the island and aimed to provide an assessment of its underwater cultural resources at a time when its post-apartheid future was being considered (Werz & Deacon 1992; Werz 1993). Other early areas of research pursued by South Africa's maritime archaeologists include the archaeology of sealing and whaling, which begun with a project to document seal-hunting sites on South Africa's sub-Antarctic Prince Edward Islands (J. Boshoff *pers. comm.*; Boshoff et al. 1997). Work continues on this project and it is also anticipated that it will in future be expanded to include a survey of coastal whaling sites within South Africa.

Key Issues/Current Debates

In 2000 the National Monuments Act was replaced by the National Heritage Resources Act (Act 25 of 1999), which established the South African Heritage Resources Agency (SAHRA). SAHRA's maritime archaeologists have worked hard to change and expand public perceptions of maritime archaeology and to develop a new national understanding of the significance of underwater heritage. The new legislation has facilitated this new focus by providing the same clear level of protection to maritime sites as had been given to terrestrial archaeological sites since the 1980s. One area of the new legislation which has and continues to be an issue for underwater heritage is the provision which allows the controlled sale and export of archaeological artifacts. Included in the Act to control the movement and export of collections of archaeological material in private hands, this provision has been seized on by treasure hunters to question SAHRA's de facto post-2000 ban on historical shipwreck salvage.

Although the Act does not state unequivocally that the commercial exploitation of historical shipwrecks is banned, the inclusion of wrecks under the definition of "archaeological" in the legislation and the fact that ownership of all archaeological material is vested in the State effectively remove shipwrecks and their contents from the realm of commercial salvage. After 2000, SAHRA began closing the door on the commercial salvage of historical wrecks and in 2003–2004 SAHRA introduced a Shipwreck

Policy aligned with the UNESCO Convention on the Protection of Underwater Cultural Heritage and the Annex attached thereto. The Shipwreck Policy essentially outlawed commercial salvage and the issuing of salvage permits for any wreck older than 60 years by requiring the application of the rules of the Annex to any future shipwreck investigations. By 2005, however, SAHRA was forced to repeal its Shipwreck Policy after legal advisors adjudged it to be in conflict with the National Heritage Resources Act of 1999 and its associated regulations and suggested a return to the permitting system introduced in the 1980s. As a compromise a transition period was agreed, during which SAHRA undertook to consider salvage-based applications. A revised National Shipwreck Policy has been prepared by SAHRA and the national Department of Arts and Culture (DAC) but remains unimplemented as DAC considers the budgetary and others costs of implementation. The new Act has put the onus on the archaeologists at the SAHRA and other institutions to promote maritime archaeology and underwater cultural heritage, its significance, and the reasons for protecting of maritime sites. It is now up to archaeologists to develop and encourage a public view of scientific investigation and excavation of this national, publically owned asset as a better alternative to salvage for the personal gain of a few individuals. To do this, maritime archaeologists in South Africa must wean the diving community and the wider public off the traditional, salvage-driven perceptions of historical shipwrecks and persuade them that the real attraction, value, and importance of these sites and objects lie in their archaeological and scientific potential and the human stories they can tell. While legislation can offer wrecks legal protection, real protection – the type that will stop treasure hunting and looting – can ultimately only come from a changed public view. The focus for SAHRA in recent years, therefore, has been on changing attitudes and expanding the public understanding of underwater heritage though education and participation. Its maritime archaeologists have thus been working to create an inclusive culture around maritime and underwater cultural heritage, and this has been marked, inter alia, by projects and work that reflect the heritage value and significance of South Africa's underwater heritage – in contrast to the historical situation where value and significance was defined and driven by a small group whose primary interest in underwater heritage and motivation for being involved was commercial. Projects aimed at the less well-publicized aspects of South Africa's underwater archaeology have been set up and brought into the public eye through the media. These projects include two National Lottery-funded initiatives – the National Survey of Underwater Heritage and the Meermin Project – and a capacity-building program funded by the Dutch government.

International Perspectives and Future Directions

Heritage legislation, the National Survey of Underwater Heritage, and the Dutch-funded Maritime Archaeology Development Programme appear to be bearing fruit with noticeable changes in attitudes towards underwater cultural heritage. Although progress has been slow, divers and others who use these sites are more aware of the legislation and the reasons for it and have taken a greater interest in protection of underwater sites. Local communities living near wreck or maritime heritage sites have begun to take ownership of these sites and are reporting transgressions against the heritage more often. The Department of Arts and Culture is also considering the ratification of the 2001 UNESCO Convention, and there is increasing political interest in underwater cultural heritage.

From a heritage management perspective, archaeologists and heritage professionals are adjusting to their new roles. New initiatives for policing must be developed, including community policing, volunteer programs, and interdepartmental and interagency cooperation. Archaeological foci must change from the simple description of sites and artifacts to social and theoretical studies, and new ways must be found to fund maritime archaeological work, develop and increase capacity, and protect sites. To be

successful, South Africa must begin to look beyond its own shores: its underwater heritage assets represent a multicultural and multinational shared heritage, and for effective future management, it is going to be essential therefore to look more widely at cooperative projects, international partnerships, and global initiatives.

Cross-References

- ▶ Ship Archaeology
- ▶ South Africa: Heritage Management
- ▶ South Africa: Maritime Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime

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South America: Lithic Industries

Antoine Lourdeau
Departamento de Arqueologia, Universidade Federal de Pernambuco, Recife, PE, Brazil

Introduction

The lithic industries of South America constitute a privileged archaeological record for the reconstruction of the modalities for human settlement of this region, relatively recent on a global scale, and the techno-cultural identities of the human groups who occupied it.

Often focused on bifacial projectile points, studies have nonetheless demonstrated an impressive range of variability in knapping concepts and technological solutions employed by the first inhabitants of this vast and varying landscape. Our knowledge of such techniques is not yet as refined as in other parts of the world. It is, however, already possible to identify the broad developmental lines of these lithic industries and to distinguish techno-cultural groups relatively well defined in time and space.

Definition

The lithic assemblages form the principal evidence of the very first human activities on the continent, probably starting in oxygen isotope stage 3, less than 50,000 years ago. Use of stone persisted until contact with the first European colonists at the beginning of the sixteenth century and often even after. The major originality of South American prehistory is the expansion of human settlement of this subcontinent, linked in part to two elements: (1) the relative isolation of this area, flanked by two vast oceans and accessible by land via a narrow isthmus and (2) the recent date, on a global scale, of the first human presence. The approach to the history and evolution of techniques on the continent is thus limited to a much more restrained timescale than elsewhere. These techniques underwent a unique sequence of development, which appears to have been linked as much to local dynamics as to external contributions.

From a strictly technological viewpoint, the main characteristics of the South American lithic industries are common to all prehistoric lithic production systems. The broad families of knapping techniques are found in all of the industries in South America: shaping, which can be bifacial or unifacial; reduction processes, represented by concepts considered little developed but also sometimes by laminar, lamellar, and Levallois concepts. Similarly, most of the known knapping techniques are represented here: direct stone percussion, bipolar percussion on anvil, direct organic percussion, and pressure flaking. It is thus with the same methodological kit used elsewhere that these lithic industries are examined and in particular by technological, technofunctional, and use-wear approaches.

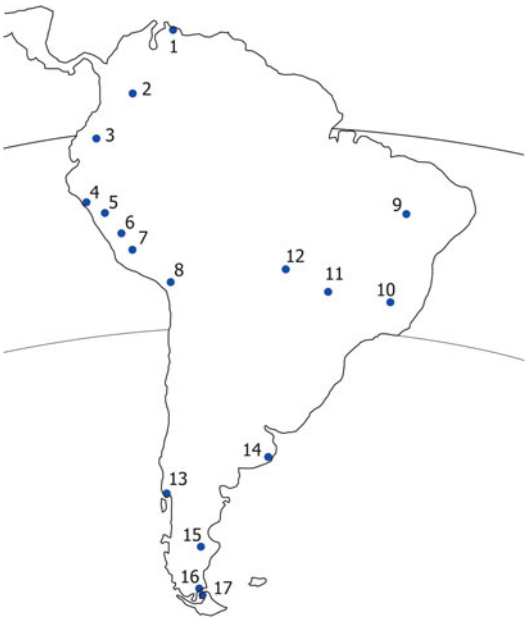
However, the South American lithic production systems are not devoid of originality, because while lithic knapping concepts are finite, methods of exploitation of stone and especially knapping objectives, that is, the intended tools,

can be represented by a number of aspects. In the specific context of South American prehistory, new technological solutions were invented. These particularities are discussed below.

Historical Background

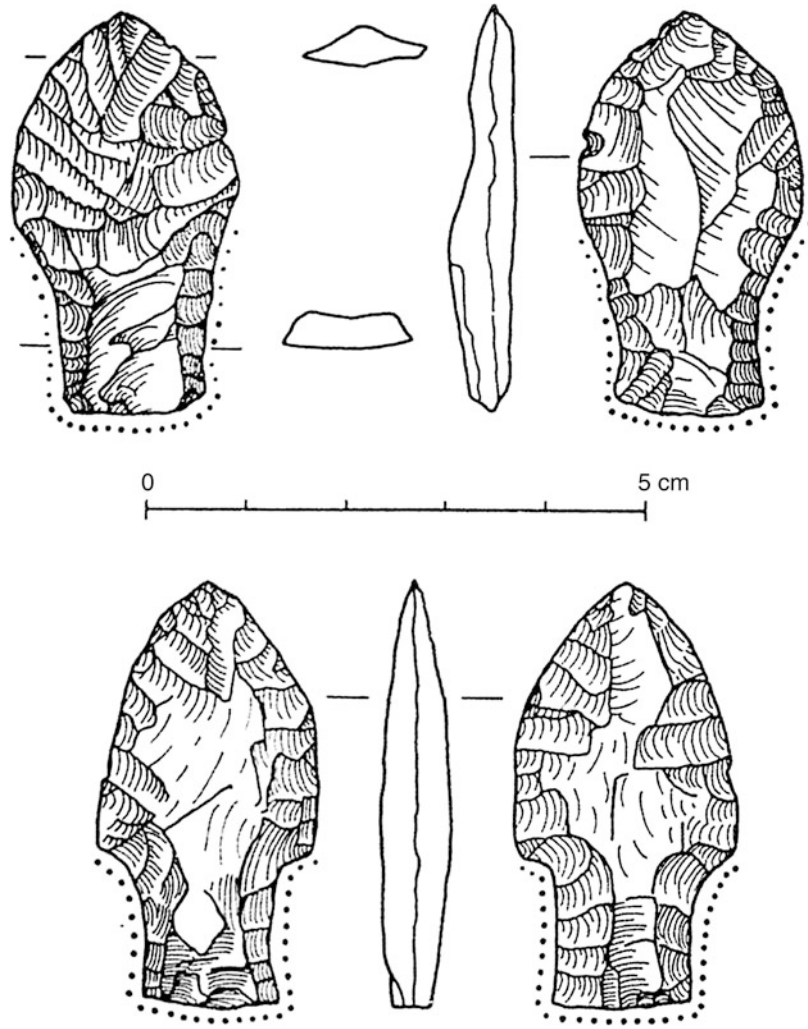
Apart from rare ethnographic comments by chroniclers and the first European voyagers, the earliest references to the South American lithic material date to the mid-nineteenth century. As for most of the continents at that time, what really matters is not the lithic artifact as evidence of a specific technological activity but rather as the marker of a human presence in the distant past. This is the case, for example, for the pioneering research of the Danish intellectual P. Lund, who sporadically mentioned the lithic material recovered during his excavations around 1840 in the Lagoa Santa region (Brazil) to support his discoveries of human remains found in stratigraphic layers assumed to be very old (Fig. 1).

It is also in this context of debate on the antiquity of human occupation of the Americas that F. Ameghino would use, at the beginning of the twentieth century, complementary to the bones discovered, the lithic material recovered on the pampas to propose his hypothesis of an Argentine origin for our species. This theory was vigorously discussed, notably by A. Hrdlicka, but the positive effect of this debate led to more detailed analyses of the lithic material. As a direct result, one of the first rigorous and in-depth studies was carried out by W. Holmes, on artifacts collected by A. Hrdlicka during surveys along the northern coast of Argentina. These were principally cobble industries, transformed by pecking, percussion, or knapped using the bipolar on anvil method. This material, coming mainly from surface collection, is of undetermined age. The 1912 publication presents many innovative elements: in addition to an initial typology and many illustrations of excellent quality, we find comments on the criteria for raw material selection by the knappers and on the modes of production for stone tools, with some experiments on knapping techniques (Hrdlicka 1912).



South America: Lithic Industries, Fig. 1 Distribution map of the archaeological sites mentioned in the text. *1*: Taima-Taima, Venezuela; *2*: El Abra, Columbia; *3*: El Inga, Ecuador; *4*: Paiján; *5*: Guitarrero cave; *6*: Telarmachay; *7*: Pikimachay; *8*: Asana, Peru; *9*: Pedra Furada and Sítio do Meio; *10*: Lagoa Santa region; *11*: Serranópolis; *12*: Santa Elina, Brazil; *13*: Monte Verde, Chile; *14*: Cerro La China; *15*: Los Toldos, Argentina; *16*: Fell's cave; *17*: Cabo San Vicente, Chile

It is only in the 1930s that the lithic material was studied in its own right, as evidence of prehistoric human identities and activities. One of the key figures in research at this time is J. Bird, who excavated main sites in Patagonia (Bird 1988). Based principally on bifacial projectile points that he discovered, Bird established a typology structured in successive chronological phases. In 1950, with the invention of radiocarbon dating, Bird's studies took on a new dimension: the dates obtained for the earliest phase that he defined were older than 10,000 years at Fell's Cave, dates much older than anticipated. Considering the settlement theories and data obtained from North America, these dates would imply a very rapid movement of the initial occupants to the south. Following these discoveries, the lithic industries found in South America would have a tendency to be systematically studied through the filter of what is known in the north.



South America: Lithic Industries, Fig. 2 Two fishtail points from Cerro La China, Argentina (From Zárate & Flegenheimer, 1991: 288, detail) (Courtesy of Nora Flegenheimer)

In the South American material, one would thus look for markers typical of the Clovis culture, assumed to be the oldest in the Americas. The Clovis point, a bifacial foliate armature with a fluted base, is the emblematic element of the first assumed industries in North America. It is not found in South America, but the discovery of bifacial projectile points with small thinned tang (called "fishtail" points) by J. Bird in the early layers at Fell's Cave suggested a southern adaptation of the North American point. This hypothesis was all the more followed when it was seen that fishtail points were not confined to Patagonia but were also common further to the north, in the Pampas (Fig. 2) and also on the Pacific coast in Peru and Ecuador, for example, at the site of El Inga.

This view of the Clovis culture as the sole origin of all human (and thus technological) manifestation in the prehistory of the Americas would dominate throughout the second half of the twentieth century and even today still have its supporters. However, in the 1960s and 1970s, a few dissenting voices made themselves heard. Based on the position maintained by A. Krieger, according to which the first American lithic industries lacked bifacial projectile points, A. Bryan argued that South American industries with projectile points at the Pleistocene-Holocene transition and during the

Early Holocene resulted from evolution from a local Pleistocene substrate (Bryan 1999). He thus argued against the idea that all South American lithic technology was due to migration from the north.

Such "liberation" of South American prehistory from its influence from the north would open the field to consider the variability within the lithic industries, both spatially and diachronically. From then on, true technological groups would be described, not only on the basis of bifacial projectile points, thus revealing the considerable variety of industries within South America. So, in the 1960s–1970s, the Abriensian would be defined by G. Correal and T. Van der Hammen, later termed the Edge-Trimmed Tool Tradition by W. Hurt, in central Colombia, the Paijanian by P. Ossa in northern Peru, the Andean Biface Horizon by E. Lanning in the Andes mountains, the Itaparica Tradition by V. Calderón and then P. Schmitz in central and northeast Brazil, the "Cerca Grande" complex by W. Hurt and O. Blasi at Lagoa Santa, the Umbu and Humaitá Traditions by E. Miller in southern Brazil, the Toldensian and the Casapedrensian by O. Menghin, and then A. Cardich in Argentinean Patagonia, to cite only a few (Dillehay 2000; Lavallée 2000).

As on the other continents, the approach to the lithic industries in South America would undergo significant changes during the 1970s. Very generally, two broad trends developed. The first, influenced by the Anglo-Saxon school, is characterized by a new perspective with respect to the material and the questions that can be addressed by it. Cultural questions and definitions of technological groups take second place in particular to processes, spatial organization, social evolution, and modes of adaptation to different environments. Lithic raw material analyses, their nature, provenance, and mode of circulation, develop considerably, especially in Argentina. The second trend is the result of a methodological approach rather than a change in perspective. Questions of a cultural order remain at the heart of research problems, behavioral approaches not being as excluded as in the first trend. This approach is based on the observation according to which the typological approaches to the material thus far are not sufficient for a complete understanding of the lithic material. The definitions of cultural groups by a simple list of types are seen as scarcely operational. A new, more technological, approach to lithic production was thus developed. Research is no longer focused only on the tools made but also examines the technological processes and the knowledge and know-how applied by the knappers. This approach, coming out of French research on lithic technology, is particularly heuristic for the interpretation of the differences observed between collections. Technological studies thus enable reevaluation of the validity of the previously defined cultural units and rationalization of the increasingly marked trend during the 1970s to create a new group, a new "tradition" or "culture" at each new site discovered. We note, among the studies done in this perspective, those of C. Chauchat and J. Pelegrin on the Paijanian industries (Chauchat et al. 2004), H. Nami on the Levallois debitage in southern Patagonia and Tierra del Fuego (Nami 1992), and more recently, the analyses of N. Pigeot, also on Patagonian material (Pigeot 2003).

With the rise of local research centers, the discovery and analysis of lithic assemblages have considerably multiplied in South America over the last two decades. Approaches remain most often more typological than technological, but knowledge has improved in the broad regions previously unknown, and the chronological framework for the analyses has expanded to include the periods as recent as the end of the Pleistocene and the Early Holocene. New methods to analyze the industries has also seen significant development, such as the techno-functional analyses in Brazil, which enables the finished products (tools) to be once again included in the discussion of technological processes and intentions (Fig. 1).

Key Issues

What Do the Points Tell Us (or Not)

Throughout the Americas, projectile points are the most commonly exploited artifacts in the

lithic assemblages to address the questions of human settlement, spread, and circulation during prehistory. The contours of such points enable definition of types, for which one attempts to perceive development through time and to interpret the meaning of their distribution across space. To the north, this typological approach has been proven and the chronological and geographic limits of the different categories of bifacial foliate points (Clovis, Folsom, Plano, etc.) can be clearly followed. In South America, attempts at typology on a continental scale are not lacking, but apart from a few zones, this approach has not been particularly fruitful. This may be due first to the near complete absence of points in vast regions, such as central and northeast Brazil. In addition, the defined types often have a limited spatial distribution and are represented by fairly low frequencies.

Fishtail points are, however, an exception. These short bifacial points, with convex edges and a tang often thinned by what is interpreted as a small flute, have been found in Argentina, Chile, Peru, and Ecuador, in contexts dating to the Pleistocene-Holocene transition (Fig. 2). This flute has led to many publications regarding the possibility of the relationship between the fishtail point and the Clovis point. Dominant in the first half of the twentieth century, this interpretation of the fishtail point as a development of its homologue to the north is today far from being unanimous. The only argument of the "flute" is quite weak since technological studies have demonstrated that, in most cases, these small removals thinning the tang were made during the shaping phase of the piece and not at the end of the production phase. They are thus not truly flutes or grooves. Therefore, several authors attribute a possible South American origin to this type of point (Politis 1991), and some even argue that there is not a single fishtail point type but several, each with its own regional origin and that their similarity is due to morphological convergence (Borrero 1983 cited in Nami 2010). Many other types of projectile points have been defined in South America, such as the "El Jobo" lanceolate point in Venezuela, the long-tanged point of Paiján type on the northern coast of Peru, and the Ayampitín point, one of many Andean point types. These artifacts were made by bifacial shaping with soft percussion, sometimes completed by a phase of pressure flaking. But fishtail points, probably the most studied type and for which the spatial distribution is the largest, are particularly representative of the limited potential of projectile points for approaching questions going beyond a regional scale. The principal danger of all morphological interpretations is the convergence of forms. To prove the existence of a historical link between two types of artifacts, one may ask, "Is the simple criterion of form really valid?" These variations between projectile points indicate limited technological differences, since the technical knowledge and skills needed are overall the same regardless of the kind of point produced and, excluding a few specific cases, the functional intentions appear to be similar. This variability may be linked to technological procedures related to different hafting modes. However, these differences may rather evidence, at least in part, stylistic variability, in other words, relatively versatile traits of technological productions that are difficult to follow for prehistoric periods. These traits are not necessarily markers of significant differences between the human groups studied.

The development of technological approaches to lithic assemblages has shown that, in order to estimate the degree of difference between several assemblages, it is necessary to study them at the scale of shaping concepts and not be limited to simply the forms resulting from application of such concepts. The profusion of publications on projectile points has had a tendency to overshadow the rest of the lithic industry, which forms the overwhelming majority of material recovered, and represent a potential often little exploited to study the development of techniques on the continent and the definition of cultural groups.

Industries of the First South Americans

Often mentioned to question their age or to discuss their human origin, South American industries dating to the Pleistocene are more rarely examined from a technological view. The earliest

lithic productions discovered would date to oxygen isotope stage 3. At Pedra Furada (Brazil), a production based solely on quartz and quartzite cobbles has been found in layers dating between 50,000 and 15,000 BP (Parenti 2001). These cobbles were shaped into different classes of massive tools by uni- or bifacial removals and were knapped in the aim of obtaining flakes. Such reduction was organized into short series of removals, generally unidirectional. Bipolar on anvil reduction has also been identified. Most of the flakes obtained are cortical and sometimes retouched. At Santa Elina (Brazil), the toolkit from stratigraphic assemblage III, dating to around 25,000 BP, was obtained from limestone plaquettes and flakes (Vilhena Vialou 2005). The latter were produced via simple reduction. The supports were sometimes retouched, generally by abrupt retouch, in order to create concave or denticulated edges. In layer MV-I at Monte Verde (Chile), dated to around 33,000 BP, a few pieces of knapped basalt were found, including a core showing the production of small flakes in unidirectional series.

These early lithic industries are thus always very simple. The tools are essentially made of natural untransformed volumes (cobbles or plaquettes) on which only the edges were retouched. Tools are also sometimes made on flakes. These come from reduction processes in which the cores were subject to short series of removals without prior preparation. Shaping is absent in these industries.

Sites dating to the end of the Pleistocene, between 15,000 and 12,000 BP, attest in particular the appearance of bifacial shaping. This appears to be associated from the start with the production of projectile points, as at Taima-Taima (Venezuela) and layer MV-II at Monte Verde (Dillehay 1997). In these two cases, lanceolate bifacial points were found. These are elongated, untanged, shaped by soft percussion, and traditionally associated with the El Jobo type. The production of tools on natural supports (cobbles or plaquettes) and on flakes obtained by short series is still present, either in association with shaping activities, as at Taima-Taima and Monte Verde, or exclusively, as at Sítio do Meio (Brazil) and Pikimachay (Peru). Monte Verde is further set apart by the discovery of ground stones, including two small grooved cobbles.

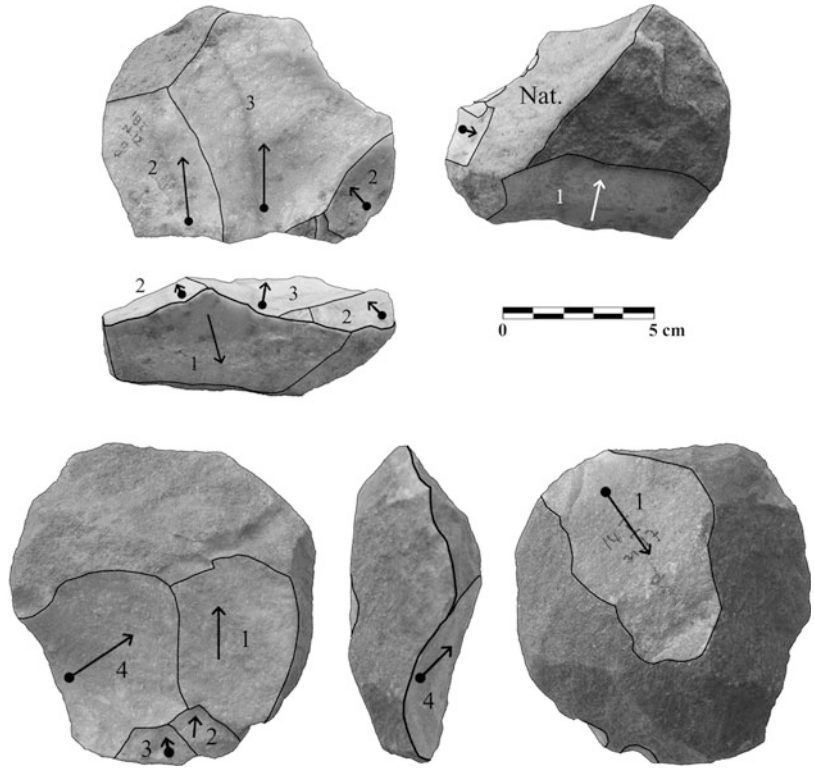
Flaking Systems and Main Technocomplexes

The objective here is not to list, site by site, the lithic material produced. This section being thematic, a purely chronological organization is not presented but rather an overview based on the principal technological systems encountered throughout South American prehistory. This is, of course, a very general and fragmented summary, the reflection of current knowledge on this topic.

Ubiquitous "Simple" Reduction Process

Flake production from "simple" reduction processes are found throughout the continent, in all time periods and in significant proportions during South American prehistory. Such omnipresence has, in a way, slowed detailed studies of the lithic industries. Indeed, what can be said, from a typological viewpoint, of an industry where no standardization of products can be clearly seen? A technological approach to these industries, and in particular to the cores, enables the observation that reduction is structured in relatively short series, often unidirectional, in which the sequence of removals is based on naturally present criteria of convexity, without advance preparation of the block of raw material. It is possible to differentiate groups of methods by the mode of core management: number of flakes produced by series, organization of removals within a single series, number of series per block, and organization of these series on a single block (Fig. 3). Knapping techniques also offer a second degree of differentiation of the industries: all of this reduction is carried out by direct stone percussion, but some cores were exploited by launched percussion, without support, and others by bipolar on anvil percussion. Bipolar on anvil percussion is effectively common through the continent, particularly when knapping small volumes.

Description of intentions, or the classes of intended tools, forms another criterion of variability for this type of production. This is without

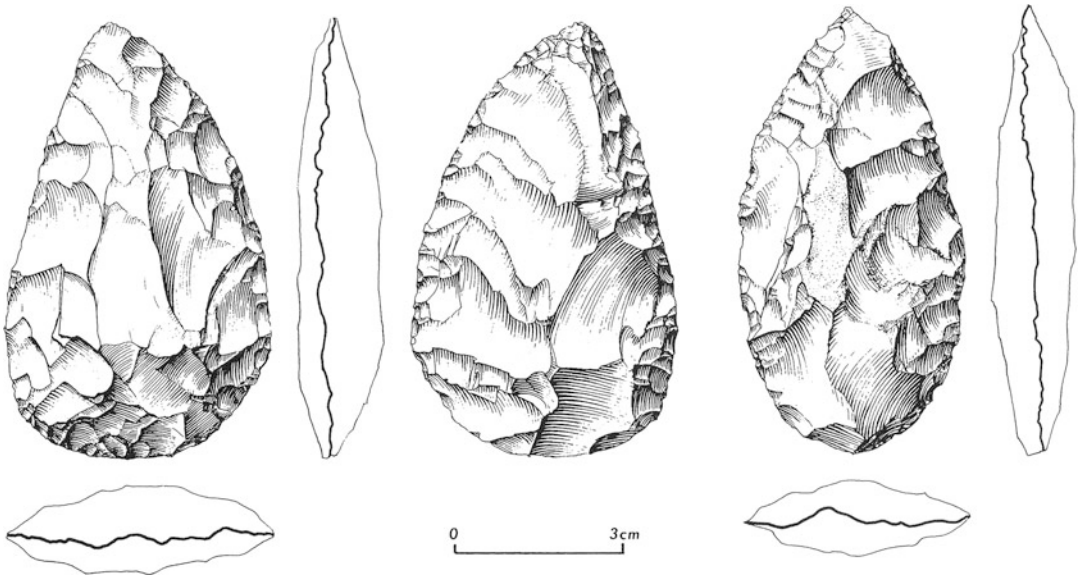


South America: Lithic Industries, Fig. 3 Two cores from Serranópolis, Brazil. Reduction is structured in short unidirectional series, without advance preparation of the block of raw material (Photos by A. Lourdeau)

doubt the most significant criterion to isolate techno-cultural groups. For such industries without standardization of blanks, the typological approach, which aims to identify artifact classes based on form, is not suitable. Determination of flaking objectives must be done by a techno-functional analysis that combines tool production schemas, the volumetric structures of the tools, the functional potentials of their active parts, and modes of grasping or hafting. Such analyses, still rare, have enabled identification, for example, in central Brazil during the Early Holocene, of the systematic intent to create short tools with a concave or denticulated edge opposite a back on flakes produced by "simple" reduction (Mello 2005).

Regions Noted for the Development of Bifacial Shaping

The utilization of bifacial shaping is observed from the end of the Pleistocene in several regions of South America, in particular for the production of projectile points. In addition to these armatures, the use of bifacial shapes also enables the creation of a broad range of tools, varying as much as tools on flakes. One of the areas notable for the development of bifacial shaping to produce a wide range of tools is the Central Andean zone. In several sites dating from the end of the Pleistocene to the Late Holocene, including Guitarrero, Telarmachay, and Asana in Peru, bifacial shaping constitutes a privileged mode of blank production (Lynch 1980; Lavalleé 1985). The different types of projectile points generally represent more than half of such production, but a varied toolkit is also sought. Bifacial artifacts that are not point have had a tendency to be considered, sometimes with reason, as point preforms abandoned during the production process. However, many of these are clearly finished tools, with edges prepared by fine retouch (Fig. 4). They are supports probably destined for different functions and are comparable in this sense to the "bifaces" (or "handaxes") known in the Old World in earlier periods. The Andean bifacial pieces are always associated, in the



South America: Lithic Industries, Fig. 4 Two bifacial artifacts form Telarmachay, Peru (Drawings by C. Chauveau, from Lavallée, 1985: 170-1, detail) (Courtesy of Danièle Lavallée)

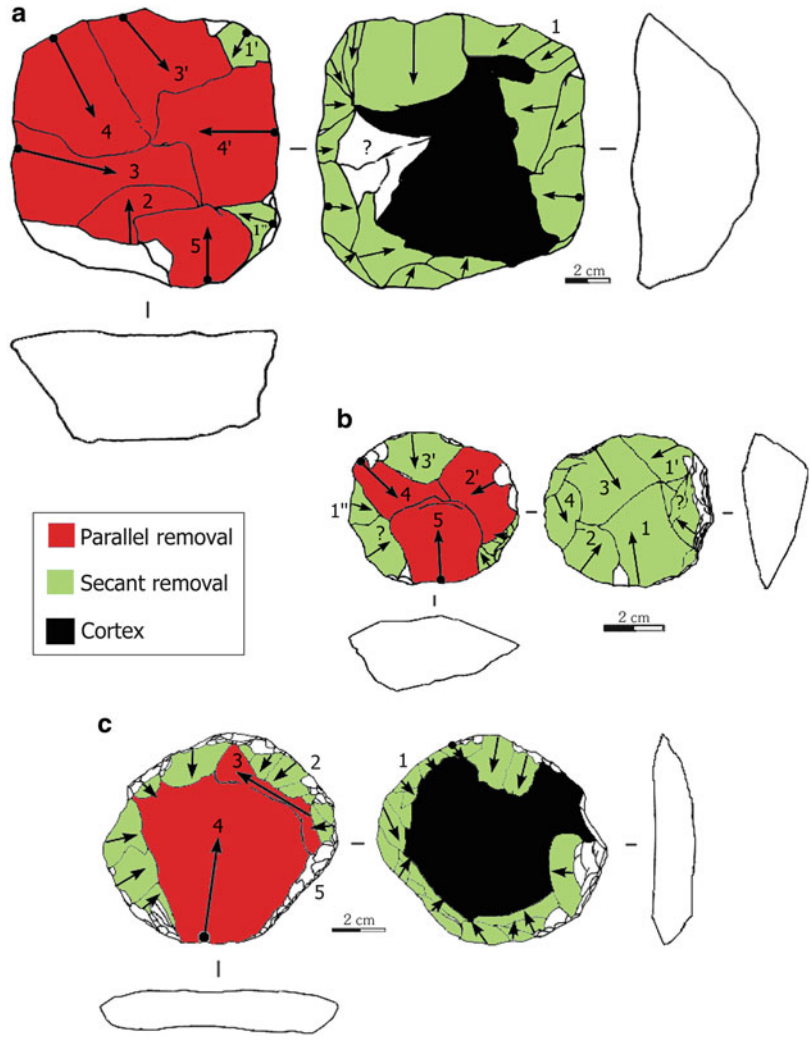
archaeological assemblages, with many unifacially retouched flake tools.

In southern Brazil, bifacial retouch is also a technological solution especially used to obtain tool blanks in archaeological assemblages of the Umbu and Humaitá traditions, dating from the Early Holocene to more recent periods (Hoeltz 2005).

"Complex" Reduction Methods Still Less Tangible

The existence of exclusively blade production has long been known in Patagonia, in particular in the Casapedrense layer at Los Toldos, in Argentina (Middle Holocene) (Cardich & Flegenheimer 1978). Yet the technological traits of this reduction process and its geographic extension and development through time are still difficult to determine, due to lack of technological studies of the collections. Some indices of this type of production are also mentioned for more northern zones, in northwest Argentina and southern Brazil (Hoguin 2012). Based on the available data, this is clearly a reduction system in which the entire core is structured to produce only blade, the angle and front being maintained during the production of these blanks. The block is at least partially prepared (presence of crests), and the technique used is hard or soft percussion. No pressure flaking has as yet been described in South America. "Blades" and "bladelets" are mentioned in several other regions, but, given the lack of detailed description of the cores, it cannot be excluded that such elongated blanks could have been obtained during non-elongated flake production.

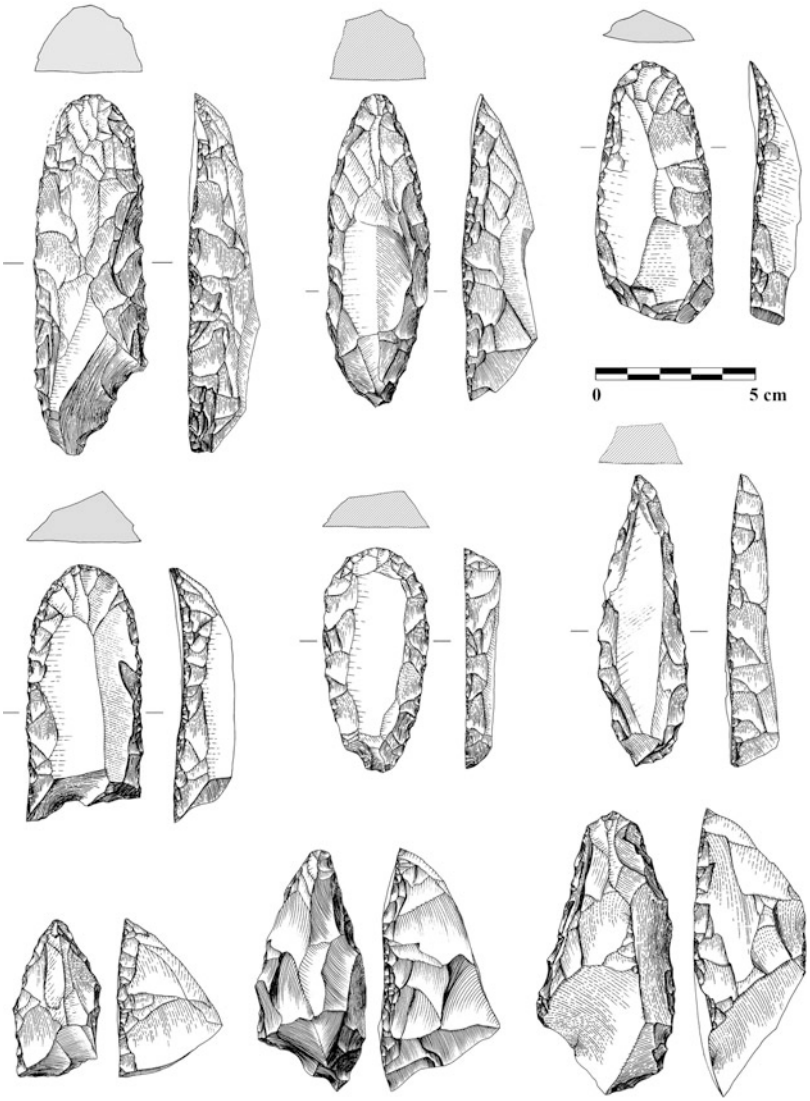
Predetermined flake production from cores for which the volumetric structure is identical in all respects to the Levallois system in the Old World has been identified by H. Nami in Patagonia (Nami 1992). Levallois reduction, until then known in quite different geographic and chronological contexts, is present in Patagonia with the same variability as elsewhere: preferential and recurrent flake methods have been described by F. Morello at Cabo San Vicente, Tierra del Fuego (Morello 2005) (Fig. 5). For now, this reduction system is limited to the extreme southern tip of the continent, in contexts dating to the Late Holocene. Based on the traits of some of the published flakes, it could, however, extend across a broader area and go back to earlier periods.



South America: Lithic Industries,
Fig. 5 Levallois cores from Cabo San Vicente, Chile. (**a**) and (**b**) Recurrent flake method; (**c**) Preferential flake method (From Morello, 2005: 40-1, modified) (Courtesy of Flavia Morello)

Unifacial Shaping: An Original Technological Solution?

Unifacial shaping constitutes a fairly common mode of blank production in South America between the end of the Pleistocene and the mid-Holocene. This is a relatively original solution with respect to the history of lithic flaking techniques, situated between shaping and reduction. The procedure consists of shaping large flakes only on their dorsal face, while the ventral face is never directly modified. The volumes obtained in this way are generally elongated, with an overall plano-convex section. Such pieces differ from flake tools with unifacial retouch by the fact that the removals after knapping clearly alter the initial volume of the blank and are not intended only to create or modify the active parts of the tool. Unifacial shaping is observed essentially in central and northeast Brazil in the Itaparica technocomplex (Lourdeau 2010). Detailed analysis of the Serranópolis collections have enabled determination that the tools obtained, often termed limaces, systematically have a symmetrical transformative part at one end, with a rounded, pointed, or transversal rectilinear delineation (Fig. 6). The analysis has demonstrated that these blanks were probably destined for several different functions and a single piece could have several independent functional parts on the ends and/or the



South America: Lithic Industries,
Fig. 6 Unifacially shaped artifacts from Serranópolis, Brazil (Drawings by A. Lourdeau)

lateral edges. These are thus, like some bifacial pieces, supports for varied tools. Similar pieces exist further to the west, in Peru, Ecuador and Colombia, and to the south in Argentina, also dating to the Early and Middle Holocene.

This rapid overview of the main technological solutions that can be encountered in the South American lithic industries enables one to appreciate the significant variability in lithic production. One finds most of the concepts, methods, and reduction techniques known in other regions, but their position in time and space remains difficult to determine. To this can also be added certain uniquely South American practices, such as unifacial shaping, a practice that has not as yet been observed elsewhere.

International Perspectives

Despite a certain idea of isolation associated with South American prehistory, full understanding of the South American lithic industries requires an overall vision of these productions. Only such a broad perspective enables us to attempt to interpret the variability in the lithic industries,

determine their local or external origin, and thus explain the dynamics of human settlement of South America.

One can consider the signification of the very first lithic industries here. They are still fairly poorly understood but are based only on natural volumes or blanks produced by simple reduction. These productions are fairly out of sync with the development of contemporaneous industries on other continents (with the exception perhaps of East Asia). Is this local development or should we look elsewhere for the origin of such production systems? One or the other of these alternatives involves in its turn many questions.

As for bifacial shaping, this technique appears abruptly in the form of projectile points without intermediary stages. Based on data for the development of bifacial shaping observable in other regions, its presence in South America could thus be interpreted as an external contribution, already at a certain stage of development.

Unifacial shaping, in contrast, appears to have had its own unique development in South America. A few examples of limaces have been mentioned in North America, but as yet nothing described is comparable to the productions in the Itaparica technocomplex. In Southeast Asia, the Hoabinhian is also known for its unifaces made on cobbles. However, important differences exist between these and the South American industries with respect to concepts of volumes and tools.

The example of the lithic industries of South America, and the singular context of its prehistory, may in addition enable understanding of certain important phenomena for the global explanation of technology (Boëda 2005). How better to illustrate technological convergence, that is, the independent development of two similar flaking systems, than by the example of Levallois reduction in Patagonia? The lack of geographic and chronological continuity with the Levallois of the Old Word is so obvious that it excludes any hypothesis of diffusion. South American blade production, while still lacking detailed technological description, would appear to be another example of convergence.

Future Directions

The next few decades should be decisive for the study and explanation of the South American lithic industries. The creation of new research centers, as well as a return to detailed studies of the material (relatively neglected for awhile in favor of more general considerations) but with more rigorous methods, foreshadow a clear increase in technological analyses of the modes of blank production and the tools which are the objective of such reduction. These new studies, coupled with new dating programs (particularly by OSL), should enable refinement of the regional sequences and offer the possibility of reconstructing a general framework for the development of lithic industries on a continental scale. New approaches, particularly use-wear analysis, will widen the field of knowledge of this material.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Bird, Junius
- ▶ Handaxes and Biface Technology
- ▶ Hrdlička, Aleš
- ▶ Lithic Technology, Paleolithic
- ▶ Monte Verde, Archaeology of
- ▶ Mousterian Industry Tradition
- ▶ Paleoindians
- ▶ Pedra Furada, Archaeology of
- ▶ Peopling of the Americas
- ▶ Technological Studies in Archaeological Science

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South American Archaeology: Postcolonial Perspectives

Alejandro F. Haber
Escuela de Arqueología, Universidad Nacional de Catamarca & Consejo Nacional de Investigaciones Científicas y Técnicas, Catamarca, Argentina

Introduction

Problematic Entrance as Entrance to the Problematic

A South American postcolonial perspective on any problem involves, first and foremost, a consideration of whether or not South America is a place from which it is possible to have such a perspective. If such perspectives are indeed postcolonial, this suggests two possibilities: (1) that they were later to a colonial experience or (2) that they were inspired by a body of theory and assumptions designated as postcolonial. Those options are external because they could mean that the colonial experience is a thing of the past – thus post – or that postcolonial theory is something that you can embrace or reject as any other theory. However, that the colonial experience, on the one hand, was not surpassed by political independence and, on the other hand, is constitutive of subjectivity becomes immanent to the perspective and not external to it. Whether we call it postcolonial or otherwise, the colonial experience is immanent to the place of these theories. The postcolonial world, in this case, is more a pre-theoretical condition than a theoretical framework, i.e., more a condition of thinking, of knowledge, than a knowledge about a delimited field of content. Moreover, once introduced into theory, that postcolonial pre-theoretical condition is, at the same time, metatheory, i.e., it is theoretical knowledge about theory and its conditions. Finally, as knowledge about the conditions of knowledge, it leads through to the possibility of overcoming the conditions of coloniality, something which has been designated as a decolonial option.

If, even more, these South American postcolonial perspectives are given in the disciplinary framework of archaeology, two other issues must be weighed: (1) the object-history of archaeology established as prehistory, i.e., a historical narrative of a time without history, i.e., as an anomalous history, and (2) the importance of disciplining and institutionalization in the demarcation of the boundaries of the object-history, demarcation which is, at the same time, of the subjectivity of history.

Finally, if we try to make history of these perspectives – as this entry suggests – we could either consider history as a narrative of what happened objectively and externally or recognize from the beginning that history itself – its idea, its method, and its scope – is an integral and active part of colonialism and the conditions of possibility of postcolonial (and even decolonial) archaeologies in South America.

Key Issues and Current Debates

Colonial Designations and the Place of Theory

I shall begin with the first of the assumptions referred to in the preceding paragraph: that South America is a place from which a perspective on archaeology can emerge. This, again, leads to the colonial question, at least in two senses. It is clear that South America (or Latin America, or Ibero America, or Hispanic America, or any of the usual geographical categories) is the result of the history of colonial designations. America was not a geographical name or its real referent until 1507 when Martin

Waldseemüller baptized it with the name of Amérigo Vespucci (what the Spaniards called then *the Indies*). At this point, it might be thought that this discussion is about a mere question of naming, and to some extent it is. It also happens that the act of naming has implications with respect to what is understood as the external reference to the name. For instance, America began to be *one* thing from that moment, i.e., a thing that was able to be designated by a single name. And, in addition, that thing that became America could, by the mere fact of the designation by European cartographers, be stated by its name from Europe (Mignolo 2007).

The designation of America, therefore, like any colonial designation, involved the appearance as one thing or category of what the name lawfully represented, as well as the appearance of a lawful enunciator of that thing. Whatever America is, then, becomes what is enunciated and written as such from the place of the colonial power, and this place becomes the place from where the colony is enunciated and written. Modern colonial bureaucracy is based on writing procedures, a technical device that needs, among other things, names for things in the world and people giving the names. Thus, the existence of both a proper name and a proper enunciator of the world out there targeted for appropriation is a material condition of modern colonialism. The colonial designation, being a mere question of names, is also a condition of the possibility of the realization of the desire of colonial expropriation. The things to expropriate – i.e., the colonized world – are lawfully enunciated by the colonizer and, as it follows, illicitly by the colonized, who is possessor of a false knowledge and an imperfect language even to enunciate the world and the one's own body; such is the historical material condition of colonialism, or its dark face, *coloniality* (Schiwy & Maldonado-Torres 2006). This *differential constitution* of being and knowledge is one of the central tenets of postcolonial thought. That America has been, much later, a name appropriated by the United States for its self-designation has led to other designations arising to qualify the other America: South America, America of the South, and Latin America.

The existence of South America as a place of enunciation of a theoretical perspective on archaeology is closely linked to the self-awareness of South American archaeologists of their differential designation, i.e., of its constitution in the *difference* from colonial powers. But in the archaeological field, this self-consciousness has not been based in any postcolonial perspective but in the so-called Latin American Social Archaeology (LSA) of the 1960s and 1970s (Politis & Pérez Gollán 2004). This current, specifically inspired by historical materialism, has been perhaps the first to occur, more or less unified, with both a theoretical inspiration and a political sense (hence, it is *social*, beyond what each one understood as such in political terms) and a place from which to establish a new perspective (thus *Latin American*). This movement will not be outlined in any more detail here as other entries in this volume deal with its development.

Although the LSA continues to be a theoretical reference in Latin America (and also in Spain – Castillo et al. 2008 – as well as other countries), towards the mid-1990s the momentum of LSA was already reasonably diluted due to the growing hegemony of processual archaeology of North American origin and the anti-Marxism of the academic contexts in some countries of South America (particularly in the Southern Cone as a long-lasting effect of the military dictatorships of overt anti-Communist orientation and counterinsurgency action).

Also, the notion of a common South American belonging was not present anymore as an inspiration for theoretical reflection. In the mid-1990s South American archaeology was so dispersed that archaeologists from different South American countries read each other in European and/or North American publications. Moreover, it then seemed to be installed a disciplinary common sense of the banality of a local or regional perspective. In reaction to this there came the series of Meetings of Archaeological Theory in South America later known as TAAS (Funari et al. 1999). The meetings of Vitoria in 1998, Olavarria in 2000, Bogotá in 2002, Catamarca in 2007, and Caracas in 2010 were milestones in the emergence

of exchange, research, mutual knowledge, and discussion, at a South American scale (Gnecco & Haber 2005). It was consolidated with the appearance of publications with continental scope, which were published on the continent by South American archaeologists, starting with the bilingual journal *Arqueología Suramericana/ Arqueologia Sul-Americana*, to which *Revista de Arqueología Histórica Argentina y Latinoamericana* and *Vestígios Revista Latino-Americana de Arqueologia Histórica* were added. Thus, the beginning of the twenty-first century sees the recovery of the notion that South America can be a place from which an archaeological perspective can be enunciated. Indeed, the TAAS meetings and the South American publications have provided the forum for discussions about whether or not South America is a singular place from which knowledge about archaeology can be generated.

Peripheral and Critical Theory

In 1984, Trigger published an influential essay that proposed ways in which relations among nations gave rise to the archaeologies in each country. Colonial, national, and imperial archaeologies were influenced by the manner in which each country was globally related (Trigger 1984). The value of the cartography of Trigger was challenged explicitly (Olsen 1991) and implicitly (Funari 1989) from perspectives that characterized the geopolitics of archaeological knowledge in terms of the theories of dependency and the world-system, introducing the concept of *peripheral archaeologies*.

Pedro Funari (1989) characterized peripheral archaeology (particularly Brazilian) according to academic and social criteria. From an academic point of view, a peripheral archaeology is bilingual – and sometimes polyglot – while a central archaeology is monolingual. Multiple linguistic competence of the periphery also implies knowledge of theoretical bodies of various origins, regardless of the nationality of the authors at issue. A central archaeology, on the other hand, has a much more insular and self-sufficient behavior (Funari 1989). This vision of the conditions of the peripheral archaeology in comparison to central archaeology contrasts sharply with common visions, according to which the central archaeologies are role models to peripheral archaeologies. There is, then, a dislocation between the scope of peripheral knowledge and the way in which that knowledge is valued by agents (peripheral and central). The postcolonial sense of this can be better understood through Funari's criticism from a sociopolitical perspective:

> Hodder can write about the 'contemporary West' (Hodder 1986: 167) only because there is a non-West, maintaining economically the so-called 'alternative' perspectives, (western) indigenous, (western) feminist, and (western) working-class archaeology. It is symptomatic that even though the concept of *West* is accepted somewhat unconsciously by *western* archaeologies, it imples (sic) the existence of Third World (or non-Western) archaeology (Funari 1989: 65).

The dependence between central and peripheral archaeologies was framed within neocolonial relationships – both academic and economic – which featured as coloniality. Within coloniality certain knowledge and certain enunciators are underestimated in relation to a "more perfect" knowledge emanating from the central academies. Like Latin American postcolonialism that would spread a couple of decades later, Funari (1989) both established criticism of the geopolitics of knowledge as a boost to the emancipator action (decolonial, as it would be called later) and located the place of liberation to the outskirts of the West: "There are therefore two radical tasks for peripheral archaeologists. First, to oppose inner and outer oppression and second, to promote a *new past*, in order to liberate people in the *present*. In this context, peripheral archaeology can provide central archaeology with a very pertinent critique, by stating the limitations of western archaeology or, at least, its one-sidedness" (1989: 65).

A Meeting of Times

Towards the end of the 1990s, Cristóbal Gnecco's text "*Historical Multivocality. Towards a Postcolonial Cartography of Archaeology*" was published; it would become the primary reference in the introduction of the discipline to the

postcolonial debate. Perhaps the most significant contribution of this work to the postcolonial debate resides in the sharpness with which Gnecco exposes the colonial sense, or better the *endocolonialism* of the scientific program of the archaeological discipline. He writes: "Archaeology is part of the cognitive apparatus of the West and one of the refined expressions of its temporary thought" and "Western time is a tool of political domination and the time that builds the archaeology is Western time, not the time of the others" as well as "These questions are no longer limited to reflections carried to the interior of the disciplinary practice, as happened during the years of formation and consolidation of the scientific archaeology, they involve the same status of the discipline in the context of other knowledges and within the framework of the social contexts of their production; they are related, in short, with what I will call political economy of archaeology. In this sense, the most important question we have to ask ourselves about the role of archaeology in a contemporary context, twice postmodern and unsubordinated" (Gnecco 1999: 17–18). Clearly, for Gnecco it is not just that archaeology should recognize the inheritances of colonialist past to get rid of them. Nor does he say that archaeology, only through recognizing in its history its colonialist origin, is able to deviate from those formerly unacknowledged negative features.

Gnecco's program is critical enough to expose the mechanisms through which archaeology is a part of the arsenal of Western knowledge to subordinate other knowledges. In this sense, the key concept that is introduced is the one of *endocolonialism* or *internal colonialism*. Despite the many multicultural readings that it has suffered, Gnecco's program is not a multicultural program of recognition and respect for differences; on the contrary, what he calls a "multivocal meeting" is a field of political struggle in which archaeology can enter only honestly by renouncing its hegemonism and opening itself to self-transformation. It is not possible for archaeology (or the Western disciplining of time, in general) to recognize in a *locus* vis-à-vis other times, without abandoning, in the first place, the universalism which constitutes the behavior characteristic of Western time, and secondly the alocronism with which it subordinates other times. Gnecco's text meant, at the end of the 1990s, a programmatic statement much more than an already transited path. Signs of that can be read in his provocations to the openness, transformation, and relativism as well as in the optimism with which post-processualism was then characterized as "unsubordinated" knowing of Western hegemonic practices. Such attitudes are common in other texts of the 1990s commented on this entry.

Ruptures and Metaphysics

History-object is marked by the colonial experience, i.e., South American history occurs before and after the colonial experience; there is a precolonial history of autonomy and a colonial history of subjugation. The postcolonial perspective comes to state that the colonial experience did not perish nor was it diluted with independence. The colonial experience has constituted colonial history as *history* and precolonial history as *prehistory*, or as a period without history. Archaeology has come both to liberate the precolonial history of the colonial gaze that constitutes it as without history and to extend the colonial sense of history over non-colonial times.

The subject of history is also marked by the colonial experience, i.e., that both the history of what happened since the colonial experience as the history of what happened before the colony, i.e., postcolonial and precolonial histories (the latter on which archaeology claims exclusivity), are focused, studied, and narrated from postcolonial perspectives. The observations offered by archaeology about precolonial history are, inevitably, still a postcolonial gaze. This is because the subjectivities of both the historian and the precolonial archaeologist are constituted by the same colonial experience.

The *constituent* character of the colonial experience in relation to archaeology is indicated in its disciplinary demarcation. Additionally, it is also interesting to explore its *constitutive* character, that is, the way in which coloniality implicitly constitutes or shapes the facts of experience, and then the scientific understandings of history. To the first constituent relationship,

called *direct*, a constitutive *recursive* relationship is added, "once the matrices that define and frame scientific disciplines are established, and are put into motion, the knowledge of objects is already mediated by this division of labor, although its origins are unnoticed, thus facilitating its reproduction with all the appearance of naturalness" (Haber 1999). Haber explored how coloniality acts upon archaeology, through the analysis of the theoretical-methodological model for the interpretation of the colonial archaeology of northwestern Argentina (called "Caspinchango model" following the fact that it was based on the classical interpretation of a so-called type-site, Haber 1999). The classic report on the Caspinchango site, written by one of the founders of the archaeological discipline, Salvador Debenedetti, thus became a canonical text for archaeology about the long war period between Calchaqui and Castile, designated as the Hispanic-indigenous period by archaeology. It enhanced indexes of subjection (Christian rosary glass beads) and decomposition (the decay of ceramic manufacturing). Classical excavations at Caspinchango, however, offered some notable stratigraphic sequences that could undermine the interpretation of an irreversible trend towards the West, something that was predicted and meticulously observed by Félix Outes (Haber 1999). Despite signs to the contrary of this critique, however, the Caspinchango model won monolithically in the archaeological discipline. The question is not simply about the facts but also about those deep, extrascientific, and immanent conditions for the creation of the facts of experience. If the interpretation of the history-object follows an interpretative canon beyond the facts, it is because the conditions by which those facts are facts do not correspond exclusively to the materiality of things nor to the objectivity of the record but to a cultural assumption, an epistemic understanding of historical time as founded on a momentous event, a rupture or gap that, beyond facts, is, as a consequence, metaphysical.

Indigenous historical archaeology is therefore an impossible endeavor, a no-time that should be moved, either towards a prehistorical past or to a nonindigenous ethnic group (Criollo, Mestizo, Christian, etc.). Preterization of the indigenous (past and present) is necessary for the consolidation of a cultural collective that needs to expurgate its indigenous para-Christian, or non-Christian, and doubtfully Western content. The *metaphysical rupture* in which the colonial understanding of history is based becomes thus encoded within the disciplinary frames of archaeology, i.e., its demarcation of object and method. In this way, being an archaeologist, that is to say, exercising knowledge within the boundaries defined by the disciplinary framework, is exercising a knowledge founded in metaphysical rupture, in a cultural form that colonial difference adopts in history as written from the canon of the national state. But, if archaeology carries even inadvertently, in its most basic internal structure, coloniality, there is no other way for archaeology than to reproduce and expand those colonial conditions of knowledge.

Future Directions

An Uncertain Way Out

The postcolonial debate has some specific areas unique to South America. Long before postcolonial theory was spreading in global academy, various aspects of South American thought interrogated similar issues. The nineteenth-century essayists, and also many and diverse currents of thought in the early decades of the twentieth century – including the reconstruction of the Andean Marxism by Mariátegui, the "cannibalist" current in Brazil, Forja Group in Argentina, to name a few – were of great influence in South America. Dependency theory and development were theoretical elaborations that received strong impetus in the middle of the last century. The theology of liberation, magical realism literature, and social muralism are some currents that transformed critical positions from other areas and many times on a Latin American scale. These and many other thoughts, together with the experience of hundreds of social movements and indigenous and peasant movements, contribute to the fact that the reception of the postcolonial debate has not adopted the

known form of the simple translation of texts from the English-speaking academy.

Many of the postcolonial thinkers were grouped into what is known as the Modernity/Coloniality Program, although this label leaves out hundreds of relevant intellectuals, among them the ones that were gathered by the Aymara Oral History Workshop. So, postcolonial South American theory, rather than aligning itself with any global intellectual current, is a particular space of thought and theoretical practice that dialogues with various intellectual currents (including postcolonial theory, structural history, and queer studies). Such a space is characterized by a theoretical interchange with social movements, indigenous peoples, and peasant organizations in an active anti-colonial struggle. It is within this experience that the postcolonial prospects in South American archaeology must be understood, as participating in these conversations rather than the simple application of a theoretical approach to the field. At the same time, based on the historical continental experience, South American perspectives within archaeology, as well as the rest of the fields, maintain a commitment beyond the deconstructive critical moment, in what has been called "the decolonial turn."

The involvement with indigenous movements has been one of the most visible experiences in the decolonial sense. Unlike the multiculturalists' positions, decolonial positions have attempted to move beyond the aim of respect for the rights to diversity and historic reparation, towards recognizing indigenous thought as real theoretical perspectives capable of establishing symmetry and even move the Western, disciplinary, and intellectual constructions, and not simply as objects of knowledge or a subject of law. What in other cases has been defined in the context of the restitution of material culture to indigenous descendants is reconfigured in South America as an encounter between archaeologies aware of their positions in the postcolonial field (Gnecco & Hernández 2008). What in science is understood as a traditional culture from traditional, ethnoscientific, or *ethic* perspectives is configured as theories of relationality that cannot be known without an epistemic-political shift that involves an openness to move the broader cultural and disciplinary certainties (Haber 2009).

The involvement with social movements (peasants, anti-mega-mining, indigenous peoples) leading the anti-colonial struggle in rural areas where archaeology is usually practiced has led us to consider epistemic priorities and other values other than the traditional basic (truth-oriented) and applied (market- and development-oriented) science, such as life – or even a good life. In all of these developments, archaeology not only expands on innovative fields guided by the goal of helping each other but also enters into a theoretical and epistemic conversation which transforms it (Curtoni & Chaparro 2011; Jofre 2010).

Finally, it is necessary to mention the efforts that, even at an initial stage, apply to the formation of networks of research and debate that link academics and movements of various South American countries with other countries of the geopolitical South, seeking to configure locales of thought and practice that are not mediated by the central academy. A case in this regard is the establishment of the South-South Network on Cultural Heritage and Globalization and the formation of South America/South Africa networks.

This entry cannot be a history of postcolonial archaeology in South America without addressing the history of the colonial constitution of history, archaeology, and South America as colonial categories. But that a history of history (or better an archaeology of archaeology) is not a mere intellectual movement locked in the campuses from where it observes what is happening "out there." If any South American perspective on things really exists, it has to be one according to which the drama of the collective history passes through each molecule of thought. This is a case as demanding for the archaeological discipline as promising for those who think it is simply unbearable to abandon the anti-colonial yearnings. Decoloniality and indiscipline could be the key words of the history that is yet to be written.

Cross-References

- ▶ Funari, Pedro Paulo A. (Historical Archaeology)
- ▶ Latin American Social Archaeology
- ▶ Postcolonial Archaeologies

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South American Rock Art

María Mercedes Podestá[1] and Matthias Strecker[2]
[1]INAPL, Buenos Aires, Argentina
[2]SIARB, La Paz, Bolivia

Introduction

South American and the Caribbean islands rock art has been produced in practically all known archaeological periods and up to our times. This entry deals with the following:

- The different kind of rock art of this subcontinent: rock engravings, rock paintings, and geoglyphs
- The distribution of rock art throughout South America, found in a great variety of geographic and cultural zones in nearly all regions from North to South and East to West including the Andean highlands and the lowlands of the Atlantic coast
- The history of research from the first reports on rock art till scientific studies as part of current archaeological and anthropological research
- References to the principal regional rock art surveys
- A summary of rock art chronology, from the first manifestations up to those produced in recent times
- Some aspects of rock art interpretation of the art
- References to rock art documentation and analysis, conservation, public and private administration of sites, as well as education campaigns in which local communities are concerned

Definition

The subject of this study is rock art in South America, including the Caribbean islands: rock engravings (petroglyphs), rock paintings (sometimes called pictographs), and geoglyphs. These categories of rock art are distinguished by their mode of production. Petroglyphs or engravings are motifs executed on a rock surface. Could be pecked, incised or abraded. Rock paintings are motifs painted or sprayed with a liquid mixture on the rock surface. Other rock art representations could be executed by a sort of crayon such as charcoal. There are some motifs which present the combination of both techniques: engraving and painting. Geoglyphs are large motifs produced on the ground, usually in desert regions, by arranging clasts (positive geoglyph, stone arrangement) or by removing patinated clasts to expose unpatinated ground (negative geoglyph). Mobile art is another important artistic manifestation which may be related to rock art; it consists of engravings or paintings executed on small objects, such as natural stones (Fig. 2). Grinding basins and cupules are, in many cases, associated to rock art.

South American Rock Art, Fig. 1 Rock painting from Cerro de las Cuevas Pintadas. Guachipas. Argentina. Photo: INAPL Archive

South American and Caribbean rock art has been produced on rock walls of caves and rockshelters, as well as boulders and other rock surfaces of open-air sites, in practically all known archaeological periods, and up to our times. Deep caves with rock art in dark areas that need artificial lighting occur only in the Caribbean region. Rock art is found in all countries and in a great variety of geographic and cultural zones (with the exception of certain regions, generally lowlands) which lack suitable rock surfaces such as the coastal region *Litoral* of Argentina.

Historical Background

South American rock art was noted in colonial times (from CE sixteenth to nineteenth century) by missionaries and numerous travelers (Greer 2001: 678). In the early Republican period

South American Rock Art, Fig. 2 Petroglyphs at Iaguy Guasu (Cerro Guazú/Jasuka Venda, Dept. of Amambay), Paraguay. Museo de Altamira

(CE nineteenth century), travelers, explorers, and ethnographers contributed a wealth of information though in many cases with faulty recording and little care to detail.

Scientific interest in South American rock art began towards the end of the CE nineteenth century. In Argentina, F. Ameghino, J. B. Ambrosetti, and A. Quiroga published their findings between 1870 and 1890; in Uruguay, J. H. Figueira presented reports in the 1890s; and in Colombia, after first recordings by L. M. Girón (1892) and V. Restrepo (1895), systematic rock art research was started by M. Triana in 1922 though he – like many others – considered rock art motifs as a sort of hieroglyphs. In Bolivia, E. Nördenskiöld recorded a few rock art sites partially in 1904–1905 and 1913–1914.

Koch-Grünberg's pioneering work "Südamerikanische Felszeichnungen" (Berlin 1907, published in Portuguese 2010) is one of the first which may be considered scientific. He provided a synthesis and critical review of the state of knowledge of the art and a summary of sites he had registered during his ethnographic studies on the Brazil-Columbian border (1903–1905).

There is a notable increase in scientific work on South American rock art from the mid-1900s to present. Studies became more detailed and attempted to place the art into archaeological, ethnographic, and interpretive contexts.

In the late 1980s Colonial and Republican rock art began being studied in a combination of rock art recordings with ethnohistoric studies. For example, in Colombia, F. Urbina R. 2004; in Peru, R. Hostnig (2004); in Brazil, C. M. Guimarães (1992) (with regard to rock drawings by fugitive Negro slaves); in Bolivia, R. Querejazu Lewis (1992) and F. Taboada (1992); in northern Chile, F. Gallardo et al. (1990, 1999); and in Argentina, A. Fernández Distel (1992).

Key Issues/Current Debates

Main Geographical Areas

Regarding the cultural configuration based on traditions linked to archaeological cultures, historic information, and ethno-linguistic distributions, the following areas may be established:

- *Caribbean islands*: west India or the Antilles, in which two areas are defined as Greater Antilles (Puerto Rico, Dominican Republic, Cuba, Haiti, and Jamaica) and Lesser Antilles.
- *Lowland South America* as defined by Greer (2001: 665): the northern Amazonas-Guianas region of southern Venezuela, southeastern Colombia, southern Brazil, Guyana, Suriname, and French Guiana, as well as lowland regions of Ecuador, Peru, and Bolivia.
- *Central Brazil and northeast Brazil* as defined by Prous (1994: 89-124).
- *Southeastern coastal Brazil* as defined by Prous (1992: 511-513) comprises of areas attributed to the "Meridional Tradition" and "Coastal Tradition" (Prous 1994: 81-85).
- *The Basin of La Plata River* includes its principal tributaries and adjacent areas in Uruguay, Paraguay, south Brazil, and Northeast Argentina, with five subareas – (1) northern, (2) Atlantic, (3) lap of the Meridional Plateau, (4) southern, and (5) Chaco-Litoral (Consens 1995).
- *Andean South America*: divided in northern, central, and southern Andes, comprising the Pacific coast and highlands of Colombia, Ecuador, Peru, Bolivia, Chile, and northwestern Argentina, excluding southern Chile and Argentina.
- *West-central and central Sierras* in Argentina.
- *Pampa-Patagonia*: southern Argentina and Chile, extends to the top end of the continent and includes Patagonian Andes.

Regional Synthesis

Regional overviews have been presented from broad-areal, regional, country, and local perspectives (Greer 2001: 681). C. N. Dubelaar's Ph.D. thesis (1986) provided a synthesis of engravings on the South American continent and the Caribbean islands, detailing history of research, techniques of production, site characteristics, approaches to dating and interpretation, geographical distribution and classification according to "pilot motifs," and a comparison between petroglyphs of the Antilles and those of northeast South

America. In later studies, Dubelaar presented inventories of rock art in the Guianas and adjacent areas, the Lesser Antilles, the Virgin Islands and Trinidad, as well as Puerto Rico.

Notable synthesis were provided for all areas and countries: *Caribbean area*: M. Hayward et al. (2009); *Venezuela*: R. de Valencia and J. Sujo Volsky (1987), J. Greer (1994, 1995, 2001), and F. Scaramelli and K. Tarble (2008, 2010); *Colombia*: G. Muñoz C. (1999) and A. Botiva C. (2000); *Ecuador*: G. González O. (2008); *Brazil*: N. Guidon (1991) on Piaui rock art, A. M. Pessis (2003) on Serra da Capivara rock art, A. Prous (1992, 1994), J. Marcos, A. Prous, and L. Ribeiro on rock engravings of southern Brazil and rock art of Central, Amazonian, and northeast Brazil (2007), G. Martin (1996) on northeast Brazil, and E. Pereira (2003, 2010) on the Central Amazonian *Peru*: J. Guffroy (1999, 2007) and R. Hostnig (2003); *Bolivia*: M. Strecker (1987); *Paraguay*: J. Lasheras et al. (2011); *Chile*: G. Mostny and H. Niemeyer (1983), Berenguer (1999; 2004), Núñez A. (1976) on rock art of Atacama, L. Briones (2008) on geoglyphs of northern Chile, and Troncoso (2008) on Aconcagua river, central Chile; *Argentina*: A. R. González (1977), J. Schobinger and C. J. Gradin (1985), Aschero (1999) on northwest Puna rock art, M. M. Podestá, D. Rolandi, and M. Sánchez P. (2005a) on northwestern rock art, M. M. Podestá, R. Paunero, and D. Rolandi (2005b) on Patagonia rock art, and A. Recalde and E. Berberián (2005) on central Argentina rock art; *Uruguay*: M. Consens (1995), L. Cabrera Pérez (2008), and A. M. Florines (2004). A general view of *South American* rock art is presented by J. Schobinger (1997) and J. Schobinger and M. Strecker (2001). The Thematic Study edited by ICOMOS (2006) presents overviews on rock art in several regions of South America.

Chronology

In some of the South American countries – particularly in those with a long tradition of archaeological research – chronological sequences have been established on rock art which make it possible to assign the beginning of its production to the earliest occupations of hunter-gatherers which in the Northeast and Patagonian region of Argentina go back more than 10,000 years before present. In northern Chile and central-south Peru, somewhat later dates have been proposed for early rock art. Some regions in Brazil (Amazonia, Mato Grosso, Minas Gerais, Piauí, Peruaçu valley) have produced early dates for rock art (12,000–9,000 BP) (Prous 2012). Guidon (2007) has proposed an extremely ancient rock art tradition for northeast Brazil (Serra da Capivara, Piauí) of some 48,000 years ago, while in the Amazonian region of Columbia (Serranía de Chiribiquete), rock paintings are believed to have started some 19,500 years ago; however, the considerable antiquity of these representations in Brazil is not accepted by a large part of the archaeologists and at present does not agree with the standard vision of early peopling of South America.

In the case of southern Peru, Toquepala y Sumbay caves have been related to human occupations dated between 11,198 and 10,413 AP and c. 7,300 AP and c. 6,300 AP, respectively (Muelle 1969 and Neira 1968) (Fig. 3). Some recent research by Guffroy (2007) and Hostnig (in preparation) have shed light on a natural style of archaic paintings with large representations of camelid figures accompanied by small stylized human figures. Most of these sites are located at an altitude of more than 4,000 m above sea level.

In most cases defining a sequence and antiquity of rock art styles is based on stylistic changes between motifs belonging to different superimposed layers and the correlation of the production and use of rock art figures with dated layers excavated at the foot of the rock art panels or in their immediate vicinity obtaining an indirect (estimated) chronology for the art. Frequently stylistic considerations play an important role, based on stylistic or iconographic similarities between rock art and other artistic productions.

On the other hand, there are very few "direct" or absolute dates for rock art which either provide a date for the rock art itself, for the rock surface underlying the art, or accretions overlying it. Dating should always be consistent with other

South American Rock Art, Fig. 3 Paintings featuring wild camelids at Sumbay, Dept. of Arequipa, Peru. Photo: SIARB Archive

archaeological data to be considered reliable. The first AMS dates (radiocarbon dating using accelerator mass spectrometry) of rock paintings have been reported for Argentina: – La Candelaria, Catamarca (Hedges et al. 1998) and Abrigo de los Emplumados or Media Agua 1, Jujuy (Hernández Llosas et al. 1999) – and Brazil: (Toca do Serrote da Bastiana, Piauí).

Rock art representations are present in all moments of human occupation of the South American mainland (preceramic hunter-gatherers, later phases of domestication, and early farmers/ceramists). Among the most ancient figures are non-iconic (abstract) designs, while in other sites figurative scenes occur including the representation of hunting wild animals, above all camelids (such as in southern Peru, northern Chile, Bolivia, northwestern Argentina, and Patagonia). In more recent periods, domesticated camelids are represented in pastoral scenes or in caravans that transported goods.

After the European conquest and initial colonization (CE fifteenth to sixteenth centuries), the indigenous communities continued its production up to the late Colonial and in some cases even to Republican times. Colonial and historical rock art is characterized by the representation of horseriders and other anthropomorphic figures with European garments, Christian crosses, horses, etc. An exceptional site in the highlands of Bolivia features numerous scenes of folkloric dances. Battle scenes have been found in sites around Titicaca Lake, possibly related to the indigenous uprisings of the late eighteenth century (Fig. 4). Among recent petroglyph motifs are the representations of cattle marks which date from the mid-twentieth century (Podestá et al. 2005a). In north Colombia similar engravings in territory of the Wayuu Indians are interpreted as totemic emblems (Delgado 2010).

In some cases, rock art sites in the Andean highlands continue to be the focus of religious rites, as recent indigenous offerings and ceremonies demonstrate.

Interpretation

Interpretation of rock art sites should be the result of long-term interdisciplinary research taking into account many factors concerning the cultural framework of the art, its distribution and natural setting, associations with the regional settlement pattern in the specific time periods, as well as indications regarding the ritual, social, and economic uses of the sites.

In South America, the theory of shamanism and its relation to rock art has been scarcely

South American Rock Art, Fig. 4 Colonial rock paintings at Carabaya, Dept. of Puno, Peru. Photo by Nicolas Merma

brought up, with the exception of some researchers such as J. Schobinger (2010). More widely accepted is the idea that rock art served as a communication system in which petroglyphs, rock paintings, and geoglyphs are interpreted as markings along traditional routes of travelers and llama caravans passing through wide regions of the Andes. Numerous researchers have favored this theory, for example, L. Núñez A. (1976) with regard to the Atacama Desert and C. A. Aschero with regard to the Argentinian puna and northern Chile. The same interpretation has been applied to historical rock art of mid-twentieth century related to cattle herders that crossed the Argentinian-Chilean border (Podestá et al. 2005a). Petroglyphs in another region and ecozone, along Río Negro river in the tropical lowlands of Brazil and Colombia, are now interpreted as territorial markers and symbols-related mythical migration routes.

Interpretation of some rock art sites in northern Chile is based on ancient indigenous myths and ceremonies related to the agricultural cycle and the growth of llama herds.

With regard to the interpretation of Colonial and Republican rock art, as mentioned before, studies in Bolivia, Peru, Chile, and Brazil relate rock art to ethnohistoric documents.

Recording and Analysis

Sometimes it is hard to integrate rock art into archaeological contexts, especially if no dating can be provided for a site. This is one of the reasons why rock art was not taken seriously by archaeologists of some South American countries for a long time, leaving the investigation and recording of these sites to researchers outside the archaeological mainstream. However, in the last four decades, rock art has played an ever increasing role in archaeological research, national inventories of the cultural heritage, and planning of selected sites to be protected in public facilities such as archaeological parks and whose importance is recognized or acknowledged by including them in lists of National Heritage or even World Heritage sites.

Rock art research depends on a data basis with detailed and carefully elaborated recording of sites and their paintings, engravings, or geoglyphs. Colombia, Bolivia, Brazil, Argentina, Uruguay, and Chile have improved their rock art data basis, but in some countries of South America (e.g., Paraguay), no comprehensive and professional archaeological and rock art programs have existed until very recently (Lasheras 2011) (Fig. 5). Many countries have been carried out rock art sites inventories. Caribbean rock art consists of much more than 1,000 sites across the

South American Rock Art, Fig. 5 Rock paintings at Toca do Boqueirao da Pedra Furada, Serra da Capivara, Piauí, Brazil. Photo by Alice Tratebas

South American Rock Art, Fig. 6 Petroglyphs at Caicara, Orinoco river, Venezuela. Photo by Franz Scaramelli

region, with the greatest concentrations in the Greater Antilles (Haviser & Strecker 2006) (Fig. 6). Over 650 sites have been reported for Venezuela (Scaramelli & Tarble 2006) (Fig. 7). In the department of Cundinamarca (Colombia) alone, some 2,000 sites have been registered, while 5,000 sites are known for the whole country (Muñoz 2006: 97, in ICOMOS 2006). Some 1,500 sites were listed for Argentina in 1988 (Renard de Coquet 1988); however, meanwhile this number might be tripled (Podestá, in ICOMOS 2006). In Ecuador, Peru, and Paraguay, some 3,000 rock art sites have been estimated (Strecker, in ICOMOS 2006), but we now believe that the number of rock art sites is in fact considerably higher. No counts of rock art sites are available at present for Chile and Uruguay (Florines *pers. comm.*).

In some South American countries, invasive recording methods (such as chalking out or

South American Rock Art, Fig. 7 Petroglyphs in Cueva de Panchito, Dominican Republic. Photo by Adolfo López

making rubbings of rock engravings) were frequently used till the decades 1960–1970, and the negative effects for the conservation of rock art can still be seen in some sites. However, noninvasive recording methods (including digital photography) are being used more widely, following such models as the IFRAO and SIARB codes of ethics.

Recent analysis of South American rock art have provided insight into engraving techniques and possible lithic tools used for their production (Álvarez et al. 2001). X-Ray Diffraction (XRD), Energy-Dispersive X-Ray Spectroscopy (EDX), Total Reflection X-Ray Fluorescence (TXRF), Fourier Transform Infrared Spectroscopy (FT-IR), and Gas Chromatography/Mass Spectrometry (GC-MS) have been employed to analyze the paint on rock walls and pigments from different occupational levels of archaeological excavations in different sites in Argentina, Uruguay, Bolivia, Chile, and Brazil. For example, analysis of pigments of rock paintings at sites in Argentina has been carried out in Cueva de las Manos and Cerro de los Indios in Patagonia (Aschero 1983-1985; Wainwright et al. 2002), northern Patagonia (Wainwright et al. 2002; Boschin et al. 2011); in Puna de Atacama region (Podestá & Aschero 2012; Yacobaccio et al. 2012) and in Quebrada de Humahuaca, both in northwestern Argentina; Brazil, in Piauí (Duarte Cavalcante 2009) Bolivia, Paja Colorada (Wainwright & Raudsepp 2008); and Chile, sites of Salado river region reveal ingredients of paint mixtures and production processes (Sepúlveda et al. 2009, 2010). Few results have been reported from Uruguay.

Conservation and Management Issues

Rock art sites, which in some cases have been preserved over thousands of years, are extremely vulnerable like all open-air sites. Their conservation depends on natural deterioration factors, such as moisture, physical weathering, biological weathering, pictogram deterioration, climate, as well as destruction of rock art by human visitors which is in many cases the overall destructive factor.

For example, the Nasca geoglyphs (Peru) have been damaged by car traffic crossing the ancient lines and lack of a global management plan. Several important rock art sites in Bolivia have been destroyed by the construction of roads, and many rock art sites from Chile and Uruguay have been deteriorated by mining industry.

Deforestation exposes rock art sites to the negative effects of the natural elements (Venezuela).

On the other hand, there is a recent tendency to include more and more sites in tourist routes without their previous adequate planning and administration. The tourist boom has facilitated access to sites which formerly were protected due to their isolation and inaccessibility. Some rock art sites in the Caribbean have been seriously affected by tourism developments, such as Borbón cave and Cueva de las Maravilla in the Dominican Republic, while the archaeological park at Trois-Rivières in Guadeloupe is a noteworthy exception of an area planned by archaeologists and managed for tourist visits without putting the rock art at risk. In Venezuela a few rock art sites have been implemented with visitor centers and guides available for the public (Pintado in the Amazon state; Piedra Pintado, Vigirima, Carabobo state). In Argentina, the National Institute of Anthropology (INAPL) initiated a program with the aim of preserving some rock art sites of exceptional value. The institute acts as consulting agency; the program aims at an effective collaboration with the provinces and specifically the local communities which have to play their role in managing the sites (Podestá, in ICOMOS 2006).

In theory, rock art sites are protected by state legislation as part of the nation's cultural heritage. However, reality is very different because of the lack of enforcement of existing laws. In consequence, if rock art sites are destroyed, actions are seldom taken.

An indicator of the awareness of rock art sites as cultural heritage in South America is the fact that several sites have been inscribed in the list of World Heritage by UNESCO: Cueva de las Manos (Argentina), Fuerte de Samaipata (Bolivia), geoglyphs of Nasca and Pampas de Jumana (Peru), and Serra da Capivara (Piauí, Brazil), while others have been included in the Tentative List to be considered in the future – Chamangá (Uruguay) and sites of Patagonia (Chile), geoglyph of Chirgua, petroglyphs and megaliths of Vigirima, and petroglyphs of Caicara (Venezuela), between others (Fig. 8). In these cases, rock art serves as a tourist attraction which results in the development of local communities and the economic growth of the respective region. The National Park of Serra da Capivara (Brazil), one of the densest concentrations of archaeological and rock art sites in the continent (more than 1,000 recorded sites), is considered one of the best developed archaeological parks in the Americas; it possesses 128 sites which may be visited and 400 km of pathways (Guidon 2007). At the same time, conservation measures taken may serve as a model for other rock art sites in South America. After inclusion (1999) of Cueva de las Manos (Argentina) in the World Heritage list, visitation increased four times, and today the site possesses adequate infrastructure for tourism (Onetto 2006).

Raised wooden boardwalks provide efficient measures for visitor control at the sites and, at the same time, allow visitors a convenient view of the rock art; they have been implemented at a number of sites such as Cueva de las Manos, Cerro Pintado (Patagonia, Argentina), Calacala and Fuerte de Samaipata (Bolivia) (Strecker & Podesta 2006), and Serra da Capivara (Brazil) (Guidon 2007).

Throughout the world, local communities possess long histories of interaction with their cultural and natural environments, and their involvement is essential in the planning stage and the management of rock art sites. In many of the South American rock art sites which have been incorporated in tourist circuits – such as the abovementioned parks – local communities participated in the planning and development of tourism. Local guides may provide to visitors an authentic message concerning the importance of the site for the cultural identity of their people (e.g., Falchi & Torres 2010).

Education

Education campaigns should play an important role in the management of rock art sites, and some models exist in Venezuela (ANAR, website), Colombia (Martínez & Botiva 2002), Brazil (Fundação do Homen Americano, São Raimundo Nonato, Museu Paraense Emilio Goeldi, Belem, Fundacão Universidade Federal de Mato Grosso do Sul, Corumba), Bolivia

South American Rock Art, Fig. 8 Geoglyphs Los Pintados, Pampa del Tamarugal, Tarapacá, North Chile. Photo by Matthias Strecker

(Strecker 2001), Peru (Strecker 2005), Chile (Museo Chileno de Arte Precolombino, website), and Argentina (Oliva & Panizza 2010; Vega & Bestard 2010).

Unfortunately, with a few exceptions, such as INAPL in Argentina, and some institutions in Chile and Uruguay, South American state institutions responsible for the protection and maintenance of archaeological sites are poorly funded and normally lack professionals in the field of administration of cultural resources. On the other hand, private organizations, such as Fundação do Homen Americano and Museu Paraense Emilio Goeldi, Belem in Brazil, SIARB in Bolivia, and Museo Chileno de Arte Precolombino, are involved in investigation, recording, and protection of sites.

While professional conservation measures at rock art sites are still rare in South America (with the exception of Serra da Capivara, Piaui, in northeastern Brazil, as mentioned), conservation and administration of rock art sites play an increasing role at rock art meetings and in academic publications (Strecker & Taboada 1995).

International Perspectives

The growing interest in South American rock art is reflected in international academic meetings held in the last decades in several countries, such as eight international rock art symposia, the 2009 and 2012 IFRAO congresses in São Raimundo Nonato, Piauí, Brazil and La Paz, Bolivia, respectively. During the last decade archaeological national congresses held in a number of countries (Colombia, Brazil, Peru, Chile, Argentina, Uruguay) included sessions dedicated to rock art studies.

On the other hand, organizations have been formed in various South American countries which promote rock art research and conservation: APAR (Peru), ABAR (Brazil), SIARB and AEARC (Bolivia), CIAR-SAA (Argentina), and CIARU (Uruguay). They all belong to the International Federation of Rock Art Organizations (IFRAO).

The inclusion of some rock art sites in the list of World Heritage (UNESCO) and others in the Tentative List, as mentioned above, places South American rock art in a worldwide perspective of sites with outstanding characteristics.

The significant advances in rock art research in this continent are also revealed in regional articles published in four volumes of the series "Rock Art Studies – News of the World" (Bahn & Fossati 1996, 2003; Bahn et al. 2008, 2012).

Future Directions

There is a great need for documentation of unrecorded rock art sites and the creation of

a data basis of sites. The application of new scientific analytical methods (e.g., Reindel & Wagner 2009) and of image enhancement techniques, such as D-Stretch, will improve considerably the results of research.

Rock art studies play a major role in South American archaeological research, but in some countries have not yet been incorporated in university programs, Argentina and Chile being notable exceptions. As the awareness of the importance of rock art grows, more academic programs to record, study, and protect this cultural heritage are needed.

State and regional institutions responsible for the administration of archaeological and rock art sites have to be strengthened and must rely more on work carried out by specialists. Education campaigns should be realized in close collaboration with universities, schools, and local communities.

Considerable efforts must be made in preservation, visitor management, and interpretation of rock art sites in the future. Conservation projects are practically inexistent, with the exception of Brazil, and, to a lesser extent, Argentina, Bolivia, and Chile. There is a great need for the training of specialists in this field.

Cross-References

- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Rock Art Sites: Management and Conservation
- ▶ Rock Art, Forms of

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South and Southeast Asia: Historical Archaeology

Miriam T. Stark
Department of Anthropology, University of Hawai'i-Manoa, Honolulu, HI, USA

Introduction and Definition

This entry reviews the historical archaeology of South and Southeast Asia from the inside looking out and from the outside looking in. Most historical archaeological research has conventionally taken place in the New World, where a significant divide exists between pre-Columbian and post-Columbian eras. Pan-Eurasian developments swept across South and Southeast Asia for millennia before Columbus set sail for the East Indies, so no clear break is evident between an earlier period of cultural and physical isolation and a later period of contact, disease, and colonization. To reconcile this dissonance between conventionally defined historical archaeology and the Asian sequences, this entry defines historical archaeology as the archaeology of capitalism, where capitalism involves the operation of intensive interregional economic interaction. Two time periods form this entry's focus: (1) an internally defined historic period, which is signaled by the earliest appearance of decipherable writing, from c. 500 BCE to CE 500 and (2) an externally defined period that is associated with the earliest European penetration in the region, starting in the late fifteenth century CE.

Use of both internally and externally defined time periods honors indigenous frameworks of historical archaeology, offers comparative archaeological data on European contact and colonization, and overlooks formative developments in each region. By the time that European states launched their expansionist projects, many of South Asia's Medieval empires had risen and collapsed, and its northern regions were under Muslim control. By the time the first Europeans reached Southeast Asia, nearly all of its classical agrarian kingdoms (e.g., Angkor, Pagan, Dai Viet, Majapahit, and Sukhothai) had ceded power and influence to maritime-based successor states to their south.

South Asian archaeology's first "historical" period, the "early historic period," lasted from the third century BCE to the fourth century CE. This period includes part of the Mauryan Empire and ends with the collapse of the Guptas. Archaeologists working at large coastal cities (e.g., Sisupalgarh, Arikamedu, Pattinam, Kaundinyapura) from this period recover substantial evidence of interregional trade and cultural elaboration (e.g., reviews in

Fogelin 2006; Smith 2006). Key Hindu and early Buddhist texts and epics in written, oral, and material form wended their way eastward from South Asia to what is now East and Southeast Asia. Abundant interdisciplinary research has been published on the early historic period: by archaeologists, historians, and art historians. From this amalgam has emerged a regional understanding of the early historic period as an urban landscape in which the region's cities were political and economic centers and in which states, empires, and religious institutions emerged earlier in the north (see review in Morrison 1997).

The late Medieval period in South Asian archaeology is associated with the European Renaissance and period of exploration. With few exceptions like the impressive program of archaeological research at the central Indian site of Vijayanagara (work by Sinopoli, Morrison, and others), most work has been undertaken through state archaeological projects and published in the gray literature. Little synthetic or theoretical archaeological research has been published on South Asia's late Medieval period (but see Chakrabarti 2003). Historians, rather than archaeologists, have dominated the discourse on this critical period in South Asia.

Many Southeast Asian archaeologists describe the period from the third century BCE to the fourth or fifth century CE as prehistoric ("the Iron Age") despite substantial evidence for Chinese documentary records about the region near its inception and indigenous documents by Southeast Asians by its closure. This entry employs the "early historic period" designation for both South and Southeast Asia for this earliest "historic" period, although Southeast Asia's archaeological record for this period was almost undocumented until the last 20 years. Like South Asia, Southeast Asia was never isolated from contact with foreigners from all directions. Yet developments from c. 1450 ADE onward, which scholars call Southeast Asia's Age of Commerce or the early modern period, prompted social and economic transformations across the region that merit attention. This period falls within the standard time frame for historical archaeologists working in the west and yields comparative insights on processes of colonization, emergence of social stratification/class, and culture change.

Space constraints also limit the geographic coverage included in the terms "South" and "Southeast Asia." Most South Asian archaeological examples derive from either India or Bangladesh; South Asia's reach far exceeds this area and contains myriad, complex political and economic trajectories that sources in the "Further Readings" explore in some detail. Most Southeast Asian examples come from the Indonesian archipelago or from the Mekong basin (i.e., Thailand, Laos, Cambodia), from regions where particular European nation states engaged in commerce and, later, political control. Just as South Asia varied markedly from one region to the next, so Southeast Asia's mainland and insular regions experienced different historical trajectories based, in part, on their access to outside contacts in South or East Asia. Agrarian states emerged across most of mainland Southeast's river valleys and deltas in the early to mid-first millennium CE; the few early states that arose across insular Southeast Asia, in contrast, took several centuries longer to emerge. With few exceptions, island Southeast Asia at European contact consisted of a socially fragmented landscape of small maritime-oriented polities of variable size (Bacus 1999) that were based on a series of unstable, personalized alliances and which competed with each other for access to trade goods (Junker 2004).

Key Issues

Some of the same methodological issues apply to South and Southeast Asia, and some substantive themes characterize both regions during the early historic period. This entry uses Southeast Asian examples to understand some substantive themes and debates that characterize the archaeology of 1450–1850 CE.

Methodological issues affect archaeological research on both the early historic periods of South and Southeast Asia and the fifteenth- to nineteenth-century research and parallel those found across the broad "historical archaeology." Foremost among these is an overreliance and

uncritical use of documentary data to frame archaeological research in both regions. In the case of South Asia's early historic period, abundant documentary sources, written by contemporary South Asians, require attention. South Asia's great Mahabharata and Ramayana epics thrived during the early centuries CE, when local scribes blended these traditions and local histories to pen the *Puranas*. The rise of western intellectual traditions associated with Indological studies is another reason. British Orientalism, which subordinated archaeological patterns to documentary accounts, was established in South Asian scholarship (Trautmann & Sinopoli 2002: 496).

Southeast Asia's early historic period has also been interpreted through contemporary Chinese dynastic annals and analogies with South Asia. One reason is that most scholarship on the early historic period has been undertaken by epigraphers and historians, the earliest of whom began their careers as Indologists and Sinologists. Another is that most Southeast Asian archaeologists have concentrated their efforts either on prehistoric research (particularly on the Paleolithic, Bronze, and Iron Ages) or on preservation efforts devoted to the ninth- to fourteenth-century monuments that resonate with nationalist claims and also attract cultural tourism. Recent archaeological work has produced archaeological data which challenges extant accounts on which historians have long relied.

South and Southeast Asia remained linguistically, culturally, and geographically discrete from the late first millennium BCE through the mid-first millennium CE. Yet beginning in the early historic period, people, goods, and ideas moved across land and water in both directions. Whether inhabitants of either region immigrated to the other remains a subject of some debate; so does the precise timing of these developments. Yet several substantive themes characterize archaeological research on the early historic period of both South and Southeast Asia:

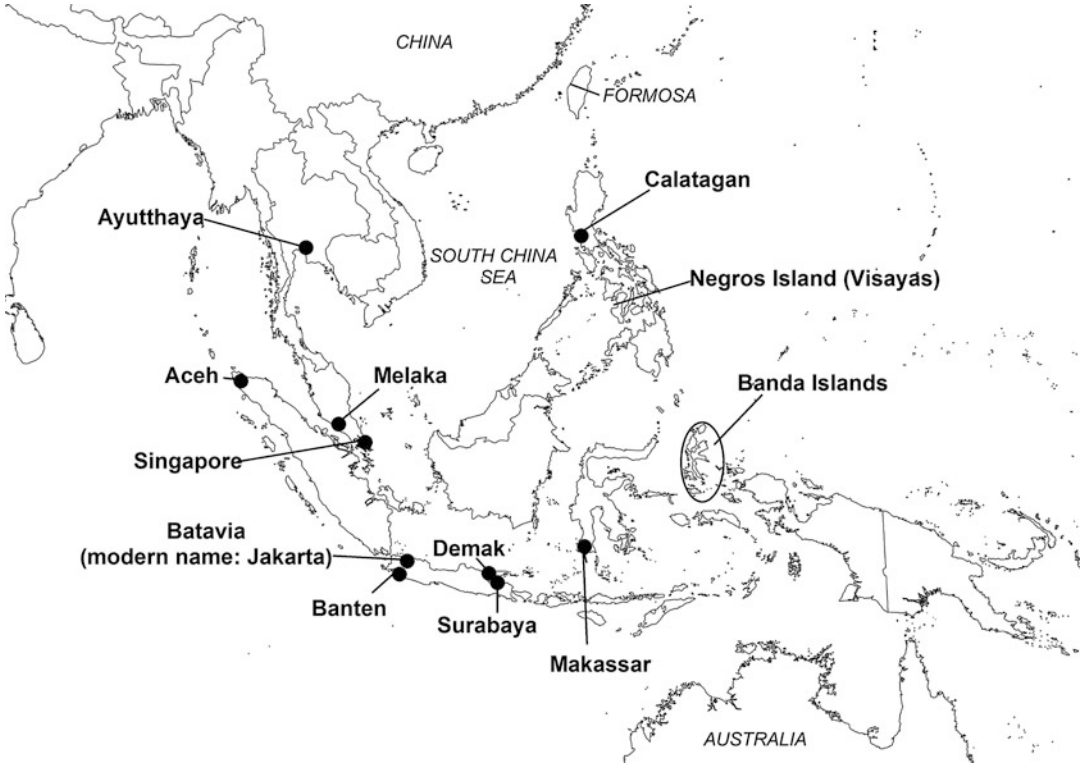
- Studies of urbanization (the "second wave" for South Asia after the Indus Valley civilization and the first for Southeast Asia)
- Religion and ritual (the adoption of Indic notions of statecraft, the study of early religious architecture and iconography, and the role of trade in Buddhist propagation)
- The emergence of a pan-South/Southeast Asian interactional network that relied on maritime circulation of people and commodities through the Bay of Bengal in what is commonly described as the maritime Silk Road
- Landscape archaeology (ritual landscapes/sacred geography and pilgrimage, agrarian landscapes, and water management)

Substantive themes in the historical archaeology of the Medieval period of South Asia (ninth century to sixteenth century CE) and the historic period of Southeast Asia vary somewhat more, but include:

- The nature of imperialism (ideology, militarism, production, and distribution)
- The nature of urbanism (political economy of craft production and social organization of cities)
- The agrarian basis of states

Some substantive themes in Southeast Asian archaeology of the fifteenth through eighteenth centuries involve the impact of European contact on settlement, political organization, and social structure. Individual European nation states sought control of Southeast Asia both for access to the region's own resources (particularly precious metals and spices from the Spice Islands) and for access to China through the South China Sea. The earliest contact involved the fifteenth-/sixteenth-century establishment of trade networks as Europeans competed with each other for access. During the next two centuries, much of Southeast Asia was taken under European control: by the Portuguese, the Spanish, and the Dutch and, in the nineteenth century, by the French, British, and Americans.

Southeast Asia's trade relationships to the east and west had begun many centuries earlier and intensified in the fourteenth to fifteenth centuries as Islamization swept through island Southeast Asia. Increased commerce between the region and points west accompanied this religious shift; archaeological work documents economic and settlement changes that preceded European involvement (Christie 1996; Lape 2000). Figure 1 illustrates a variety of Southeast cities that were



South and Southeast Asia: Historical Archaeology, Fig. 1 Location of sixteenth- through seventeenth-century Southeast Asian cities involved in world commerce (Drafted by Alex Morrison)

established or expanded across the region (some in conjunction with the rise of Muslim polities), from Batavia, Manila, and Singapore to mainland capitals that functioned as inland ports like Bangkok and Phnom Penh (Miksic 2000). Only a few such centers have received archaeological attention, like Singapore and Pattani in southern Thailand.

Fourteenth- through fifteenth-century shifts in Ming imperial economic policy also effected changes in Southeast Asia. Archaeological research in the Philippines suggests that agricultural and political intensification occurred during this period. So did the frequency of maritime raiding and intervalley warfare in export-oriented islands. Manufacturing industries, like stoneware production, also emerged during this time to meet regional needs (Grave et al. 2000; Gutman 2002) and rarely circulated beyond Southeast Asia's borders. Evidence of regional industrial-level production of trade goods, like high-fired ceramics, has been reported from archaeological research on myriad shipwrecks in the region (Fig. 2).

Southeast Asian archaeologists have not only documented shifts that preceded or coincided with European contact. Work has now been done on the impact of European colonization: in settlement, in economic structure, and in sociopolitical organization. European colonization entailed significant settlement reorganization to meet European demands for local products and Chinese goods and changed through time in response as European colonial policies shifted. Initial resistance to European contact was intense across much of the region outside of Sinicized northern Vietnam and effected settlement changes. In eastern Indonesia's Spice Islands, the Dutch resorted to wholesale slaughter of local populations to gain control of spice-growing islands like Banda (Lape 2000). Some Filipino populations fled into the Luzon highlands to escape Spanish relocation policies of

South and Southeast Asia: Historical Archaeology, Fig. 2 Location of recovered fourteenth- through sixteenth-century shipwrecks in Southeast Asia (From Flecker 2007, with permission from John Wiley and Sons)

reducción in the Philippines (Acabado 2009). Work in northern Thailand illustrates migrations to upland areas in response to lowland Ayutthaya state demand for labor to support new export-oriented production systems (Grave 1995: 258).

European colonization also brought the establishment of the new Manila Galleon network that moved goods between Asia and the New World. This network linked the Spanish Philippines to Spanish Mexico through annual or biannual trips from the sixteenth to nineteenth centuries. Chinese and Southeast Asian goods sailed eastward across the Pacific to reach Acapulco, on the west coast of Mexico. These goods were exchanged for silver bullion and minted coin that returned to the Philippines. More than 100

Manila Galleon expeditions set sail during this period.

European colonization in the seventeenth through nineteenth centuries not only drew Southeast Asia into the western hemisphere; it also knit Chinese commerce more closely with the west. Diasporic ethnic communities and urban ethnogenesis borne of unions between overseas Chinese and European colonials and local women were one by-product of such commerce that archaeologists have not yet studied. Melaka (Malaysia) and Dutch Batavia (Indonesia), for example, housed *Peranakan* (Chinese/Malaysian), *Mardijker* (freed slaves of Malaysian and Indian descent), and "Topass" or "black Portuguese" (descendants of Portuguese and Flores or Solor people) communities.

Archaeological research has begun to illustrate the differential impact of European contact and colonization across the very broad and heterogeneous region of Southeast Asia. Coastal and lowland areas were most receptive to initial contact and most susceptible to subsequent colonization. That European colonization also affected sociopolitical organization in some areas seems evident from research on sixteenth-century mortuary ceramics from Calatagan, Philippines (Barretto-Tesoro 2008: 156-158).

The relative paucity of archaeological work on fourteenth- through eighteenth-century Southeast Asia may explain the near absence of key debates. Perhaps the only salient and persistent issue concerns the ethics of "historical archaeology" that retrieves shipwrecked materials through maritime commercial salvage operations. These materials provide the region's basic chronological sequence. Given the unreliability of the radiocarbon curve for this period and the dearth of alternative dating techniques, most archaeologists date their sites through their association with locally manufactured stonewares and Chinese tradewares. Geochemical analysis of maritime trade ceramics also helps archaeologists reconstruct changing regional and international trade networks through time.

Future Directions

South and Southeast Asian archaeology continue to play marginal roles in studies of the fifteenth through nineteenth centuries, where additional archaeological research could contribute to the expansion and refinement of micro- and macro-histories. Ethnohistorians working through multiple European and Southeast Asian literatures have been extraordinarily interested in economic and political history, two topics on which archaeological research often yields unique insights. Scholars of the Iberian expansion currently lack archaeological knowledge of the easternmost reach of the Iberian empire: while the Spanish colonized the Philippines, the Portuguese spent time in Melaka and in East Timor.

In global perspective, South and Southeast Asia played instrumental roles in the emergence and operation of the Asia's history coinciding with the expansion of a world system that linked New with Old Worlds along both land and ocean routes. Systematic, well-designed archaeological research in South and Southeast Asia might inform on how shifts in key source zones and peripheries reflected and affected other parts of the system. These regions offer rich archaeological data for studying other topics that fall under the purview of historical archaeology, like urbanism and ethnogenesis. Almost no one has yet studied Southeast Asia's Catholic missions, which were established by the seventeenth century in the Philippines, East Timor, Vietnam, and Cambodia. Such research would provide comparative data with studies already done in the New World (and particularly in North America) on Spanish and French missions.

Archaeological scholars of European imperialism would find ample data in both South and Southeast Asia: Europeans colonized every Southeast Asian country except Thailand, and British, French, Portuguese, and Danish all established a colonial presence in South Asia. So, too, would archaeologists in the emerging study of preindustrial and early modern "capitalism." Very little archaeological attention has yet been paid to the political economy of plantations and especially of the rise of nineteenth-century

industrial plantations: rubber in Indochina, Malaysia, and Sri Lanka; sugar in the Philippines, Indonesia, and India; tea in India, Sri Lanka, and Malaysia; spices in Indonesia; indigo and cotton in India; and coffee in Indonesia, Vietnam, and Sri Lanka.

High-quality, long-term research commitment to South and Southeast Asia's fifteenth- through nineteenth-century archaeological record would help redress the current imbalance in which historians have interpreted this period. Focused local studies on the period would complement our knowledge based on documentary data and yield insights on topics that interest historical archaeologists worldwide and that center on long-term responses of social transformation and resistance. The need is increasingly urgent, as many parts of South and Southeast Asia transition out of their status as developing countries and obliterate much of the historical archaeological record.

Cross-References

- ▶ Capitalism: Historical Archaeology
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Colonial Encounters, Archaeology of
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Ethnic Identity and Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Insular Southeast Asia at the Interface of Continent-Archipelago: Geography and Chronology
- ▶ Mexico: Historical Archaeology
- ▶ Oceania: Historical Archaeology
- ▶ Overseas Chinese Archaeology
- ▶ Underwater Cultural Heritage: International Law Regime

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South Asia: Paleolithic

Parth Randhir Chauhan
Stone Age Institute and Department of Anthropology, Indiana University, Indiana, IN, USA

Introduction

Numerous biological and technological milestones in hominin evolution have taken place within the last 2 Ma, one of the most important being the multiple dispersals out of Africa. In that regard, South Asia can yield valuable information regarding the adaptations of various *Homo* species as it critically lies in the center of the Old World, i.e., between important paleoanthropological evidence in Africa, Europe, China, and Australasia. It also significantly straddles the eastern end of the *Movius Line* and represents the easternmost distribution of *rich and classic* Acheulean localities in the Old World. (The Movius Line is named after a geographic boundary first recognized and proposed by H. Movius in the 1940s. It essentially represents the easternmost boundary or dispersal extent of Acheulean technology from Africa in the west. In recent years, however, Acheulean-like tools such as hand axes and cleavers have also been found beyond the boundary, mainly in Korea and China, thus fueling debates about whether those tools are Acheulean or represent independent parallel innovations.) The region is also known for the comparative lack of early hominin fossils, a dearth of excavated sites and associated chronometric dates. Consequently, critical information such as the timing of colonization, the factors responsible for techno-cultural change, and the earliest arrival of modern humans and identifying the various hominin specie(s) that occupied the region is not known. The South Asian landmass comprises a temperate/subtropical setting, dominated by a seasonal monsoon regime prevalent since the Miocene or at least the last 18 Ma. The physiographic configuration of India induces the behavior of both the Southwest and Northeast monsoons, during the summer and winter months, respectively. South Asia or the Indian subcontinent generally encompasses the political boundaries of Pakistan, India, Nepal, Sri Lanka, Bangladesh, and Bhutan. The north is dominated by the Greater Himalaya, the Lesser Himalaya, and the Siwalik Hills, all ranges almost geographically parallel and temporally successive to each other. The Gangetic plains are followed (to the south) by the great Thar Desert (in eastern Pakistan and northwestern India) and the Vindhyan range of hills. These hills are located north of the Deccan Plateau, which is a prominent landscape of peninsular India, and includes the Western and Eastern Ghats. In the past, different ecozones provided access to different types and shapes of lithic raw material. For example, for fluvial sources in the Siwalik region, rounded and subrounded quartzite and sandstone clasts dominated the Pleistocene landscape. In parts of north-central India, Acheulean assemblages were made on pink granite. In the Western and Eastern Ghats, however, the primary raw material was basalt and doleritic dykes, occurring as fragments from bedrock outcrops and waterworn clasts belonging to the Deccan volcanic Traps. Further south, in parts of Karnataka, limestone bedrock was the dominant raw material type available in the form of tabular slabs (Fig. 1). The Rohri Hills in Pakistan is a rare occurrence of more or less continuous exploitation of the same raw material source – chert outcrops – from the Lower Paleolithic to Harappan times. From the variety of raw materials exploited extensively by South Asian hominins, quartzite was one of the more dominant types used during the Lower, Middle, and Upper Paleolithic and at various types of sites contexts – quarry, factory, workshop, and occupational.

The most obvious geographic areas of entry into the subcontinent (and subsequent population

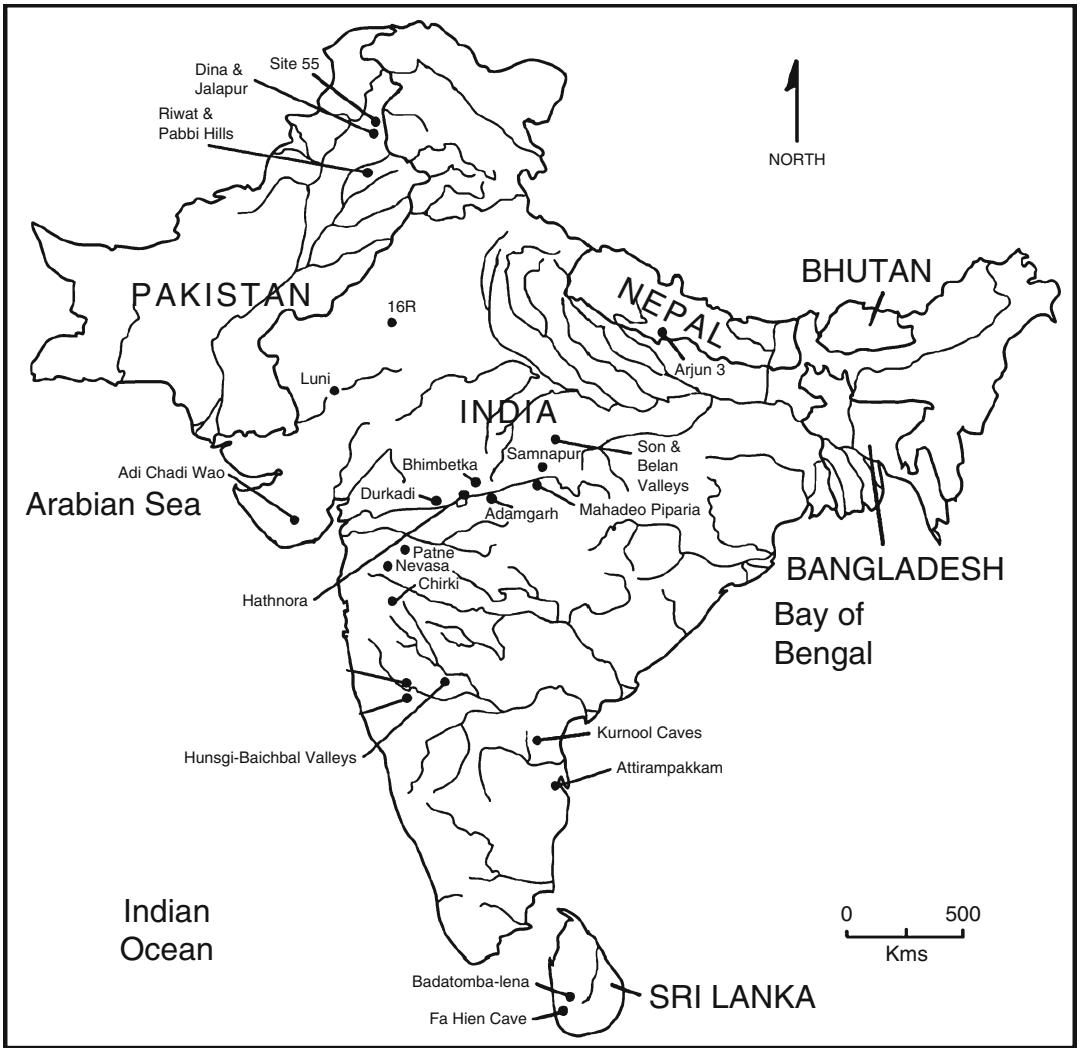
South Asia: Paleolithic, Fig. 1 Two examples of diverse rock types for stone tool manufacture: limestone blocks from Karnataka (*left*) and quartzite cobbles from the Siwalik Hills (*inset*)

movements *from* India) are Afghanistan and Pakistan to the northwest and Myanmar in the northeast. Both zones offered coastal routes, as well inland mountain passes and ecologically rich tropical evergreen and deciduous forests, without any major mountain ranges or deserts impeding potential movements. The Thar Desert may have acted as a temporary ecological barrier but also contained numerous isolated raw material sources (e.g., Jayal Gravel Ridge), and once crossed, ample outcrops of Aravalli quartzites were available on the landscape. The northeast region has a rich record of younger non-biface assemblages, most of which may be related culturally to the comparatively younger lithic industries from Southeast Asia. Similar to the Indo-Gangetic landscape in the north and northwest, however, the Bay of Bengal and the Ganges-Brahmaputra drainage system may have also acted as temporary barriers during the Late Pliocene-Early Pleistocene, due to a low occurrence of raw materials in the region and general delta environment. From the current lack of older Paleolithic evidence in NE India, the main point of movement appears to have been NW India.

Definition

Lower Paleolithic

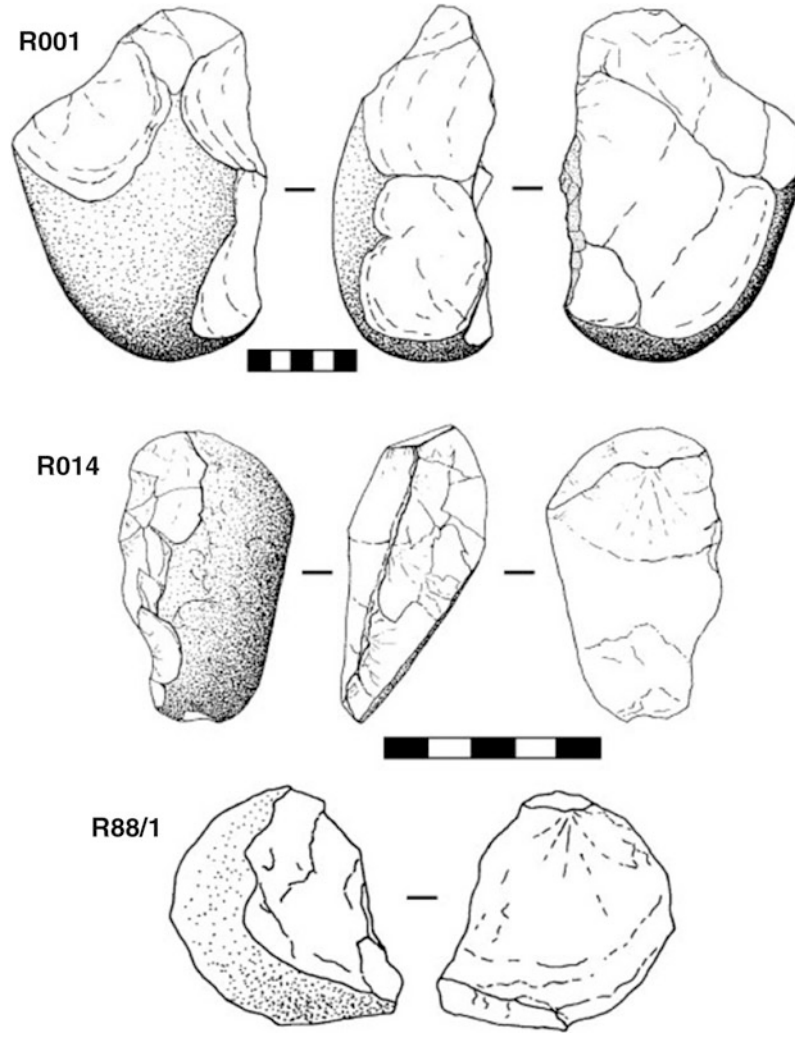
The South Asian Lower Paleolithic evidence has been traditionally divided into two facies or types of lithic assemblages: Soanian (non- or pre-Acheulean) and Acheulean industries, both often occurring independently as well in shared geographical, geomorphological, and stratigraphical contexts. However, most of the Soanian evidence is now known to postdate the Acheulean. Stone tools across South Asia are found in stratified or surface association with fine-grained fluvial and lacustrine sediments, ferricretes, laterites, and gravel or conglomerate deposits. Most of the Indian localities have been directly dated through the uranium-thorium (^{234}Th-^{230}U) and thermoluminescence (TL) or optically stimulated luminescence (OSL) methods and include a predominance of Acheulean sites (Mishra 1995). Ages for other occurrences such as Riwat, Dina, Jalapur, Pabbi Hills, Morgaon, and Satpati Hill have been estimated using paleomagnetism and geostratigraphic correlations. With some possible exceptions in Nepal and in western India, the only unequivocal evidence of



South Asia: Paleolithic, Fig. 2 Map of key paleoanthropological localities in South Asia

Acheulean occupation prior to the Middle Pleistocene in the subcontinent comes from Attirampakkam at between 1.07 Ma and 1.5 Ma. Other Acheulean sites have also been reported to be older but most indicate problems with the dating results, site contexts, or general interpretations. The majority of evidence in Sri Lanka belongs to the Upper Paleolithic, and some Middle Paleolithic lithic assemblages have been reported (Deraniyagala 1992), thus signifying a relatively late colonization of that region from southernmost peninsular India, when perhaps the sea levels were significantly lower. The terminal Acheulean evidence is not well established and the use of diminutive bifaces persisted well into the Upper Pleistocene as parts of early Middle Paleolithic assemblages (Chauhan 2009).

Some unique features of the South Asian Lower Paleolithic record include possible stone alignments and postholes at Paisra and stone alignments at Bhimbetka and Hunsgi. Though viewed as being controversial, a rockshelter at Bhimbetka has yielded cupule marks thought to be contemporary with the Late Acheulean.



South Asia: Paleolithic, Fig. 3 The main stone tool specimens reported from Riwat, Pakistan

At Singi Talav, an Early Acheulean level – layer 4 – yielded six complete and unmodified quartz crystals (though one may have some use-wear), possibly suggesting the transport of nonutilitarian objects from elsewhere. A similar example comes from the Acheulean layer at Hunsgi, which yielded almost 20 hematite pebbles, geologically exotic to the region, including one with striations interpreted as a sign of utilization. The only known premodern hominin fossils in the subcontinent may be contemporary with or younger than the Late Acheulean and come from Hathnora in the central Narmada Valley (see Patnaik et al. 2009). The Narmada fossil evidence includes a partial calvarium (possibly female) and possibly associated clavicles, and a rib fragment. The calvarium was originally identified as an "advanced" *Homo erectus* and later reclassified as an archaic or early form of *H. sapiens*; most recently it has been classified as *Homo* sp. indet. Modern human fossils and subfossils are more abundant in South Asia. In India, examples are known from Baghai Khor, Bagor, Pachmarhi, Mahara-Pahar, Tilwara, Valasna, Sarai Nahar Rai, Mahadaha, Damdama, and Lekhahia. In Sri Lanka, they come from Fa Hien, Batadomba Lena, Beli Lena Kitulgala, Bellanbandi Palassa, Hambantota, Alu Galge, Ravan Alle, and Beli Lena Athula (Kennedy 2003).

The South Asian "Oldowan"

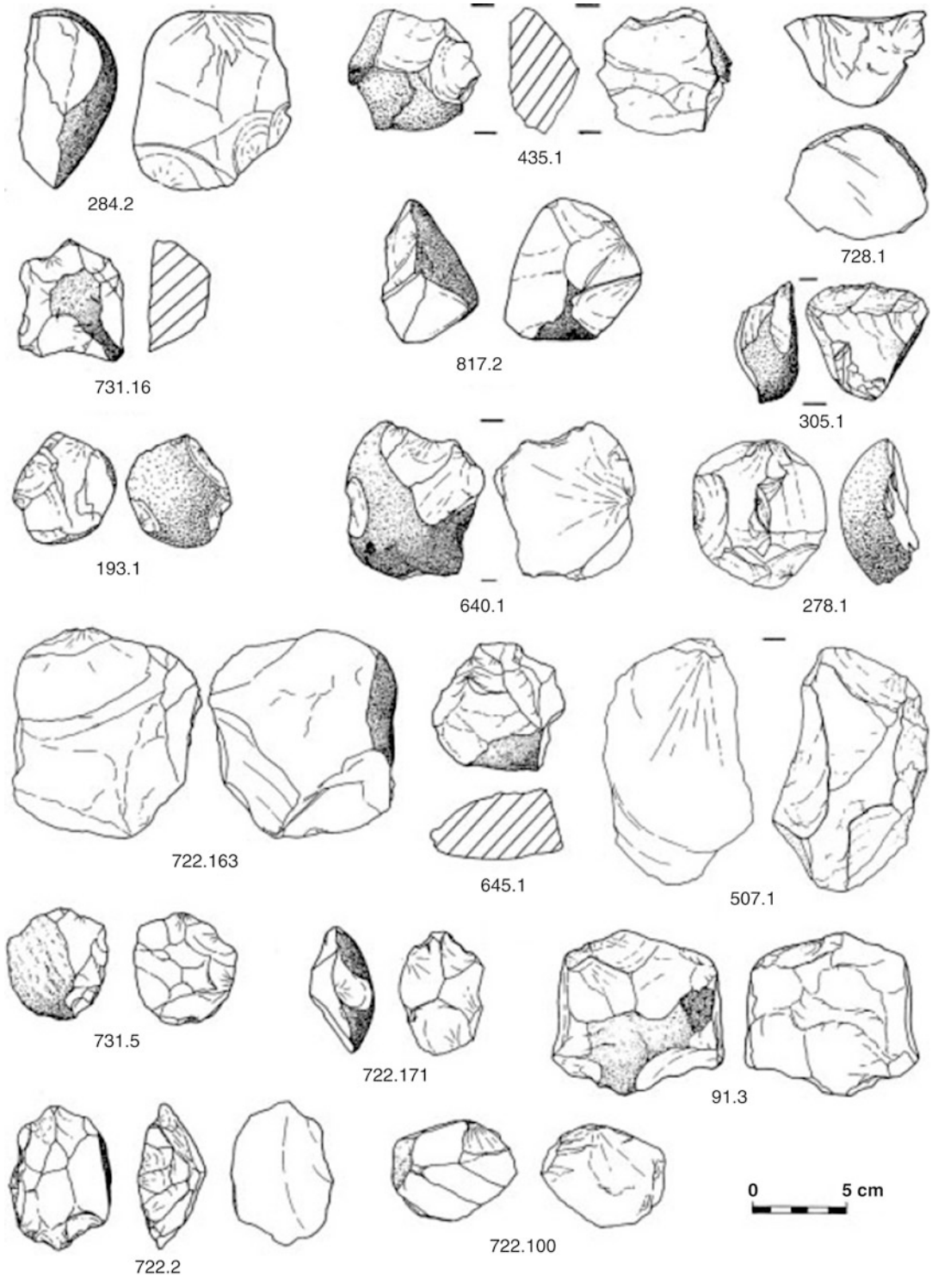
In the 1960s, A.P. Khatri was the first to argue for an indigenous origin of the Indian Acheulean from the Mahadevian industry, equated to the Oldowan, at Mahadeo Piparia in the Upper Narmada Valley. A similar claim was later made by J. Armand who reported a comparable assemblage at Durkadi from excavated contexts in the lower part of the valley. Numerous core-and-flake assemblages have also been reported from the Konkan coast, Karnataka, Uttar Pradesh, Bihar and West Bengal, Orissa, Andhra Pradesh, and northeastern India. Unfortunately, none of these assemblages have been dated and remain techno-chronologically undiagnostic; most appear to postdate the Acheulean (Chauhan 2009). The most systematically studied pre-Acheulean evidence in the subcontinent is also the most controversial and comes from the Siwalik deposits of northern Pakistan. The oldest archaeological evidence here is represented by the c. 2.0 Ma finds from Riwat and the 2.2–0.9 Ma old Mode 1 assemblages from the nearby Pabbi Hills. At Riwat, only three out of 23 specimens have been promoted as being most convincing as artifacts (Fig. 3). The assemblages from the Pabbi Hills comprise a total of 607 lithics (Fig. 4), and the investigators chronologically divided them based on the underlying strata and associated vertebrate faunal assemblages: 102 specimens dated to 0.9–1.2 Ma, 307 specimens to between 1.2 Ma and 1.4 Ma, and 198 specimens to between 2.2 Ma and 1.7 Ma. Unfortunately, the Riwat and Pabbi Hills material come from gravel and surface contexts, respectively, and comparable evidence in excavated contexts is required.

The South Asian Acheulean

With the exception of northeast India and parts of Konkan Maharashtra, western Kerala, south of the Cauvery River in Tamil Nadu, and Sri Lanka, Acheulean assemblages are found throughout most of the Indian subcontinent (Pappu 2001). The South Asian Acheulean is generally divided into Early or Late developmental phases, based primarily on typo-technological features, assemblage compositions, comparative stratigraphy, and associated metrical analyses. Early Acheulean assemblages are known to comprise hand axes, choppers, polyhedrons, and spheroids, usually a lower number of cleavers (but not always) and flake tools, the predominant use of the stone-hammer technique, and a marked absence of the Levallois technique. The Early Acheulean bifaces are often asymmetrical, large with thick butts or midsections, and possess large, bold, and irregular flake scars, indicative of hard-hammer percussion. In contrast, Late Acheulean assemblages are defined by the low proportion of bifaces, the high ratio of cleavers to hand axes, the very high ratio of flake tools such as scrapers, and the extensive employment of the soft-hammer technique and the Levallois and discoid-core techniques. These bifaces are also generally smaller, thinner, and morphologically more refined, with a significant increase in the degree of retouching and controlled bifacial thinning/flaking.

The Earlier Acheulean

The Early Acheulean phase is typologically and chrono-stratigraphically represented by several occurrences, including Nepal, the Thar Desert, and parts of Maharashtra, Karnataka, and Madhya Pradesh. From the available geochronological information and comparative geology and typology, most of these assemblages appear to be older than c. 400 ka. Currently, the oldest securely dated Acheulean evidence in the Siwaliks comes from findspots at Dina and Jalalpur in northern Pakistan (700–400 ka). In the Hunsgi-Baichbal valleys (Karnataka), systematic surveys and excavations were conducted since the mid-1960s by K. Paddayya, revealing numerous occurrences belonging to all Paleolithic phases (Paddayya 2001). Probably the most important Early Acheulean site from the Hunsgi complex is Isampur, representing the first-known occurrence of in situ artifacts in a quarry context in India. The region of Tamil Nadu, where stone tools were first reported in India, has been studied for over a century by various researchers. The most significant site in the region is Attirampakkam, located in the Kortallayar valley and investigated intermittently



South Asia: Paleolithic, Fig. 4 Some representative stone tool specimens from the Pabbi Hills, Pakistan

South Asia: Paleolithic, Fig. 5 A view of the 16R dune (multi-cultural Paleolithic site) near Didwana and quartz crystals (inset) found in Acheulean levels at nearby Singi Talav (both in Rajasthan, NW India)

for several decades. Cultural levels at the site derive from a 7 m section and, like the 16R dune in Rajasthan (Fig. 5), are thought to range from the Lower Paleolithic to the Mesolithic. Preliminary lithic analyses reveal that a part of the Attirampakkam assemblage exhibits both Early and Late Acheulean characters, and the oldest evidence is now known to be between 1.07 Ma and 1.5 Ma in age from paleomagnetic and cosmogenic dating (Pappu et al. 2011). Indeed, this work signifies the first comprehensive interdisciplinary study in recent years in India. Other earlier Acheulean examples include Chirki and Morgaon in Maharashtra, Singi Talav in Rajasthan, and Pilikarar in Madhya Pradesh.

The Later Acheulean

The South Asian Late Acheulean sites occur in greater numbers, possibly reflecting population dynamics and associated land-use intensity during the later Middle Pleistocene. This evidence marks the earliest, but undated, employment of the prepared-core and Levallois technology in the region, which are in the form of discoidal cores and the Victoria West technique, as well as the initial production of large blades at sites such as Bhimbetka. The Rohri Hills in southern Pakistan are one of the few South Asian Lower Paleolithic occurrences produced on chert (Fig. 6), and the assemblages come from numerous localities comprised of hundreds of artifacts. In Nepal, the site of Gadari indicates occupation along the banks of the Babai River, as the hand axes were recovered from the basal gravels of the alluvium, the oldest period of the Dang dun, a shallow intermontane post-Siwalik valley (Corvinus 2006). Most of the South Asian Late Acheulean evidence, however, is located in central and peninsular India, including parts of Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, Bihar, Karnataka, Andhra Pradesh, and Tamil Nadu (Pappu 2001). Some of the best-known Late Acheulean assemblages in north-central India come from Bhimbetka, where hundreds of rockshelters (many with rock paintings) are situated in a hilly and forested area in Madhya Pradesh (Misra 2001). Trenches in a cave (III-F-24) yielded a 3.8 m Lower and Middle Paleolithic sequence as well as Mesolithic material at the top (Fig. 7). It is unclear exactly when hand axes and cleavers disappeared from the South Asian archaeological record but occur as late as 110 ka and 60 ka in central and western India, respectively.

South Asia: Paleolithic, Fig. 6 Example of an Acheulean biface on chert in the Rohri Hills, Pakistan

South Asia: Paleolithic, Fig. 7 One of the excavated rockshelters at Bhimbetka in central India

The Middle Paleolithic

The South Asian Middle Paleolithic has been clearly defined from a large number of occurrences found throughout the entire region, and H.D. Sankalia was the first to formally recognize and define the South Asian Middle Paleolithic at Nevasa (Pal 2002). However, separating the Middle Paleolithic horizons from the terminal Acheulean ones has proved to be challenging because the Levallois technique (Fig. 8) and other forms of prepared-core technology originate in the Late Acheulean phase of the subcontinent. Additionally, the South Asian Middle Paleolithic sites often overlap geographically with the Late Acheulean occurrences and indicate successful adaptations and exploitation of

South Asia: Paleolithic, Fig. 8 A Levallois flake from the Narmada Basin, central India

a range of ecological and topographic settings. Older assemblages often appear to contain diminutive hand axes, and younger assemblages may have an increasing blade component. These observations, however, need to be verified through a more robust chronological framework. The features that distinguish Middle Paleolithic assemblages are the following: (a) a decrease in size of the artifacts, (b) a noticeable shift from large Acheulean bifaces to more smaller, specialized tools, (c) an increase in the prepared-core technique, and (d) a preference for fine-grained raw material (such as quartz, fine-grained quartzite, chert, jasper, chalcedony, flint, agate, cryptocrystalline silica, lydianite, and bloodstone). The South Asian Middle Paleolithic sites vary in their assemblage compositions, which generally include cores, choppers, discoids, scrapers, flakes, points, debitage, and so forth. Some well-studied stratified examples are Nevasa in Maharashtra, Samnapur in Madhya Pradesh, evidence from the Kortallayar Basin in Tamil Nadu, and the Jwalapuram lithic assemblages associated with Younger Toba Tephra in Andhra Pradesh (Petraglia et al. 2007). In Rajasthan, they have been found to be stratified in stabilized paleo-sand dunes and fluvial contexts (e.g., Luni and Berach Basins; 16R dune at Didwana). Absolute dating methods on different materials from different sites suggest that the Indian Middle Paleolithic is provisionally bracketed between 110 ka and 50 ka. Though difficult to classify exclusively as Middle or Upper Paleolithic, archaeological evidence at about 45 ka is represented by Kalpi in the Ganga Plains which yielded vertebrate fossil remains as well as core tools and by Site 55 in Pakistan in loess context. Also in Pakistan, Sanghao Cave of Mousterian and Upper Paleolithic cultural affinities also shows broadly comparable ages ranging from 42 ka to 22 ka.

The Upper Paleolithic

The South Asian Upper Paleolithic is also not clearly defined, due to lack of absolute dates and detailed technological analyses/classification. This entity was first recognized based on specific tool types already known from Africa and Europe. Its dominating and defining features include a notable increase in the production of more specialized tools such as blades, burins, borers, and, at some sites, an early occurrence of microliths. Additional tool types of this period include flakes, knives, awls, scrapers, and cores including cylindrical types, choppers, and bone tools. At Bhimbetka, for example, end scrapers dominate the Upper Paleolithic assemblages and are often made from the bases of blades and burins. The use of pressure flaking and the soft-hammer technique for flake detachment appears to increase significantly as compared with the older lithic traditions. The degree or intensity of retouch also appears to increase in general. The South Asian Upper Paleolithic shows a greater degree of regional typo-technological variation as well as an increase in different types of scrapers (e.g., steep, convex, convergent) and backed blades. Additional unique features include (a) the exploitation of ostrich eggshell fragments for making beads at Patne, Mehtakheri, Bhimbetka, Batadomba Lena, and Jwalapuram rockshelter, and nonutilitarian artifacts such as engraved geometric or crosshatched patterns; (b) possibly the oldest evidence of a shrine in the region at Baghor II; and (c) stone platforms at Bhimbetka and Site 55, and bone harpoons from the Belan Valley and Jwalapuram rockshelter. Some of the later Paleolithic assemblages, such as Badatomba-lena and Sites 49 and 50 (Sri Lanka) and Jwalapuram

rockshelter (India), comprise the earliest geometric microlithic evidence in South Asia (see Clarkson et al. 2009). A sound chronological framework for the South Asian Upper Paleolithic is lacking but a broad estimate can be provisionally assigned as 50 ka to 15 ka before the Mesolithic starts. The best-known sites (or stratigraphic sequences with Upper Paleolithic assemblages) include the Son Valley sites and the Bhimbetka rockshelters (shelters IIIF-23 and III-A-28) in Madhya Pradesh, the Kurnool caves and several river basins in Andhra Pradesh, the Belan Valley sites in Uttar Pradesh, the Singhbhum region of Bihar, Patne in Maharashtra, Mehtakheri in the Narmada Valley, Visadi in Gujarat, the Budha Pushkar region in Rajasthan, the Rohri Hills in Pakistan, the Chota Nagpur region in Bihar, the Sanghao rockshelter and Site 55 in Pakistan, and Batadomba Lena and Fa Hien Cave in Sri Lanka. Rock art and other forms of symbolic behavior appear to have started during this time before becoming prolific during the subsequent Mesolithic phase (Table 1).

The Siwalik Hills and the Soanian Industry

The most enigmatic and prominent non-bifacial techno-complex is represented by the Soanian industry, found throughout the Siwalik Hills region in Pakistan, India, and Nepal. As first defined by de Terra and Paterson (1939) from the Soan terrace sequence in northern Pakistan, Soanian artifacts were manufactured on quartzite pebbles, cobbles, and occasionally on boulders, all derived from various fluvial sources on the surrounding landscape. These assemblages generally comprise varieties of choppers, discoids, scrapers, cores, and numerous flake types (Fig. 9), all occurring in varying typo-technological frequencies at individual sites. Such attributes as bifacial reduction, acortical finished tools, extensive platform preparation (i.e., facetted platforms), and plan form and lateral symmetry are absent within the Soanian. The primary issues in accurately characterizing Soanian assemblages include lack of primary contexts and absolute dates and low numbers of diagnostic assemblages. The dynamic sedimentary and tectonic history of the Siwalik region has prevented preservation of Paleolithic sites. Most occur in non-dateable surface contexts with stray artifacts strewn randomly across Siwalik landscapes. Excluding some localities in the Soan Valley of Pakistan, the site complexes of Guler (Beas Valley) and Toka (Kala Amb area) in India, and the Arjun-3 site in Nepal, Soanian assemblages rarely comprise more than a few dozen artifacts. Rendell and colleagues (1989) have shown the Soanian "terraces" observed by de Terra and Paterson to be erosional features in the Soan Valley, rather than true river terraces. Although this challenges the validity of Soanian technological progression based on terrace sequences, current geological evidence suggests a post-Acheulean age for the earliest Soanian assemblages, also supported by preliminary dates from Arjun-3 in Nepal (e.g., Zöller 2000). Although the techno-cultural origins of the Soanian and associated chronologies are obscure, it is clear that the regionally dominant raw material (fluvially rounded quartzite clasts) and associated technology continued to be manifested into the Holocene.

Historical Background

The development of Quaternary and Paleolithic research in India can be divided into three phases: (1) from 1863 to 1964, (2) from 1964 to the early 1980s (see Korisetter & Rajaguru 1998), and (3) from the 1980s to the present day. During the first phase, inferences relating to paleoclimates and paleoenvironments depended on the characteristics of lithological units (such as coarse-grained and fine-grained clastic sediments) and the associated faunal material. Methodology and interpretative frameworks that were prominent in Europe were applied to the Indian context (most especially the glacial climatic sequence). Due to this massive influx of European influence between 1940 and 1960, many regional surveys were conducted to eradicate theoretical gaps, which included Pleistocene chronology and cultural successions. The 1960s formed a decade of important methodological and theoretical applications in the earth sciences

South Asia: Paleolithic, Table 1 Salient paleoanthropological features in the Indian Subcontinent (see Harrod 2007; Petraglia 2007)

Period	Site or region	Age	Significance	References
Lower and early? Middle Paleolithic feature				
O	Riwat*	c. 2.0 Ma	Possibly the oldest Oldowan evidence	Rendell et al. (1987)
O	(Pabbi Hills)*	2.2−1.0 Ma	Oldest Modes 1 evidence in stratigraphic association with vertebrate fossils	Dennell (2004)
O?	Durkadi*	?	The only-known stratified core-and-flake site in India	Armand (1983)
EA	Isampur[a]	1.27−0.73 Ma	Possibly the oldest Acheulian evidence & 1st known quarry	Paddayya et al. (2002)
A	Dina & Jalapur	400−700 ka	Oldest securely dated Acheulean	Rendell and Dennell (1985)
EA	Singi Talav	>800 ka?	Transport of non-utilitarian quartz crystals; 1 of 2 sites in clay context	Gaillard (2006)
EA	Chirki-on-Pravara	>350 ka	Preservation of fossilized tree fragments	Corvinus (1971)
A	Kuliana	?	First Lower Paleolithic site to be excavated	Bose and Sen (1948)
A	Attirmpakkam	?	Bovid and elephant footprints and shell impressions; 2nd site in clay context	Pappu et al. (2003)
A	Attirampakkam	?	Buried bifaces found in vertical and oblique positions	Pappu et al. (2003)
A	Hunsgi Valley	?	Twenty hematite nodules, one with striations (from use?)	Paddayya (1982)
A	Hunsgi locality V	?	Possible stone alignment	Paddayya (1984)
LA	Multiple sites	?	Earliest evidence of the Levallois or prepared-core technique	Multiple publications
LA	Bhimbetka[b]	?	Cupulue and engraving on rockshelter wall	Bednarik (2003)
LA	Bhimbetka	?	Oldest known blade production	Misra (1982)
LA-M	Bhimbetka	?	Largest, lengthiest, earliest and stratified cave/rockshelter complex with rock art	Wakanker (1973)
LA	Paisra	?	Possible stone alignment and post-holes	Pant and Jayaswal (1991)
LA	Zia Piarat Shaban	?	The only chert bifaces known and in quarry context	Biagi and Cremaschi (1988)
LA	Maihar	?	Flat sandstone disc, centripetally flaked	see Bednarik (2003)
LA-MP?	Hathnora	?	Oldest pre-modern fossil hominin, attributed to various species of *Homo*	see Athreya (2007)
LA-MP?	Hathnora	?	Oldest post-cranial fossil specimens (clavicles and rib fragment?)	Sankhyan (1997, 2005)
LA-MP	Daraki-Chattan	?	500+ cupules, 2 engraved grooves, stone floors	see Bednarik (2003)
LA-MP?	Adi Chadi Wao	~69 ka	Youngest dated handaxes	Marathe (1981)
Late? Middle and Upper Paleolithic features				
MP	Jwalapuram	~74 ka	Open-air stratified lithic assemblages above and below Toba ash	Petraglia et al. (2007)
MP	Hathnora	>33 ka	Possible engraved lithic artifact	Patnaik et al. (2009)
MP	Bhimbetka	?	Earliest stone structure in rockshelter context	Misra (1989)

(*continued*)

South Asia: Paleolithic, Table 1 (continued)

Period	Site or region	Age	Significance	References
MP	Kalpi	45 ka	Burnt bones and diminutive choppers; possible cut-marks	Tewari et al. (2002)
MO-UP?	Site 55	45 ka	Stone-lined pit, low wall, blades, microblades in open-air context	Dennell et al. (1992)
UP?	>40 Indian sites	40–20 ka	Numerous sites with ostrich eggshells	Multiple publications
?	Chandrasal	39 ka	Oldest engraved ostrich eggshell fragment	Kumar et al. (1988)
MP-UP	Fa Hien cave	31 ka	Earliest known modern human fossils & geometric microliths	Deraniyagala (1992)
?	Khaparkheda	?	OEB production site	Kumar (2000–01)
UP	Bhimbetka III A-28	?	2 OEBs found with modern human burial	Kumar et al. (1988)
UP	Batadombalena	28.5 ka	Geometric microlithic toolds; bone points & OEB present	Deraniyagala (1992)
UP	Kurnool Caves[c]	?	Earliest known use of controlled fire, bone tools, cut-marked bones	Nambi and Murty (1983)
UP	Patne	25 ka	Incised ostrich eggshell fragment	Sali (1989)
UP	Baghor	8–9 ka?	Oldest Paleolithic shrine (still practiced in the region today)	Kenoyer et al. (1983)
?	Belan Valley	?	Bone harpoon point	Bednarik (2003)
LLP	Jwalapuram	?	Beads and harpoon in rockshelter context	see Petraglia (2007)

Legend: *O* Oldowan, *EA* Early Acheulean, *A* Acheulean, *LA* Late Acheulean, *LP* Lower Paleolithic, *MP* Middle Paleolithic, *UP* Upper Paleolithic, *M* Mesolithic, *LLP Later Paleolithic*, *OEB* ostrich eggshell beads
[a]denotes controversial or ambiguous evidence.
[b]viewed as controversial by James and Petraglia (2005).
[c]called into question by Petraglia (1995).

and archaeology, all over the world. Numerous geographic zones of study were introduced and they included littoral, aeoline, lacustrine, and offshore environments. The first discovery (in 1863) of Lower Paleolithic artifacts was made at Pallavaram near Madras (now Chennai) by Robert Bruce Foote (Kennedy 2003). He was probably the first investigator to attempt establishing their ages as well as reconstructing contemporary climatic conditions, and also the first to apply a geoarchaeological perspective with an emphasis on site formation. A few decades later, the Yale-Cambridge expedition was launched by de Terra and Paterson (1939) to seek evidence of Pleistocene glaciation phases in the Sub-Himalayan region and to highlight its impact on early human cultures, both in concordance with the European model. Following their fieldwork in the Kashmir Valley (Jhelum), on the Potwar plateau (Soan Valley in modern-day Pakistan, discussed below in greater detail), in the central Narmada Valley (between the towns of Hoshangabad and Narsinghpur), and around Chennai, they arrived at a fourfold glacial-interglacial model first established in Europe in 1909. This glacial-interglacial model became a standard for subsequent Pleistocene research in India and prevailed for several decades, until revised by other researchers in the 1980s. In the greater part of the twentieth century, H. D. Sankalia and his colleagues and students placed great emphasis on correlating paleoenvironmental parameters and corresponding technological and behavioral adaptations of early hominids in the subcontinent. An interesting point to be noted is the emphasis placed (at that time) on river valleys and basins for the investigation of Paleolithic sites. Later efforts were directed at sites between river valleys or away from river valleys and expanded the potential of

South Asia: Paleolithic, Fig. 9 Representative stone tool specimen from a Soanian site in the Siwalik Hills of northern India

these sites in peninsular India (Fig. 2 and Table 2). Comprehensive multidisciplinary approaches have been applied only in the last two decades and at very few Paleolithic sites in South Asia. As a result, it is unknown whether various transitions represent technological influences of incoming populations (dispersal of *Homo sapiens* from Africa) or represent indigenous biocultural continuities (independent of external influence). These dynamic transitions probably reflect the collective impact of a suite of factors: demography, raw material type, topographical prominence, water resources, cognitive capabilities, mobility and settlement patterns, and subsequent hominin dispersals from peripheral regions. Research efforts in the last few years have centered on identifying technological dispersals from Africa, pinpointing Early Pleistocene occupations, pinpointing the initial arrival of modern humans, understanding the regional ecological impact of the Toba super-eruption at 74 ka on hominin populations, and establishing the earliest occurrence of microlithic technology.

Key Issues/Current Debates

Most regions of the subcontinent contain assemblages belonging to almost all three Paleolithic phases of techno-chronology, reflecting continuous occupation in various regions but at different levels (e.g., Rohri Hills in southern Pakistan, Hunsgi-Baichbal basins in southern India, the Son valley in Madhya Pradesh). However, continuous stratigraphic and archaeological sequences from the Lower Paleolithic to the Upper Paleolithic and Mesolithic phases at single locations are rare in South Asia. Exceptional

South Asia: Paleolithic, Table 2 Key South Asian paleoanthropological sites and their significances. For further details and relevant reference sources, see Chauhan (2009) and other citations in text

Site name	Age	Significance
Riwat	? – c. 2.0 Ma	Possibly the oldest Oldowan evidence IN South Asia
Pabbi Hills	? – 2.2–1.0 Ma	Oldest Mode 1 evidence in stratigraphic association with vertebrate fossils
Attirampakkam	1.07–1.5 Ma	Oldest Acheulean occurrence in South Asia; possible bovid and elephant footprints and shell impressions preserved
Isampur	? – 1.27–0.73 Ma	First-known Acheulean quarry
Bhimbetka	? – Late Middle Pleistocene to Holocene	Largest, lengthiest, earliest, and stratified rockshelter complex with rock art
Hathnora	? – Late Middle Pleistocene or Late Quaternary	Oldest premodern fossil hominin; attributed to various species of *Homo*
Adi Chadi Wao	69 ka	Youngest dated hand axes
Jwalapuram	c. 74 ka	Oldest well-dated Middle Paleolithic assemblages and in association with Younger Toba tephra (note: below YTT only; the assemblages above YTT are in secondary context)
Kurnool Caves	? – Late Quaternary	Earliest known use of controlled fire, bone tools, cut-marked bones
Patne	25 ka	Incised ostrich eggshell fragment

occurrences have been reported from the 16R dune (Rajasthan), the Bhimbetka and Adamgarh rockshelter complexes (Madhya Pradesh), and Attirampakkam (Tamil Nadu), all of which preserve continuous archaeological sequences. Some sites have shorter behavioral sequences, such as Patne (Maharashtra), which has Middle and Upper Paleolithic and Mesolithic assemblages but no evidence of Lower Paleolithic occupation. Though these sites have variably preserved multiple techno-chronological horizons ranging from the Lower Paleolithic to the Mesolithic, the sequences are not stratigraphically (i.e., chronologically) continuous. Some of these occurrences represent no visible hiatus during the Late Acheulean to Middle Paleolithic transition, while other sites have yielded sterile layers between cultural horizons. The South Asian Middle Paleolithic and South Asian Upper Paleolithic may represent a combination of indigenous development as well as technological and behavioral influences from incoming populations. The Lower-to-Middle Paleolithic transition is often defined by some by the presence/absence of bifaces. Likewise, the regional Upper Paleolithic-to-Mesolithic transition is becoming difficult to characterize because the antiquity of microlithic technology is being pushed back. The absence of Paleolithic evidence in some parts of the Indian subcontinent may be related unique climatic and topographic features. For example, parts of northeastern India are known to receive the highest amount of rainfall in the world, a climatic feature that may have affected regional environmental conditions during the Pleistocene, including sedimentation rates, seasonal raw material availability, and access to required resources for subsistence (as compared to other regions of the subcontinent). One reason for the dearth of Paleolithic archaeological evidence in such regions may be poor visibility for survey purposes or a limited occurrence of time-specific deposits in this thickly vegetated zone.

Many tool types within the South Asian Paleolithic are also known from other regions of the Old World, thus suggesting broad similarities in their overall functional and behavioral aspects, as well as shared subsistence strategies. At the same time, the conspicuous absence or low profile of specific tool types, such as classic tanged bifacial (projectile) points (Costa 2012), may reflect the absence of associated behaviors (e.g., hunting of

large mammals with hafted points on short thrusting spears) in the subcontinent. No convincing evidence of butchery has been clearly demonstrated in South Asia earlier than the evidence from the Kurnool Caves and possibly Kalpi at about 45 ka. Though rare, there appear to be some regional typo-technological variants within the South Asian Paleolithic. For example, the cleaver manufacturing technique from Chiri-on-Pravara is not found anywhere else in the subcontinent. Likewise, the Middle Paleolithic Jamalpur industry from Bihar shows higher than "normal" frequencies of end scrapers, notched tools, and denticulates, as well as typo-morphologically unique knife and scraper types. The paleoanthropological record of the island country of Sri Lanka is comparatively less well known but has a significant bearing on the evolution of modern humans in the subcontinent. Some of the most well-preserved South Asian fossils of modern *Homo sapiens* come from various cave deposits in Sri Lanka such as Fa Hien Cave. Renewed paleoanthropological research is critically required, however, to identify and date the earliest occupation in this region, which currently appears to be no older than 30 ka. The Ratnapura region in the southwestern wet lowlands (Deraniyagala 1992) has yielded quartz and quartzite lithic artifacts, but these remain undated and ambiguous.

Future Directions

Despite over a century of Paleolithic research in South Asia or the Indian subcontinent, a large number of important issues require to be addressed and explained. Some examples include (a) the lack of premodern hominin fossils as compared with other Old World regions, (b) the lack of unambiguous Oldowan evidence (especially if South Asia was a route during Out of Africa I migration from eastern Africa to SE Asia during the early Pleistocene), (c) the potential impact of the Toba super-eruption at 74 ka on regional (and global) climate and hominin adaptations/survival, (d) the number of dispersals and hominin species in the region during the last 2 Ma, and (e) specific subsistence strategies and land-use patterns in relation to the differing ecologies across the entire region. More systematic surveys, multidisciplinary investigations, and rigorous absolute dating projects are crucially required to address all of these problems and related questions (see Dennell 2000-01). A more increased focus on paleoanthropology in South Asia is all the more important as numerous areas with Paleolithic evidence are under constant threat from population increase, growing infrastructure, widespread agriculture, and other destructive agents.

On the lack of hominin fossils: One of the most significant deficiencies in South Asian paleoanthropology is the virtual lack of hominin fossils older than the Upper Pleistocene. This insufficiency appears to be related to a number of possible factors: (1) geological factors such as low rates of preservation and high rates of erosion, (2) the fossils are exposed or preserved in very rare contexts and have not been recovered as of yet, (3) the fossils, especially fragmentary or weathered specimens, have not been recognized as being *hominin* by nonspecialists, since most investigators in the field are archaeologists, prehistorians, and geologists. Qualified physical anthropologists have rarely carried out long-term and systematic surveys for hominin fossils in South Asia.

On lack of Oldowan evidence: Though numerous "Oldowan" assemblages have been reported throughout the subcontinent, unequivocal evidence (if any) continues to remain elusive. Because there is a considerable faunal overlap between the Siwalik Hills region and various early *Homo* sites, it appears that the Pliocene conditions in India during the Pinjore Fm. times were conducive to possibly allow dispersion of early hominin through the region. Moreover, sediments older than the Middle Pleistocene occur only in pockets south of the Siwalik Hills, suggesting that associated Oldowan evidence has not been preserved in primary context or is deeply buried at places. If early hominins with Oldowan technology passed through this region on the way to SE Asia, associated evidence should be (theoretically) preserved in South Asia, even if marginally.

On the possible impacts of the Toba super-eruption: The Toba volcano, located in Indonesia, erupted at least three times in the last 1 Ma. The largest eruption, or super-eruption, is known to have occurred at ~74 ka, and resulting ash was widely deposited in India due to the wind direction following the eruption. Primary deposits of this ash or tephra can be used as chronostratigraphic marker in the field. Current debates are centered on the potential ecological impact(s) of the eruption on Indian Pleistocene flora, fauna, and hominin populations (Williams 2012). A key hindrance has been the challenge in finding undisturbed Paleolithic assemblages in stratigraphic association above, below, *and within* primary-context Younger Toba Tephra deposits.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Art, Paleolithic
- ▶ Central Asia: Paleolithic
- ▶ *Homo erectus*
- ▶ *Homo sapiens*
- ▶ Lithic Technology, Paleolithic
- ▶ Misra, Virendra Nath
- ▶ Movius Line
- ▶ Paddayya, Katragadda
- ▶ Sankalia, Hasmukh Dhirajlal
- ▶ Sharma, Govardhan Rai
- ▶ Zeuner, Frederick Everard

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South, Stanley A.

Russell K. Skowronek
University of Texas-Pan American,
Edinburg, TX, USA

Basic Biographical Information

Stanley A. South is one of the most complex and fascinating archaeologists of the past 60 years. Born on February 2, 1928, Stanley was the only son among the four children of Austin E. South and Mae Belle Casey South of Boone, North Carolina. A child of the Great Depression, South grew up in a loving multigenerational family filled with music, singing, poetry, art, and a profound respect for the people and culture of the Appalachian Mountains. In 1934 when others were migrating westward, the South family traveled across the United States to Carlsbad Caverns, the Grand Canyon, Yosemite, and the Chicago World's fair. His formative years ended with service in the US Navy during the final months of WWII followed by photography school and a brief stint as a professional photographer before matriculating at Appalachian State Teachers College (now Appalachian State University) in Boone, NC (1946–1949). After graduation South did some acting and was a public school teacher in a junior high school in Greensboro, NC. There he taught a class on the American Indian, and he began recording archaeological sites in the region.

It was as a student at Appalachian State that South was first exposed to Darwinian evolutionary theory and the then cutting-edge cultural evolutionary theorists Julian Steward and Leslie White. South found his muse in the evolutionary approach and its application to anthropology. He left teaching and entered the graduate program in anthropology at the University of North Carolina. There, under the tutelage of Joffre Coe, he fully embraced the application of evolutionary theory in archaeology (South 1955). Fifty years later he is still an outspoken proponent (South 2005; South & Green 2005).

Major Accomplishments

Over the past five decades, South has made significant contributions in prehistoric and historical archaeology of the Carolinas and the interpretation of same to the general public. This included work at such prehistoric sites as Town Creek Indian Mound in North Carolina and at Charles Towne Landing in South Carolina. He has worked on English (e.g., Brunswick Town [South 2008]; Bethabara [South 1999]; Charles Towne Landing [South 2005]; Ninety-Six), French (Port Royal), Spanish (Santa Elena), and American (Edgefield, Columbia [South 2010]) sites in the Carolinas dating from the sixteenth to twentieth centuries. Known for his exacting field techniques, South drew on his background in photography and drawing and admonished his colleagues to do likewise. This would include the quantifying of findings and their interpretation to the public through reconstruction (South 2002). Significantly South was an early proponent for the timely analysis and reporting of fieldwork.

Over the course of his career, he has completed more than 200 reports, articles, monographs, and books detailing his findings. He was the founder of the Conference on Historic Sites Archaeology in 1959 and a cofounder of the Society for Historical Archaeology in 1967. Through his efforts and the support of the Conference on Historic Sites Archaeology, South compiled and published 15 volumes of papers delivered at the annual meetings and later created two other publication series, *Volumes in Historical Archaeology* and *Historical Archaeology in Latin America*. These number 51 and 16 volumes, respectively.

Just before his fiftieth birthday in 1977, South crossed a watershed in his career with the publication of *Method and Theory in Historical Archaeology*. In it South the anthropologist said that to go beyond simple antiquarianism, we must explicitly engage in scientific archaeology. That is, its foundation must rest on evolutionary theory, using the hypothetico-deductive-inductive paradigm (South 1977: 6). Simply put, the humanistic and particularistic paradigms did not meet the criteria necessary for scientific research.

By using the scientific paradigm, South believed that the historic archaeological record would reveal valuable patterning linked to behavior. Thus began his search for patterning to demonstrate that. Built on two decades of research on English-colonial era sites in the Carolinas, its quantitative approach led to the definition of a variety of material patterns reflecting the behaviors associated with the resident cultures of the past. Embraced by the field for making explicit what was implicit, it would be required reading for a generation of students and would transform the field (South 1978). Today pattern recognition is a de rigueur aspect of the methods associated with historical archaeology. While many have turned to humanistic post-processual "storytelling" or other impressionistic approaches, South and many others continue to recognize that pattern delineation holds great promise for comparing differing cultural adaptations in similar natural and social environments. South sums up his basic philosophical belief as "Science: Seek life's truths to set you free" (Joseph 2010: 135, 141).

Beginning in 1978 and continuing for the next quarter of a century, South worked at the sixteenth-century capital of Spanish La Florida Santa Elena. Now a National Historic Landmark, the site, located on the US Marine Corps Recruit Depot, Parris Island, South Carolina, is one of the most completely investigated and best preserved sixteenth-century town sites in the Americas. A detailed publication on the European material culture from the site is widely cited throughout the hemisphere (South et al. 1988). Information from this site will continue to influence our knowledge of sixteenth-century adaptations for decades to come.

Stanley South has been repeatedly honored for his many contributions to the field of historical archaeology, regional history, and scholarship. In 1987 South was awarded the J. C. Harrington medal in Historical Archaeology, the most prestigious award the profession has to offer by the Society for Historical Archaeology (Ferguson 1987). This was followed with the "Order of the Palmettos" and "The Old North State Award" by the states of South and North Carolina. In 1997 he was awarded an Honorary Doctor of Humanities from the University of South Carolina Trustees for his then four decades of research.

In 2012, at the age of 84, Stanley South retired after 43 years at the South Carolina Institute of Archaeology and Anthropology in Columbia, South Carolina.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Dating Methods in Historical Archaeology
- ▶ Historical Archaeology
- ▶ Historical Archaeology in Latin America
- ▶ North America (USA): Historical Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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Southeast Europe: Archaeological Museums

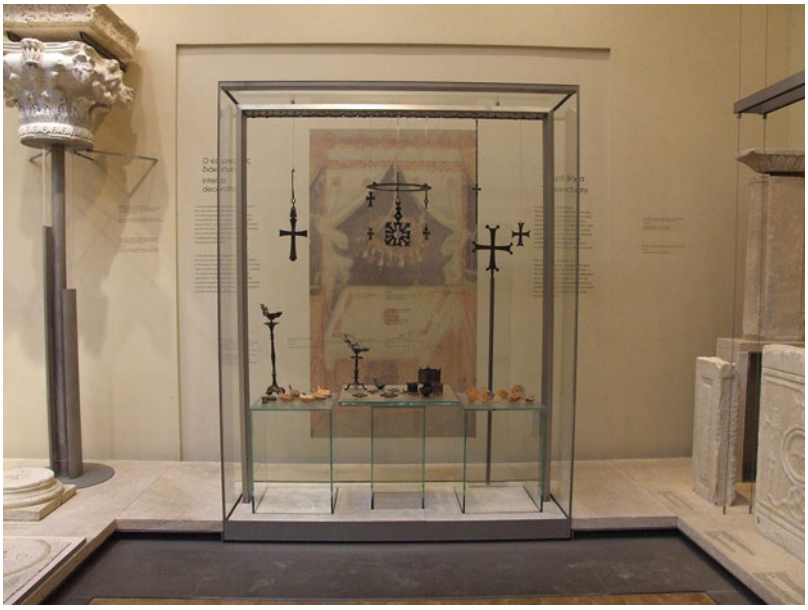
Eleni Kotjabopoulou
Archaeological Institute for Epirotic Studies, Ioannina, Greece

Introduction

The establishment of archaeological museums in Southeast Europe is tightly interwoven with the modern, often turbulent, political history of this highly diverse territory, its people, and cultural traditions. The gradual dissolution of the Ottoman Empire through the nineteenth to the early twentieth century and the creation of independent nation-states throughout the Balkan Peninsula (Hobsbawm 1990) – an ongoing process marked in a most traumatic way in the 1990s by the breakup of the former Yugoslavia – inevitably meant that deep history was conceptualized and interpreted in a linear, evolutionary, effectively nationalist perspective. The past, discontinuous and fragmented as it was, was nonetheless put on a high pedestal, as in many other parts of Europe, to be glorified and broadcast as an "entity." This "pure", "innocent" and "protected" image of the past served legitimize and negotiate various, often conflicting, goals and aspirations (e.g., territorial, political, ideological and aesthetical) of the present.

Definition

Archaeological museums in Southeast Europe to a large extent still maintain the focus on artifact-centered, art history, "idealist" narratives, and only recently, since the late 1990s, did some of them begin to explore a different trajectory: one, which departs from the doctrine of proving, confirming or propagating historical continuity, "uniqueness" or remoteness. A reformed scope, admittedly of disparate pace and ideological tendency depending on the country or tradition in question, is emerging which attempts to bring to the forefront the *variability* of past cultural formations, the circumstances and the contingencies of particular socioeconomic contexts and processes and one, that seeks to give room to the *agents or actors* of history, the ancient people, their communities, ideologies, institutions, technologies, etc. However, despite this newer trend, archaeological museums in the Balkans continue to hold the lion's share in the domain of mainstream, top-down, identity-building. Nevertheless, some recent exhibitions explored evolving critical reevaluations and/or redefinitions of the past and a number of them have received international recognition.



Southeast Europe: Archaeological Museums, Fig. 1 Byzantine and Christian Museum, Athens, Greece. Aspect of the exhibition section "From Antiquity to Byzantium: the Temples of the New Religion" (Photo by E. Kotjabopoulou)

Key Issues/Current Debates/Future Directions/Examples

The *singular* past rationale was, and to some extent still is, nowhere better exemplified than in the case of Greek archaeological and museum displays (Hamilakis 2007; Damaskos & Plantzos 2008). Not least, and this needs to be highlighted, because Classical ruins, especially *white* – yet initially polychrome-painted – marbled architecture and sculpture, not only served as the foundations *par excellence* of Hellenism, but equally, if not even more so as a fundamental image of European identity since the Enlightenment (Settis 2006). However, in a country which is an overwhelming palimpsest of ancient relics, curated at no fewer than 150 museums, the way has been opened to more public-oriented and democratic museum scenarios and practices. Put in other words, the intention is widespread – yet not fully implemented – to break with the tradition of repository-type exhibitions useful only to the *élite* "experts" and pleasing to educated aesthetes. No doubt, the recent influx of European Union support funds for carrying out extensive renovation and re-exhibition projects has greatly contributed to this trend as well as the *loss of innocence* of Greek archaeological theory and museology (Kotsakis 1991; Mouliou 2008). Interestingly, this wave of reform was initiated by two state-run museums not having as a subject matter the "golden" Classical past, but, instead, the somewhat less esteemed and specialized religious art history of the Byzantine (medieval) epoch. The Museum of Byzantine Culture, Thessaloniki, and its annex, the White Tower Museum, which hosts a multimedia enhanced itinerary into the multicultural, cosmopolitan history of that city, the second largest in the country, and the Byzantine and Christian Museum, Athens, constitute groundbreaking, open-minded interpretative exhibitions. In these, ancient peoples and their beliefs are center stage. Thematically instead of being taxonomically organized (Fig. 1), these displays offer sharp insights on long established national historiographies (Gazi 2011). In the last decade or so, among the many rearranged and refurbished and greatly improved regional Greek museums dedicated to antiquity, the Ioannina Archaeological Museum, Northwestern Greece, stands out for its cutting-edge, dialectical approach and appropriate design. In it, material cultural remains, whether of seminomadic mountain shepherds or of pilgrims to the oldest oracle site of Greece, that of Zeus (Jupiter) at Dodona, are used as vehicles, and

Southeast Europe: Archaeological Museums, Fig. 2 Archaeological Museum of Ioannina, Greece. Aspect of the exhibition section "The Archaeology of Death" (Photo by E. Kotjabopoulou)

not as self-evident, axiomatic values (artistic, technological or other) for the visitors to explore a multilayered past (Fig. 2) and to question *how* the past relates to the present and vice versa. This issue is most challenging for museums worldwide: it is an issue which touches on various aspects of epistemology as much as of museography, and one which has not been adequately addressed in the recently opened (2009), heavily visited New Acropolis Museum, Athens. Some of the text-book masterpieces of ancient Greek art production – notably votive statues in which the historically contingent anthropocentric spirit of 5th c. BCE democracy was encoded – are now housed in an imposing glass-and-concrete building, albeit elegantly emplaced in direct visual contact with the Athenian sacred hilltop (Fig. 3). Even though the exhibits remain largely un-contextualized (Plantzos 2011), the juxtaposition of the few *original* Parthenon friezes – which escaped Lord Elgin's dismantling project – with *plaster copies* from those on display at the British Museum (London), the Louvre (Paris) and elsewhere, do, however, make an eloquently strong, constructive argument in the debate on the repatriation and illicit circulation of antiquities internationally.

In the rest of the Balkan countries which experienced the former so-called eastern-bloc (communist) regimes, collections of antiquities, whether national or regional, have as a rule formed part of what can be called *diachronic* knowledge building institutions, focusing on the construction and legitimization of national/ethnic identities and visions. In Bulgaria, Rumania, and other new nation-states, relics of antiquity formed part of an "evolutionary" heritage continuum; until recently, in many cases, they were displayed under the same roof as artifacts from medieval times and ethnographic, cartographic, miscellaneous collections, even including those of natural history specimens, in the model of analogous nineteenth century central European establishments (e.g., Guzin Lukic 2011; Lozic 2011; Vukov 2011). In spite of the grave financial and other structural problems currently faced by these countries, some attempts are being made to review form, content, and layout. Site-specific archaeology museums stand at the forefront of this trend, which directs great emphasis on the educational aspect. A most informative case, the Krapina Neanderthal Museum, is situated in Croatia. It is associated with a famous cave site rich in internationally significant remains of Neanderthals and ice age fauna which have been researched for over a century. This contextual exhibition relies on a "simulation of life in the past" model. Modern interactive technology aims to create a sensual experience for the visitor.

Southeast Europe: Archaeological Museums, Fig. 3 Exterior view of The New Acropolis Museum, Athens, Greece. In the background (*right*), the Acropolis hill and the Parthenon (Photo by C. Economides)

Because of its core content, the display embraces a rarely portrayed pan-European perspective on the past. The exhibition challenges the now obsolete paradigm which saw the Neanderthal lineage as marginal to mainstream human history. In Albania, where archaeological remains have been overtly manipulated by its leadership to advance territorial agendas, the Butrint Museum offers a holistic, in contrast to what was formerly a selective, approach to represent the past. In this small local museum, the focus is not overwhelmingly on the important large Roman seashore colony, Buthrotum, a UNESCO World Heritage Site since 1993; instead, even though the display genre remains effectively an artifact-oriented conservative one, a more balanced, *diachronic*, narrative is presented which charts the many transformations that the locale underwent, from its modest status as an Iron Age settlement down to its strategic fortification by Venetian and Ottoman rulers.

Turkey currently invests much energy and funds in modernizing some of its leading archaeological museums (e.g., the Topkapi Palace, Instanbul); a comparable, yet on a much grander scale, reconceptualization of the past is clearly evident at the Museum of Anatolian Civilizations, Ankara. With the aim of validating the new, westernized, Turkish identity, this, the first museum of archaeology of Republican Turkey, was originally assembled (1938–1941) to "construct" a deep national, i.e., autochthonous, past by "acculturating" the remains of the Hittite civilization – an empire born and developed in Anatolia and with no "obvious" descendants (Gürol 2008). After the museum's renovation in the 1990s, an impressive array of artifact collections were often displayed in a "reconstruction" mode – that is, they were arranged in a manner that recreated how they were used in the past. The exhibition encompasses an amplified chronological scheme, from early prehistory to the early twentieth century. Due attention and a more even representation is now placed on the many other cultural manifestations – e.g., Phrygian, Lydian, Greek, Roman, Byzantine, Ottoman – that left their rich imprint on the vast expanses of this westernmost Asian peninsula. This dynamic institution is currently being rearranged.

The traumatic recent history of Cyprus and still unresolved partition of the island has prevented renovation of its archaeological museums on either side of the Green Line (Bounia & Stylianou-Lambert 2011). However, a site-specific museum innovative for its time (the 1990s) is located at Maa-Palaiokastro, in the remote southwest countryside near Paphos. Although this exhibition does not, for security reasons, hold collections of original artifacts, it does provide in its modern building an insightful outlook on everyday life at this Late Bronze settlement and the key-role this resource-rich island played in the wider trading and cultural networks throughout antiquity.

From the above eclectic survey, it becomes evident that there is immense potential for the future development of archaeological museums in Southeast Europe especially intellectually by disregarding old- or neo-nationalist modes of thought. In this portion of the Continent, which incontestably holds a deep and rich past, archaeological museums can and perhaps urgently need to set challenging goals by turning away from unproductive policies which have haunted the modern history of the area and to explore the *tremendous* cultural variability of the region, in time and space. Powerfully singular, archaic, medieval or other, selective or utopian narratives become all the less appealing in the increasingly competitive tourist industry on which these institutions increasingly rely upon for their very existence. Besides, any kind of culturally monolithic and simplistic museum narrative of the past entails dangers for the communities and citizens of today and jeopardizes their future. As some of the examples reviewed above demonstrate, archaeological museums in this diverse region can become bridging rather than dividing institutions of memory.

Cross-References

- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage: Public Perceptions
- ▶ International Council of Museums (ICOM)
- ▶ Museums and Memory Experiences
- ▶ Nationalism and Archaeology
- ▶ Parthenon (Elgin) Marbles: Case Study

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Southern Africa: Cultural Heritage Tourism Development and Management

Susan O. Keitumetse
Okavango Research Institute, University of Botswana, Maun, Botswana

Introduction

Cultural heritage tourism is travel that focuses on admiring and learning about historical landscapes, past monuments, cultural landscapes, archaeological sites, and historical artifacts. These features and material culture can be situated in their places of origin, such as Egyptian pyramids, or can be packaged and placed in a museum setting, e.g., a hub of Smithsonian Museums in Washington DC, USA. The process of deliberate travel to and seeking of interpretation of these features adds the tourism value to these cultural and heritage landscapes and associated material culture.

Cultural heritage resources that sustain cultural heritage tourism are of two categories:

1. *Tangible* (UNESCO 1972) – These include among others archaeological artifacts as well as archaeo-historical sites, monuments, and landscapes.
2. *Intangible heritage* (UNESCO 2003) – constitutes cultural skills, knowledge, and expressions associated with material culture, i.e., the intellect that informs the production of tangible heritage.

The development of heritage tourism in southern Africa needs to be assessed through four key processes in order to come up with a balanced representation of heritage at any particular site:

1. The process of heritage knowledge production (i.e., placement of meanings and values associated with material culture, in a country)
2. Sociocultural, sociopolitical, and socioeconomic landscape within which heritage knowledge is identified, selected, and expressed through tourism
3. The broader context within which tourism developed and resulted in cultural and heritage tourism
4. Extent of local community involvement and development – which in archaeology is represented by what is popularly referred to as public archaeology (Little 2005)

Cultural heritage tourism commercializes historical events related to people's lives. Unlike safari tourism currently taking place in most of southern African countries, the use of cultural and heritage resources in an open market setting requires more attention towards the sensitivity of the cultural resources. Conservation indicators that are specific to cultural and heritage resources are therefore necessary.

Like tourism, the origins of cultural heritage tourism in the south can be attributed to nineteenth-century European travel that inspired exotic travel to most regions including southern Africa. Particular to southern Africa, this travel was largely triggered by the advent of missionaries, ancient traders, and explorers seeking alternative trade routes, all of which exposed African communities and cultures to the outside world. Colonial anthropological research also played a significant role as it placed a spotlight on exotic cultures.

In post-nineteenth century period, environmental protection awareness policies such as the 1972 World Heritage Convention and the 1987 World Convention on Environment and Development (WCED) resulted in natural resources tourism (safari tourism) that became dominant in African wilderness. However, the formal incorporation of cultural heritage resources in safari tourism remained limited if not neglected.

The twenty-first century has seen the development of concepts such as ecotourism (Drumm & Moore 2002), responsible tourism (cf. Revitt & Sanders 2002), and pro-poor tourism. The aim of these concepts is to promote tourism that encourages direct interaction and responsibility towards local communities, thus exposing African local cultures to international visitors. However, of concern is the lack of attention accorded the management of cultural heritage resources. Within the broader rural and local development studies, tourism is gradually being perceived as a medium through which the local "publics" (in archaeological heritage language) or local communities (in social development literature) represent and express themselves to a global world as well as a means to acquire financial gain.

In sub-Saharan Africa, a prerequisite to selecting heritage for tourism is to analyze issues of ownership/affiliation identification, selection, interpretation of heritage resources In addition, a broader theory of the concept of "community" and cultural resources use in tourism also has to be established. In cultural heritage tourism, a balanced point of departure that considers political, social, economic, as well as cultural meanings and affiliations that are imbued within existing archaeological interpretations is necessary to balance presented identities. Case studies in boxes 1 and 2 below provide examples of issues to be considered in packaging cultural heritage resources for tourism in southern African contexts. Others are discussed in detail in a section below, under the heading "Key Issues/ Current Debates."

In most cases, the tourism aspect of cultural heritage is not addressed by specific cultural heritage professionals from disciplines such as archaeology, but rather by business-based disciplines. In this regard, cultural resources become vulnerable to destruction as their conservation needs are not attended to.

Definition

Tourism is travel to exotic places. Cultural heritage tourism is a branch of tourism that extends the symbolic value of cultural and heritage resources to economic significance. The extended value is however dependent on conservation of historical sites, archaeological remains, monuments, sites, and cultural landscapes. Archaeological and historical heritage tourism can take place in museums, interpretation facilities, in situ archaeological sites, and historical landscapes, among others.

Smith (1995) provides a summary of salient features that characterize definitions and descriptions of twentieth-century tourism within the mandate of the 1970 World Tourism Organization (UNWTO) as follows:

1937 – Key indicator was 24 h stay.

1950 – Inclusion of student on study tours as tourists and less than 24 h traveler called excursionist.

1963 – Distinction between tourists staying 24 h and those staying less recognized.

1967 – Distinction between tourists who stay overnight and those that do not was drawn as well as recognition of transit travelers as tourists.

1991 – International definitions of tourism emphasized and developed.

Box 1. Botswana case study: Examples of issues to consider when initiating cultural heritage for tourism

Botswana: 1900–Present

Bechuanaland Protectorate became independent in 1966. Pre-independence archaeological heritage protection in the country included Proclamation No. 40, of 18 November 1911 cited as "*The Bushmen Relics and Ancient Ruins Protection (Bechuanaland Protectorate)*" – highlighting the Bushmen/San/Basarwa as a perceived "local community" at the time. This perception of "Bushmen" as the public in what later became heritage management emanated from South Africa where Bushmen rock art was protected from European expedition members who supposedly vandalized it for souvenir purposes as well as protection from resident communities who used the caves in which rock art was found for livestock rearing and shelter. Government of the Republic of South Africa, National Monuments Council (1970–1977).

The heritage "management" approach, as it were, prohibited the perceived "public" from interacting with tangible heritage. Emphasis on the *"Bushmen"* also indicates perception of whose heritage was selected and presented as well as by whom.

It appears that perception of the Bushmen as "ancient" perpetuated their image as a community that could not manage (select, interpret, and present) their heritage to visitors, a characteristic that still prevails to a certain extent in southern African heritage management to date. "Bushmen" heritage is currently managed by either NGOs or governments on their behalf (see Fig. 1 below).

The case study shows that whereas earlier focus on the Bushmen established a basic framework approach for public/local community recognition, their placement as passive participants rather than custodians of heritage has set a negative precedence that they are not empowered to lead a process of identification, selection, and presentation of their heritage through tourism. The question of who places tourism value on the San/Bushmen/Basarwa or any community, heritage and for what purpose becomes relevant. In developing heritage tourism, these historical nuances become very significant in achieving an ethical and sustainable tourism product.

The most substantive archaeological legislation in present-day Botswana came into effect after the revision of the 1934 *Antiquities* Act and it was named *The Monuments and Relics Act, 1970 chapter 59:03*. In contrast with the Bushmen Relics Act of 1911, any feature "...known or believed to have been erected, constructed or used before 1st June, 1902..." was considered of importance. This characteristic broadened the scope of the concept of the public to include those who were not represented in the 1911 and 1934 legislation. Three decades later, the 1970 Act has been revised and reenacted as the *Monuments and Relics Act 2001*, which is currently in operation.

1993 – Tourism concepts at the center stage – identification and refining of these.

In addition to developments on tourism description and definition, The International Ecotourism Society (TIES) was launched in 1990 to guide and control tourism activities in ecologically sensitive areas. Ecotourism is defined as travel to pristine places to experience both environment and cultures of the people without jeopardizing opportunities for others to have similar experiences in the future – in other words, the sustainable aspect of travel. In 1997 TIES included "Ecotourism and community participation" as one of its operational principles which

Box 2: The Republic of South Africa case study: History of cultural heritage legislation and the development of tourism identities

The Republic of South Africa: 1900s–Present

A number of institutions have had either a general interest or a legal mandate for heritage management in RSA over the years. These are the South African National Society (1905–1934), the Historical Monuments Commission (1934–1969), and the National Monuments Council (1969–1999). Since the promulgation of the NHRA, heritage management has been restructured along the national, provincial, and local levels. The South African Heritage Resources Agency (2000–present) is currently tasked with the management of Grade I sites, while the Provincial Heritage Resources Authorities and Local Heritage Resource Authorities are responsible for Grade II and Grade III heritage sites, respectively. Historical accounts from these institutions highlight the events that shaped the selection, presentation, and representation of cultural heritage, some of which is currently used in cultural heritage tourism in the country. In the early 1900s, the South African National Society (1905–1934) was more biased on Bushmen heritage (cf. *The 1911 Bushmen Relics and Ancient Ruins Protection*). By the mid-1930s, focus shifted to the cultural heritage of European origin. This is well illustrated by the quote from van Riet Lowe who was the Secretary of the Historical Monuments Commission:

> "The intrepid Portuguese navigators who originally discovered and explored our coast; the courageous and freedom-loving Dutch settlers who first made South Africa their home and braved the dangers of colonizing a remote and barbarous country; the Huguenots who for the sake of their ideals, sacrificed their all; and the British settlers, who assisted in colonizing the border districts and who gave us the institutions of democracy, including a free press. They have all left us a heritage which should serve as a nerve-ending source of inspiration to our growing nation. . ." (Van Riet Lowe 1941: 08).

The narrow definition of heritage communities from the example above illustrates a common mistake by most heritage managers to fail to proactively inquire, prior to selection, about the type of heritage represented, by whom, and how (Figs. 1 and 2). An all encompassing approach has to always be consciously sought.

Another aspect highlighted by this account is that which concerns the question of whose heritage. Since 1986, however, conceptualizations of public heritage in RSA legislation and practice broadened to encompass social inclusion. Heritages that ". . .constituted historical, aesthetic. . .value" (Annual report 18 1987: 03) were considered under the *War Graves and National Monuments Amendment Act of 1986* (Annual report 21 1990: 03). This 1986 legislation made allowance for a subcommittee which was formulated to coordinate the interpretation of historical sites in a way that encompassed and enhanced all types of community participation in rural areas of the Republic (Annual report 26 1994: 11).

An aspect that the RSA history brings out is one that is common to all countries in sub-Saharan Africa – that of selecting only tangible heritage (monuments, relics, archaeological and paleontological remains, marked landscapes) for heritage expression through tourism. This was mostly the case in the 1970s as the excerpts from the 1970 *National Monument Council* (1970–1998) illustrate:

". . .Indeed, owing to this extreme youth of our culture in SA and the absence of folklore and traditions one finds in older countries, it is perhaps more necessary for us. . . to preserve the relics we have" (Van Riet Lowe 1941: 07). Intangible heritage (UNESCO 2003) in the form of folklore

was not recognized as representative of heritage identity of the country.

However, after independence and into the present, the South African Heritage Resources Agency (SAHRA), under the National Heritage Resources Act No. 25 of 1999, aims to *redress past inequities* relating to identification, recognition, selection, and expression of heritage belonging to all forms of "communities" or "publics" in RSA by consciously *promoting* what officials refer to as: ". . .new and previously neglected research into our rich oral traditions and customs" (SAHRA annual report 2001: 03).

The once neglected research include material culture that attest to historical archaeologies of Bantu-speaking groups as well as cultural material pointing to interaction between Bantu and San cultures. These identities provide a balanced cultural identity that could be expressed through heritage tourism in the present.

ultimately kick-started a process for recognition of local community with associated cultural, and heritage resources.

The concept of *community participation* is significant in both conservation and tourism product interpretation. There are various definitions surrounding the use of the phrase "the public" and/or community in approaches towards cultural and heritage resources management. In cultural heritage literature, a community is composed of people residing in close proximity to a heritage site and has direct affiliation and emotional connection with the site, hence has acquired a significant level of commitment to the overall cultural landscape (Keitumetse 2005, 2009). In tourism literature, the generic term, "hosts," represents this group well. Within the development field, a community is composed of a group of people who share geographical affiliation and may or may not have historical ties to a particular cultural heritage.

On a more international scale, tourists represent "a public" or a "community" that is neither historically affiliated to a geographical space nor a particular form of heritage, but acknowledge certain cultural heritage as significant enough to be visited, and enjoyed, hence placing tourism values on those. In protected areas of southern Africa, a consciously guided cultural/archaeological heritage is yet to be established, and in this instance the development of heritage tourism faces two options: adopt the existing notions of the public (local community) as per natural resources management processes or modify the existing to suit the needs of the relatively new field of cultural heritage resources management and tourism. While pondering on this dilemma, it is important to consider the public in the context within which each disciplinary research has developed.

Historical Background

Cultural heritage is an offshoot of the discipline of archaeology, from which heritage studies emanated in most European and American universities. Subsequently, cultural heritage tourism falls within the same category although there is reluctance by archaeologists, historians, and anthropologists to directly push the development of cultural heritage tourism due to a lack of knowledge on the subject of tourism in particular. On the other hand, cultural heritage tourism has been hijacked by business management departments, although there is very limited knowledge about conservation needs of cultural resources in these departments. Cultural heritage tourism influences values placed on cultural resources as it provides an interface between the sociocultural and the socioeconomic aspects.

The trend in the demand for cultural heritage tourism is common among a sector of tourists known as *ecotourists*. Ecotourism is travel that respects both the environment and the cultures being visited, with a keen attempt to contribute to the welfare of communities in touristic places. Therefore, in addition to wilderness and wildlife, ecotourists are looking for an interaction with

host communities as a way to understand their history, archaeology, and overall culture.

Cultural heritage tourism as a subdiscipline of both the heritage studies and broader tourism has achieved very limited, if any, formal recognition and home in southern African disciplinary discourses and research. In almost all instances, it is adopted within a department in a haphazard rather than a planned manner.

Southern Africa: Cultural Heritage Tourism Development and Management, Fig. 1 San/Bushmen of southern Africa depicted in international playing cards by other stakeholders

Boxes 1 and 2 are case studies from Botswana and the Republic of South Africa, presented below, provide indicators to look out for in the process of developing a cultural heritage tourism package in southern Africa. Preliminary focus on theorization of several concepts in order to situate its development within sub-Saharan approaches towards identification, selection, interpretation, and presentation is necessary.

As already mentioned, cultural heritage tourism as a subdiscipline of cultural heritage studies is still at its infancy in southern Africa. Archaeology, the discipline within which heritage studies originated in Europe, is not public oriented in Africa, hence alienates other groups that are not of academic focus that could use archaeological products to develop cultural heritage tourism. The alienation of the discipline from the local people is due to technical approaches to archaeological heritage research that focuses on hardcore science approach and neglects to articulate archaeology as a medium between science and construction of social histories and identities.

Southern Africa: Cultural Heritage Tourism Development and Management, Fig. 2 A cultural village setup where members of the local communities become employees hired to perform their cultural heritage aspects to tourists

Against this background, a development of tourism interpretation has to be aware of a basic framework guiding identification, selection, and choice of cultural heritage, anchored upon three main archaeological research approaches being the culture history (1950s), processual (1960s), and post-processual (1980s) approaches. To balance tourism interpretation of African histories, more research on the sociocultural and socioeconomic significance of material culture using alternative methodological approaches is required. Examples of alternative methodological approaches that are more relevant for African heritage contexts include research by scholars such as Cleere (1989), Alison Wylie (1993), Gero and Conkey (1991), Kohl and Fawcett (1995), and Palmer (2009).

Key Issues/Current Debates

Issues surrounding development of cultural heritage tourism in southern Africa are several, but those that deserve a heightened attention are those that relate to the following:

(a) Processes and indicators for identification and selection of cultural heritage for tourism
(b) Conservation of cultural resources relative to the overall environment
(c) Mechanisms of sustainable production and consumption of cultural and heritage resources
(d) Processes that enable host communities to identify, select, and present their own heritage to the tourists

Boxes 1 and 2 below present case studies that illuminate on issues a) to d) above. The presented scenarios on Botswana and the Republic of South Africa illustrate angles to be covered in order to exhaust hidden aspects that may influence a practitioner's point of departure when developing a tourism product. The angles include political, social, economic, communal, intellectual, historical, academic research, and others.

One of the key issues that dominate packaging and presentation of cultural heritage resources for tourism is the relationship between the resources and the various stakeholders. This is not unique to countries in southern Africa. In some parts of sub-Saharan Africa such as Kenya, a prolonged focus on prehistory or "early man" meant to create and project a national identity to the outside world (tourists) have had a negative effect of delaying development of local cultural heritage within the country (Schmidt & Patterson 1995). An added focus on safari tourism in the same country, as well as in most parts of southern Africa, provides yet another example of packaging a somewhat "neutral" and nationalistic heritage for outside tourists. These examples illustrate earlier approaches to packaging cultural heritage resources for tourism to influence tourists consumption. Further examples from other regions include the "...racial and imperialistic policies in archaeological research under the Nazis" (Arnold & Hassmann 1995: 73), during the Third Reich in Germany, as well as an example of the use of the history of the farming class in Denmark to create national identity (Kristiansen 1992). In all these cases the relationship between archaeology, the state, and the local community affects communities' attitudes and perceptions towards a heritage which is consequently extended to the "tourist public" through tourism experience.

Another key aspect in the development of cultural heritage tourism is the need to engage local communities, an approach which emanates from a participatory approach principle of sustainable development (cf. Midgley 1986) within the broader conservation debate. As a starting point, heritage legislation (particularly national) is an indicator of a direction that a budding field such as heritage tourism is taking within a country as shown in boxes 1 and 2 below where the development of heritage legislation illuminates colonial aspects of heritage management that that have to be aligned to the present. Key basic questions that are brought out by the two case studies are:

– What indicators are used to identify and select a particular heritage as significant?
– What is selected? Why?
– By whom is it selected and presented?

International Perspectives

International institutions that deal with cultural and heritage resources conservation are beginning to incorporate tourism into cultural resources management. However, a lot still needs to be done in coming up with tourism procedures that speak to cultural heritage tourism as opposed to tourism in general.

United Nations (UN) has several institutions that are relevant to the development of cultural heritage tourism in southern Africa. United Nations Educational, Scientific and Cultural Organization (UNESCO) and United Nations World Tourism Organization (UNWTO) are two of the most relevant institutions in this regard. Other international institutions include International Council on Museums and Sites (ICOMOS) and World Commission on Environment and Development (WCED), otherwise known as the Brundtland Commission.

UNESCO's focus on world heritage in the 1970s added a conventional management approach to heritage which was later expanded from tangible (1972 Convention) to intangible (2003 Convention) cultural heritage. In 2008, UNESCO came up with a Sustainable Tourism Programme which is being augmented by the 2011 World Heritage and Sustainable Tourism Programme. Still within UNESCO, the 2005 Convention on the Protection and Promotion of the Diversity of Cultural Expressions that addresses policies and measures relating to conservation of cultural diversity and cultural expressions (www.unesco.org) is yet another convention that augments cultural initiatives towards cultural heritage tourism development.

In addition to UNESCO, the International Council on Monuments and Sites (ICOMOS) provides insight on matters relating to cultural heritage resources management within which principles governing tourism applications on cultural sites are considered (www.icomos.org). In particular to tourism, ICOMOS adopted an "International Cultural Tourism Charter" in 1999, in which it is recognized that "Tourism promotion programmes should protect and enhance Natural and Cultural Heritage characteristics" (ICOMOS Tourism Charter, principle 6).

One other convention that supplements UNESCO and ICOMOS conservation measures is the 1971 Ramsar Convention on Wetlands, (www.ramsar.org). In 2002, the convention secretariat, through its Culture Working Group, came up with Resolution VIII.19 on "Guiding principles for taking into account the cultural values of wetlands for the effective management of sites"; followed in 2005 by the Resolution IX.21 on "Taking into account the cultural values of wetlands." All of these culminated into a 2009 document titled "The future of the WHC: Ramsar contribution," a bilateral cooperation between the international organizations.

Overlooking the implementation of conservation measures is the popular *sustainable development* framework initiated under the World Commission on Environment and Development (WCED 1987) model but with conservation guidelines that are compatible with both cultural and natural resources. The WCED's emphasis on development of conservation indicators provide for resources monitoring strategies to ensure that cultural resources are not vandalized nor depleted in a way that deprive future generations a chance to experience them. However Production and consumption indicators for cultural and heritage resources are currently not available (Keitumetse 2005, 2009), although there are plenty of those for natural resources such as forests, wildlife, and others. Cultural heritage practitioners and associated professionals have to kick-start this process to ensure conservation of cultural heritage resources.

The ecotourism conservation model has brought attention to cultural heritage as a component of tourism in Africa.

With time, tourists are gradually developing interest in cultural landscapes where resident communities live in proximity to monuments and national parks of southern Africa. The realization is that "The unique selling point for destinations in developing countries is likely to be increasingly associated with the uniqueness of unusual cultures, as opposed to the physical environment. . ." (Burns 1995: 12).

A framework similar to sustainable development (SD) where production and consumption indicators relating to cultural resources and applicable to sustainable heritage tourism are developed, is needed to achieve sustainable tourism using cultural heritage resources.

Future Directions

Cultural heritage tourism in southern Africa is growing at a very high rate. The concern is that it is spearheaded by professionals that are not well versed with conservation needs of cultural heritage components such as archaeological heritage, museums, and social culture. Due to its appeal to tourism business, cultural heritage tourism is currently pursued within the business sectors at a superficial level meant to diversify the tourism product. It is important that various heritage practitioners take the responsibility of situating the growth of cultural heritage tourism within a sustainable framework that recognizes conservation needs of cultural resources.

One direction that could guide the use of cultural heritage resources in tourism is to consider significant placement of cultural heritage resources within the sustainable development framework (cf. WCED 1987; Hall 1992; Keitumetse 2005). Sustainable development emphasizes current use of resources in a way that ensures their continuity for future generations. The question is how can this be achieved? A way forward will be to align conservation ideals of cultural heritage resources with the processes of sustainable development framework whereby production and consumption indicators specific to cultural resources are identified to enable monitoring of use in order to limit destruction. Currently, very few, if any, of these indicators exist for cultural and heritage resources, let alone a clear guidance on what constitutes cultural resources suitable for use in tourism. Preliminary research discourses have been attempted in this regard though at a very localized and limited level as evidenced in Keitumetse (2009) on "Ecotourism of Cultural Heritage Management."

At an operational level, eco-certification of tourism establishments is becoming popular within hotels, game lodges, camping areas, and game reserves. For example, the Botswana eco-certification system for ecotour standards as well as accommodation standards (Botswana Tourism Board 2009) is one such initiative. Within this operational framework, once devised, indicators that support sustainable use of cultural heritage resources can be applied into such frameworks to enhance conservation of cultural heritage resources. For a detailed understanding of eco-certification, refer to Leslie (2001) on serviced accommodation and environmental performance, Sasidharan et al. (2002) on developing countries and eco-labels, Drumm and Moore (2002) on ecotourism development manual, and Botswana Tourism Organization (BTO (2010)) on Botswana eco-certification grading. The equivalent of eco-certification program is necessary in cultural heritage tourism that takes place in protected areas such as world heritage sites that may be in danger due to large numbers of tourists.

Particular to southern Africa is the issue of community involvement. Institutions such as Botswana Tourism Organization (BTO) are coming up with new management models that are more corporate than sociopolitical. This is aimed at avoiding ethnic-based decisions supported by management frameworks within natural resources management, e.g., the Community Based Natural Resources Management (CBNRM) which is ethnic based.

Digital technology provides conservation opportunities that may reduce threat to cultural resources. Virtual exhibitions of sites in open-air museums as well as housed museums have potential to support future development of cultural heritage tourism in southern Africa.

At a scholarly level, cultural heritage studies is still lacking a theoretical framework within which subfields such as cultural heritage tourism could source guidance. Cultural heritage studies are still haphazardly placed in terms of theory and so is the implementation of cultural heritage tourism.

Amid all the opportunities however, it is important to acknowledge that the relationship between tourism and any type of resource is impressionable, hence requires constant alignment.

Cross-References

- Community and Archaeology
- Conservation and Management of Archaeological Sites
- Cultural Heritage and Communities
- Environmental Assessment in Cultural Heritage Management
- Ethnic Identity and Archaeology
- Heritage and Public Policy
- Heritage & Society
- Heritage Landscapes
- Heritage Museums and the Public
- Heritage Tourism and the Marketplace
- Heritage Valuation: Paradigm Shifts
- Heritage: History and Context
- Intangible Cultural Heritage
- Nationalism and Archaeology
- Tangible Heritage in Archaeology
- Tourism, Archaeology, and Ethics: A Case Study in the Rupununi Region of Guyana
- UNESCO World Heritage List and "Imbalanced" Properties: An African Perspective

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Southern Africa: Historical Archaeology

Innocent Pikirayi
Department of Anthropology and Archaeology, Faculty of Humanities, University of Pretoria, Pretoria, South Africa

Introduction

Several trends in historical archaeology are apparent in southern Africa since the early 1990s. These include, and are not limited to, historical archaeology as a study of African-European contact and interaction, historical archaeology as the study of the emergence of the modern (post CE 1500) world, historical archaeology as the study of the origins of modern historical identities, and historical archaeology as the study of heritage and the recent and contemporary past. These trends and themes are not mutually exclusive but rather demonstrate considerable convergence and overlap with one another. They are largely influenced not only by an emerging postcolonial academic critique in a region where European colonization had a major impact on African societies but also by emerging global trends in archaeological theory.

Definition

While studies up to the 1990s contextualized historical archaeology as essentially the archaeological study of documented African societies primarily by Western sources (see Pikirayi 1993), current approaches are taking a radically different view. This is conditioned by problems arising from the dichotomization arising from our intellectual perceptions of human development, conveniently divided across much of Africa into traditional cultural stages of Stone Age, Iron Age, and the historical period. This approach, which perceives society as having a prehistory prior to history, compromises understanding of the past, largely negating cultural continuities which

European colonialism attempted to disrupt after CE 1500. A major constraint is the narrow time depth and limited spatial coverage of European sources and the exclusion of pre-European, oral histories from many, although not all, such studies. There is an increasing move towards accessing the "voiceless" through the study of their material culture, as these were underrepresented and often falsely represented in written texts (Reid & Lane 2004; Schmidt & Mrozowski 2013).

In southern Africa, European documentary sources have dominated studies in historical archaeology. European travelers', traders', and visitors' descriptions of the coast and inland regions date from the fifteenth century onwards. Though limited in nature, Arabic sources make references to the Indian Ocean coast and parts of the hinterland from the early tenth century. However, southern African scholars have not considered periods prior to the fifteenth century strictly as defining a historical period, and thus there is a divide around CE 1500, when prehistory supposedly comes to an end. The use of "external" texts in framing African societies in this way is now being questioned (see Swanepoel et al. 2008).

An alternative approach to historical archaeology in Africa comes from the use of "internal" sources, dominated mainly by oral traditions, local histories, and folklore, all of which constitute the primary means of preserving and passing on traditional information and knowledge systems. Oral traditions have been criticized for their narrow time depth, selective coverage of information, central focus on ruling dynasties, and narrow content verging on myth. The general perception by many historians is that they are less reliable than written, "external" sources. However, some African historians such as Beach (1994) have shown the usefulness of these "internal" sources, especially if approached more critically (see also Vansina 1985).

Key Issues/Current Debates

A major focus in southern African historical archaeology remains the study of African-European contact and interaction over the last 500 years, with a particular emphasis on European expansion, modernization, and the relationship between colonialism and the formation of local identities (Pikirayi 2004; Swanepoel et al. 2008). A number of research themes have emerged from this. These include the rise of merchant capital in Europe, the development of plantation economies in the Mediterranean, European expansion into the shores of southern Africa post 1500 CE, and their gradual movement into the African interior (Elphick & Giliomee 1980; Schrire 1988, 1995). Gold prompted the Portuguese to outflank the trans-Saharan trade and the trade involving the Zimbabwe plateau and eastern Africa. The migration of plantation economies from the Mediterranean to the Atlantic and later the Indian oceans promoted trade in slaves, initially to the offshore islands and subsequently the Americas. This impacted southern African social formations, as new complex societies emerged to respond to changed circumstances. Contacts were both beneficial and destructive to the parties concerned, although Europeans always wanted to manipulate them for maximum gain. Some societies resisted strongly for their survival, while others adapted to the colonial settings, manipulating them to their own advantage. This process continued until the late nineteenth century when Africans were defeated by renewed European colonization of the region and witnessed marked shifts in power relations in favor of Europeans.

These processes just outlined constitute historical archaeology as an archaeological study of the origins of the modern world (Hall & Silliman 2006), dominated by European colonization. However, this is not to adopt the view that the discipline is primarily defined by external agents which impact on indigenous African societies in some of the ways already described. Rather, studies on the origins of modernity also seek to understand how the colonization process is understood from the view of the colonized, through agency – interpreting the "absent presence" behind the artifacts – as a force driving the process of history.

Another dominant theme in southern African historical archaeological studies is the study of the origins of modern identities. This approach also demonstrates that modernity should not be framed in European terms but was also conditioned by deep, long-term histories which were severely punctuated by colonization. The disciplinary identity of historical archaeology in this regard goes beyond the last five centuries, as some of the contributors to the volume edited by Swanepoel and colleagues (2008) clearly demonstrate. Southern African societies do show remarkable cultural continuities going beyond CE 1500, and when this premise is considered, understanding complexities in local ethnic histories provides refreshing approaches towards the understanding of the past. Studies on the origins of the Nguni and Sotho Tswana are examples (Huffman 2004). Other studies have managed to re-interrogate the nature of cultural and other identities presented in written texts as historical. The study of the Mutapa state in northern Zimbabwe (Pikirayi 2009) shows considerable dualities in archaeological sites often identified in written texts essentially as Portuguese trading sites or forts. Such studies have also demonstrated the need to conduct archaeological investigations for situations where primacy is given to either written or oral texts (see Pikirayi 1997, 1999). Such approaches are extremely helpful as they also invoke the element of agency, as several studies done in Cape Town demonstrate (Hall 1992, 1999; Abrahams 1993; Hall et al. 1993), including consideration of the enslaved (e.g., Markell et al. 1995; Cox et al. 2001). Other examples where material and other identities are also being explored include the context of the expansion of the European "frontier" into the southern African hinterland and how encounters were negotiated with Africans around points of contact (Swanepoel et al. 2008) and the variable responses of different African communities to the expansion on Christianity and the work of nonconformist missions (e.g., Reid et al. 1997).

Future Directions

Historical archaeology now also involves focus on cultural landscapes and documenting memories imprinted therein. Some of these memories include but are not limited to warfare, social formation, movement and migrations, and settlement. Examples include studies of the Ndwandwe kingdom, the Swazi origins, the *mfecane*, the South African war of 1899–1902, the history of the origins of major urban centers such as Pretoria and Cape Town, and industrialization. In this way, historical archaeology may be regarded as a study of contemporary history or heritage, which directly impacts on people's lives and thus represents living histories. Thus, such approaches are dealing with "the past in the present" (Orser & Fagan 1995), a living archaeology affected by contemporary issues such as politics and economics. Here, archaeological research is used to reclaim pasts which may have been denied in one way or the other, given the region's highly checkered colonial histories. Zimbabwe, for instance, is the only country in the world named after an archaeological site. Rhodesian colonization had appropriated the African past and had given Great Zimbabwe and its culture a foreign non-African identity. Recent research in northern Zimbabwe has demonstrated continuity of this culture system to the present and also confirmed its Karanga identity. South Africa, which identifies itself as the "Rainbow Nation," a reference to the diversity of its peoples and cultures, has successfully integrated archaeology into the education curriculum. What is evident is that the Southern Africa of today has been forged from deep historical roots, where current complex politics derive from many centuries of cooperation and misunderstandings between Europeans and Africans. These encounters are well documented historically, but archaeology has added another dimension. However, in situations where the past has not been given serious consideration, or has been manipulated to present only one version for certain groups of people, the consequences can be very tragic.

Cross-References

▶ Colonial Encounters, Archaeology of
▶ Contemporary Past, Archaeology of the

▶ Critical Historical Archaeology
▶ East Africa: Historical Archaeology
▶ Hall, Martin (Modern World)
▶ Industrial Archaeology
▶ Malan, Antonia
▶ Modern World: Historical Archaeology
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Southern Africa: Origins and Development of Agriculture

Innocent Pikirayi
Department of Anthropology and Archaeology, Faculty of Humanities, University of Pretoria, Pretoria, South Africa

Introduction

Some 2,500 years ago in southern Africa – the subcontinent of Africa subsuming the basins of Kunene, Okavango, Zambezi, Kafue, Luangwa and Shire rivers, and Lake Malawi and all the regions to the south of these water bodies – foragers were drawn to a process by which greater control over plants and animals gave rise to domestic forms. Gradually, some of these foragers began to work metals. These developments ushered in significant social, cultural, economic, ideological, and political changes on the societies involved. Most of the evidence for farming comes from archaeology through actual remains of cultivated plants and domestic animals, and artistic representations of the latter in rock art or engravings. Although direct archaeological evidence remains poor due to the limited number of samples directly subjected to scientific analyses, a key factor remains the preservation of the evince itself. While the biological evidence suggests that the process of domestication was introduced from elsewhere, and by extension, farming, some evidence however suggests the inhabitants of the subcontinent continued to exercise greater, though not full control of wild resources, a process which required no domestication. This may explain the continued

reliance of both wild and plant resources, as the subcontinent's biomes allowed such interaction to take place.

Key Issues/Current Debates/Future Directions/Examples

Archaeological and Linguistic Background

Up to and until about 1,500 years ago, the inhabitants of southern Africa were largely stone-using hunter-gatherers, most probably the ancestors of the modern San (Mitchell 2002). Some 2000–2200 years ago, some of these hunter-gatherers became cattle and sheep herders. Archaeological evidence attesting to their presence in the region has been found in what is now southern Angola, Namibia, Botswana, the Northern and the Western Cape regions of South Africa (Sadr in press). They also made pottery, with some scholars thinking that they could have ushered in some form of a "pastoral Neolithic" comparable with that from the more northerly and eastern parts of the African continent, but this interpretation remains debatable. What is interesting though is the appearance of domestic sheep in the Western Cape region more than 2,000 years ago, and how they were introduced into the region most probably from eastern Africa remains unresolved.

Subsistence practices directly associated with farming seem to have gathered momentum during the first and second centuries CE. Communities linked to these developments cultivated millets, sorghum, lentils, melons, kept cattle, sheep, or goats. Initially, the farmers did not fundamentally change the subsistence patterns of the autochthonous communities. However, they were to leave their mark on the southern African landscape through pottery making traditions that were so distinct that Iron Age archaeologists have equated this to human groupings, equivalent to early forms of ethnic entities (Huffman 1989, 2007; Phillipson 2005). Archaeological sites of the Chifumbaze complex or tradition, also referred to Early Iron Age or Early Farming Community sites are directly attributed to this development. The spatial pattern points initially to a gradual expansion of the farming population in the subcontinent (Vansina 1994/1995), resulting in substantial village settlements whose inhabitants also specialized in metal, mainly iron, production.

It remains unclear whether these farmers dispersed from the northerly part of the African continent or the knowledge reached the southern African herders and hunter-gatherers, the latter representing an internal transformation within such communities, moving toward a sedentary subsistence lifestyle. Linguistically, they are identified with the ancestors of Bantu speakers, who populate the region today (Huffman & Herbert 1994/1995), leading to the suggestion that the dispersal of the ceramic traditions associated with early farmers correlates with the spread Bantu languages.

The Physiography of Early Farmers

The subcontinent of southern Africa is made up of a number of biomes ranging from extreme desert to the west to savannah in the east, sub-equatorial woodlands to the north to temperate zones further south. The eastern half of the region is summer rainfall area. Here the savannah biome is the largest, covering just over 45 % of the area, characterized by open grassland and woodlands. Brachystegia and acacia are the dominant species. Altitude ranges from sea level to over 2,000 m, where montane forest grows. Summer rainfall ranges from 200 to 1,000 mm per annum. The region also had almost every major geological and soil type contained in it.

It is in these biomes that a wide range of plant and animal foods exist, both wild and domestic; these were at the disposal of the hunter-gatherers, herders, and farmers during the last 2 millennia or so. Specifically, the savannah biome is home to seasonal forest fires, and grazing which is ideal for cattle, game, and goats, though the latter are highly tolerant of drier, hotter, and lower-lying altitudes (see, e.g., Vogel 1989).

Intensification of Farming

The intensification of crop cultivation must have started in the fifth century CE, with the expansion of farming communities in much of the southern African region. The region also witnessed gradual, but significant transformations which shaped the character of early farmers. The second half of the first millennium CE saw the region opening up to the Indian Ocean trade, gold mining, and exploitation of wild resources such as elephants for ivory. This triggered economic specialization, and with the society becoming differentiated following the development of chiefdoms and states. The middle Limpopo valley witnessed some of these developments at Schroda, Ratho, Bambandyanalo, Mmamgwe, and Mapungubwe, and there are indications that much of the Shashe-Limpopo experienced similar developments, as suggested by archaeological evidence associated with the Zhizo/Toutswe (CE 700–1300) and Leopard's Kopje (CE 900–1500) tradition sites in western Zimbabwe and adjacent eastern Botswana.

A significant development from the late first millennium to the early second millennium CE is the increase in the number of cattle. This development is particularly notable within the Toutswe and Leopard's Kopje traditions. Toutswe sites show a definite hierarchy, with large settlements on the tops of hills being occupied for up to 300 years or more, and smaller village and homestead scattered around near water sources and grazing. Well-investigated sites include Toutswemogala, Bosutswe, and Shoshong, and these could have been at the help of chiefdom societies that existed in what is now eastern Botswana, and trading with the Indian Ocean coast. These seem to have lost this trade to villages and towns now attributed to the Leopard's Kopje tradition, clustered further east in the middle Limpopo and Shashe river basins, and who also kept substantial cattle herds, as attested by large middens of vitrified dung located on the central parts of their settlements. One of these centers, Mapungubwe, developed a fully fledged state society during the thirteenth century (Huffman 2007).

The need for storage of agricultural produce becomes apparent, as attested by grain bins on sites associated with the Leopard's Kopje tradition. The state societies at Mapungubwe (CE 1200–1300) and Great Zimbabwe (CE 1280–1550) evidently became dependent on a rich agricultural hinterland to support their ruling elites and craft specialists, as well as large towns with a burgeoning population, all of which needed food. Storage was also an added insurance especially in times of droughts or periods of prolonged aridity, given the fragility of the savannah biomes in relation to global weather systems. Storage was also necessary during conflict situations, as later historically documented events show.

The Introduction of Maize

Maize, *zea mays*, was introduced in Africa in the 1500s following the continent's contacts with the Atlantic world, the Americas – a process triggered by the Columbus voyages and Portuguese sea faring activities, and the slave trade. Since then, it has become one of the most dominant food crops on the continent. Maize is rich in vitamins, is a carbohydrate, and also contains essential minerals and protein. It is also a digestive, containing dietary fiber and calories. No doubt, given its origins in Central America, its cultivation was easier compared to that of sorghum and carried significantly higher yields. Maize seems to have displaced sorghum and millets in medium to high rainfall regions.

Issues and Debates

Several topics require answers when discussing the origins of agriculture in southern Africa. The first issue is whether the region may have experienced earlier forms of food production among stone-using hunter-gatherers and herder-herders as opposed to the Iron Age farmers as is widely thought. Evidence demonstrating more direct connections with eastern Africa and the southerly parts of the Sahara is crucial in this regard. A potential area of study is the assessment of both domestic and wild prototypes, if any, in southern Africa, to determine why there is a limited range of domestic

animals and plants, given the abundance of wild fauna and flora. Was domestication really necessary in this case? A third issue is the role of climate change on domestication of both plants and animals, and human subsistence patterns, given the known shifts from hunting to farming and back. For the more recent periods, it would also be interesting to assess the impact of the introduction of maize on southern African societies. Some of the major population shifts triggered by environmental stress and human conflict are speculatively linked with the introduction of maize on the subcontinent (Huffman 2007). The only challenge is the limited oral histories with direct references to southern African hinterland societies that may provide crucial testimony to this; otherwise, all the answers have to come from archaeology.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ East and Southern African Neolithic: Geography and Overview

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Southern and East African Middle Stone Age: Geography and Culture

Sarah Wurz
Institute for Human Evolution, University of Witwatersrand, Johannesburg, South Africa
Department of Archaeology, History, Cultural Studies and Religion, University of Bergen, Bergen, Norway

State of Knowledge and Current Debate

Introduction

The term "Middle Stone Age" was introduced by South African pioneer archaeologists Goodwin and van Riet Lowe in 1929 to describe stone tool assemblages technologically distinct from those of the Early and Later Stone Age periods. Originally it referred to assemblages in which convergent flaking on prepared cores was used to produce unretouched pointed flakes with faceted platforms. It is now known that the Middle Stone Age encompasses a much wider range of technological and typological variability. The original definition of Middle Stone Age referred specifically to prepared platforms, but a wide variety of platform types, including plain, punctiform, dihedral, and laminar platforms, occur. According to Goodwin and

van Riet Lowe, prepared core methodology is typical of the Middle Stone Age. Prepared cores are designed to produce preformed blanks for use with little or no further shaping by retouch. This encompasses as Levallois technology. In Levallois technology the core is conceived of as two opposing volumes that play different roles in the production process. End products are only removed from the upper production surface that is methodically prepared before a limited number of flakes are removed. Repreparation occurs before the next set of end products can be removed. The non-production volume is treated much less methodically and plays the role of striking platform only. In both southern and East Africa, this method is used extensively in conjunction with discoid technology for flakes. Blade technologies also occur in these areas. In addition, almost the full inventory of retouched tool types and artistic practices of the Later Stone Age also occurs in the Middle Stone Age. There are so many continuities between the Middle and Later Stone Age that a rigid system in which the two entities are opposed and contrasted serves little purpose. Such reservations have been expressed formally as early as the 1960s at a Burg Wartenstein conference on African prehistory (Barham & Mitchell 2008).

Most prehistorians currently use "Middle Stone Age" simply as temporal stage term to describe sub-Saharan assemblages of the late Middle and Late Pleistocene. The mode system, created by Clark in 1969, describes technological change in terms of key innovations independent of temporal association and is preferred by some researchers. In Clark's system mode 2 refers to bifacially worked tools such as hand axes and cleavers, mode 3 to flake tools produced from prepared cores, and mode 4 to punch-struck blades sometimes retouched into various specialized tool types. Mode 5 assemblages have microlithic components of composite artifacts, often backed or retouched. Middle Stone Age occurrences include mode 2, 3, 4, and 5 elements (Barham & Mitchell 2008). The mode system does unite variously termed industries by a few common technological traits, but it conceals as wide a range of variation as the more conventional Middle Stone Age designation. The "Middle Stone Age" still has currency as a historical and technological stage division and is used here in conjunction with Clark's mode system in spite of its general nature and ambiguity. In southern and East Africa, the first typical Middle Stone Age (MSA) or mode 3 elements emerge sometime before the Middle Pleistocene (~430–127 kya). In this early time range, they appear with late Acheulean mode 2 occurrences with large cutting tools (LCTs) such as hand axes and cleavers.

In this review the variability in stone tool technology from southern and East Africa from the Middle and Late Pleistocene is discussed. Thereafter, the focus is on the behavioral debates and milestones associated with the Middle Stone Age. Southern Africa refers to the area south of the Zambezi and the Kunene which forms an ecological, cultural, and archaeological unit (Mitchell 2002). It includes South Africa, Botswana, Zimbabwe, Lesotho, southern Mozambique, and Swaziland. Most research in southern Africa has taken place in South Africa perhaps due to a favorable sociopolitical infrastructure. There are a number of exceptionally well-known sites on the southern Cape coast that often dominate discussion on the MSA. To a certain extent, this bias is reflected here, but this does not imply that other southern African areas were less well populated in the past or were less important. The Middle Stone Age of Zimbabwe and Botswana is described using nomenclature different from that used in South Africa, Namibia, and Lesotho, and this complicates drawing regional comparisons. Zimbabwe contains many open-air and stratified sites, such as Nswatugi Cave, Tshangula Cave, Pomongwe Cave, and Zombepata Cave (Fig. 1). Political and economic turmoil impede deeper investigation into the significant potential of Zimbabwe to understand regional patterning. In Botswana, Middle Stone Age sites occur, for example, in the Tsodilo Hills at White Paintings Rockshelter and Rhino Cave, at Drotsky's Cave, and at #Gi, an open-air site. Swaziland and southern Mozambique are not well known for its Middle Stone Age occurrences, but future work at, for example,

Southern and East African Middle Stone Age: Geography and Culture, Fig. 1 Map of sites in southern and East Africa mentioned in the text

Sibebe shelter in Swaziland and the areas around Maputo Bay, Inhaca Island, and Bazaruto Island in Mozambique may bring new insights (Mitchell 2008, see also Lombard 2012), while the Middle Stone Age from southern Mozambique is largely unexplored. The Middle Stone Age of East Africa is reviewed by discussing data from Tanzania, Kenya, and Ethiopia, the most intensively researched areas. Cursory reference is made to key sites in central African Zambia where the type sites and very early evidence of characteristic Middle Stone Age behaviors occur. A number

of syntheses cover the Middle Stone Age of southern and East Africa (e.g., Deacon & Deacon 1999; Mc Brearty & Brooks 2000; Mitchell 2002; Willoughby 2007; Barham & Mitchell 2008; Klein 2009), and predominantly new research is cited here to complement these detailed accounts.

The Evolutionary and Environmental Context of the Middle Stone Age

The Middle Stone Age is associated with several hominin types including archaic groups such as *Homo heidelbergensis* and *Homo helmei* and also with modern *Homo sapiens*. This period thus saw the development of anatomically modern humans from archaic forms. It is not known which of these groups were ancestral to *Homo sapiens* or whether archaic groups survived into the Late Pleistocene. Fossils representing premodern groups in East Africa have been recovered from Ileret (Ileret Footprints) and Eliye Springs in Kenya and Ngaloba in Tanzania. The Ngaloba fossils are associated with Middle Stone Age tools (McBrearty & Brooks 2000). An archaic *Homo helmei* fossil from Florisbad (Archaic Homo Sapiens), South Africa, dated to around ~260 kya, was found close to Middle Stone Age tools with no particular diagnostic traits (Kuman et al. 1999). The earliest member of *Homo sapiens* may be the Omo I calvarium, from Kamoya's hominid site (KHS) in the Kibish formation, southern Ethiopia, dating to ~195 kya (McDougall et al. 2008) (Homo Sapiens). The Omo II calvarium was found 2.7 km northwest from Omo 1, at Paul's hominid site. Omo II is of more uncertain phylogenetic affiliation but often mentioned as an early modern human. The lithic assemblages at Omo contain Levallois cores and blades, along with an ovate hand axe (Shea 2008). Four individuals classified as *Homo sapiens idaltu* (White et al. 2003) were found in the Herto member of the Bouri formation, also in Ethiopia. They date to between 160 and 154 kya and are associated with Acheulean and Middle Stone Age tools (Clark et al. 2003). The crania bear intentional modification marks, interpreted as a type of mortuary practice. These early representatives of modern humans display a mosaic of derived modern and archaic features. There is debate on precisely which traits constitute anatomical modernity and the processes underlying speciation of modern human (Schwartz & Tattersall 2010). It is evident that the combination of archaic and more derived features in the populations from ~200,000 years ago continued into the Late Pleistocene. Late Pleistocene *Homo sapiens* in East Africa includes fossils from, for example, Aduma, Porc Epic, and Mumba (McBrearty & Brooks 2000). The co-occurrence of Acheulean and Middle Stone Age elements with the earliest modern humans indicates that there is not a straightforward correlation between hominin groups and technological strategies.

In southern Africa anatomically modern human fossils appear somewhat later than in East Africa, around ~115 kya, and they are invariably associated with Middle Stone Age artifacts. The earliest representatives of anatomically modern *Homo sapiens* in southern Africa come from Klasies River (Klasies River Mouth and Related Sites, Archaeology of) where a relative large collection of cranial and postcranial fossils has been found (Willoughby 2007). Two maxillary fragments that date to ~115 ka are the oldest hominins from the site, with the majority of the fossils dating to between ~100 and 80 kya. These fossils show signs of cutmarks and burning, consistent with cannibalistic practices (Deacon & Deacon 1999). Border Cave provided an enigmatic collection of human fossils, with the earliest reliably dated specimen dating to ~70 kya (Barham & Mitchell 2008). Fossils with no particular diagnostic traits, all probably postdating 80,000 years ago, occur in the Middle Stone Age levels at Die Kelders, Hoedjies Punt, Equus Cave, Sea Harvest (McBrearty & Brooks 2000), Blombos Cave (Barham & Mitchell 2008), and Pinnacle Point (Marean 2010).

Molecular genetic data has played a crucial role in estimating the date of the origin of *Homo sapiens* (DNA and Skeletal Analysis in Bioarchaeology and Human Osteology). Investigations of mitochondrial DNA (mtDNA), the nonrecombinant portion of the Y chromosome (NRY) variation, and autosomal DNA have shown that extant African populations have the highest levels of genetic variation. This is

consistent with an African origin for all modern humans. It has been calculated that the most recent ancestor may have lived between ~200 and 100 000 years ago (see Sheinfeldt et al. 2010 and Klein 2009 for a discussion of the genetic evidence). The technology to develop genetic sequences and undertake genotypical analyses is growing at unparalleled speed and now also allows genomewide studies. New results underline that the genetic processes that gave rise to current patterns of genetic variation are complex and best explored in combination with linguistic and archaeological data (Scheinfeldt et al. 2010). Genetic analyses have also been used to explore the demographic and geographic distribution patterns of early Middle Stone Age populations. There are indications that several bottlenecks, where extreme reduction in populations and genetic variability is followed by rapid expansion, may have occurred in the evolution of *Homo sapiens*. Global climatic changes are sometimes discussed as causal mechanisms in such genetic bottlenecks.

Middle Stone Age populations from southern and East Africa lived in a range of habitats that fluctuated in concert with the 100,000 year rhythm of glacial cycles. For the past 450,000 years, the extremes between cold and warm periods became more pronounced and warm interglacials became shorter than in earlier time periods. Barham and Mitchell (2008) use the global marine isotope record as an overarching framework to discuss the changing climatic and environmental conditions that may have influenced Middle Stone Age lifeways. However, they also note that it is not yet possible to reconstruct the fine-grained environmental changes that might have affected behavioral responses, as the data from proxies for climate change in the Middle and Late Pleistocene provide too coarse a resolution. The analysis of records from marine and ice cores from the northern hemisphere gives some indication of global climatic change whereas the Dome C ice record from Antarctica provides a southern hemispheric record of such changes. The range of proxy data sources used for paleoenvironmental reconstructions in southern and East Africa include non-terrestrial and terrestrial components such as pollens, inorganic sediments, isotope records, and relict landforms (Environmental Reconstruction in Archaeological Science). Extreme environmental events, such as droughts, are sometimes invoked as motors of behavioral change in the Middle Stone Age. Areas from southern Africa and East Africa are suggested as refugias where small groups could have survived in extreme conditions (e.g., Basell 2008; Marean 2010). African landscapes are complex, and the global climatic records do not necessarily reflect local environmental variations. Exploring the effect of past climate on southern and East African Middle Stone Age populations requires paleoclimate and paleoenvironmental data from multiple regional terrestrial proxies that indicate changes on a regional scale (Thomas & Burrough 2012).

The Middle Stone Age of Southern Africa

The transition between the Early and Middle Stone Age in southern Africa is not well understood. Middle Stone Age and Acheulean elements are found together in sites as old as 500,000 years ago, while Acheulean occurrences have been recorded up to ~125,000 years ago. The most recent Acheulean industry in southern Africa, dating to between 125 and 300 kya, may be from Duinefontein 2 in the Western Cape (Klein 2009) (Handaxes and Biface Technology). Three transitional entities are known from southern Africa – the Sangoan and Lupemban in the northern areas and the Fauresmith with a more widespread regional distribution. Very few of these transitional industries are associated with dates, and they are generally not well defined or documented. At Kalambo Falls, Zambia, initially excavated by J.D. Clark and now investigated by L. Barham, the Sangoan and Lupemban occur in stratified context. As one of only a few occurrences in Africa with stratified mode 2 and 3 assemblages, this site plays a central role in understanding these transitional industries. At Kalambo Falls the Sangoan, labelled the Chipeta industry, is typified by core axes, blades, and many scrapers, the elements characterizing most Sangoan assemblages in Africa. Lupemban

layers overlie the Sangoan and also contain core axes and picks, in addition to elongated bifacially retouched (lanceolate) points and backed blades (Barham & Mitchell 2008). Such lanceolate points characterise Lupemban assemblages. The Sangoan, once considered a regional phenomenon restricted to central Africa, has now been identified as far as southern and northern Africa. In southern Africa, Kuman and coworkers investigated Sangoan occurrences. They describe Sangoan-like industries from open-air sites in the Mapungubwe National Park and surrounding farms situated on the border with Zimbabwe and Botswana. These are the oldest archaeological sites known from this area and contain small bifaces and picks, cleaver-like tools, denticulates, and denticulated scrapers, as well as prepared cores with Levallois-like traits. The Sangoan has also been identified at Kudu Koppie, Keratic Koppie, and Hackthorne and along the KwaZulu-Natal coast (Herries 2011). These assemblages may be similar to the Charaman industry of southern Zimbabwe. Sangoan-like picks and core axes of this industry occur in the Matopos region at Bambata and Pomongwe Caves (Barham & Mitchell 2008). The Lupemban is the least known transitional entity in southern Africa and has been recorded in Namibia, as part of its greater Congo basin distribution (McBrearty & Brooks 2000).

The Fauresmith, though not well defined or extensively analyzed, is better known than the Sangoan and Lupemban in southern Africa. The type implements of the Fauresmith are small ovate finely made hand axes. These tools are frequently associated with Levallois cores, large blades, and points. Fauresmith industries occur in Zimbabwe and several sites in South Africa (Herries 2011). Well-known Fauresmith assemblages are from Rooidam, Kathu Pan, and Bundu Farm in the Northern Cape. Fauresmith occurrences have also been recorded at Elandsfontein, on the Vaal and Orange Rivers, in the Seacow Valley, and at Taung. Wonderwerk Cave is the only cave site with stratified Fauresmith deposits, and here it has been dated to ~286–276 kya (Beaumont & Vogel 2006). At Bundu Farm a mean age of 245 kya has been assigned to a transitional ESA/MSA industry that may be Fauresmith in nature, and Rooidam contains a Fauresmith industry associated with a U–Th age of between 209 and 309 kya. New analysis of the Kathu Pan 1 assemblage brings a sharper focus to the Fauresmith (Wilkins & Chazan 2012). OSL and combined U-series–ESR methods provide dates of between 464 and 542 kya for the Kathu Pan 1 Fauresmith. It is of considerable interest that this occurrence is associated with systematic blade production. Hard-hammer percussion was used to remove blades from centripetally prepared cores. Some blades were further retouched into points (Wilkins & Chazan 2012). Although this blade industry is broadly contemporaneous with the blades recorded from the Kapthurin formation (Johnson & McBrearty 2010), the reduction method followed is different.

Southern Africa contains a multitude of Middle Stone Age industries that innovative analysts like Sampson and Volman organized into culture-stratigraphic frameworks without the benefit of adequate chronometric dating estimates (Barham & Mitchell 2008; Willoughby 2007). A relatively large number of radiometric dates have since become available for the Middle Stone Age, and this forms the basis of a recent summary of the Stone Age culture stratigraphy of South Africa and Lesotho (Lombard et al. 2012). A handful of "early Middle Stone Age" (EMSA) occurrences with dates between ~300 and 130 kya occur, for example, at the Sterkfontein and Lincoln Caves, Border Cave, and Wonderwerk Cave. EMSA assemblages are small and await detailed description, but they are associated with low frequencies of retouched tools and blades and flakes sometimes produced with the Levallois technique. The earliest Middle Stone Age assemblage in southern Africa without hand axes and picks occurs at Florisbad and dates to ~279 kya (Kuman et al. 1999). This assemblage is small and is dominated by flakes from multiple platform cores. In cave 13B from Pinnacle Point, a ~162 kya assemblage include Levallois components and bladelets, defined as pieces with a width of less than 10 mm. The stone tools occur in association with shellfish and thus

provide the earliest evidence for coastal occupation in South Africa (Marean 2010). Blombos Cave (Blombos Cave the Middle Stone Age Levels) on the southern Cape coast, about 100 km west from Pinnacle Point, yielded deposits that date to ~130 kya (Henshilwood & Jacobs *pers. comm*), also with shellfish and Middle Stone Age artifacts. At Florisbad, an eponymous industry, dating to ~157 kya (Kuman et al. 1999), has sidescrapers and elongated products. This "Florisbad industry" is broadly contemporaneous with the Pinnacle Point assemblage, but it is not clear whether there are any technological or typological similarities between these industries. The number of Middle Stone Age sites increases substantially from the last interglacial onwards (Deacon & Deacon 1999). In South Africa, Lesotho, and Namibia, a number of long culture-stratigraphic sequences occur that provide insights into temporal and technological patterns of the Late Pleistocene Middle Stone Age. Many of these sites, such as Klasies River, Pinnacle Point, and Blombos Cave, occur on the southern Cape coast. Sibudu Cave situated 15 km inland from KwaZulu-Natal coast contributed most notably in the last decade to changing conceptions of the Middle Stone Age. Important inland multi-sequence sites such as Rose Cottage Cave, Border Cave, Cave of Hearths, Bushman Rockshelter, Wonderwerk Cave, Umhlatuzana, Apollo 11, and Melikane further provide insights into the Middle Stone Age of southern Africa.

The global marine isotope record is frequently used to guide investigations and discussions on Middle Stone Age of the Late Pleistocene. In MIS 5e, the last interglacial that lasted from ~130 to 116 kya, warm temperatures and sea levels as high and higher than today occurred. Thereafter, temperatures dropped until full glacial conditions were reached in MIS 4. Although MIS 5 was predominantly cold, MIS 5b (~93–85 kya) was preceded and followed by the relatively warmer interstadials MIS 5c (~109–93 kya) and MIS 5a (~85–75 kya) (Willoughby 2007; Barham & Mitchell 2008). The spatial and chronological patterning of MIS 5 sites is not clear, as very few assemblages from this time range have both reliable dates and published technological analyses. The MIS 5 deposits from Klasies River possibly contain the largest collection of MIS 5d-a artifacts in southern Africa. The artifacts, from a reliable chronological context, have been described by Wurz (2012). Two techno-complexes occur in the layers dated to between ~115 and 80 kya. The lowermost techno-complex dating to ~115 kya is known as the Klasies River substage (previously known as the MSA 2a or MSA I) (Lombard et al. 2012). This assemblage is much smaller than the succeeding Mossel Bay techno-complex, but the technology is noticeably different. It is characterized by a blade reduction strategy for quartzite blades and elongated pointed end products. The worked-out single and double platform blade cores initially had very convex production surfaces as evidenced by the marked longitudinal curvature of some of the blades. There are only three assemblages with broadly comparable chronometric dates. The MIS 5d/e assemblage from Pinnacle Point Cave 13B is perhaps too small to provide technological information. A substantial assemblage from Ysterfontein 1 has ambiguous dates, but its technology is clear. This assemblage is mainly a flake industry but also contains elongated products and denticulates (Wurz 2012). The Florisbad assemblage, dating to ~121 kya, in contrast has relatively few formal tools (Kuman et al. 1999).

The MIS 5c-a assemblage from Klasies River is large and represents more than 10 m of deposit. It has been termed the Mossel Bay (also known as the MSA 2b and MSA ll). It has been dated to between ~100 and ~80 kya. The Mossel Bay at Klasies River is characterized by a unipolar recurrent Levallois reduction process for points alongside blade production systems. The majority of the end products have large, frequently faceted platforms, associated with prominent bulbs of percussion, and straight profiles. The Cape St Blaize collection analyzed by E. Thompson corresponds to the Mossel Bay techno-complex from Klasies River (Wurz 2012). The only other recently dated site with artifacts from MIS 5c is Pinnacle Point where Thompson and colleagues identify points and blades typologically similar to those from the Klasies River

Mossel Bay but perhaps with technological differences. Volman noted that some of the Nelson Bay Cave and Cave of Hearths assemblages may be similar to the Klasies River Mossel Bay techno-complex. MIS 5c-a covers a period of more than 25,000 years, and it is likely that more technological variation will be recorded in future.

The Still Bay and Howieson's Poort techno-complexes are associated with MIS 4, a glacial period occurring from ~75 to ~58 kya. The Still Bay was one of the first industries described in the formative years of South African archaeology. It was known from Peers Cave and surrounding sites on the coastal belt of the Western Cape Province of South Africa. New investigations at Blombos Cave, Hollow Rockshelter, Diepkloof, Sibudu, Umhlatuzana, and Apollo 11 over the last 15 years brought a much broader and deeper insight into this techno-complex. It has been determined that the Still Bay occurs throughout South Africa and the bifacial foliate point has been confirmed as the marker type for the Still Bay. Still Bay bifacial points occur in a wide range of raw materials and sizes, but there seems to have been a preference for fine-grained raw materials such as silcrete. Some investigations, as discussed in Henshilwood and Dubreil (2011), have demonstrated that hard- and soft-hammer techniques, as well as occasional pressure flaking and heat treatment, were used to produce these points. They were also hafted and used as spear points and knives. A recent publication on the Still Bay from Hollow Rockshelter in the Western Cape is the first to provide technological details of the reduction processes used for blank production. At this site three different reduction strategies were used to produce typologically similar bifacial tools (Högberg & Larsson 2011). At Apollo 11, Diepkloof, and Sibudu Cave, the Still Bay was dated to ~72–71 kya by Jacobs and colleagues, indicating duration of less than 1,000 years. However, other dating results indicate that the Still Bay may date to between ~71 kya and 80 kya, with outlier dates of >100 kya from Diepkloof (Henshilwood & Dubreil 2011; Högberg & Larsson 2011).

The Howieson's Poort techno-complex has (Howieson's Poort Industry: Geography and Culture), since its inception, attracted much attention for its "Upper Paleolithic"-like backed geometrics. It is the most widespread Middle Stone Age industry recorded in southern Africa and is known from more than 32 sites south of the Zambezi. Howieson's Poort sites in South Africa include the Howieson's Poort name site, Boomplaas, Border Cave, Diepkloof, Klasies River, Klein Kliphuis, Rose Cottage Cave, Sibudu, and Umhlatuzana. It also occurs at Melikane and Ntloana Tsoana in Lesotho and at Apollo 11 in Namibia. The Bambatan sites in Zimbabwe and Botswana may have Howieson's Poort affinities (Henshilwood & Dubreil 2011). Several researchers undertook typological and technological analyses of the Howieson's Poort in recent years. Publications, for example, by J. Deacon, Delagnes, Mackay, Mohapi, Porraz, Soriano, Teyssandier, Villa, Wadley, and Wurz provide information on the typological variability and reduction processes followed (Henshilwood & Dubreil 2011). At most sites, blade and bladelet reduction strategies occur alongside the production of flakes. Often, but not always, fine-grained raw materials were selected for the bladelets, blades, and backed artifacts. The Howieson's Poort forms an integral part of the Middle Stone Age, and at most sites, larger quartzite flakes and blades typical of earlier and later Middle Stone Age periods were also produced. However, it was smaller blade blanks that were retouched by marginal backing into geometric shapes such as segments and trapezes. The backed artifacts are larger than those from the Later Stone Age associated with the Wilton industry and are on average around 40 mm in length. Another characteristic typological component of the Howieson's Poort, sometimes overseen, is denticulated and notched blades. The Howieson's Poort backed artifacts were hafted. The smaller pieces were possibly used in bow-and-arrow technology and the larger ones as inserts in spears (Lombard & Phillipson 2010; Lombard 2011). Eight Howieson's Poort sites, Melikane, Ntloana Tsoana, Klein Kliphuis, Klasies River, Apollo 11, Diepkloof, Rose

Cottage Cave, and Sibudu, from different ecological contexts in southern Africa have been dated with the single-grain OSL method by Jacobs and colleagues. This study suggests that the Howieson's Poort lasted for around 5,300 years, starting at ~64.8 and ending around 59.5 kya. Results from other dating methods, thermoluminescence and ESR, indicate that the Howieson's Poort may be older at, for example, Diepkloof and younger at Klasies River (Lombard et al. 2012).

The post-Howieson's Poort period in southern Africa shows continued occupation of sites in a variety of ecological zones (Mitchell 2008). Post-Howieson's Poort sites have been described using various labels, including "MSA lll," "MSA 3," "post-Howieson's Poort," and "informal late Middle Stone Age" (Lombard et al. 2012). The elements typifying assemblages dating to between ~45 and 58 kya are points, often unifacially retouched. This is the case at Border Cave, Klein Kliphuis, Sibudu Cave, Diepkloof, Klasies River, Umhlatuzana, and Rose Cottage Cave in South Africa and Melikane, Ntloana Tsoana, and Sehonghong in Lesotho. The work on the Sibudu post-Howieson's Poort assemblages, with ages between ~46 and 59 kya, has been particularly influential in advancing insight into the post-Howieson's Poort industries in South Africa. The label "Sibudu technocomplex" (Lombard et al. 2012) has been proposed for assemblages of this time range that are characterized by formal retouch, predominantly aimed at producing triangular or elongated unifacial points. Knowledge of the period between 45 and 20 kya, the end of the Middle Stone Age, does not yet allow a coherent assessment of variability. In this period typical Middle Stone Age assemblages and those possibly transitional to the Later Stone Age occur. Characteristic Middle Stone Age elements such as elongated flakes and blades persist until ~25 kya at sites like Boomplaas and Strathalan Cave (Deacon & Deacon 1999) and Apollo 11 in Namibia (Vogelsang et al. 2010). Other final Middle Stone Age assemblages (Lombard et al. 2012) are often associated with a wide variety of types. Hollow-based points and bifacial and unifacial points occur, for example, at Rose Cottage Cave, Sibudu, Heuningneskrans, Klein Kliphuis, Umhlatuzana, Melikane, and Sehonghong. At Border Cave ~38 kya assemblages with small, irregular microlithic flakes in quartz often produced by bipolar reduction and a few retouched tools, including *outils écaillées*, occur. In 1978 Beaumont proposed that this industry should be labelled the "early Later Stone Age" and that it indicates the transition between the MSA and LSA in South Africa. The ostrich eggshell beads and bone tools also associated with this assemblage may be more appropriate markers for the Later Stone Age, but such tools occur in much earlier contexts in South African sites, as will be discussed below. More detailed technological descriptions from sites associated with reliable chronometric dates are needed before the transition to the Later Stone Age can be securely defined in South Africa. In Botswana the transition may have occurred around ~40 kya and in Zimbabwe around ~35 kya (Mitchell 2002).

The Middle Stone Age of East Africa

In East Africa, as in southern Africa, understanding the transition between the MSA and ESA is hampered by poor chronological control and too few relevant multi-sequences. Transitional Sangoan and the Lupemban industries occur in East Africa (McBrearty & Tryon 2006). The Sangoan from this region is characterized by heavy-duty tools, such as choppers, pick axes, core scrapers, and core axes, in addition to small flake tools and Levallois cores. In some instances bifacial points occur as well (Barham & Mitchell 2008). Sites in Tanzania with Sangoan assemblages include Isimila and the Njarasan industry from Mumba Cave (Willoughby 2007). At Lake Eyasi, Sangoan artifacts are associated with cranial fragments, probably of archaic nature (McBrearty & Brooks 2000). The Lupemban succeeds the Sangoan. The work of McBrearty has shown this succession in good stratigraphic context at Muguruk in Kenya. Here Sangoan and Lupemban artifacts are overlain by Middle Stone Age artifacts (Willoughby 2007). Lupemban assemblages contain typical finely

made lanceolate points that may exceed 30 cm in length, blades, and Levallois debitage. The Olkesiteti formation at Olorgesailie, dating to around 220 kya, contains Sangoan-like picks, core axes, elongate bifaces, and Levallois cores interstratified with conventional Middle Stone Age artifacts. This area promises to provide new perspectives on the timing and nature of the ESA MSA transition (Barham & Mitchell 2008).

Currently the best-dated evidence for the transition is from the Kapthurin formation, a Pleistocene sedimentary sequence in the Tugen Hills of the Kenya Rift Valley, west of Lake Baringo. It is visible over an area of ~150 km^2 and is about 125 m thick. The Kapthurin formation stratigraphic succession, divided into five members, from K1 at the bottom to K5 at the top, is well dated through $^{40}Ar/^{39}Ar$ dating of tuffs. Interstratified Acheulean and Middle Stone Age layers occur and some assemblages contain both Acheulean bifaces and Middle Stone Age Levallois technology. A small assemblage of blades, dating to between 545 and 509 kya, comes from two sites, GnJh-42 and GnJh-50, from the base of the K3 deposits (Johnson & McBrearty 2010). The blades have been produced with hard-hammer percussion according to the Hummal volumetric concept in which there is no elaborate preparation of flaking platforms. The blades occur with discoidal cores and flakes. Blades have also been recovered from three younger sites in the Kapthurin formation that date to between 509 and 285 kya. This suggests that the development of blade technology in this region had its origins in the Acheulean and that blades formed a persistent, if small, part of the technological repertoire in the Middle Pleistocene. The base of member K4, with a date of ~285 kya, provides a marker for the change to the Middle Stone Age without core tools. After this time no bifaces occur and typical Levallois production strategies become commonplace.

Early Middle Stone Age sites, occurrences older than ~130,000 years ago (McBrearty & Tryon 2006), are rare in East Africa. Levallois reduction methods form an important component of such assemblages. At the ~200 kya Koimilot sites in the Kapthurin formation, for example, the preferential and recurrent methods for Levallois flakes from centripetal cores and unidirectional and convergent strategies for triangular Levallois flakes and points have been recorded. The Levallois method also occurs at Acheulean sites, for example, at the Leakey Handaxe Area. Here Acheulean assemblages dating to ~284,000–510,000 have boulder-sized cores that were centripetally prepared for the production of large Levallois flakes. Levallois technology is thus associated with Middle Stone Age and Acheulean assemblages in the Rift Valley, northern Kenya. What distinguishes the early Middle Stone Age is not so much the presence of Levallois technology but its diversification (Tryon 2006). Up to ~120 kya, sites tend to be on river or lake margins or the highlands of Ethiopia and western Kenya. These areas could have acted as refugia during glacials or periods of environmental deterioration. After this time, a variety of site locations have been selected (Basell 2008).

Early *Homo sapiens* fossils in the Omo and Middle Awash valleys are associated with mixed Middle Stone Age and Acheulean assemblages. Further investigation of three sites in the Omo Kibish formation shed more light on the technology. The ~195,000-year-old Omo I Kamoya's hominid site (KHS) and Awoke's hominid site (AHS) and Bird's Nest Site (BNS), minimally dated to ~104 kya, have been re-excavated and analyzed (Shea 2008). The exploitation of high-quality raw material such as cryptocrystalline silicate and chert for the production of end products characterizes these assemblages. Radial or centripetal Levallois and discoidal methods occur. Foliate bifaces, hand axes, picks, and lanceolates are common in surface finds but rare in these stratified contexts. The Kibish sites are described as showing technological and typological unity over a period of 90,000 years. Shea (2008) labels it the Kibish industry characterized by Levallois radial, centripetal, and preferential core reduction methods. The association of the Kibish industry with bifacial core tools, such as hand axes, lanceolates, and foliate points, needs to be clarified. Further comparative analysis on these elements is necessary to describe variability

more precisely and to understand to which extent certain bifacial components co-occur with Levallois elements. The broadly contemporaneous Middle Awash Valley sites associated with the Herto *Homo sapiens* similarly contain hand axes and picks and a conspicuous Levallois component (Clark et al. 2003). Assemblages from the Gademotta and Kulkuletti site complex in the central Rift Valley of Ethiopia, dating to between ~140 and 230 kya, are also similar to the Kibish industry. Levallois technology is present but the proportion of retouched triangular flakes and foliate points is higher (Shea & Hildebrand 2010). A somewhat different pattern is presented by the Kapedo Tuff sites in Kenya, dating to ~135–123 kya. Blade production is common but points and retouched pieces are rare. The raw material is predominantly coarse-grained volcanic raw material. Sites in the lower and middle Kapthurin formation in the Lake Baringo Basin show a similar pattern. Stone artifacts from Koimilot Locus 1 and Locus 2 and surface collections at Nyogonyek, dating to ~200 kya, are also characterized by the production of elongated products and coarse-grained volcanic raw material (Tryon et al. 2008). The Nakechichok 1 site (Shea & Hildebrand 2010) from West Turkana, Kenya, with MSA lithics on volcanics also has laminar products and low proportions of points and retouched pieces. The technological and typological differences among Rift Valley MSA sites in northern Kenya and southern Ethiopia may be the result of raw material availability. Chert and cryptocrystalline siliceous raw materials are geologically more abundant towards the north (Tryon et al. 2008).

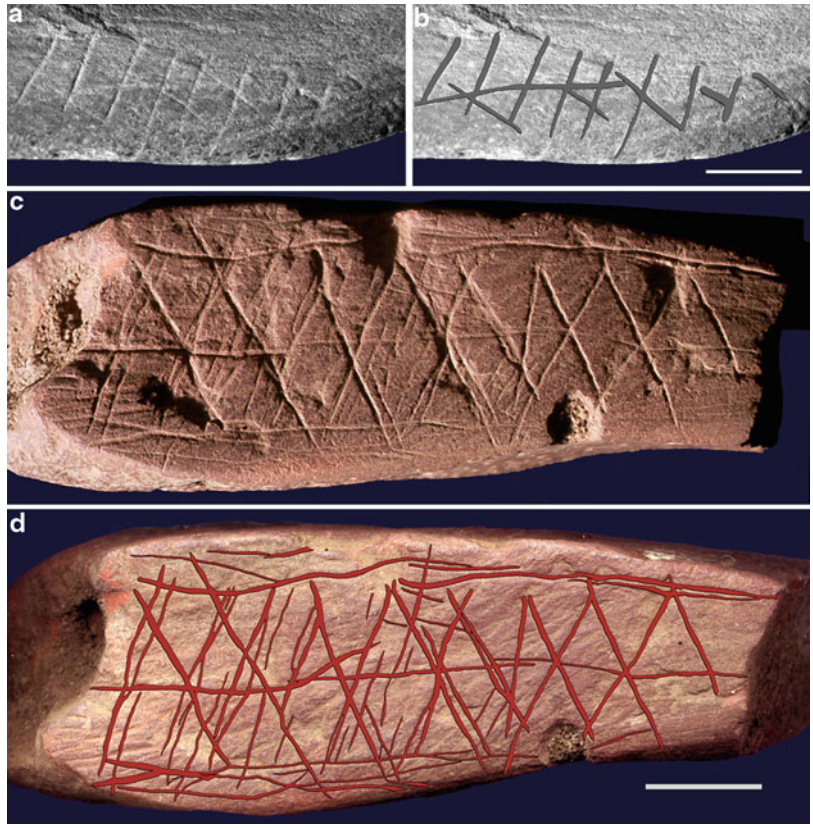
The first evidence for in situ MSA occurrences from the Wasiriya Beds of Rusinga Island, the region bounding Lake Victoria in Kenya, has been documented recently. Acheulean and Sangoan artifacts have been collected from the Wasiriya Beds in earlier years. Small lithic assemblages at Nyamita and Wakondo, dating to >33–45 kya, include Levallois flakes and diminutive carefully worked points, other types of points, and perhaps blades (Tryon et al. 2010). These elements typically occur in several other sites in East Africa. Examples are GvJm16 at Lukenya Hill, Songhor, Prolonged Drift, and Cartwright's Site in Kenya and the Nasera rockshelter in Tanzania. Assemblages from the Middle Awash Valley, Porc Epic, and Mumba Cave are among the few dated assemblages with such features. The Aduma industry of the Middle Awash Valley, investigated by Yellen and colleagues, dates to ~90 kya. This industry is characterized by diminution of tool size over time, a range of point types, small scrapers, and perforates. Levallois cores for the production of flake and blade tools have been recorded. Porc Epic Cave from Ethiopia is another site with stratified deposit, dating minimally to 60–77 kya. Pleurdeau, who analyzed the artifacts from Porc Epic, notes that there is no significant typo-technological variation through time. It has the same characteristics as many other MSA sites from East Africa, including Levallois and discoid reduction methods and retouched points, in addition to backed bladelets and geometrics (Barham & Mitchell 2008). The similarities between the Kibish sites, Porc Epic, Gademotta and Kulkuletti, and the Aduma industry may indicate that *Homo sapiens* populations used relatively similar technological strategies throughout southern and central Ethiopia between 80 and 200 kya (Shea 2008). The artifact patterning from Mumba Cave, as investigated by Mehlman, may also fit this pattern. New dates for the Mumba Cave deposits indicate a somewhat younger date for the Middle Stone Age deposits than previously estimated. The Kisele industry, with bifacial and unifacial points and scrapers, was estimated to be ~90 kya, but the new OSL and post-IR IRSL ages are between ~74 and 63 kya. The Mumba industry from Bed V in this cave, with backed artifacts similar to those from the Howieson's Poort from southern Africa, was thought to date to ~65 kya (McBrearty & Brooks 2000). This industry is now dated to between ~57 and 49 kya (Gliganic 2011). The MSA to LSA transition in East Africa is best known from the Central Rift sites in Kenya (Willoughby 2007). The Nasampolai industry from Enkapune ya Muto, investigated by Ambrose, is known as the earliest Later Stone Age site in sub-Saharan Africa, dating to more than 46 kya. This blade

industry contains large backed blades and geometric microliths, a few *outils écaillées*, scrapers, and burins. Other Later Stone Age sites in East Africa older than ~30 kya include assemblages from the Kisese II rockshelter, Mlambalasi, and the Nasera industry from the Mumba Cave, recently dated to ~37 kya (Gliganic 2011).

Behavioral Debates

A variety of artifacts in organic materials such as bone and shell and processed ochre occur in the Middle Stone Age. Non-lithic artifacts feature prominently in debates on whether Middle Stone Age populations acted in ways that could be considered typically human, or modern. When and how modern behavior is reflected in the Middle Stone Age is one of the most intensely debated issues in archaeological research (Cognitive Archaeology). This is especially the case for the South African Middle Stone Age. Until recently, the criteria used to recognize modern behavior were decidedly Eurocentric, sourced from the archaeological signals associated with the Upper Paleolithic (Deacon & Deacon 1999). Art, ornamentation, and other advanced behaviors such as widespread shaping of bone, ivory, shell, and spatial organization of camp floors appeared relatively sudden and as a "package" in the Upper Paleolithic of Europe (Europe, Early Upper Paleolithic in). From this perspective it is only when this package of behaviors can be detected in the Middle Stone Age of Africa, from around 50,000 years ago, that behavioral modernity can be inferred. Klein (2009) suggests that a genetic mutation occurred at ~50 kya in African populations that allowed this expression of modern behavior, probably underlain by language and symbol use (Cognitive Evolution and Origins of Language and Speech). Some Upper Paleolithic type behaviors occur already in the early Middle Stone Age of Africa, but they appear and disappear again. This may be interpreted as an indication of a non-modern level of behavior, but it may also be the case that demographic patterns influenced the expression of behaviors and that ongoing transmission of innovations required higher population densities. A distinct possibility is that many of the traits we assume to be modern were present from the mid-Pleistocene after 600 kya (Barham & Mitchell 2008).

The criterion of "symbolically mediated culture" is often used to recognize modern behaviors (see Henshilwood & Dubreil 2011 and critical commentary on this hypothesis). Symbolically mediated culture would reflect the capacity to think in symbols and structure social lives symbolically. This capability may be apparent in abstract patterns engraved on ochre from Blombos Cave. Several pieces of ochre with engravings, dating to between ~72 and 100 kya, have been recovered from Still Bay and pre-Still Bay layers. The signature piece is a ~77,000-year-old small slab of dark-red ochre with a stone tool engraved cross-hatched pattern bounded by parallel lines (Fig. 2). A comparable engraving on a small ochre fragment occurs at Klein Kliphuis in a layer that dates to between ~80 and 50 kya (Henshilwood & Dubreil 2011). Engraved ochreous pieces may occur as early as the Fauresmith. Beaumont and Vogel (2006) describe a fragment of silicified ironstone with subparallel lines engraved with a stone tool, from the Fauresmith industry at Wonderwerk Cave. In the Middle Stone Age of South Africa, the convention of engraving extends to other raw materials such as bone and ostrich eggshell. Engravings on bone occur at Blombos Cave in the Still Bay levels. At Klasies River four parallel lines have been engraved with a lithic point on a midshaft fragment of a limb bone associated with the early Howieson's Poort (Fig. 3). More spectacular is the engravings on ostrich eggshell from Diepkloof in the Western Cape, where 270 fragments of intentionally marked ostrich eggshell have been recovered from the Howieson's Poort levels dated to ~60 kya. A limited number of abstract geometric motifs occur, for example, straight parallel lines, cross-hatching, and a hatched band. These abstract linear engravings were originally made on eggshell containers (Texier et al. 2010). In the Howieson's Poort levels from Apollo 11 in Namibia, potential eggshell flask apertures (represented by 23 pieces) have also been found, together with two small fragments of ostrich eggshell (OES) with



Southern and East African Middle Stone Age: Geography and Culture, Fig. 2 Engraved ochre, Still Bay techno-complex, Blombos Cave

intentionally engraved patterns (Vogelsang et al. 2010).

Another reflection of symbolic culture may be the use of beads as personal ornaments. Beads made from shell occur from around 100,000 years ago in some sites in Africa and the Near East. Vanhaeren, Henshilwood, d'Errico, and colleagues have published a number of papers describing early occurrences of shell beads and the implications of their presence in the Middle Stone Age of South Africa (see Henshilwood & Dubreil 2011 for a recent synthesis). More than 41 *Nassarius kraussianus* shell beads have been found in Still Bay layers dating to ~72 kya at Blombos Cave (Fig. 4). Microscopic study has revealed that the shells were pierced with a bone tool to create a perforation. Discrete use-wear facets on the beads indicate that the tick shells were strung, possibly on cord or sinew, and perhaps worn as personal ornaments. Microscopic residues of ochre inside some beads may have been caused by deliberate coloring or transference of ochre when worn. Six *Afrolittorina africana* shells occur in the Still Bay levels from Sibudu. Three of these were probably beads as they have been deliberately pierced. The first ostrich eggshell beads appear earlier than 40 kya in deposits in southern and East Africa. The earliest indication of the use of ostrich eggshell (OES) for personal ornamentation may be from Apollo 11. Three OES pieces with smoothed edges, similar to LSA OES pendants, have been described from the Howieson's Poort techno-complex (Vogelsang et al. 2010). Ostrich eggshell beads start to appear more regularly in MSA sites postdating ~50 kya. OES beads occur in level V at Mumba Cave, recently dated to ~49 kya. Other sites with early occurrences of OES beads include Enkapune ya Muto in Kenya, Nswatugi in Zimbabwe, and Boomplaas, Bushman Rockshelter, Cave of Hearths, and Border Cave in South Africa

Southern and East African Middle Stone Age: Geography and Culture, Fig. 3 Engraved bone, Howieson's Poort techno-complex, Klasies River

(McBrearty & Brooks 2000). OES beads are very common in the later periods of the Later Stone Age of southern and East Africa.

There is some debate as to whether early beads represent symbolically mediated culture. It has been suggested that they may reflect theory of mind and the capability to pay attention to one's appearance, abilities not specifically related to symbolic culture (commentary in Henshilwood & Dubreil 2011). Art, on the other hand, is a largely uncontested indicator of symbolic thought. The earliest representational art in Africa is the well-known painted slabs from Apollo 11 cave. These drawings, executed with pigment crayon, are on seven loose slabs ("art mobilier") and depict a therianthrope, geometric patterns, and animals. The later Middle Stone Age deposits in which the painted slabs were found have been redated giving an age of 29.4 ± 1.4 ka, confirming that the painted slabs date to ~30 kya as earlier suggested (Vogelsang et al. 2010). Another, less straightforward indicator of symbolic cognition may be the early use of ochre. It is known that pigments have been used at least from around ~285 kya, as ochre occurs in the Kapthurin formation in deposits dating to older than 200 kya (McBrearty & Tryon 2006). The oldest occurrence of ochre use in Africa may be from Twin Rivers in Zambia where utilized ochre have been recorded in layers older than 300 kya (Barham & Mitchell 2008). Striated ochre is present in the Pinnacle Point levels dating to ~162 kya (Marean 2010), and it becomes common in South African sites from the Late Pleistocene onwards (Deacon & Deacon 1999). Even the earliest ochre recovered is modified and bears striations on its surfaces. Such striations occur on fragments and on ochre crayons with smoothed edges, such as the ~90,000-year-old subtriangular ochre crayon from Klasies River (Fig. 5). There are grindstones that retain traces of ochre from many Middle Stone Age sites, indicating that ochre was sometimes powdered before use. Ochre could also have been processed and used in a liquid form. Two ~100,000-year-old ochre-processing toolkits have been recovered from Blombos Cave (Henshilwood et al. 2011). The coeval and spatially associated toolkits consist of *Haliotis midae* (abalone) shells and are associated with grinders, stone artifacts, bone, and ochre (Fig. 6a and b). Inside the abalone shell of toolkit A, adhering to the inner surface, a 5-mm-thick red compound is visible. The compound consists of ochre, fragments of spongy bone of which the fat may have acted as a binder, charcoal fragments, and quartz and quartzite microflakes. These microflakes may have originated from quartzite flakes with ochre traces found underneath the abalone shell in association with three identifiable bone fragments. A quartzite cobble that was used as percussor and grinder was also found inside the toolkit (Fig. 6a). Sixteen centimeters from this toolkit, another abalone toolkit was found (Fig. 6b), also with a thick red

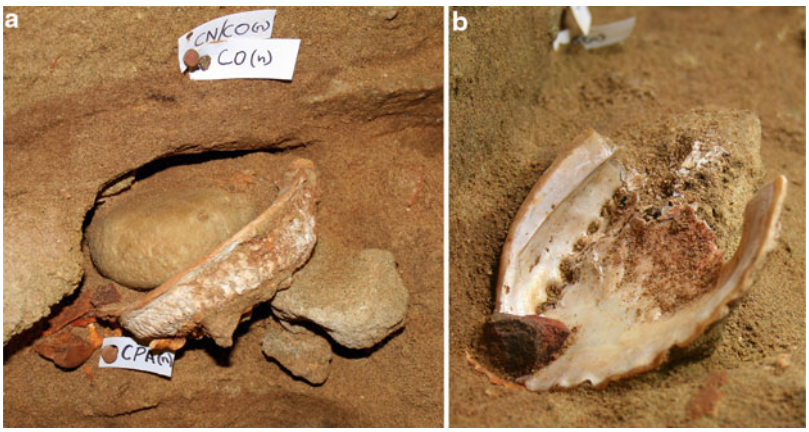
Southern and East African Middle Stone Age: Geography and Culture, Fig. 4 Nassarius kraussianus beads, Still Bay techno-complex, Blombos Cave

compound adhering to the inside of the shell. A small quartzite core, used as a grinder, and a large piece of ochre that was knapped to produce small pieces of ochre, similar to the ochre found inside the abalone shells, were associated with this toolkit. It is not known what the ochre liquid was used for, but it may have been applied as paint on a surface. This find shows that the conceptual capability to source, combine, and store substances that characterize modern humans was present 100,000 years ago.

The quest to identify innovations as markers of modern behavior has stimulated much research on the Middle Stone Age of South Africa. Technological innovations associated with the Howieson's Poort and Still Bay have been investigated most extensively. The production techniques and methods from these industries have been described as advanced or innovative. An important technological milestone was the deliberate heat treatment of lithic raw material to improve flaking capability. Silcrete is a very

hard intractable material, and Brown et al. (2009) have shown that it is significantly easier to produce bifacial tools and bladelets in silcrete after systematic heat treatment with fire. Three independent methods, archaeomagnetism, thermoluminescence, and maximum gloss (Pinnacle Point Methods), were used to infer heat treatment of archaeological silcrete artifacts dating to ~72 kya and ~162 kya, from Pinnacle Point. Heat treatment was also used to produce silcrete bifacial points in the Still Bay at Blombos Cave (Mourre et al. 2010). Another significant technological innovation that occurred in the Middle Stone Age is the production of formal bone tools. These are tools or bone implements that have been fully modified with techniques specific to bone material such as grinding, scraping, or cutting (d'Errico et al. 2012). The largest collection of bone tools is from Blombos Cave from the Still Bay (Henshilwood & Dubreil 2011). The oldest bone tool from this site is a bone percussor dating to ~72 kya. Bone tools also occur at Sibudu. Twenty-three bone tools that have been shaped by scraping and sometimes by percussion flaking have been identified from the pre-Still Bay, Howieson's Poort, post-Howieson's Poort, and final Middle Stone Age (d'Errico et al. 2012). They include specialized types such as wedges, pièces esquillées, pressure flakers, smoothers, sequentially notched pieces, awls, and a possible projectile point. A wedge-like implement from the pre-Still Bay layers also date to older than ~72 kya. Notched bone, most probably with a nonfunctional purpose, occurs in the Mossel Bay levels at Klasies River (Fig. 7), at Apollo 11 in the Still Bay levels (Vogelsang et al. 2010), and at Sibudu Cave in the Howieson's Poort levels. Earlier investigations described Middle Stone Age bone tools from, for example, Border Cave and White Paintings Shelter from Botswana ~38–50 kya, but the barbed and unbarbed bone points from the Katanda sites in the Semliki Valley, dating to ~90 kya, are the oldest formal bone tools discovered yet in Africa (McBrearty & Brooks 2000; d'Errico et al. 2012). Not many Middle Stone Age assemblages have been examined with advanced microscopic techniques, and it is likely that future investigations will significantly

Southern and East African Middle Stone Age: Geography and Culture, Fig. 5 Ochre crayon, Mossel Bay techno-complex, Klasies River

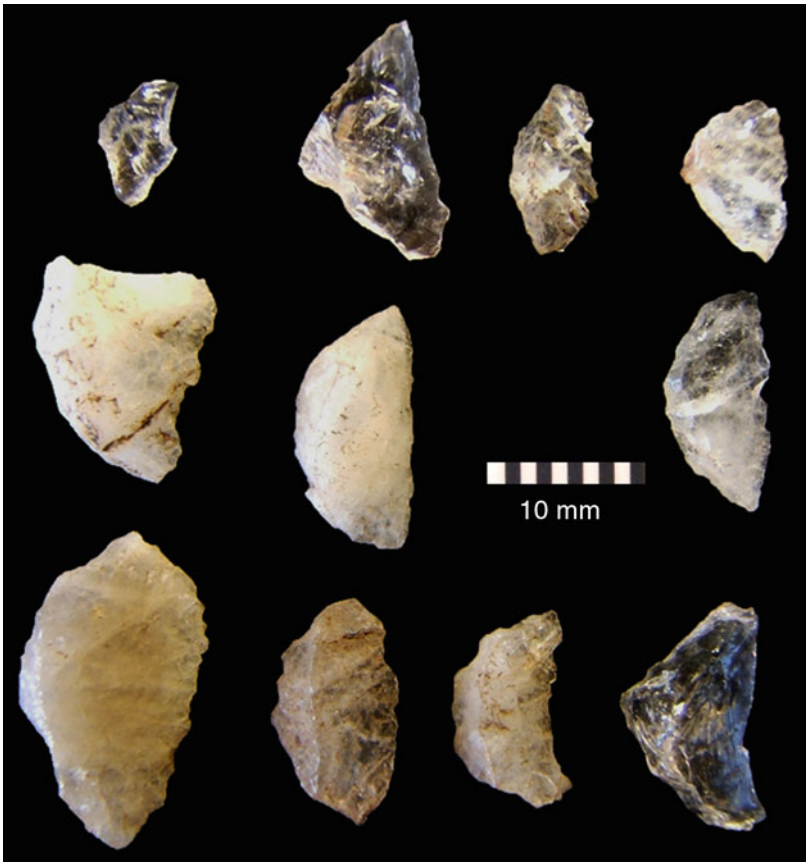


Southern and East African Middle Stone Age: Geography and Culture, Fig. 6 (**a** and **b**) In situ ochre-processing toolkits from Blombos Cave

Southern and East African Middle Stone Age: Geography and Culture, Fig. 7 Notched bone, Mossel Bay techno-complex, Klasies River

increase the number of bone tools from the Middle Stone Age.

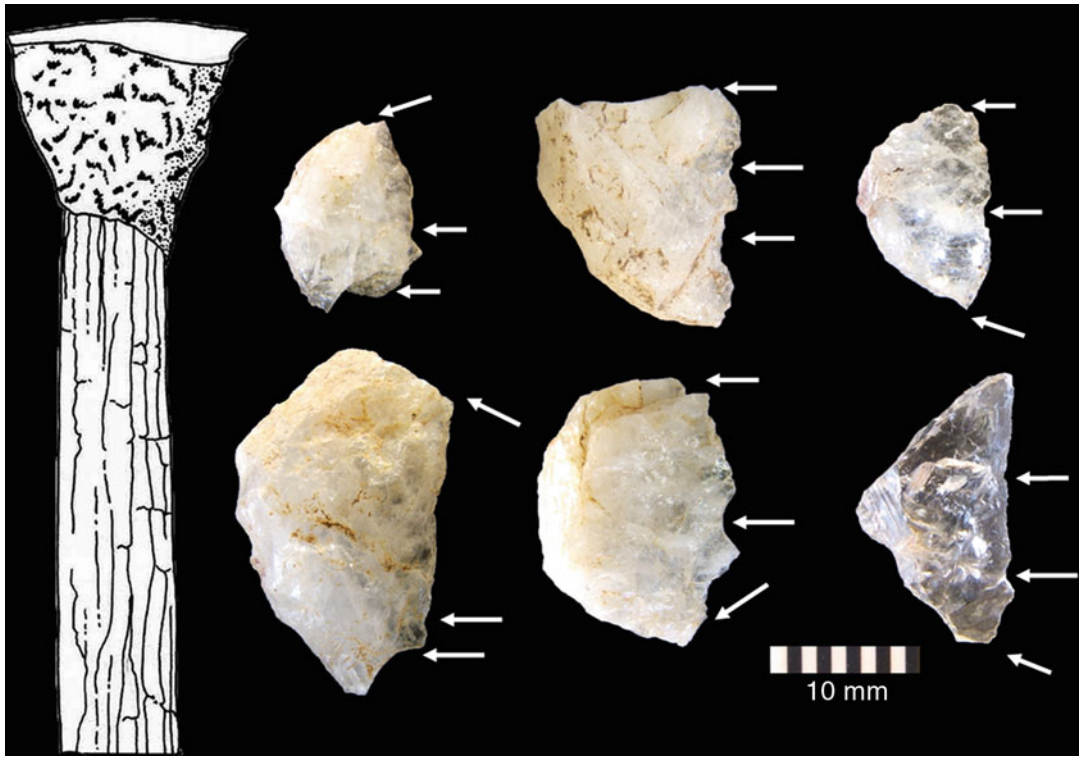
Hafting, the practice of setting a bone or a stone artifact in a handle of organic material to produce multicomponent tools, was a major innovation. The transition from handheld to composite tools preceded the evolution of *Homo sapiens* (Barham & Mitchell 2008). Various forms of Levallois and unretouched points and small backed artifacts would have been hafted on spears and propelled by hand. It is this kind of weapon that may have occurred as early as the ~285 kya in East Africa (McBrearty & Tryon 2006; Barham & Mitchell 2008) and somewhat later in southern Africa (Lombard 2011). Bone points, dating to MIS 4, that could have been used to tip arrows have been identified from Peers Cave, Sibudu, and Klasies River (d'Errico et al. 2012). The origins of bow-and-arrow technology, previously associated with the Upper Paleolithic of Europe, may be linked to the Howieson's Poort. Metric analyses and use-wear and microtrace studies show that microlithic quartz backed artifacts from Umhlatuzana and Sibudu have been hafted and used in bow-and-arrow technology (Lombard 2011, Figs. 8 and 9). Howieson's Poort backed artifacts could also have been used as barbs for hand-delivered spears. Experimental research provides an alternative avenue to investigate ancient cognition that may avoid some of the theoretical difficulties involved in identifying symbolic culture in archaeological artifacts. Experiments were undertaken to investigate how mastic was produced to facilitate hafting of Howieson's Poort backed artifacts. Microresidues on the Sibudu Cave backed artifacts provided the clues for the ingredients of the prehistoric adhesive (Stone Tool Usewear and Residue Analysis in Environmental Archaeology). The results indicate that several ingredients including ochre, gum, and a fatty substance had to be mixed and heated to the correct temperature to ensure the correct degree elasticity for successful hafting (Wadley et al. 2009). The production and use of stone-tipped spears and bow-and-arrow technology required multiphase planning and working memory capabilities. These abilities would have allowed individuals to keep design elements, adhesive production, and the combination of different raw materials in mind. This is typical of the thought processes underlying modern



Southern and East African Middle Stone Age: Geography and Culture, Fig. 8 Quartz segments and backed pieces from Sibudu Cave, KwaZulu-Natal, South Africa (Lombard & Phillipson 2010)

technological procedures (Lombard 2012). Investigations into the organization of space and the use of plant materials further allow insights into the minds of Middle Stone Age people outside of the symbolic behavior debate. Lombard (2012) discusses the few instances where preservation allows the reconstruction of spatial patterns. It is highly probable that the same social and cognitive rules structured the organization of space in the Later Stone Age and the Middle Stone Age as shown at sites such as Diepkloof, Strathalan Cave B, and Klasies River. Micromorphological studies also demonstrate that hearths and bedding heaps have been maintained at Sibudu from ~58 kya. Another innovation recently recorded in this regard is the use of sedges and aromatic leaves to construct bedding areas at ~77 kya at Sibudu Cave (Wadley et al. 2011).

The hunting technology and hafting procedures discussed above imply a level of flexibility similar to that of current hunter-gatherer groups (Archaeology of Hunter-Gatherers). The choice of prey in the Middle Stone Age, on the other hand, has led some researchers to question the sophistication of hunting capabilities. Middle Stone Age paleoecology is best known from coastal South Africa, and it is in this context that the cognitive implications of subsistence behavior have been debated. The MSA differ significantly from the LSA in terms of relative species abundance. In LSA assemblages an increased exploitation of dangerous game such as wild pigs and buffalo occurs whereas MSA populations hunted more docile species like the eland. LSA populations also exploited marine mollusks, tortoises, and airborne birds more intensively than MSA people. In the LSA more young seals were hunted and fish was added to the diet. These contrasts are seen as an indication that populations in the LSA were



Southern and East African Middle Stone Age: Geography and Culture, Fig. 9 *Left*: reconstructed arrow, tipped with a transversely hafted segment. *Right*: segments and backed pieces from Sibudu Cave and Umhlatuzana Rockshelter with impact fractures consistent to those observed on similar artifacts that were used as transverse tips in experimental arrows (Lombard & Phillipson 2010)

technologically more advanced and efficient and therefore more competent hunters than Middle Stone Age groups (Klein 2009). However, it has been noted that these contrasts are based on assemblages dated to before 60 kya and after 20 kya and that the crucial period between these dates has not been documented. Investigating this time gap is a major priority for future research in subsistence patterns (Steele & Klein 2009). The differences in species abundance in the MSA and LSA need not necessarily reflect cognitive capabilities or the innovation of novel technologies. It has been suggested that the differences reflect resource intensification imposed by higher population densities in the LSA (Deacon & Deacon 1999). The changes in the coastal environment in the previous glacial/interglacial cycles in the Cape Floral Region (CFR), where the southern Cape sites are situated, influenced the carrying capacity of this area. The coastal environment may not have had adequate grassland habitat to support grazing taxa and therefore affected the large ungulate biomass. This would have required expansion of diet breath to include more intensive exploitation of shellfish, flying seabirds, tortoises, and fish in the LSA (Faith 2011). Due to the relative absence of assemblages with fauna in East Africa, relatively few Middle Stone Age zooarchaeological studies have been undertaken, and data from sites from this area do not generally form part of this debate.

Conclusion

In southern and East Africa, the absence of good chronometric control and scarcity of multi-sequence sites prevent a precise grasp of the transition of the ESA to the MSA that occurred

from ~500–285 kya. During the transition Middle Stone Age and Acheulean elements frequently appear together in sites. The earliest date for Middle Stone Age occurrences without LCTs in southern and East Africa is around ~285 kya. In East Africa such assemblages occur first in the Kapthurin formation in Kenya and in southern Africa at Florisbad. In both regions the visibility of archaeological sites increases from ~130 kya onwards. Flakes, blades, and points of various degrees of elongation comprise the unretouched component of Middle Stone Age assemblages. The retouched components of bifacial and unifacial points and backed artifacts occur in both regions and are frequently used as temporal markers in the South African Middle Stone Age. Other types include scrapers and denticulates. In East Africa and across most of the African continent, the transition to the LSA took place around 40,000 years ago (Mc Brearty & Brooks 2000), but in southern Africa timing and nature of the transition are still debated. More progress has been made towards creating an overarching regional culture-historical framework for the southern African MSA than for the eastern African MSA. The multitude of analyses undertaken on all aspects of the Howieson's Poort makes it perhaps the most intensively studied techno-complex in southern and East Africa. The MSA from East Africa is best described as evidencing a mosaic pattern of variation through time and space (Shea 2008). An intriguing topic for future research is the spatial extent of patterning in southern and East Africa. The Still Bay and Howieson's Poort techno-complexes have a southern African distribution and crosscut a variety of ecological zones. Future inter-site comparisons will demonstrate whether variability exists on the same geographical scale in other Middle Stone periods and areas. It is a priority to further develop J.D. Clark's idea that various forms of points can be used to identify regional variations in the Middle Stone Age of East Africa and South Africa. He mentioned, for example, Howieson's Poort geometrics, Still Bay, Pietersburg and Bambata points, and small triangular points from Mumba. Increased research focus may expand the kinds of artifacts that pattern in a regional way. The reconstruction of Middle Stone Age behavioral patterns most frequently takes place within the framework of the modern behavior debate, especially for sites in South Africa. Whether or not Middle Stone Age populations were "modern," this review has shown that they varied hunting technologies by changing hafting configurations and types of insets in composite tools. They invested effort in various forms of artisan activities such as engraving of geometric designs on ochre and shell, making shell beads and formal bone tools, and processing ochre. This indicates that Middle Stone Age hunter-gatherers could adapt to their environment flexibly and creatively.

Cross-References

- ▶ Archaic *Homo sapiens*
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Clark, John Desmond
- ▶ Clark, John Grahame Douglas
- ▶ Cognitive Archaeology
- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Europe: Early Upper Paleolithic
- ▶ Handaxes and Biface Technology
- ▶ *Homo sapiens*
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Ileret Footprints
- ▶ Pinnacle Point: Excavation and Survey Methods
- ▶ Stone Tool Usewear and Residue Analysis

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Southern Ocean and Antarctic Maritime Archaeology

Matthew Carter[1] and Emily Jateff[2]
[1]University of Otago, North Dunedin, New Zealand
[2]South Australian Maritime Museum, Adelaide, SA, Australia

Introduction

Professional archaeology has been practiced in the Southern ocean and Antarctic region since the 1970s with archaeologists from Australia, Argentina, Brazil, Chile, New Zealand, the United Kingdom, Scandinavia and the United surveying, recording and excavating a number of maritime sites. This work has been undertaken primarily to create inventories of historic places and to aid in the conservation of historic buildings, and as a result, this work has been almost exclusively terrestrially based.

Definition

The Southern Ocean and Antarctica cover more than one-eleventh of the Earth's surface. Antarctica is the fifth largest continent in the world, while the Southern Ocean is the fourth largest ocean, extending from the shores of Antarctica to 60° south to the approximate extent of the Antarctic convergence (although this definition is often broadened to include the Subantarctic Islands south of 45° latitude).

The Southern Ocean comprises the world's southernmost body of water and includes parts of the Drake Passage, the Scotia Sea, the Weddell Sea, the King Haakon VII Sea, the Cosmonaut Sea, the Cooperation Sea, the Davis Sea, the Mawson Sea, the D'Urville Sea, the Ross Sea, the Amundsen Sea, and the Bellingshausen Sea. Throughout its waters are islands within the Antarctic continental shelf, such as the South Orkney Islands, South Shetland Islands, Bellenny Islands, and Scott Islands, and outside this area, the Subantarctic Islands of the Falkland Islands, South Georgia, the South Sandwich Islands, Bouvet Island, the Prince Edward Islands, the Crozet Islands, the Kerguelen Archipelago, Heard Island, the McDonald Islands, Macquarie Island, the Auckland Islands, Bounty Island, Campbell Island, the Antipodes, and the Snares.

The amount of ice within the Southern Ocean is enormously variable and fluctuates seasonally; in winter, the ocean freezes outward from Antarctica to approximately 65° south latitude in the Pacific sector and 55° south latitude in the Atlantic sector a greater than a sixfold increase in area. At some coastal points, intense persistent drainage winds from the interior keep the Antarctic shoreline ice-free throughout the winter.

The Southern Ocean is 4,000–5,000 m deep over most of its extent with only limited areas of shallow water with even the Antarctic continental shelf being generally narrow and deep, its edge lying at depths of 400–800 m. The ocean's greatest depth is 7,235 m at the southern end of the South Sandwich Trench.

The Southern Ocean and Antarctic is characterized by frequent intense cyclonic storms caused by the temperature contrast between ice and open ocean with the area from about latitude 40 south to the Antarctic Circle recording the strongest average winds anywhere on Earth.

World Heritage Sites and Legislation

The islands in the Southern Ocean and their surrounding waters are protected by an interwoven web of legislation aimed at protecting both natural and cultural resources. Each island comes under the legislation of its sovereign nation which provides the framework for the management and protection of heritage sites. In addition, many of the islands including Auckland Island, Campbell Island, Heard Island, and Macquarie Island have been designated as "nature reserves," and in the last two decades, the waters surrounding these islands have been also been made into marine reserves, further restricting activities that may be harmful to natural and cultural resources. Significantly, Heard Island, the New Zealand Subantarctic Islands, Macquarie Island, and the Tristan da Cunha Islands are all UNESCO world heritage sites based on their outstanding universal natural values.

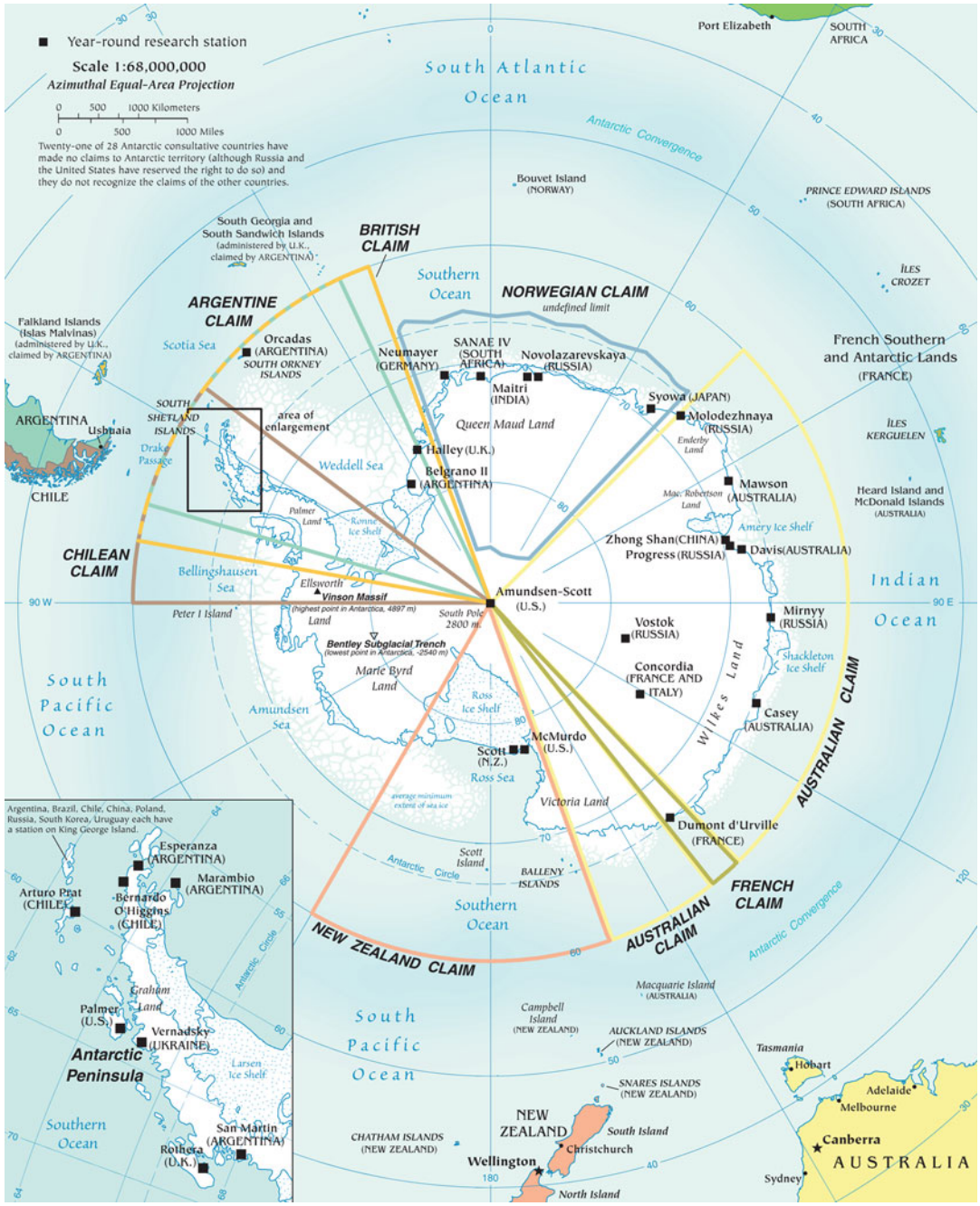
The Antarctic Treaty System (ATS) is one of the most successful examples of international law ever created. Ratified in 1959 by 25 consultative parties including those previously involved in Antarctic action (highly active signatories include Australia, Argentina, Belgium, Chile, France, Japan, New Zealand, Norway, South Africa, Russia, the United Kingdom, and the United States of America), the Antarctic Treaty created rules and regulations for exploration and exploitation of the southern continent. Drafted in the spirit of peaceful scientific international agreement, all activities may be monitored or "observed" by any nation and disputes must be settled by common vote. Consultative parties cannot resign or be expelled from membership, although nations are allowed to ratify and become a consultative party if conducting research in Antarctica.

Seven nations (Australia, New Zealand, United Kingdom, Argentina, Chile, France, and Norway) claim sovereign rights to territory in Antarctica. Under the 1959 Antarctic Treaty and subsequent 1999 Protocol on Environmental Protection to the Antarctic Treaty, or Madrid Protocol, territorial claimant nations are responsible for protection of cultural heritage under pertinent national legislation. However, signatories remain at odds over recognition of marine claims, an issue that has implications for Antarctica's submerged cultural heritage sites. Marine areas (e.g., the Australian Antarctic Territory [AAT] Exclusive Economic Zone [EEZ]) may not be recognized by states other than the claimant nation, a dubious measure of protection for heritage sites in disputed waters (Fig. 1).

Documents within the ATS that relate to cultural heritage are the Antarctic Treaty Recommendation VII-9, which regulates scientific endeavor, and the Madrid Protocol. The Madrid Protocol entered into force on 14 January 1998, with the goal to, as per Article 3, avoid "degradation of, or substantial risk to, areas of biological, scientific, historic, aesthetic or wilderness significance." Annex V. Area Protection and Management outline the procedures for site nomination as an Antarctic Specially Protected Area (ASPA) or Antarctic Specially Managed Area (ASMA) and provides for permitting procedures. In order to be recognized as a historic site or monument, sites must first be accepted as (or be located within) an ASPA or ASMA, which requires a process of nomination. All sites are then entered on the Antarctic sites and monuments list. Guidelines (Resolution 5) were submitted at the 2001 Antarctic Treaty Consultative Meeting (ATCH) that offer blanket protection for all pre-1958 historic sites and artifacts and recommend best archaeological practice for necessary disturbance of remains. Oversight is through the ATS and the Scientific Council on Antarctic Research (SCAR) and can be accessed via the International Polar Heritage Committee website (www.polarheritage.com).

Maritime Sites on the Antarctic Sites and Monuments List

While many sites on the Antarctic mainland have associations with maritime activities (such as



Southern Ocean and Antarctic Maritime Archaeology, Fig.1 *Map of the Antarctic region*. Twenty-one of 28 Antarctic consultative countries have made no claims to Antarctic territory (although Russia and the United States have reserved the right to do so), and they do not recognize the claims of the other countries. The World Factbook, 2009. Courtesy Wikimedia Commons

whaling and sealing sites, and research stations), only three dedicated maritime archaeological sites are currently located on the Antarctic Sites and Monuments List. These sites are the whaling station at Whalers Bay, Deception Island (No. 71); nineteenth-century wreckage located

on the beach at Elephant Island by a Naval expedition in the 1990s (No. 74); and Cape Denison, Commonwealth Bay (No. 77), which is the only listed site that incorporates an underwater object (a bow anchor associated with Mawson's vessel *Aurora*) that has not yet been located. Commonwealth Bay is managed as ASMA 3. Two sites (Whalers Bay and Elephant Island) fall within the United Kingdom territory. The third site (ASMA 3) is located within the AAT and managed by Australia.

Historical Background

Polynesian seafarers were the first humans to venture into the Southern Ocean region with archaeological evidence suggesting that they discovered and briefly occupied the Auckland Islands in the Subantarctic Island group some 650 years ago. European exploration in the Southern Ocean, and the eventual discovery of Antarctica, began with the voyages sponsored by the Portuguese Prince Henry the Navigator in the early fifteenth century. The Portuguese rounding of the Cape of Good Hope in 1487–1488 and the crossing of the Indian Ocean in 1497–1499 distanced both Africa and southern Asia from the hypothesized *Terra australis incognita*, and later, the discovery of the Strait of Magellan 1519–1522 and Drake Passage 1577–1580 also separated South America from the fabled southern land, confirming the possibility of world circumnavigation via the southern hemisphere. The surveying of the coast of Australia by the Dutch explorer Abel Tasman in 1644–1645 provided further information as to the extent of the southern continent while almost a century later, French expeditions from 1738 onwards began to discover isolated Islands in the southern Indian Ocean. Identification of the Southern Ocean however is credited to Captain James Cook who during three expeditions between 1771 and 1780 discovered South Georgia and the South Sandwich Islands and crossed the Antarctic Circle for the first time. The subsequent publication of accounts of Cook's voyages heralded the start of both sealing and whaling in the Southern Ocean region. Descriptions of the abundance of seals on South Georgia led to a rush of sealing vessels into the Southern Ocean from the late 1780s. The search for unexploited stocks of seals led to the discovery of many other Southern Ocean island groups such as the Antipodes (1800), Auckland Islands (1805–1806), Bounty Islands (1807), and Campbell and Macquarie Island (1809–1810). Each island was stripped of its stocks so that by 1850s, there were few southern fur seals left; however, the use of the Great Circle sailing routes by naval and merchant ships travelling through the Southern Ocean from around this time continued the discovery of islands between the latitudes of 50° and 60° south.

Discovering Antarctica

Early Western exploration of the Antarctica continent was attempted for a number of reasons: Some nations were interested in locating new fertile whaling grounds; others sought to locate the Southern Magnetic Pole, and others to acquire territory. The first recorded sighting of the Antarctica continent was by Russian explorer Thaddeus von Bellinghausen who circumnavigated the Antarctic south of Cook's route in 1819–1821, yet American whaler *Nathanial Palmer* is the first to land men on the Antarctica continent in 1821. French explorer Jules Dumont D'Urville was instructed to reach and claim the South Magnetic Pole for France. He relied on coordinates predicted by mathematician Carl Gauss but ended up west of the mark. With ships *Astrolabe* and *Zelee*, he sighted a section of the Antarctic coast and claimed Terre Adelie for France in 1840. Charles Wilkes' United States exploring expedition also searched for the South Magnetic Pole in 1838–1842, encountering the French ship *Astrolabe* in Antarctic waters. Bipolar adventurer James Clark Ross led the British bid for the South Magnetic Pole from 1839 to 1843, with the ships *Erebus* and *Terror*. Ross noted his rivals' routes and headed the other

direction, narrowly missing the pole. Ross explored more of Antarctica than any previous adventurers, naming features such as Mounts Erebus and Terror and the Ross Sea. A British scientific expedition in 1872–1876 on *Challenger* circumnavigated the continent, produced valuable deep sea soundings and helped initiate the next phase of Antarctic exploration.

The first International Polar Year (1882–1883) saw an increase in expeditions, leading to what is known as the "Heroic Age" of polar exploration. Eight nations sent exploratory expeditions to the southlands for national honor, pride, and scientific endeavor. Not until the Space Race of the 1960s would such a feat be seen again. This period is usually said to end with the tragic voyage of Ernest Shackleton in 1914–1916 which resulted in the loss of *Endurance* to pack ice. Only a few survived by rowing to South Georgia (Elephant Island) in the tender *James Caird*.

In 1898, *Belgica* was the first vessel to overwinter in Antarctica, and in 1899, Carsten Borckgrevink's *Southern Cross* was the first to set up a temporary camp on the mainland. Erich von Drygalski's Gauss 1901–1903 expedition became trapped in the pack ice. This expedition charted part of Antarctica, including Drygalski Island. Baron Otto Nordensköld and the 1901–1903 Swedish Antarctic Expedition resulted in the loss of vessel *Antarctic*, which was crushed in pack ice. Robert Falcon Scott's first expedition (in vessel *Discovery*) was from 1901 to 1904, setting a new farthest South record and charting territory. The Scottish National Antarctic Expedition (1902–1904) charted portions of Coats Land along the Weddell Sea, and in 1903, a French team led by Jean-Baptiste Charcot set sail in *Français* to rescue the Nordensköld party. While Nordensköld was eventually rescued by Argentinean vessel *Uruguay*, Charcot charted portions of Graham Land and Loubet Land.

The South Magnetic Pole was finally achieved in 1909 by the Northern Party of the British Antarctic Expedition on *Nimrod*, Ernest Shackleton in command. Charcot returned to Antarctica in 1908–1910 to continue exploration of the continent. In 1910, Nobu Shirase led the Japanese Antarctic Expedition in *Kainan Maru*. It all came to a head on 15 December 1911, when Roald Amundsen's South Pole Expedition beat Robert Falcon Scott, of the British *Terra Nova* Expedition to the South Pole. On the return journey, Scott and his party succumbed to the elements. The 1911–1914 Australasian Antarctic Expedition (under Douglas Mawson in vessel *Aurora*) charted the coastline between Cape Adare and Mount Gauss. Shackleton's Imperial 1914–1917 Trans-Antarctic Expedition (*Endurance*) was 1915–1917. Supported by the Ross Sea Party with Aeneas Mackintosh in charge, they succeed in laying depots across the Great Ice Barrier. Shackleton's final voyage is 1921–1922 on vessel *Quest* continues mapping the Antarctic continent but results in Shackleton's death and burial at South Georgia Island. A final footnote is the first Antarctic flight, made by Hubert Wilkins in 1928. For further information, see Headland (2009).

By the 1870s, the falling number of whales in northern waters saw German, Scottish, and Norwegian whalers exploring and taking whales from the waters of the Southern Ocean down as far as the Antarctic Peninsula. In 1904, this interest was cemented by the establishment of the first Antarctic land-based whaling station on Georgia Island. This success of this station soon saw the establishment of other whaling operations on South Georgia and the extending of their range southward to the southern Scotia Sea and Antarctic Peninsula. By 1912 Norwegian whaling factory ships were operating in the open waters or the Southern Ocean using the edge of the Antarctic ice field to provide the calm waters they needed to hunt and process their prey. The 1920s saw a massive increase in demand for whale oil which saw the rapid growth of the industry; however, overproduction caused the market to collapse, and in 1931 an international convention for the regulation of whaling was established.

After the Second World War, scientific exploration of the Antarctic continent again increased. Fifty-five research stations were established as a result of the first International Geophysical Year (1957–1958). A third cycle of resource

extraction (modern fishing and whaling) led by Soviet, Chilean, and Japanese vessels began in the 1960s and continues today. Fishing below 60° South latitude is now regulated by the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR).

Archaeology

The relatively recent exploration and settlement of the islands in the Southern Ocean and of the Antarctic continent itself, the rugged conditions, and the loss of many vessels have combined to create a rich maritime archaeological record which has only recently become the subject of archaeological investigation.

The archaeological remains from various sealing expeditions in the Southern Ocean and Antarctic have been investigated by researchers from Australia, Chile, South Africa, and New Zealand. This work has included the survey of sealing sites on Campbell Island (Palmer & Judd 1981), the Prince Edward Islands (Cooper & Avery 1986), and Kerguelen Island (Le Mouël 2004), while excavations have been undertaken on Auckland Island (Dingwall et al. 2009), Heard Island (Lazer & McGowan 1990), Macquarie Island (Townrow 1989), and the South Shetland Islands (Stehberg & Cabeza 1987). The transient nature of most sealing expeditions means that the archaeological remains from this industry are typically slight; however, the investigation of sealing sites in this area has covered not only the camps that the sealers used but also production and storage sites providing insights into both the domestic and industrial aspects of this industry. The majority of archaeological work directed toward sealing on these islands has been undertaken by government agencies in order to create inventories of historic sites and to gain sufficient information to make appropriate management recommendations for these sites. These surveys and excavations have also raised a number of academic questions including the role of sealing in the expansion of capitalism in the nineteenth century, the organization of the sealing industry, the technology and the international commercial networks, and the archaeology of communities in isolation.

Shore-based whaling sites have been investigated at a number of sites within the region. The earliest whaling station investigated is the 1850 Southern Whale Fishery Company's whaling station at Port Ross in the Auckland Islands. In 2003 a New Zealand Department of Conservation expedition to the Auckland Islands surveyed the remains of this settlement which at its height comprised some 30 buildings and around 200 colonists (Dingwall et al. 2009). This archaeological survey reconstructed from the surface evidence the general layout and many of the features of the settlement, providing insights into the character and composition of this failed colonial enterprise. Whaling stations from the early twentieth century have also been investigated including the Te Awaiti whaling station (1909) and Cook's whaling station (1911) on Campbell Island (Palmer & Judd 1981); the whaling station on Deception Island (1906) (Hacquebord 1992); the Jeanne d'Arc whaling station (1908) on Kerguelen Island (Le Mouël, 2004); and the whaling stations at Husvik (1910), Stromness (1912), Grytviken (1904), and Leith Harbour (1909) on South Georgia (Basberg 2004). The investigation of these sites has generally involved the recording of the above-ground evidence in order to establish the functions of the various parts of the whaling stations. At Kerguelen Island, archaeology accompanied the restoration of a number of buildings at the Jeanne d'Arc whaling station, while the whaling stations on South Georgia were investigated for their functional relationships to one another in an industrial archaeological context.

A notable component of the maritime archaeological record of the Southern Ocean and Antarctic is the presence of numerous shipwrecks which relate to all phases of the discovery and exploitation of the region. Despite the considerable number and importance of such archaeological sites, very few shipwrecks have been investigated in this region and no underwater archaeological investigations have yet taken place. In the Auckland Islands, 11 ships are historically recorded as being wrecked; only one of which has been the subject of archaeological

attention. The 56-t schooner *Grafton* was wrecked in 1864, and in 2003, a small section of the vessel's hull timbering, found above the tide mark, was recorded (Dingwall et al. 2009). The most famous Auckland Island shipwreck is that of *General Grant* which sank in 1866 reputedly with a cargo of gold bullion and as a result has been the target of many salvage expeditions, none of which have been successful in locating the wreck. Archaeologists however have had more success in recording the various castaway depots, boatsheds, and finger posts found throughout the Auckland Islands. In 2007, an expedition to Campbell Island mapped and took samples from two maritime artifacts described as most likely being from an unknown shipwreck that predated the known history of the island (Judd 2007). The subsequent report to the New Zealand Historic Places Trust outlined the possible origins for such material and stresses the need for further research of the maritime archaeology of the island. At least 12 shipwrecks are known to have occurred at Macquarie Island, none of which have been relocated. During an expedition to the island in 1988, archaeologists took 65 samples from exposed, partially buried and buried timbers from around the island including the remains of sealers huts (Townrow & Nash 1990). The analysis of these samples revealed that much of the timber excavated from sealers huts came from the remains of the ships wrecked around the island, providing insights into the postdepositional processes affecting these sites.

Archaeology on the Antarctic mainland began in the late 1960s with a focus on the conservation and preservation of huts and shelters associated with the Heroic Age of Exploration. A number of scholars have completed exceptional studies of aspects of Antarctic and Subantarctic maritime history, archaeology, and heritage assessment. For an overview of maritime sites located within the Antarctic regions, see Headland (2009). For a review of archaeology in Antarctica, see Harrowfield (2005). For current work, see the IPHC website.

Sea level change and coastal erosion provide opportunities for underwater recovery of materials associated with heroic expeditions. During the 2010 Mawson's Hut Foundation expedition, a combination of a low tide and receding ice revealed four fragments from the tail section of a Vickers REP Monoplane near Boat Harbour adjacent to Cape Denison. This "air tractor" was the first brought to the continent as part of the 1911–1914 Australian Antarctic Expedition. Mawson's Hut Foundation staff began surveying in 2008. Terrestrial ground-penetrating radar and magnetometer surveys were conducted in 2009 and 2010, and future investigation is planned (Henderson 2010; Lucas et al. 2011).

Key Issues/Current Debates

Key issues with maritime archaeology in the Southern Ocean and Antarctic regions are project funding and design, managed growth of cultural tourism, cultural heritage in relation to environmental protection, and interpretation of relevant legislation. To date, all proposed projects to survey for submerged shipwreck sites have been unsuccessful. In the 1990s, the University of Zaragoza and the Chilean Antarctic Institute attempted to fund underwater archaeological research to locate the shipwrecked vessel *San Telmo*, lost after reaching the Antarctic mainland in 1819 (Zarankin & Senatore 2005). Numerous private and public entities in Australia and the United Kingdom have attempted to fund expeditions to search for Shackleton's lost vessel *Endurance*. Expedition costs for Antarctic expeditions are well above the funding threshold for most humanities-related projects, and so far, no grants to fund underwater archaeology on the Antarctic continent have been successful. Private sponsorship has also failed to provide the funds needed to survey and recover materials from a Southern marine environment. With the introduction of research vessels such as the Australian CSIRO ship RV *Investigator* – which is rated to Southern oceans and can accommodate up to 40 scientists – more opportunities arise to "piggyback" a small maritime archaeological project on an existing Southern Ocean or Antarctic scientific voyage.

Cultural tourism in Antarctica is an ever-expanding market. The Antarctic mainland is a short two-hour flight from South America and cruise ships regularly run to the Subantarctic islands from Australia, NZ, and Argentina. General guidelines for Antarctic visitors (Resolution 3) were adopted at the 2011 Antarctic Treaty Consultative Meeting that recommends a "take only pictures, leave only bubbles" approach to terrestrial heritage tourism in polar regions. However, limited access as protection for maritime heritage located within polar regions should not be seen to stand alone as a viable method of in situ preservation. Cultural tourism in Antarctica is advised by the International Association of Antarctic Tour Operators (IAATO). Most heritage tourism operators place emphasis on a mix of heroic exploration and natural scenery; downplaying the role of whaling and sealing operations or addressing sites as relics of past negative behaviors (Basberg 2008). IAATO also regularly contributes to heritage funding projects.

Current interpretation of Annex III of the Madrid Protocol places emphasis on "cleanup" of the Antarctic environment. In certain cases, this can lead to negative impacts on the cultural heritage, a perception of artifacts as rubbish, and a need to include cultural resources as part of the environment (Pearson 2004; Evans 2007, 2011). In 2003 and 2004, vessels *Petrel*, *Dias*, and *Albatros* were refloated and emptied of oil, and *Dias* and *Albatros* beached as part of a major environmental cleanup at Grytviken, South Georgia; the station had previously been closed to tourism as a result of asbestos and oil concerns (Basberg 2004). Limited funds prevented further conservation or restoration; the vessels are now managed by the South Georgia Heritage Trust.

International Perspectives

Under the Antarctic Treaty System, the Antarctic continent is internationally legislated and managed. However, as with the islands in the Southern Ocean, all sites should be protected under relevant national legislation – as long as the claimant nation has adequate cultural heritage legislation. For example, all Australian Antarctic Territory (AAT) cultural heritage sites are protected under Commonwealth heritage legislation and the *Environment Protection and Biodiversity Conservation Act* (as amended 2003) which also require that conservation and management plans be drafted for heritage places. This would include submerged cultural heritage as protected under the Commonwealth *Historic Shipwrecks Act* 1976 or blanket protection to all shipwrecks over 75 years located within territorial waters up to the continental shelf.

Prior to UNCLOS, Antarctic territorial seas were only recognized to extend to three nautical miles from the coastline. Extension of territorial seas to the UNCLOS-defined territorial limit of 12 nautical miles *can* be seen as a violation of the Antarctic Treaty (although all claimant nations have since extended their territorial waters to the full 12-nm limit). Two hundred nm continental shelf claims were asserted by Australia and Chile prior to the Antarctic Treaty – although only Argentina and France have made post-treaty claims to further land. EEZs have been claimed by Australia, Argentina, and Chile, mostly for fisheries purposes. The EEZ extension was not recognized under international law until 1961 – after the ATS was formed and may also be considered a violation of the treaty. Exploitation of the "Area" (commonly used to define international waters) may be an issue as a result of overlapping territorial EEZ claims. If the Area begins at 60° South latitude, then all waters between this mark and the Antarctic convergence could be seen to fall outside the Antarctic Treaty area and relevant jurisdiction. Any cultural heritage sites located within this area may not be protected if there is no recognized EEZ claim.

Only nationals and their vessels are subject to laws mandated by their parent nation within "proclaimed waters" – as few of the other claimant nations or non-Treaty nations recognize

rival claims. The United States and Russia consistently deny that any nation has territorial rights to any portion of the Antarctic landmass – although both nations have established research stations in both claimed and unclaimed Antarctic territory. Argentina, Chile, and the United Kingdom have overlapping claims. Attempts to resolve this dispute in 1956 resulted in a stalemate – as both Argentina and Chile refused to acknowledge the jurisdiction of the International Court of Justice.

With unresolved overlapping claims in the balance, investigation of known and unknown submerged sites within Antarctic waters could become an issue – if territories with overlapping claims were to disagree as to dispensation of heritage materials. However, bilateral agreements are a possibility for the "common heritage of mankind" approach international exploration of submerged heritage in Antarctic waters, in line with the original aims of the ATS.

Future Directions

Recent research has shown that there is a high probability for locating shipwrecks in Antarctic waters. Some territory nations have oversight bodies in place: Australia, New Zealand, and the United Kingdom have programs in place (Antarctic Heritage Trust [NZ], Australian Antarctic Division, Antarctic Heritage Trust [UK]) while others do not – Argentina, Chile, France, and Norway. Of these, three have applied for funding to investigate shipwreck sites in Antarctic waters (*Aurora*'s anchor, *Endurance*, *San Telmo*), and all have instigated some heritage conservation programs and provided for management of maritime cultural sites (including whaling and sealing sites, shipwrecked timbers, and abandoned vessels) located on the mainland and associated islands. Strangely, what has yet to take place in Antarctica or the Subantarctic islands is the "traditional" maritime archaeological project – the full-scale investigation of a submerged shipwrecked vessel.

Standard archaeological best practice has moved away from full-scale excavation as a first option. However, Antarctic waters are an untapped resource, nominally protected, and provide an excellent opportunity to use current best practice to regulate future investigation of underwater cultural heritage. In 2010, a Parks Canada team located Arctic HMS *Investigator* – lost while searching for Franklin's exploration vessels *Erebus* and *Terror* – in Mercy Bay, offshore from the Aulavik National Park in the Arctic Ocean. Research conducted by Parks Canada at the HMS *Investigator* site demonstrates the feasibility of deep-ocean and diver-based shipwreck investigation in the polar regions (Parks Canada 2011).

Cross-References

- ▶ Antarctica: Historical Archaeology
- ▶ Arctic Ocean and Bering Sea: Maritime Archaeology
- ▶ Islamic and Maritime Archaeologies

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Southwest United States and Northwestern Mexico: Geography and Culture

Stephen H. Lekson
University of Colorado, Boulder, CO, USA

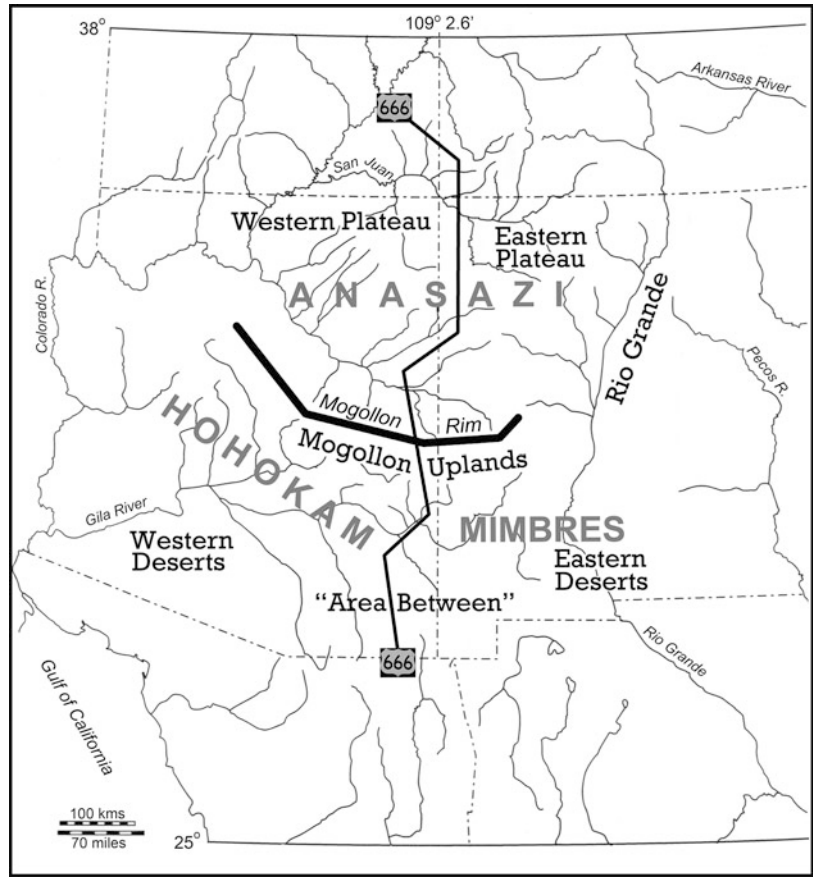
State of Knowledge and Current Debates

The Archaeological Southwest

The Southwest region (Fig. 1) reflects colonial history perhaps more than Native prehistory. The ancient Southwest is seen as a cultural "island" related to, but distant from Mesoamerican civilizations – much like colonial New Mexico vis-a-vis old Mexico. The ancient Southwest was "simpler" than Mesoamerican civilizations, avoiding their complicated political histories. In the received view, modern Pueblos tribes of Arizona and New Mexico are essentially unchanging; thus, Pueblo practices of the nineteenth century can be readily transposed onto ancient sites. That view of the Southwest was crafted in large part by American cultural entrepreneurs in the early twentieth century, building on the work of early archaeologists who sought to link exotic ruins (e.g., cliff dwellings) to modern Pueblos, rather than to vanished Aztecs (the then-popular view). *Continuity in isolation* underwrote Southwestern archaeology through most of the twentieth century.

It has become clear, however, that the ancient Southwest had a diverse and dynamic history, much like human history everywhere. This entry is based on *A History of the Ancient Southwest* (Lekson 2009), which presents a recent reading of that history. Due to editorial limits, detailed citations and extended arguments supporting this entry will be found in that volume. References here identify recent major synthetic works, some of which propose alternate readings of the ancient Southwest.

Southwestern archaeology has enjoyed remarkable investments of funds, energies,



Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 1 Map of the Southwest. Four quarters defined by the Mogollon Rim and old Highway 666, which approximates the Continental Divide. The northeastern and northwestern quarters correspond to Anasazi or Ancestral Pueblo; the southwestern quarter to Hohokam; the southeastern quarter to Mimbres Mogollon

talents, and public recognition for a relatively straightforward archaeology (Fowler 2000). Many sites remain clearly visible; preservation is generally excellent; and tree-ring dating provides cheap and accurate chronology. After 1960, large Cultural Resource Management (rescue) archaeology projects in the Hohokam and Anasazi regions have far surpassed academic research; CRM data are fundamental to our understanding of these areas (Roberts et al. 2004).

In recent years, archaeology has attempted to work more closely with indigenous Pueblo and other Native groups in the Southwest, with mixed results. Many collaborations are successful, but Native views of history are sometimes at odds with archaeological data. That conundrum confronts archaeology globally; the Southwest may be a place where these cultural and intellectual challenges can be usefully explored and, perhaps, resolved.

The Region and Its Nomenclature

Most of the Southwest is too dry for farming. Yet many areas were farmed, through chancy rainfall farming (aptly termed "dry farming"), or with more reliable canal irrigation from streams and rivers. The key subsistence crops included maize, beans, and squash; cotton was grown at lower elevations. Large game included elk, deer, pronghorn, mountain sheep and, on region's eastern boundary with the Great Plains, bison. Rabbits and small mammals were eaten, especially when large game resources were hunted out; and domesticated turkey substituted for game in some times and areas. Turkeys and dogs were the only domesticated animals.

Two geographic lines quarter the region (Fig. 1). An escarpment called the "Mogollon Rim" runs roughly from west to east, separating the higher Colorado Plateau (hereafter, Plateau) on the north from the lower Deserts to the south.

A line along old Highway 666 (and roughly approximating the Continental Divide) separates western and eastern Plateaus, and western and eastern Deserts.

Archaeological "cultures" correspond roughly to those quarters: Anasazi (or, Ancestral Pueblo) Culture developed on the Plateau, with significant differences east and west. The Western Desert corresponds to the Sonoran Desert and the Hohokam Culture, with its core in the Phoenix Basin. The Eastern Desert corresponds to the Chihuahuan Desert and two key Mogollon Culture districts, Mimbres and Casas Grandes. Upland Mogollon societies occupied the mountainous Rim.

The Early Agricultural Period (1500 BCE to CE 400)

Maize arrived from western Mesoamerica well before 2000 BCE (Staller et al. 2006). Maize spread rapidly through the four quarters of the Southwest, but the relatively small cobs of early maize did not transform the region (Vierra 2005). Five centuries passed before farming villages took root in the Western Deserts around 1500. New strains arrived, perhaps together with new people from the south, already committed to agriculture. It took special knowledge to grow maize – originally a tropical crop – and to adapt it to new settings. Irrigation was necessary as maize moved from wetter to drier climes. Desert farmers planted first in naturally wet bottomlands (*cienegas*) in the Eastern and Western Deserts. As favored settings filled, farmers created new fields by diverting water from streams through small ditches to terraces above the floodplain.

Knowledge of maize may have been embedded in social structures, ceremonial practices, political relationships, and languages: a Uto-Aztecan mother stock that later became Piman, Hopi, and other Southwestern languages (Hill 2006; see also Merrill et al. 2009). A chain of Uto-Aztecan-speaking groups linked the Western Deserts and West Mexico. Shared histories ensured that desert communities looked south throughout the following centuries.

The Early Agricultural period in the Southwest was part of a much larger, continental phenomenon: from Poverty Point in the lower Mississippi Valley to Olmec in Veracruz, North American was waking up. Villages in the Western Desert, by 1000 BCE, consisted of 20 or more small, shallow pit structures – family homes – around a plaza. Near the center of some villages stood a single large building, a place for community affairs. Defensive sites such as Cerro Juanaqueña (1250 BCE) – a large village on an impressively terraced and walled mountain in the Eastern Deserts – attest to frictions in the Early Agricultural period. Its massive terrace walls were the Southwest's first monumental construction.

Boom times in the Deserts: Uto-Aztecan speakers spilled up over the Mogollon Rim and on to the Plateau. The indigenous peoples of the Plateau – people (presumably) speaking languages that would become Zuni, Keres, and Tanoan – noticed the thriving villages around Tucson and the terraced mountain of Cerro Juanaqueña. Small canals were constructed around Zuni as early as 1000 BCE. But early maize did not prosper on the Plateau. When maize-based villages finally appeared on the Plateau, they probably owed much to the Western Deserts, perhaps a final push of Uto-Aztecan migrations around 500 BCE. The Western Desert people moved north onto the western Plateau, displacing Plateau natives to the east (LeBlanc 2002). The divide between the Uto-Aztecan west and the Zuni–Keres–Tanoan east cast long shadows. Many centuries later, hierarchical governments would rise in the east, among the "locals," but not among the peoples of the west, who harked back to different, desert ways.

Brownware pottery spread throughout both Deserts and the Plateau between CE 200 and 400. Its initial appearance, in the Deserts, may hark back to the South – there must have been constant comings and goings between the Deserts and West Mexico. A brownware "foundation" formed across the region, a craft shared among villages with different histories and backgrounds. After mastering the basics, potters invented techniques and created styles increasingly characteristic of each area. By CE 500, different traditions marked the Plateau (graywares), the Western

Desert (buffwares), and the Eastern Desert (brownwares).

Maize fueled southwestern civilizations, but in fact, the Southwest was a tough place to grow maize. Maize's failures were as important as its successes. The mismatch between maize and the Southwest played out in unequal production, agrarian tensions, droughts, famines, and – above all – the many measures, social and political, taken to support maize-based societies in blistering deserts. Most importantly: canal irrigation systems in the Western Desert. It is not so much that maize worked in the Southwest; it is that *they made it work* – most of the time.

Early Villages (CE 400 to 750)

By about CE 400, more than a millennium after farming villages first appeared in the Deserts, a few hundred small settlements flanked small steams, irrigating crops with small, simple ditches. Three short centuries later, the western deserts were crossed by a dozen massive canals systems – main canals 10 m wide and up to 30 km long, hundreds of distribution canals, intakes, drains, etc. – taking water from major rivers, the Salt and the Gila. Western Desert irrigation was the largest canal system in North America. Small farming villages grew to become very large towns. The remarkable increase in scale probably demanded new political structures, or perhaps new political structures allowed larger village sizes, or a bit of both. New political practices replaced the older, inclusive village-council level of governance.

New ways of living in the Southwest reflected, distantly, a new idea in North America: urbanism at Teotihuacán, far to the south. It was not the first Mesoamerican city but Teotihuacán was by far the greatest. Teotihuacán redefined the possible. No one in the Southwest had to "invent" villages, towns, or cities. Every wandering hunter-gatherer, far into the northern tundra, was at least dimly aware that people could live in densely packed, permanent cities.

The Desert farming villages succeeded and grew. Small, simple ditches got deeper and longer, bringing water out to upper terraces to meet the need for new farmlands. Irrigation – even on these modest levels – demanded centralized decision making, a few making decisions for the many. Around CE 500, at larger villages, a few prominent families with more lands, more wealth, and more power built notably larger residences ("Big Houses") which incorporated ritual features. A ring of multiple Big Houses were built around and immediately adjacent to the central plaza (Fig. 2). Other families built their smaller houses behind the inner circle of Big Houses, farther away from the plaza. The council houses of earlier times disappeared, their governance functions evidently shifting to Big House families. Importantly, the half-dozen Big Houses in each village appear to be equals: no one Big House bigger than the others.

Big House political power was modest, scaled to small, early ditches – insignificant by Mesoamerican measures. When irrigation tapped larger rivers – the Gila and the Salt rivers in the Phoenix Basin – the scope of decision making expanded exponentially. Canals got big and Big Houses got bigger, at towns/sites today called Snaketown, Grewe, and a score of others in the Phoenix Basin. Their spheres of interest and control surely expanded beyond farming and irrigation.

At Snaketown and Grewe, leaders legitimized themselves with exotic objects, badges of office: copper bells and other Mesoamerica regalia. Big House leaders may have traveled to the source, to western Mexico and Mesoamerica, returning with these impressive objects. It seems likely that people to the far south knew of the fertile farmlands, impressively irrigated, of the Western Deserts. People on the Plateau doubtless noticed too. Plateau villages of any size were few and far between and relatively impermanent – short lived and semi sedentary. Plateau farmers discovered that, unlike the Deserts, it was possible to farm away from streams, relying on precipitation: rainfall farming. Rainfall farming was risky, but it reshaped life on the Plateau, for both the Uto-Aztecans of the west and the local populations of the east. The two groups were increasingly difficult to tell apart, but the old divisions remained in language and history.

Southwest United States and Northwestern Mexico: Geography and Culture,
Fig. 2 Community House at Las Capas, Early Agricultural Period site, near Tucson AZ

Plateau peoples had not yet developed centralized political institutions. Decisions were probably made in a large community or council house: the "Great Kiva." Great Kivas were round chambers, often roofed but sometimes not, and big enough for representatives of families or clans to meet and make decisions, presumably in the context of ritual.

Unlike Desert farming, tied to canal systems, rainfall farming required no investment in infrastructure and therefore no commitment to any particular place. Rainfall varied from year to year and place to place. Groups moved often, on cycles of a generation or less – a fluidity that discouraged political leadership.

Yet, in the end, leaders put themselves forward. Perhaps inspired by desert Big House elites, ambitious Plateau families apparently decided to try it too. In the Deserts, political leaders lived in Big Houses prestigiously near the plaza. And at a few Plateau villages around 500 – such as the remarkably large Shabik'eschee site in Chaco Canyon – the first attempts at political leadership appeared as exceptionally large pit houses, built near the village center and the Great Kiva – much like Desert Big Houses.

Big House-manqué elites at Shabik'eschee and other Plateau villages were not needed to control and coordinate canal systems. Indeed, they may not have been *needed* for any economic or agricultural reasons. Tensions between the eastern and western Plateau may have promoted political leadership. Remarkable things – perhaps alarming things – were happening in Western Deserts, marked by Big House elites. Western Plateau villages had historical and linguistic ties to the deserts. But the East did not. Eastern Plateau societies might have needed (or accepted) tighter organization, but political leadership did not "take" on the Plateau. Unlike canal communities of the deserts, Plateau families – if annoyed by would-be leaders – could simply leave, move to a better or at least different place. Rainfall was equally spotty everywhere. If a leader became obnoxious, the led could leave.

It was different in the Deserts. People were tied to canals – the investment in infrastructure created true sedentism. Canals were essential for farming, so leaving was not an option. Consequently, Desert towns got bigger and bigger; towns in both Western and Eastern Deserts spanned centuries, compared to a generation or two on the Plateau.

Canals on the Salt and Gila rivers created a breadbasket, the richest farming economy in the Southwest. The confluence of those two rivers

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 3 Ball court at Wupatki, near Flagstaff AZ

was the setting, a thousand years later, of the modern city of Phoenix – which "rose from the ashes" of the ruins of the earlier Desert civilization. Phoenix had maize adapted to irrigation, long-growing seasons, abundant water from the rivers, canal technologies to capture that water, and a Big House political system to make it all work. Deserts farming economies needed leadership. Phoenix at 700 was a civilization waiting to happen. The region was primed to produce the food surpluses needed to fuel great things: kings, empires, whatever. But Big House rulers did not become kings. Desert civilizations took a different path.

Hohokam (CE 750 to 900)

Hohokam, as a set of practices, began around 700 perhaps with another wave of people, or a new wave of ideas from western Mesoamerica, drawn by the thriving irrigated farmlands of Phoenix. The ideology united many groups – newcomers, long-settled migrants, and converted locals. It was a supra-governmental or anti-governmental or instead-of-governmental ideology that united large areas and many (perhaps ethnically distinct) people, and got big things done – all without kings.

In the Phoenix core of the Western Deserts, Hohokam presented new ways of life manifested as oval, earthen ball courts (Fig. 3), elaborate (but largely democratic) cremation burial rituals, bold new styles of art, and, apparently, decision-making structures that disguised or diffused political power (Gumerman 1991; Fish and Fish 2007). As at Teotihuacán (but on a far smaller scale), individual political leaders in Big Houses were replaced by a government of bureaus and committees – in the guise, perhaps, of priesthoods and councils. For a few brilliant centuries, Hohokam ideologies allowed an enormous, elaborate irrigation economy without evident centralized political power – and propelled a remarkable cultural explosion out from Phoenix and across the deserts.

Some elements of what became Hohokam already existed in the deserts, part of the continuous interchange from the deserts to western coastal Mexico and back again. Some parts of Hohokam were endemic, local developments. But the key elements were new to the Deserts, introduced almost certainly from the south. Hohokam ideologies replaced and overshadowed conventional Big House leadership (which remained for few more centuries at the village level).

It seems fair to say that people *became* Hohokam. Perhaps the most conspicuous and widespread markers of Hohokam were bracelets or more likely armlets of *Glycimeris* shell. Bivalve shells from the Gulf of California were

carefully shaped into armlets and sometimes carved with symbols – birds carrying snakes, desert toads, and the like. They had once been rarities, but after 700, they were ubiquitous. People in every sizable settlement had this badge of membership prominently displayed on an upper arm.

Inward-facing clusters of three or four shallow pit houses, around a small courtyard, formed the typical home – in both the Western Deserts and in northern Mesoamerica. A dozen or two dozen courtyard clusters were grouped into small neighborhoods or "village segments." Multiple neighborhoods encircled a large plaza which, as in earlier periods, marked the center or core of the villages. Ball courts displaced Big Houses as the iconic architecture, the key monument. Not *re*placed: Big Houses and their elite families continued, but their leadership functions were transferred, apparently, to another arena. The whole village could witness the ball "game" that (as in Mesoamerica) probably played out political issues, territorial dilemmas, and difficult decisions. Each village of sufficient size had a ball court; large villages had two, usually at the edge of town, away from the old central plaza (Wilcox 1991).

Around the central plaza was a ring of low earthen mounds, usually round or oval. Mounds were architecture: A site was selected, fill was brought in and sculpted to shape, and a smooth plaster surface applied. Might these be Big Houses, elevated? No evidence has been found of houses atop these mounds, but most have been trenched as "trash mounds," not excavated as architecture. But, on the evidence, these mounds were not residential. They were relatively low – waist-high, well below the peaked roofs of surrounding houses. These low mounds supported ceremonies and small presentations, presumably performed for comparatively large audiences. The village could view actions or performances atop the mound's elevation, like a stage. Mounds were inclusive; events that would be restricted in the old community house or private in Big Houses were now public.

Hohokam did not emphasize elite individuals or families. Not a return to village councils – Hohokam society was probably far too large and complex for that – but rather a decentralized, inclusive stew of ritual, power, and decision making. Individuals surely had power, but they did not flaunt it with Big Houses, palaces, or tombs. Whatever Hohokam was, it controlled individual political ambitions and curtailed social stratification and hierarchy.

To the south, it was a time of kings and nobles – the Epi-Classic, and the beginning of an age of city-state polities (*altepetl,* in Nahua) and, later, empires. The fall of Teotihuacán (about 550/600) sent ripples – tsunamis – of political power outward, ruling houses looking for places to rule (Nelson 2000). Displaced noble families transformed towns throughout Mesoamerica into small city-states. The aftershocks of Teotihuacán's fall reached the Pacific Coast with the temple-towns of the Aztatlan horizon and reached the very northernmost frontiers of Mesoamerica at La Quemada.

Petty chiefs and Big House leaders must have been tempted to emulate southern kings. As Mesoamerican polities popped up nearer and nearer to home, they provided models of hierarchy. Hohokam apparently rejected seventh- and eighth-century Mesoamerican political models – while using a wide range of Mesoamerican forms and symbols.

For almost three centuries, Hohokam worked. More than worked: Hohokam prospered and expanded – exploded – out from Phoenix in one of the most remarkable events in the history of the ancient Southwest. Ball courts, distinctive pottery, and burial rituals pushed rapidly upstream, up to the very edges of the Plateau. Surprisingly, Hohokam did not go far downstream, stopping at Gila Bend a short distance west of Phoenix.

By 900, there were hints of hierarchy not within but between and among towns, with the largest occupying positions of control at the heads of canal systems. A geographic pecking order emerged. The very largest towns, such as Snaketown, Grewe, and Aztatlan, had the very largest ball courts.

One of the largest ball courts was built at Pueblo Viejo, high up the Gila River, 250 km east of Phoenix. Beyond Pueblo Viejo, Hohokam

elements reached deep into the Mimbres region of the Eastern Deserts, where mountain streams flowed out of the Mogollon highlands into the Chihuahuan Desert (Nelson & Hegmon 2010). Mimbres settlements were initially less permanent than the villages of Western Deserts. Pit house groups moved from one valley to the next, allowing depleted soils, hunted-out game, and gallery forests to replenish and regrow. It was a successful way of life – so successful that rising numbers filled the valleys.

Like the Hohokam societies of the Western Desert, Mimbres farmers dug ditches to water their fields. They almost certainly learned the tricks of irrigation from Hohokam, but Mimbres canals were modest compared to the huge Phoenix systems. Mimbres accepted, selectively, Hohokam beliefs: cremation burial (for some), ideologically charged naturalistic designs on pottery, and – conspicuously – Hohokam *Glycimeris* armlets. Not every Mimbres person wore them, but some were buried with dozens.

Canals pinned Mimbres villages in place. Pit houses, which had a fairly short use-life, stacked up (insofar as pit structures can stack). Newer houses cut into older abandoned structures. Some villages grew large, with several scores of houses – untroubled, it seems, by hierarchy (Hegmon 2002). Much like Hohokam, Mimbres ideologies discouraged conspicuous leadership. Mimbres, however, did not accept the whole Hohokam package; ball courts, essential to Hohokam, were absent. Instead, Great Kivas (a form shared with Plateau pithouse villages) held communities together, serving some of the purposes that ball courts played for Hohokam.

Hohokam reached as far north as east. Western Plateau peoples and Phoenix shared linguistic and historical connections – so deep (by this time) to perhaps be mythical. Hohokam ball courts were built far north in the western Plateau, in the dormant volcanic fields west of Hopi.

With increasingly sophisticated knowledge of land and maize (and decades of favorable weather), Plateau populations grew and villages got larger (Reed 2000). Over generations, people became accustomed to the structures and strictures of village life. They had to: There were fewer open valleys, fewer places to start over – and, thus, more possibilities for hierarchical leadership. Inter-village squabbles escalated after 700, reaching levels approaching warfare by 850. Increasing violence called for leaders, to lead or to avoid war.

Over the short term, shifting rainfall favored some areas over others. In the ninth century, rains fell on the great Sage Plains, northwest of Mesa Verde and population concentrated there. Towns expanded, and lasted longer (Lipe et al. 1999; Noble 2006). There, ambitious families built the first Big Houses on the Plateau since the false start at Shabik'eschee, three centuries before.

Basic house forms had changed, somewhat, since the pit houses of Shabik'eschee. Plateau peoples now used more stone masonry in their architectural repertoire. Behind the pit structure (which remained the primary living space), they added a small masonry building of a half-dozen low rooms used mainly for storage. With food and gear housed safely above, the pit structure itself could be smaller and easier to heat. That combination – six rooms and a pit structure – became the standard for Plateau housing (and a clear contrast to the courtyard homes of the Western Deserts). The new, ninth- and tenth-century Big Houses used that same form: six rooms and a pit house modules, built *really* big: *Great Houses*.

Great Houses – Big Houses by another name – were essentially residences, built on the same ground plan as other houses, but larger, more substantial, and built with greater craft and care. Just like the early Big Houses of the Western Deserts, Plateau Great Houses combined secular and ritual architecture in conspicuous, even (modestly) monumental elite residences. Both Desert Big Houses and Plateau Great Houses were, importantly, *houses – not* public facilities like ball courts or Great Kivas.

Great Kivas – the people's council chambers – continued to be built, especially in villages evidently lacking Great House elites. One village might have a Great Kiva but no Great House. Another might have a notable Great House but no Great Kiva. Often both were present but at some distance apart. It seems likely that

Great Kivas were buildings of the people, while Great Houses were buildings of elites.

Great Houses eventually appeared over much of the Eastern Plateau. The Western Plateau stayed out of it, for a while. In western villages, homes were often jammed together in long rows. Each home was essentially identical to the next. Those villages often (usually?) had Great Kivas. Eastern villages were more dispersed, with clusters of freestanding homes or scattered short segments of three or four conjoined homes. Large settlements had scores of these separate housing segments and one or more Great Houses – and no Great Kiva. The people were architecturally fragmented, without a common hall or communal center. Looming over them, the Great House offered the coherence and regulation needed, perhaps, for village life.

Plateau peoples still moved, shifting villages as they had for centuries, but in larger groups and longer cycles than in earlier times. Rising violence urged safety in numbers. Elite lineages – noble families – probably emerged as important families maintained their status from old village to new village, from one generation to the next. They may have begun to think it was their right, or their duty, to rule.

Chaco (CE 900 to 1150)

The decades from 900 to 1150 were momentous in North America. Three centuries of uncertainty and reorganization that followed Teotihuacán's fall ended with the rise of Tula and the beginning of Mesoamerica's Post-Classic Period (950–1500; Smith & Berdan 2003), an era of small polities and long-distance interactions. Mesoamerica was dotted with hundreds of city-states. Short-lived "empires" encompassed multiple city-states, but not until the Aztecs (in the Late Post-Classic) was empire-building truly successful. Yet the Early Post-Classic was notable for long-distance trade and interaction – ideologically charged "international" styles of pottery and architecture that linked cities that are a thousand kilometer apart. In eastern North America, the great city of Cahokia urbanized the middle Mississippi Valley and set the course for subsequent political history, much as Teotihuacán had set the agenda for Mesoamerican urbanism five centuries before. Cahokia was larger than most Post-Classic Mesoamerican cities.

On the Plateau, Great House families had several generations to become accustomed to their status and duties – not unlike Mesoamerican noble families. Great House families moved south of the San Juan River and into Chaco Canyon. Perhaps Chaco was simply the last empty, isolated valley. Perhaps Great House leaders saw themselves as the heirs of Shabik'eschee. At any rate, the people who promoted Great Houses at Dolores and Blue Mesa – their direct descendants or their spiritual heirs – built three Great Houses in Chaco Canyon by 900. Unlike earlier, short-lived Great Houses, these lasted. After a century-long germination, Chaco burst forth to dominate the Plateau from 1020 to 1125 (Noble 2004; Lekson 2006).

Pueblo Bonito was the largest Chaco Great House, a giant "D"-shaped building with massive sandstone masonry walls standing up to five stories tall. Its 600-plus rooms and enclosed plaza covered almost one hectare. It appears that perhaps a dozen or so families (presumably extended families) lived at Pueblo Bonito. They were very important families: elite or noble families. And much of the building was not residential, as was the case at most Great Houses. Chaco's Great Houses were in part elite residences and in part monuments. Eventually, eight major Great Houses were built at Chaco, presumably representing eight elite or noble lineages. Planning, coordination, and labor rivaled Phoenix canals. There was an important difference between Desert canals and Plateau Great Houses: Canals delineated an economy; Great Houses manifested an ideology of power.

Great House families lived privileged lives. They probably did not farm or hunt – maize and meat were brought into Chaco. They probably did not make pottery or chip arrowheads or grind maize. Those too were imported into the canyon. They probably traveled far to the south (almost certainly to Mimbres and very likely to western Mexico and Mesoamerica) and brought back macaws, metals, cacao, and other wonders (see, e.g., Crown & Hurst 2009). When they

died, they were buried with pomp and ritual in the oldest parts of the building (Akins 1986; Plog & Heitman 2010), becoming part of its history. Great Houses were the houses of generations of elites – noble families of the Plateau. Or so they might have seen themselves, modeling their polity on the Mesoamerican *altepetl* – or city-state, the ubiquitous political formation in Mesoamerica during Chaco's era, translated into Plateau idioms, architectures, and cosmologies.

With the rise of noble families at Chaco, the people found themselves redefined as commoners. Villages with dozens of separate individual homes – six rooms and a pit house – dotted the landscape. Set on a low hill or prominence above the village stood a small, secondary Great House, and off among the commoners' homes a Great Kiva – the traditional community center of the people. The two forms coexisted, perhaps uneasily, throughout Chaco's reign.

Chaco created a degree of political integration over most of the Plateau, offering economic and political security. Escalating inter-village violence ended with Chaco's rise (LeBlanc 1999). And there was the fact of the Hohokam. Plateau peoples must have known of the remarkable Hohokam expansion of 750–900. Western Plateau peoples shared (distantly) a language with the Desert civilization. Eastern Plateau peoples remembered the earlier Uto-Aztecan expansion onto the Western Plateau. On some level, Chaco itself may have been a geopolitical response to Hohokam.

Chaco's success was in part a gift of geography and climate. Chaco Canyon itself was a dry and cheerless place, unfit for extensive agriculture, but it was central to a ring of villages, 80–150 km from the capital, around the better-watered margins of what would become Chaco's interior region. Chaco, from its beginnings, served as a center for the interior region, evening out the short-term agricultural problems of surrounding villages. Bulk goods – building timbers, pottery, maize – moved freely within that 150-km radius. Many things came to Chaco and stayed there, in the service of the elites. Maize moved into and through the canyon, perhaps from places that had plenty to places that had none.

Chaco's influence soon reached far beyond that original region. Colony or copy Great Houses popped up, up to 250 km away. Local leaders almost everywhere on the Plateau joined with or deferred to Chaco. And it worked – ultimately, about 150 second-tier Great Houses marked Chaco's greater region (Kanter 2003). They represented local, second-tier elites or noble families who undoubtedly acknowledged and visited Chaco, perhaps regularly, on a network of "roads" radiating out from, and in to Chaco Canyon.

Chaco Canyon itself was decidedly top-heavy – a city of palaces – but the tip of the social pyramid was in fact rather small: perhaps a thousand or fifteen hundred elites. And the pyramid had a broad base: tens of thousands of commoners across the wide Plateau. At a guess, commoners numbered perhaps 40 or 50,000, about the same size as a Mesoamerican city-state, but spread over a much larger region.

As Chaco waxed, Hohokam waned. The high water mark in the deserts came between 900 and 1050; on the Plateau between 1020 and 1250. In the decades after 1000, Hohokam's remarkable expansion reversed and shrank back in on the Phoenix Basin. The hallmarks of Hohokam civilization – ball courts, shell insignia, elaborate cremation burials, low mounds, and (most importantly) polity without kings – continued into the early 1100s, but the energy was gone. Most ball courts fell out of use. Hohokam fragmented into multiple local polities. Phoenix and Tucson went separate and unequal ways.

Even in decline, Hohokam remained far more impressive as an economic landscape than Chaco – or anything else, then or thereafter, on the Plateau or the Rio Grande. The canal systems continued to expand, bringing more of the desert under cultivation. Each canal system was apparently independent, with key social dynamics among multiple settlements strung along the same canal. A dozen independent "irrigation communities" emerged within the Phoenix Basin, and the Hohokam ideology ensured that power was diffused within those communities. Hohokam political life – and social life – was relentlessly modular (Abbott 2000).

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 4 Mimbres Black-on-white bowl, c. CE 1050. UCM 9366 (Courtesy University of Colorado Museum of Natural History)

Population in the Phoenix towns increased, less from local growth than from in-migration into Phoenix. Thousands of people retreated from the edges of the Hohokam world back into the heartland. The demographic implosion accelerated through CE 1300 (Abbott 2003). With all those new people, the farmlands of Phoenix were perhaps reaching their limits.

Mimbres, in the Eastern Deserts, registered the shift from Desert to the Plateau, like a weather vane swinging to the winds. Mimbres pit house villages once looked west to Hohokam; after 1000, they looked north to Chaco. Pit houses were quickly replaced by small masonry homes of a half-dozen rooms, not unlike the Plateau house form, and spectacular black-on-white pottery (Fig. 4) (Hegmon 2002; Shafer 2003). Something like Great Houses, 400 km from Chaco, were built at a few villages, with much larger rooms, more formal layouts, and more massive masonry than was customary in Mimbres pueblos.

Would-be Great House elites never took hold. Through a remarkable combination of old Hohokam ideologies, new Plateau forms, an influx of Mesoamerican ideas, and their own local genius, Mimbres people developed new ways of living that allowed for large towns, complicated canal systems, and interactions with the Chaco world – but that avoided Chaco's hierarchies and political complications.

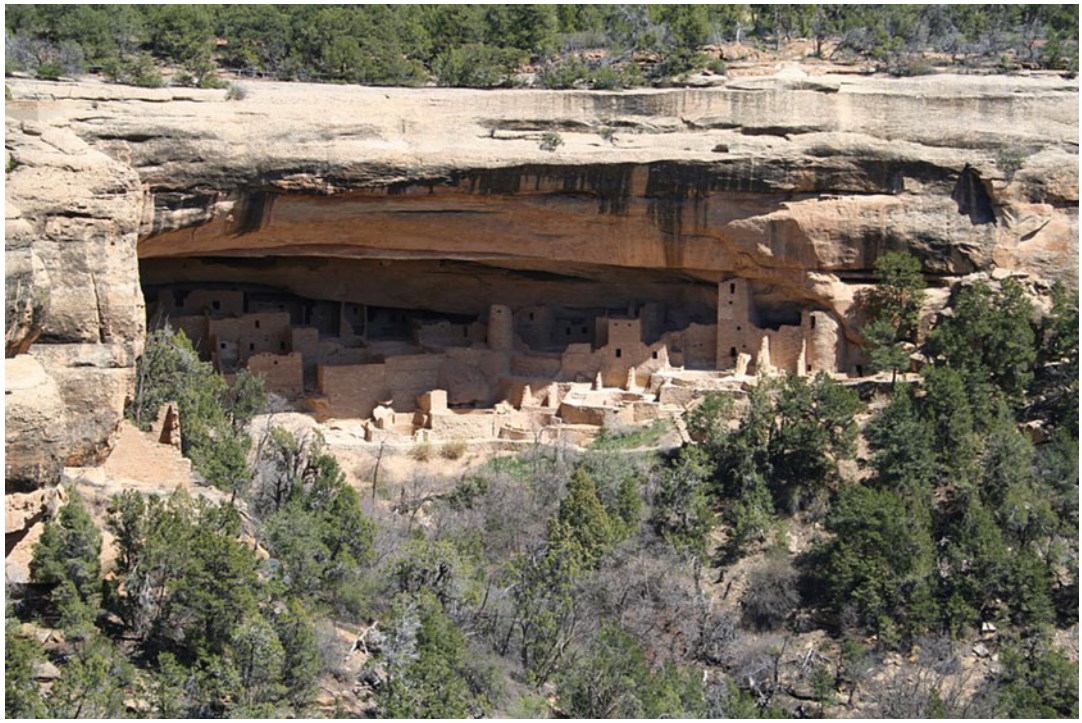
Going around Hohokam, Mimbres villages evidently established direct trade relations, over the Sierra Madre, with western Mexico and perhaps even the Aztatlan cities of Mexico's Pacific Coast. Mimbres had a straight shot down the east flanks of the mountains to the Post-Classic states of central Mexico.

Mimbres middlemen supplied Plateau rulers. Long-distance trade shifted from the Pacific side of the Sierra Madre to the inland side. Inland routes pioneered by Mimbres reached their fullest expression with the rise, two centuries later, of Paquimé.

Chaco prospered. Then, 300 km west of Chaco Canyon in the western Plateau, a wonderful awful thing happened. A volcano erupted, at the northernmost edge of the Hohokam world and westernmost reaches of Chaco. Sunset Crater was a small volcano, but it was spectacular (Elson 2003; Downum 2012). Its plume of fire was visible from highpoints on the Eastern Plateau – possibly from Chaco – and from Phoenix. The volcano became an important place, perhaps more important than Chaco Canyon.

An extraordinary collection of structures and monuments converged at the volcano's flank, at a safe distance: Wupatki. The place was known to Chaco; a small Great House there preceded the eruption by perhaps a decade. After the eruption, a larger Great House rose after 1135. (By then, Chaco was gone and Aztec Ruins was ascendant on the Plateau.) Wupatki had elaborate turquoise artifacts, macaws, and Mesoamerican objects that rivaled Chaco and eclipsed Aztec. And more: at Wupatki, a Great Kiva was built next to a large masonry-walled Hohokam ball court, perhaps the last ball courts ever built. Chaco and Hohokam met, at last, under the volcano. But by 1135, when Wupatki was built, Hohokam was greatly diminished and Chaco Canyon was at its end.

Chaco ended with political strife. The orientations of major Great Houses marked two competing cosmologies. The old, original worldview (of 850 and perhaps even earlier) was represented by a loose southeastern (solstitial?) alignment. A newer, tighter north–south (cardinal?)



Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 5 Cliff Palace, Mesa Verde CO

cosmology was introduced at several Great Houses around 1020. A crisis may have come around 1070, with the construction of a new capital far to the north at Aztec Ruins. The location of the new Chaco was fixed by cardinal direction: due north, up the Great North Road, to the San Juan River. About 1110 construction began at Aztec Ruins. Its plan was profoundly solstitial. It seems that the cardinal party prevailed in the location of the new capital, but the solstitial bloc determined the new capital's form and cosmic vision. The cardinal noble families quite possibly turned away from Aztec, and reversed directions, going south (Lekson 1999).

Retrenchment and Reorganization (CE 1150 to 1300)

The cosmological schism – manifest as solstitial versus cardinal – had real political consequences. Aztec was, literally, only half the capital that Chaco had been (Lekson 1999). And its region was reduced to less than half of Chaco's. Aztec's polity, however, included Mesa Verde and, more importantly, the densely settled Great Sage Plains of southwestern Colorado (Noble 2006; Lipe et al. 1999; Varien and Wilshusen 2002).

Things that worked at Chaco failed at Aztec. The new capital was unable to keep the peace or to bring the rain, as Chaco had done. A major drought hit from 1135 to 1180 – a drought, while Wupatki flourished! A second burst of monumental construction at Aztec marked a brief rebound. But by about 1250, rainfall became erratic and unpredictable. Violence spun out of control. Farmsteads – previously scattered freely among their fields – clustered into large, walled towns or huddled together in alcoves high on the cliffs of Mesa Verde (Fig. 5), defensive patterns seen across the Plateau (Adler 1996).

To enforce its failing rule, Aztec unleashed lethal force (Turner & Turner 1999). At farmsteads, squads of warriors fell upon families failing in their tributary duties. Men, women, and

children were brutally and publicly killed and left to rot, unburied, in the ruins of their homes. But even terror could not hold together.

It was a classic case of unintended consequences. Aztec's use of force apparently drove away already-wavering groups. Beginning as early as 1220 (decades before the "Great Drought" of 1275–1300), villages began leaving Aztec's troubled region. Movement and relocation had always been typical, but within the confines of the Plateau. Now, people moved farther, setting off cascades that rippled out from the Plateau into the Deserts.

Aztec and its region were abandoned, an exodus of tens of thousands of people, complete and permanent, seldom paralleled in human history. A final "Great Drought" from 1275 to 1300 was merely the final punctuation on a story already told – most people were already gone. Only a few of their descendants returned as pilgrims praying over ancestors, never to reestablish villages or farms.

Most who left the Plateau went to the southern fringes of Chaco, the regions of modern pueblos: Hopi, Zuni, Acoma, Laguna, and the many towns of the Rio Grande, spiking Pueblo populations around 1325 (Adams & Duff 2004). Some went farther: whole villages relocated far to the south in the East and West Deserts. In the west, Mogollon pueblos and Hohokam towns grudgingly accepted newcomers. Migrants sometimes settled atop defensive buttes and mesas. A generation later, they were joined by more people from the north, following paths into the upper Gila and the Salt drainages. These newcomers integrated into fading Hohokam societies – on their own terms.

The old order passed. Chacoan nobles, perhaps, and Chacoan ideas of hierarchy survived Chaco and Aztec's fall. Chaco lineages in the deepest south (beyond Acoma and Zuni) maintained their status decades after Chaco removed to distant Aztec. Perhaps, to commoners, Chaco was always a remote, near-mythical place – Rome to an ancient Pict, Jerusalem to a medieval serf. In any event, southern elites kept up appearances, brooding in their Great Houses on hills above their towns. The second wave of immigrants – who knew what was really happening up north and wanted no more Great Houses – drove those relic elites out, and south.

Authority vanished, refugees arrived, and violence ensued. Two centuries of Chacoan peace ended after 1175. Fighting quickly escalated to village-on-village warfare. As in the Mesa Verde region, scattered farmsteads clustered into larger and larger villages. But unlike those in the north, southern villages were not hodgepodge affairs. They were carefully planned, with the organizing principles of Chacoan architecture applied to thousand-room pueblos, with tall perimeter walls laid out as precise squares and circles. Homes in-filled those geometric spaces in a jumble; but within those impressive walls, no single house was "great." From the Rio Grande on the east to the mountains of central Arizona on the west, aggregated towns employed elements of Chacoan planning but rejected Chaco-style ruling elites.

We do not know the fates of the northernmost elites – the lords of Aztec and their allies. Not all who died in the violence of the thirteenth century were commoners. What of the southern Great House leaders, elites, and noble families around Zuni and Acoma? Their lives were disrupted first by the end of Chaco, then by the fall of distant Aztec, and finally by a popular movement – literally a migration – away from hierarchy and toward a new social order. Some elites surely converted; many moved. North – a region and direction of ill omen – was no longer possible. There was no one left to rule. To the south, Hohokam beckoned from the deserts – a civilization without kings.

The causes of warfare on the Plateau did not obtain in the Deserts, but refugees from the violence brought the means and perhaps the disposition. The revival of defensive *trincheras* communities (massively terraced hills) in the twelfth and thirteenth centuries reflects cracks in the tottering Hohokam edifice. For many generations, Hohokam ideologies supported diffuse governance, collaboration, cooperation – at least, no obvious rulers. Desert dwellers lacked clear leaders who could react quickly and decisively. Hohokam institutions could not turn the

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 6 Curtis Site platform mound, near Gila Bend AZ

violence spilling out of the Plateau – or displaced Plateau noble families looking for someplace to rule.

Architecture tells the tale. For centuries, Hohokam homes were loosely clustered in small courtyard groups, and those groups into open neighborhoods. The pervasive modularity of these units reflected the nonhierarchical nature of Hohokam society. By about 1150, the modular house clusters were replaced by adobe walled "compounds": enclosing pueblo-like houses built of puddled adobe. In marked contrast to the open house clusters, compounds were closed, rigid, exclusive spaces. That architectural development (inspired at least in part by Plateau building traditions) marked the breakdown of the old Hohokam way of life (Fish & Fish 2007).

Ball courts – the *sine qua non* of Hohokam – were replaced, around 1150, by platform mounds (Fig. 6). The old courts were not leveled or razed; they were simply forsaken, left open and unused. The contrast between the sunken surfaces of ball courts and the raised surfaces of platforms was a clear indication of new ways of doing business.

Nor could platforms be confused, architecturally, with the earlier Hohokam mounds. In contrast to the low, rounded mounds – which had served as stages for public viewing of ceremonies and rituals – the new platform mounds were large, tall, sheer-sided, and sharply rectangular structures. Some platforms – square, massive, controlling – were built directly over earlier low mounds, making a statement. The height of the platforms lifted their upper surfaces (and the buildings and activities they supported) far above the people. People below could see figures only at the platform's edge – criers, priests, those who reported, ordered, and communicated. Events at the center of the platform were effectively screened from public view. Priests and leaders did their work above and beyond ordinary people's reach. Platforms were the architectural antithesis of both earlier low mounds and ball courts – both of which allowed many to see the activity or performance. Platforms paralleled the shift from open courtyard groups to closed compounds. Something had changed in Hohokam thinking. Indeed, "Hohokam," as a suite of beliefs and practices, effectively ended.

Hohokam fell apart just as Plateau populations spilled into the deserts, into the upper reaches of the Gila River and Salt River. On the upper Salt River (and perhaps elsewhere), massively walled, small, rectangular masonry buildings were built in existing towns. They had no precedent in the deserts – perhaps distant variations on the Great House theme? But the desert peoples did not want Great Houses. Tonto Basin quasi–Great Houses

were quickly converted into rectangular platform mounds – filled with rocks and capped with a flat adobe surface. The old Hohokam world, for at least a few decades, fended off Plateau adventurers and displaced nobility.

While Hohokam shifted shape, Mimbres went through parallel changes. It was probably no coincidence that when Chaco's move to Aztec was complete and construction at the old center ceased around 1130, Mimbres societies rejected, completely, the ideological and political forms that had held them together for a century. The change was sudden and complete – as if someone had thrown a switch. Once-bustling Mimbres towns emptied. Mimbres pottery – for a century, the focus of intense artistic energies, depicting scenes of myth and history – became anti-designs: black, burnished interiors, dimly reflecting the viewer's eyes and nothing more. The people formerly known as Mimbres changed how they built their homes – from stone masonry to puddle adobe, usually at new towns some distance removed from the old pueblos. Many Mimbres people moved up into the hills and declined; others probably moved north and joined the big towns around Zuni and Acoma (see also Gregory & Wilcox 2007). But most Mimbres apparently moved south, out of their valleys and into the desert.

New adobe towns with black burnished pottery were built where there were no permanent streams – just dry desert channels. With no streams, there were no canals. It is not entirely clear how people supported themselves – at small cienegas, perhaps, a throwback to the very earliest farming villages. These short-lived post-Mimbres settlements skipped from valley to valley in a fast-tempo dance. When the music stopped, around 1250, many probably came to rest in the valley of the Rio Casas Grandes, 100 km south of the Mimbres Valley. They apparently became part of the base population, the commoners of the Southwest's last and greatest city, Paquimé.

Not only a push from the north, but a draw to the south: the Middle Post-Classic of Mesoamerica (Smith & Berdan 2003). Tula fell by about 1150. The implications of that fall are a matter of debate: truly momentous or merely legendary? In any event, with Tula's end, the Post-Classic pattern came into focus in vibrant clarity: expansive politics, long-distance dynamics, power plays and upheavals, and a swirling world of migrations, invasions, expulsions, and fragmentation into even more small city-states. That was the world the Southwest knew, of which it was a part.

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 7 White Mountain Redware, c. CE 1350. UCM 9634 (Courtesy University of Colorado Museum of Natural History)

Paquimé (CE 1250 to 1450)

The influx of migrants fleeing the troubled north strained the existing Pueblo communities at Hopi, Zuni, Acoma, and the Rio Grande. Violence flared. Wars broke out, with villages sacking other villages. Larger towns were safer but – without rulers – inherently unstable and often split apart. How to hold together big towns? Native histories suggest that no one wanted the kind of leaders who had created cities like Chaco and Aztec. New ideologies rose and old ideologies were revived to replace political power with ritual authority. The explosion of ideas is reflected in art. The older, Chaco-era, grimly geometric black-on-white pottery gave way to a polychrome revolution. Unprecedented pigments, dynamic symmetries, and new icons mirrored changes in worldview and cosmology (Fig. 7). Images of kachinas and new

supernaturals bloomed on pottery and rock art like flowers after rain (Schaafsma 1994, 2007; VanPool et al. 2006). After several centuries of experiments – competing cults and cures – the foundations of modern Puebloan society emerged from the crucible of post-Chaco chaos: communal, egalitarian, ritually based, purposefully antihierarchical.

Chaco faded to a (bad) memory. For many Pueblos, Chaco and Aztec became White House, remembered as a great city led by rulers who, improperly, had power over other people. White House was a lesson: It came to a bad end, with violence, famine, and forced migration. For Navajo people who lived later in those same lands, Chaco was remembered as a place where a kinglike ruler – neither Navajo nor Pueblo – enslaved all the peoples of the region and forced them to build palatial homes for his family. In this history, the people rose up and overthrew the tyrannical rule.

New town plans and new iconography reflected new ways of living. But the larger picture remained grim. Regionally, population began to fall sharply after 1300 and continued to fall for several centuries. Paradoxically, fewer and fewer people jammed into bigger and bigger towns (Adams & Duff 2004). Several towns might group into a defensive alliance or cluster. Clustering put safe distances between battered populations – de facto demilitarized zones. The frequency of violent incidents declined, but not their severity. Wars still raged between villages, between clusters.

The Plateau's trouble accelerated Hohokam's transformation, but on the opposite tack – away from faceless bureaucracies and toward more visible hierarchy (Fish & Fish 2007). Large areas within the old Hohokam sphere emptied as people retreated back into Phoenix, taxing the diminishing productivity of those long-farmed lands (Abbott 2003). At the largest Phoenix towns, health suffered. Most babies died; those who survived died young. The old Hohokam way of life was gone, the intricate web of beliefs abandoned or discredited. New forms of governance were needed to stem the downward spiral.

Out on the margins of the old Hohokam world, there were out-of-work rulers: Great House nobles pushed off the Plateau. In the upper Gila and the Tonto Basin, local people had earlier rejected Great Houses, filling their rooms with rocks and rubble and converting them to platform mounds. Would-be rulers, either from the north or inspired by the north, riposted by building new houses – Great Houses – atop those same platforms. Great Houses rose from platform mounds along the Desert–Plateau borderlands, and soon after in the Phoenix heartland and the Tucson Basin. Elites had come to the deserts.

Just as platform mounds were built over earlier low mounds, Great Houses atop platform mounds were a blunt architectural statement, a stratigraphy of power. Pima people who live today amid the empty ball courts and eroding mounds of Phoenix and Tucson recall in their histories the elites who lived atop platforms. They were foreigners, even supernatural – certainly not Piman. They came into the heartlands and imposed their rule, tyrannical and oppressive. But the new regime could not reverse the social and economic decline. The people suffered under these rulers for a time and then rose in revolt. They went from platform mound to platform mound, killing the kings. The Pima stories ring true. Something like a class revolt toppled the new governments.

The drought of 1135–1180 marked the end of Chaco. The Great Drought of 1275–1300 closed the book on Aztec. The Phoenix Basin's bitter end was punctuated by huge floods on the Salt River in 1357–1359 and again in 1381–1384 (Graybill et al. 2006). Equally disastrous floods hit the Gila River in 1420. These floods destroyed the canal systems. After centuries of decline, the heartlands were unlivable.

Plateau and Pueblo peoples took themselves out of the Post-Classic world. One Eastern Desert, society more closely engaged the south. Paquimé rose on the Rio Casas Grandes, in the southern Eastern Deserts, while Pueblos jelled and Hohokam fell. Prior to Paquimé, the Casas Grandes Valley had been a quiet backwater with a scattering of pit house villages (for another view, see Whalen & Minnis 2001, 2009) – the

southern margin of the densely populated Mimbres region.

A century later, by 1250, the Mimbres valleys were empty and the Rio Casas Grandes teemed with people – in large part Mimbres peoples, shifted south through a string of short-lived desert town. They knew the Casas Grandes Valley and would have recognized that it was perfect for irrigation, but in their desert hegira, they probably lost the technical skills to tap the large river. The remarkable ideologies that had united Mimbres villages for major public works, such as canals, had been left behind, dramatically rejected a century before. If large populations were to live on the Rio Casas Grandes, major irrigation would have to be grafted into the valley – lock, stock, and barrel.

New towns on the Rio Casas Grandes surely sought help from the West, perhaps from experts fleeing Phoenix. But Hohokam canal irrigation was an intricate balance of enormous public works administered by deliberately diffuse governance, fine-tuned to Phoenix Basin societies. It might be possible to transfer technology, but not that administrative culture (even then on the skids in its homelands). Neither Hohokam nor Mimbres had traditions and institutions of strong central leadership. In the Southwest, Chaco (and its successor, Aztec) had those skills. Chacoan elites knew how to get big things built. They dug canals at Aztec Ruins, their final Plateau capital. And the heirs of Chaco and Aztec Ruins nobility – or at least its cardinal factions – were conveniently available.

Pueblo histories tell us that, after the fall of White House, the people were instructed to go south, (in part) to find macaws. Most stopped at Acoma, Zuni, and other pueblos. But others continued straight south beyond the arc of modern pueblos, in search of macaws (we are told). If they continued south, they probably proceeded through the empty Mimbres Valley, once Chaco's source for macaws and other regalia (Lekson 1999).

Native peoples in southern Chihuahua told Spanish conquistadors of two large groups coming into the region from the north, led by two brothers. The brothers found an old hag perched on a huge iron boulder. At this omen, one brother stopped to found a city. The second brother and his people continued south. An exceptionally large, boulder-sized iron meteorite was found at Paquimé. Was that the omen? Paquimé became a famous breeder of macaws, on commercial scales.

The people who became the modern Pueblos voted with their feet against hierarchy – by moving away from Aztec and by *not* moving on to Paquimé. But many northerners joined the journey to the south. The late thirteenth/early fourteenth century saw extraordinary population increase in Chihuahua – a combination of local populations, Mimbres migrants, Plateau northerners, and other peoples attracted to the new city from south and west. The region became one of the most densely settled areas in the Southwest. Paquimé was a new and brilliant city (Fig. 8) (Di Peso 1974).

Many architectural and organizational details – for example, the verticality of multistoried Great Houses – recalled Chaco, Aztec, and the now fabled cities of the north. Paquimé was constructed of poured adobe, a desert technology adopted by Mimbres people in their wanderings after they had ceased being Mimbres. Adobe was a poor fabric for Paquimé's towering five-story walls. Form trumped function – or, rather, symbolism trumped compressive strength. The city was an aggregate of separate, multistoried compounds, each the scale of an old Chaco Great House. The compounds were palatial – expansive and expensive and filled with treasures. Around the urban core were platform mounds and masonry pyramids, at least three I-shaped masonry ball courts (direct copies of Mesoamerican models, not the peculiarly Hohokam earthen ovals), and, most remarkably, monumental effigy mounds, unique in the Southwest. At least two of these, a four-armed cross and a long north–south snake, commemorated cardinality.

Paquimé was more closely tied to Mesoamerica – both west and central – than any previous southwestern polity. Architectural forms – colonnades, ball courts, and (modest) pyramids – and astonishing quantities of

Southwest United States and Northwestern Mexico: Geography and Culture, Fig. 8 Paquimé (aka Casas Grandes) in northern Chihuahua, Mexico

ideologically charged Mesoamerican objects far surpassed Chaco, Mimbres, and Hohokam. While all three southwestern traditions played parts in Paquimé, the city's leaders redefined (or refined) themselves as truly Mesoamerican nobility – not Chaco's wannabes. Southern objects and architecture were no longer simply props or window dressing, reinterpreted in local contexts for local politics.

Paquimé and Phoenix were "peer polities" – one on the way up, the other on the way down. Paquimé undercut Hohokam's commerce. The Plateau's demographic center of gravity shifted dramatically east to the Rio Grande (Adams & Duff 2004; Kohler 2004; Powers 2005; Schaafsma 2007), well away from Hohokam's established trading circuits, but a straight shot north for Paquimé. Phoenix's western sphere was reduced to Hopi – its linguistic cousin – and a dozen large but short-lived towns in the Mogollon uplands that soon were abandoned, one after the other. Paquimé had an up market and Phoenix did not. By 1450, little was left of Hohokam's earlier glories, save stories and histories.

Pueblos and Others (CE 1450 to 1600)

Paquimé fell, sacked by unknown parties shortly after 1450, the last episode in the political history of the Southwest. The densely populated Casas Grandes region emptied. Some may have gone to Hopi or other Pueblos, but many survivors did not return to the north. They probably went west over the mountains to the Rio Sonora, or followed factions gone south centuries earlier. The people who came out of Casas Grandes could not have been the Mexica Aztecs, who founded their empire in 1427. Rather, southwestern peoples were sub-currents in a vast swirl of migrations, mostly north to south, which created a complex patchwork of northern and western Mesoamerican societies later conquered by Spain.

Population continued to plummet over the entire Southwest. The number of towns decreased. Whole districts were depopulated. Scores of towns – big towns! – in the Western Deserts, in the Mogollon uplands, and along the southern Rio Grande were abandoned a century before Spanish conquistadors entered the region in 1540.

The Pueblos from Hopi to Taos absorbed new peoples, not always of the same language or history. The unsettled social conditions must have tempted Pueblos (and Pueblo individuals) to reassert a degree of political authority, to bring order out of chaos. There are hints, even today, of that kind of authority in Rio Grande Pueblos. But the bitter lessons of Chaco and Aztec were still fresh. After 1300, Pueblos avoided political hierarchy and suppressed would-be leaders

through a complex mesh of ritual and social practices. In one researcher's words, they "defeated hierarchy" (Mills 2004).

The fifteenth century saw renewed trade with Mexico, almost certainly tied to the fall of Paquimé, which had controlled inland trade routes. Turquoise was still much in demand in Late Post-Classic Mesoamerica. The eastern Pueblos also forged economic connections to and across southern Plains groups (Adams & Duff 2004).

The people who would become Navajos and Apaches arrived from the north, after the fall of Chaco and probably after the end of Aztec – but not long after. Athabaskan speakers may well have been on the Plateau during Aztec's reign. Navajo clans have detailed knowledge of the times and places of the ancient Plateau cities.

Piman peoples recovered slowly from the final, tumultuous centuries of Hohokam and their rebellion against the platform mound rulers. It would take deserts many years to rebound from centuries of intense canal irrigation, overhunting and overgathering, and the depletion of firewood and other resources. Before they could revive completely, Europe arrived.

Coronado's army entered the deserts in 1540, looking for cities of gold. The memory of a rich, urban Southwest lived on in the stories of Mesoamerican traders. Traders guided conquistadors into what should have been the new Mexico. The stories were true: There had been cities, rich cities. But the Spaniards came a century too late for Paquimé and the Phoenix Basin, two centuries too late for Aztec and Chaco. The pueblos they found were nothing like cities: no gold, no wealth, no commerce, no kings. Discouraged, the conquistadors returned to Old Mexico. Sixty years later, Don Juan de Oñate returned with colonists seeking not cities but farmlands and metals. They stayed. Not without incident of course: Native revolts, political revolutions, Yankee invasions, and all the alarms and excursions of modern history.

The history of the ancient Southwest ends at 1600. After 1600, the Southwest was no longer Native, no longer aboriginal, no longer "ancient." Native people remained, of course, and their stories continued in the face of crushing colonization.

Key Issues in Southwestern Archaeology

Recent research has greatly clarified Chaco (e.g., Lekson 2006) and Hohokam (e.g., Fish & Fish 2007) – two key episodes in Southwestern archaeology. The nature of Hohokam governance pre-1150 remains enigmatic; indeed, what was "Hohokam," as a cluster of beliefs and practices? A horizon of great importance recently emerged with the Early Agricultural Period (Vierra 2005). Agricultural societies (we once thought) began around CE 200 in the Deserts and CE 500 on the Plateau, but now we know that farming towns began a millennium earlier in the Deserts. Equally important are new research and new understandings of the Casas Grandes region in the Chihuahua Desert. In an understudied area, interpretations vary remarkably. One school sees Paquimé (Casas Grandes) as relatively small and local (e.g., Whalen & Minnis 2001, 2009); another school follows the site's original excavator (Di Peso 1974), emphasizing Paquime's role in the larger Post-Classic world (Riley 2005; Lekson 2006). Early Agriculture and Paquimé "book-end" Southwestern prehistory: the first farming villages and the last great city. While many other key questions remain in the Southwest, Early Agriculture and Paquimé stand out as epochal events – as yet, far from fully understood.

Cross-References

- ▶ Chaco Canyon, Archaeology of
- ▶ Mesa Verde
- ▶ Navajo Nation Archaeology Department
- ▶ North American Plains: Geography and Culture
- ▶ Pueblo Bonito

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Sowunmi, Margaret Adebisi

Emuobosa Akpo Orijemie
Department of Archaeology and Anthropology, University of Ibadan, Ibadan, Nigeria

Basic Biographical Information

Prof. M.A. Sowunmi (nee Jadesimi) is known to many as both a botanist and an environmental archaeologist. But it is in palynology that she is a household name in Nigeria. In fact she is the country's foremost palynologist and environmental archaeologist (archaeobotanist).

Prof. M.A. Sowunmi was born on September 24, 1939, in Kano, Northern Nigeria, where her father, Revd (later bishop), had been posted to pastor the northern province of the Church of Nigeria (Anglican Communion). The young 'Bisi was admitted into the Department of Botany, University College Ibadan (now University of Ibadan) in October 1959 and graduated B.Sc. (Special Botany) (Lond.) in June 1962. She was awarded a University of Ibadan Postgraduate Scholarship in October 1963 to undertake Ph. D. research work in palynology. At that time, because palynology was not taught in Nigeria, 'Bisi had to be sent abroad. So in April 1964 she travelled to Stockholm, Sweden, and spent six months studying palynology in the laboratory of Prof. Gunnar Erdtman, the *Father of Modern Palynology* (Sowunmi 2004). Her Ph.D. work was supervised by Prof. Erdtman. On July 27, 1967, M. Adebisi Sowunmi earned a Ph.D. (botany) degree from the University of Ibadan. She thus became the first Nigerian to obtain such a degree.

In December 1967, at the instance of Prof. Thurstan Shaw, the doyen of archaeology in Nigeria, she was appointed as a postdoctoral research fellow at the Archaeology Unit of the Institute of African Studies, University of Ibadan; she held this position until his unfortunate death in 2006. When she became a lecturer in the newly created Department of Archaeology (now Archaeology and Anthropology), University of

Ibadan. She became Professor of Palynology and Environmental Archaeology in October 1982 and officially retired from the University of Ibadan in 2004, having attained the statutory age of 65 years.

Prof Adebisi Sowunmi was a visiting professor at the Department of African Archaeology, Uppsala University, Sweden, from October 1 to December 23, 1997, and visiting professor at the Institute of Archaeology, University College London, England (January 4 to March 23, 1998). Between April and June 1998, she was a visiting professor at the Departments of African Archaeology and African Archaeobotany, Johann Wolfgang Goethe-Universität, Frankfurt am Main, Germany. She has travelled to at least 23 countries to attend scientific conferences, meetings, and workshops. She is a member of several international organizations, such as the Archaeological Association of Nigeria (member, Board of Trustees), Palynological Association of Nigeria (Foundation and current President), Science Association of Nigeria (life member), West African Archaeological Association (past president), World Archaeological Congress, International Association of African Palynology, Nigerian Environmental Study/Action Team, and the Nigerian Field Society. Prof. Sowunmi has published 31 scholarly papers in scientific journals, four books, ten chapters in books, and six technical reports and delivered over 30 public lectures and conference papers.

Major Accomplishments

Prof. M. Adebisi Sowunmi, having been awarded a postgraduate scholarship by the University of Ibadan (1963–1967), became the first person to earn a Ph.D. degree in Botany from the University of Ibadan, Ibadan, Nigeria. She pioneered the paleo-ethnobotanical and environmental archaeology research in Nigeria and the university palynological research with the setting up in 1971 of the first Nigerian University Palynology Laboratory. The laboratory contains over 3,600 reference pollen slides of present-day Nigerian and some other West African plants; albums of original descriptions, hand-drawn diagrams, and photomicrographs of the pollen grains important Nigerian plants; and 151 overhead transparencies covering various topics in palynology, Nigerian and West African archaeology, and environmental archaeology. Prof Sowunmi supervised the second Ph.D. in botany (palynology) and the first Nigerian Ph.D. in environmental archaeology (with Dr Phillip Allsworth-Jones) in 1981 and 1991, respectively.

She (with Kogbe, C.A.) was the first to indicate the age and paleoenvironment of the Gwandu Formation (Continental Terminal), Northwestern Nigeria. With two others she produced the first descriptions of some Eocene pollen of the Ogwashi-Asaba Formation, Southeastern Nigeria. She published the first paper on the Late Quaternary vegetation and environmental history of Nigeria and the pollen morphology of extant Nigerian plants which are ecological indicators. Prof. Sowunmi also carried out the first pollen analysis of honey from the forest and savanna zones of Nigeria, obtained the first botanical evidence of the beginning of agriculture in Nigeria, made the first pollen analysis of an archaeological site in Nigeria (with E.O. Awosina), and indicated the relevance of archaeology in national development.

In January 2003, M.A. Sowunmi was conferred with an honorary Doctor of Philosophy degree in the Humanities by Uppsala University, Uppsala, Sweden, in recognition of her outstanding scholarship and contributions in research and teaching in the fields of environmental archaeology and paleobotany (Sowunmi 2012). In July 2005, she was one of the keynote speakers (long-term and short-term socio-environmental dynamics in West Africa: the challenge of environmental archaeology) at the Pan African Association for Prehistory and Related Studies Conference, Gaborone, Botswana.

During her academic career at the University of Ibadan, she produced seven Ph.D.s and over 20 M.Sc.s. She was involved in the supervision of Ph.D.s in the Department of Archaeology and Anthropology, University of Ibadan, from 2007 till February 2013. Prof. Sowunmi returned to teaching, being an adjunct lecturer for one undergraduate course, three M.Sc. courses, and the

supervision of two M.Sc. research projects in the Botany Department, University of Ibadan. It is of common knowledge that Sowunmi is a feminist (Folorunso 2004) and has a high degree of intolerance for indolence. She is reputed to be an exceptionally thorough and effective teacher (Egunyomi 2004). At Ibadan and elsewhere, she has taught palynology, paleobotany, environmental archaeology, and ethnobotany. She is revered as the Matriarch of Nigerian Palynology and preaches that to be a good palynologist, one must think, dream, and feel pollen.

Prof Bisi Sowunmi's husband was late Prof. Segun Sowunmi, and they have three children and one grandchild.

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- ▶ Archaeobotany
- ▶ West and Central Africa: Historical Archaeology

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Space Archaeology

Alice Gorman
Department of Archaeology, Flinders University, Adelaide, SA, Australia

Introduction

Space archaeology is the study of the material culture associated with space exploration from the twentieth century onwards. This includes terrestrial infrastructure related to the development, manufacturing, operation, and use of space systems, spacecraft and space debris located throughout the solar system and the landing sites of robotic and crewed missions on other planets and celestial bodies. Space archaeology sits within the field known as "archaeology of the contemporary past."

The era of modern rocketry, which created the first real capacity to break free of Earth's gravity, had its roots in the amateur rocket societies of the first half of the twentieth century. In World War II (1939–1945), Germany developed missiles capable of reaching other continents and, hence, also capable of reaching space. The V2 rocket drew on the expertise of the amateur rocketeers such as Wernher von Braun, and following the war, a diaspora of German rocket scientists and materials seeded the space industries of the nascent spacefaring nations.

Four rocket test and launch sites were established in 1947: White Sands (USA), Woomera (UK/Australia), Kapustin Yar (USSR/Kazakhstan), and Colomb-Béchar (France/Algeria). While these were all military sites, the first satellite launches occurred against the backdrop of international cooperation for the International Geophysical Year of 1957–1958. In 1957, the USSR successfully injected the aluminum sphere Sputnik 1 into Low Earth Orbit. Within the emerging Cold War, the demonstration of superior ideology through space technology became a central feature.

Within six years, the rapid growth of technology enabled the USA to launch the first telecommunications satellite into geostationary orbit, about 35,000 km above the Earth. This ushered in the era of modern telecommunications. Telephone and television were now able to achieve global coverage using just three satellites, as predicted by legendary science fiction writer Sir Arthur C. Clarke in 1945. The "space club" expanded as more nations across the world began to develop their own industries, as both suppliers and consumers of space services.

The landing of humans on the Moon in 1969 captured the imagination of the world.

However, this remarkable achievement had less impact on terrestrial life than the developing industries of telecommunications, navigation, meteorology, and Earth observation, provided by an ever-evolving population of satellites in Earth orbit and their ground infrastructure. Nonetheless, the series of Apollo lunar landings between 1969 and 1972 made humans active agents in shaping an interplanetary cultural landscape (Gorman 2005a).

With over 7,000 spacecraft launched since 1957, there is a growing population of space hardware in the solar system, with most of it located in Earth orbit. In the twenty-first century, private and commercial space enterprises are in the ascendancy, and space tourism is poised to become a major industry. The study of this distinct technology and its social correlates has the potential to offer new insights into contemporary life on Earth.

A Brief History of Space Archaeology

Turning the archaeological gaze on space exploration is far from a recent development. In 1967, historical archaeologist James Deetz suggested that one day archaeologists would look at spaceships as part of the archaeological record. In the late 1990s, William Rathje (1999) extended his investigation of the role of garbage in contemporary human society to include orbital debris. Around the same time, NASA funded the Lunar Legacy Project, for which Beth Laura O'Leary (2009) and her team created an archaeological inventory of the Tranquility Base lunar landing site, where humans first set foot on another celestial body in 1969.

The first decade of the new millennium saw interest in space archaeology gain momentum. Gregory Fewer (2002) explored issues surrounding the protection of historic planetary landing sites on the Moon and Mars, proposing a system of heritage listing. Alice Gorman (2005a, b, 2009a), in her study of orbital debris, proposed a cultural landscape approach to space and applied the Burra Charter (1999) heritage management guidelines to spacecraft in orbit in order to understand their cultural significance. She also highlighted the impacts of space industry on Indigenous people through the location of launch sites on their lands, configuring launch sites such as Woomera and Kourou in French Guiana as places of cultural contact and exchange. Robotic landing sites on Mars were considered by Dirk Spenneman (Spennemann & Murphy 2009). The *Handbook of Space Engineering, Archaeology, and Heritage* (Darrin & O'Leary 2009) provides a comprehensive overview of the entire field.

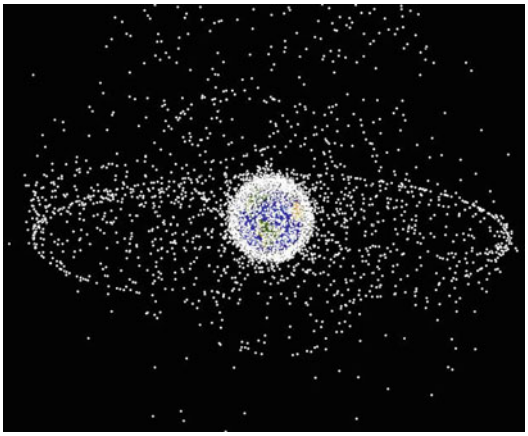
With India and China planning human missions to the Moon, determining appropriate management strategies for Tranquility Base became more urgent, and O'Leary and others spearheaded a successful campaign in 2010 to have artifacts at the site registered at state level in the USA, preparatory to a nomination for the World Heritage List. In 2011, NASA responded to the growing awareness of lunar heritage issues by creating a set of guidelines for future missions. Both the World Archaeological Congress (WAC) and the International Council on Monuments and Sites (ICOMOS) have recognized that space heritage is a distinct area requiring consideration.

Definition

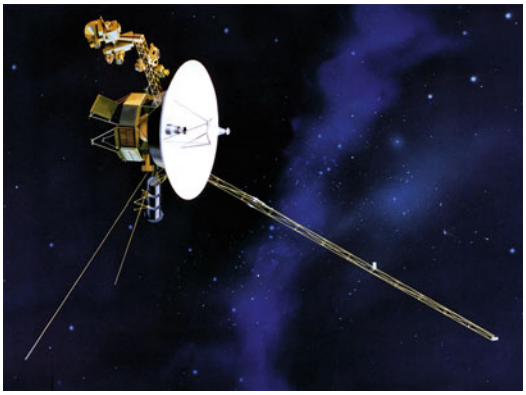
Characterizing the Archaeological Record in Space and Time

Space archaeology deals with human physical and material interactions with microgravity, technology, and interplanetary environments. Gravity regimes very different to those on Earth have a profound structuring effect on the distribution of space artifacts throughout the solar system. The material of space archaeology could be divided into several zones, all connected to the surface of the Earth through launch and tracking sites:

- Earth (terrestrial infrastructure, terrestrial and marine orbital debris reentry sites)
- Earth orbit (Low Earth Orbit, Medium Earth Orbit, geosynchronous and geostationary orbit, Molniya orbit, Sun-synchronous orbit, and various others)
- Cislunar space (the region of space between the Earth's atmosphere and the Moon)
- Lunar orbit and surface



Space Archaeology, Fig. 1 Orbital debris (Image courtesy of NASA)



Space Archaeology, Fig. 2 Voyager 2, launched in 1977 by the USA (Image courtesy of NASA)

Space Archaeology, Fig. 3 Antenna pylons at the former Orroral Valley NASA tracking station, Australia (Author's image)

- Heliocentric orbit (around the Sun)
- Venusian orbit and surface
- Martian orbit and surface
- Miscellaneous orbital, landing, and encounter sites
- Interplanetary space

The Earth orbits are most dense in material, with over 19,000 trackable spacecraft and pieces of debris, from Low Earth Orbit up to the "graveyard" orbit above 35,000 km (Fig. 1). This debris includes the Vanguard 1 satellite, launched in 1958 and now the oldest human object in space. Gorman (2005a, b) has argued that orbital debris forms an organically evolved cultural landscape with value in its own right. In doing this, she has proposed a new frame of reference for archaeology, structured by gravity, rather than the traditional division into terrestrial and celestial spheres (Gorman 2009b).

In the rest of the solar system, human material is present on the Moon, Mars, Venus, Titan (a moon of Saturn), two asteroids and a comet, and in orbit around most celestial bodies (Capelotti 2010). Of particular significance are the Martian, Venusian, and lunar sites where crewed or robotic missions have landed. Tranquility Base on the Moon, with its iconic astronaut bootprints, can be compared to the Paleolithic footprints of *Australopithecus afarensis* in volcanic tuff at Laetoli in Tanzania: both can be argued to represent evidence of major evolutionary turning points. At the farthest reaches of the solar system, there are four spacecraft, only two of which are in communication (Voyager 1 and 2; Fig. 2).

The distance from the Earth creates requirements for the ground segments, in terms of their location on Earth and the types of receiving and command antennas. The technology of spacecraft is inseparable from the infrastructure required to send and receive signals, so neither can be studied in isolation. Many early generations of launch and tracking sites are now abandoned, such as the Colomb-Béchar launch site in Algeria and the Orroral Valley tracking station in Australia (Fig. 3), overtaken by changing technology and politics. There are a myriad of satellites which are

no longer functioning and other defunct spacecraft, such as rocket bodies, in Earth orbit.

Early Cold War launch sites are also frequently associated with nuclear testing, as this requires similar infrastructure and environmental conditions. In Australia, the USA, the Pacific, and other places, many of these sites are now abandoned. Rockets were originally developed as nuclear warhead-bearing missiles, and early satellites were ideological weapons in the Cold War, as Gorman and O'Leary (2007) have argued. The Cold War (1945–1991) can be regarded as the first stage of the Space Age, encompassing the "Space Race" and the "conquest" of space as matters of national prestige.

While launch sites tend to be distributed among the spacefaring states (e.g., USA, Russia, Europe, India, China, Japan) and their colonies, most countries have some level of space infrastructure, and all are now users of space-based services. Most nations maintain satellite downlink facilities, even if only at the level of domestic satellite dishes and telephones (Gorman 2009a). The cultural footprint of satellite data can also be considered as the domain of space archaeology. This is particularly so in the period from 1991 until the present, the second stage of the Space Age, when space activities are driven by the telecommunications requirements of globalized economies.

Commercial and private space enterprises, including tourism, are likely to characterize the next phase of space activities. We can expect new forms of propulsion and new ways in which humans relate to technology. They will not arise sui generis: they will be built on the "heritage" of past space activities. Nevertheless, one can imagine a time when the spacecraft of the twenty-first century appear as quaint and outdated as a horse and cart or a biplane. Considering space exploration as an expression of cultural change invites and inspires long-term visions of the future.

Key Issues/Current Debates/Future Directions/Examples

Methods, Theories, and Applications

Space archaeology employs the same methods as historical and industrial archaeology in using survey, excavation, artifact analysis, oral history, documentary research, aerial imagery, and geographical information systems (GIS) to characterize and analyze material remains and landscapes. However, specialist knowledge in areas such as electronics, propulsion systems, telecommunications, aerospace engineering, materials science, and planetary science is required in order to recognize and record features of significance. A limitation is that usually sites and objects in orbit and on celestial bodies can only be accessed by remote sensing, and there is much that is unknown about what actually survives in these locations. Several space agencies and organizations track debris in Earth orbit within the limits of their observation and modelling capacities. Reconnaissance missions have located and filmed previous landing sites on the Moon and Mars. Less frequented parts of the solar system can only be speculated about.

Studying the material record of the contemporary past presents some unique challenges. Because we are immersed in it, we may not be the best judges of what is significant and what is not: we are implicated in the ideologies of our time and place. Theorists of contemporary archaeology speak of the necessity of making the familiar unfamiliar. Techniques used to do this often trespass into the realm of the artist, using juxtaposition, montage, performance, and changes of scale to bring into focus objects and the relationships between them that are normally obscured. Another method of historical and contemporary archaeology is the use of oral history and personal narratives to augment and stand alongside the physical material. Frequently, there is a disjunction between individual memories and knowledge and the published or officially sanctioned histories. In these gaps, we can discern something about human engagement with the contemporary past and the social memories constructed around high technology.

A significant application of space archaeology is in heritage and environmental management. While remoteness has, in the past, protected many space sites from human impacts, this is rapidly changing. For example, the level of orbital debris has now reached a critical point

where it threatens functioning satellites, and plans are being devised to remove or destroy portions of it, while renewed interest in lunar, Martian, and Venusian exploration raises the question of how sites such as Tranquility Base can be best managed. Creating an inventory of space sites, landscapes, and objects and assessing their cultural significance prior to impacts arising from orbital debris cleanup, future missions, and space tourism is a priority for space archaeologists.

The Dublin Principles for the Conservation of Industrial Heritage Sites, Structures, Areas, and Landscapes (ICOMOS and the International Committee for the Conservation of the Industrial Heritage or TICCIH) provide some guidance here. The principles stress the interconnectedness of industrial places across multiple sites, from the extraction of raw materials to the systems of energy and transport. This is particularly applicable to space, where a single strand of operation can span the distance from Earth to orbit and back again across, for example, tracking stations, satellites, and downlinks. To conserve this heritage, inventories of all physical and intangible elements, including documents, objects, and landscapes, need to be made.

Since its inception, space exploration has tended to be the province of industrial elites and has been dominated by the USA and the former USSR. However, given the agenda of historical archaeology to uncover the lives of those often overlooked in official histories, such as women, working classes, ethnic minorities, and Indigenous people, an archaeological approach to space exploration has the potential to tell very different stories than those captured in the popular account of the "Space Race." For example, Indigenous people were frequently contributors to the success of space exploration through the forced surrender of their lands for launch sites, in a form of late industrial colonialism. Rocket launch sites can be conceived as places where ongoing cross-cultural engagements and tight security requirements structured new types of cultural landscape.

In turning a lens on the contemporary or recent past, space archaeology can illuminate aspects of twentieth- and twenty-first-century human existence. Despite a general public lack of awareness of their dependency on satellite-based services such as PNT (Position, Navigation, and Timing), the capacity for global telecommunications and Earth observation has transformed personal experiences of space and time, cultural transmission and hybridization, and national and transnational economies. While it is common for historians, economists, and other scholars of the contemporary world to analyze the movement of information and capital and their cultural consequences, few acknowledge the role that the *material* culture of space plays in enabling these late industrial transformations. In this regard space archaeology intersects with Science and Technology Studies (STS) and Social Construction of Technology (SCOT) studies. Archaeology brings to the investigation of space exploration the traditional focus on material culture, deep-time perspectives, and an understanding of the resilience and flexibility of cultural responses to change.

With the world divided into spacefaring and non-spacefaring states, the United Nations has called for the inclusion of those usually excluded from space: women, Indigenous people, and "developing" nations. Space archaeology can contribute to redressing the imbalance between the haves and have-nots of space by highlighting alternative narratives accessible only through an analysis of what is left behind and discarded and the material impacts of new technologies both in space and on Earth.

Cross-References

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- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Cold War
- ▶ Contemporary Past, Archaeology of the
- ▶ Deetz, James (Historical Archaeology)
- ▶ Historical Archaeology
- ▶ Modern Material Culture Studies
- ▶ Nevada Test Site

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- ▶ Space Heritage Protection
- ▶ World Archaeological Congress (WAC)

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Space Heritage Protection

Beth Laura O'Leary
Department of Anthropology, New Mexico State University, Las Cruces, NM, USA

Introduction

The heavens and the night sky have always belonged to humanity. Celestial bodies have been named and are present in the narratives, calendars, and rituals of the world's cultures. The Moon, especially, features in stories created by cultures from Africa to the Arctic since prehistoric times. In a real sense, everyone owns the Moon. However, it is only within the last 50 years that humans have created technology that has taken them into outer space and

onto the lunar surface. Cultural resources exist on the Earth's surface, in space, on the Moon, and on other celestial bodies (O'Leary 2006: 307). There are archaeological sites, structures, and objects, both on Earth and in space, which are associated in a cultural landscape of humanity's extraordinary scientific achievements in exploration. Objects and sites in space can be looked at as part of a much larger assemblage that until the Space Age – a particular time and level of technological development – were confined to Earth but then entered the archaeological record somewhere else (Staski 2009: 23).

Definition

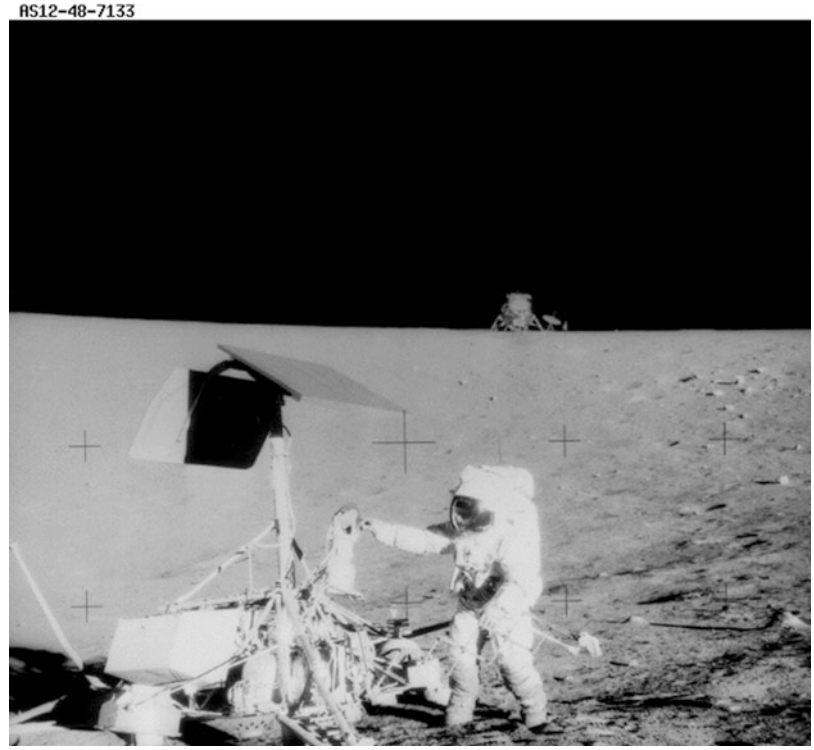
Space Archaeology is a new field which focuses on the "material culture relevant to space exploration that is found on earth and in outer space (i.e., exoatmospheric material) and that is clearly the result of human behavior" (Darrin & O'Leary 2009: 5). It is most strongly linked to the Cold War and post-Cold War period. The Cold War was played out by military, social, and political maneuvers in space as well as on Earth. In 1945, the USA and USSR engaged in a race to acquire both German rockets and rocket scientists and engineers (Gorman & O'Leary 2007: 73). The descendants of the V-2 rocket launched the first satellites and later propelled the first humans into space and onto the Moon. Former Apollo 8 astronaut Borman (2001) called the Apollo Program a battle in the Cold War. These events changed history and provided the basis for the associated technologies that currently include a satellite-based telecommunication industry and spacecraft that continue to explore farther and farther away from Earth.

The term Space Archaeology is frequently paired with space heritage which focuses on ways to identify, evaluate, and protect significant places and artifacts associated with space exploration that may be lost through deliberate destruction, looting, recycling, or neglect. In some ways, the remoteness of, for example, sites on the Moon or Mars and the costs associated with revisitation have provided a form of protection, at least from human impacts. The preservation of objects in space and on other celestial bodies is, for the most part, in a gray legal area as ownership and the varied post depositional contexts lie within zones of many contested and evolving international treaties and agreements. The goals of space archaeology and heritage are to illuminate the interaction of human behavior in order to understand both the past and the present, provide for preservation of significant sites and objects, and, perhaps, be useful for future space missions (Gorman & O'Leary 2013).

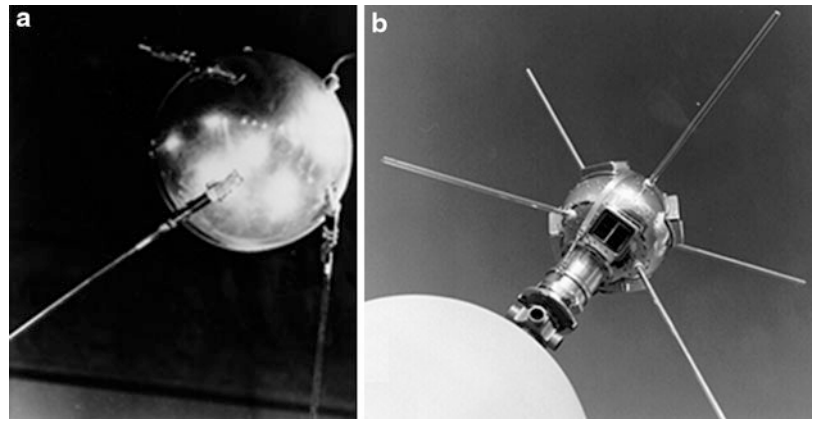
Historical Background

The earliest evidence for Space Archaeology begins with two astronauts. As part of the Apollo 12 mission in November 1969, astronauts Conrad and Bean were instructed to survey and record information about *Surveyor 3*, a robotic probe that had landed on the Moon's surface 3 years earlier (Fig. 1). Conrad and Bean landed their spacecraft 180 m from *Surveyor 3* and conducted the first "archaeological" studies on the Moon by photographing and collecting samples and returning them to Earth for analyses. Although the analyses were designed to help NASA detect changes to the materials from *Surveyor* caused by the lunar environment, Capelotti (2004: 51) notes this as the first example of extraterrestrial archaeology and "formational archaeology, the study of environmental and cultural forces upon the life history of human artifacts in space."

The Space Age is different from other periods in human's technological evolution, both in its speed and the global nature of the massive amount of research and development by nation-states that delivered material culture to a very remote region. The Space Age usually begins with the launch of the first satellite, USSR's *Sputnik 1* in 1957, followed by the successful launch of *Vanguard 1* by the USA (Fig. 2). *Sputnik 1* remained aloft only several months



Space Heritage Protection, Fig. 1 Apollo 12 Astronaut Alan Bean and Surveyor 3 on the lunar surface November 19, 1969 (Courtesy of NASA)



Space Heritage Protection, Fig. 2 Sputnik and Vanguard 1 (Courtesy of NASA)

after its launch, but created the first object and orbital debris which expanded the archaeological frontier into space. *Vanguard 1*, a 15.2 cm sphere with antennae weighing about 1.5 kg, was launched on March 17, 1958, and continues to circle the Earth every two hours. It is expected by NASA to remain aloft for the next 600 years (O'Leary 2009a: 771). *Vanguard 1* is currently the oldest human object in orbit, and its orbit will allow it to be essentially preserved in space.

The history of space exploration is ongoing and includes many kinds of robotics. What lies at the edge of the subdiscipline is interest in the cultural heritage of robots (O'Leary 2009b: 41). Spennemann (2007) focuses on emergent heritage or technologies that are still in use and form an ongoing technological investment. This area includes heritage created by robots in the form of their artificial intelligence. The lunar surface, Mars, and several asteroids are rife with all kinds

of robotics and the places they created or modified, especially during the early stages of exploration (e.g., *Ranger, Luna, Beagle 2*). It is a heritage that is part human and part machine.

Key Issues/Current Debates

Space Archaeology also concerns itself with orbital debris. For archaeological purposes, orbital debris has been defined by Gorman (2009: 382) as "any human manufactured object in orbit that does not currently serve a useful purpose and is not anticipated to in the foreseeable future." There are currently huge amounts of orbital debris varying from small flakes of paint to large defunct satellites and all pieces of spacecraft jettisoned, crashed, and simply existing in space. Low Earth orbit(LEO) and Medium (MEO) and Geosynchronous Orbit (c. 160 – 37,000 km from the Earth's surface) contain the most debris, while vehicles like the two *Pioneer* and two *Voyager* spacecrafts are currently the farthest away from Earth in the interstellar medium. The amount of orbital debris increases yearly as more satellites and exploration vehicles continue to be launched into space. NASA currently tracks over 15,000 pieces of debris over 10 cm in size. Referred to in the popular media as "space junk," collisions of debris can cause future spacecraft to fail, be damaged, explode, and create more space junk. The methods to "clean up" or even to evaluate the "junk" are dependent on finding ways to accomplish this and secure international agreements.

Space Archaeology lends itself well to the concept of a cultural landscape, which has become more prevalent in archaeological and cultural resource management studies, but has to be broadened to include cultural resources off the Earth. UNESCO's World Heritage Convention describes a cultural landscape as the combined works of nature and man (WHC). It focuses on the idea of a site, for example, the first lunar landing site at Tranquility Base, as embedded within a landscape that includes launch Complex 39 at Cape Canaveral, the tracking station in Australia (Honeysuckle Creek), and the facilities that were critical to developing the rocketry (Saturn V Test Stand). It can be argued that the Tranquility Base site on the lunar surface is a critical component of the cultural landscape of space exploration. A cultural landscape approach allows for the perception of broad chronological, technological, and geographical patterns in the human interactions with space. Space ceased being an empty vacuum when humans entered it (Gorman & O'Leary 2007). In effect, it became a place that could be managed and studied in many of the ways that historic places are on Earth. However, in most cases, objects in space or on other celestial bodies present complexities that supersede the disposition of sites on Earth (O'Leary 2009a: 774).

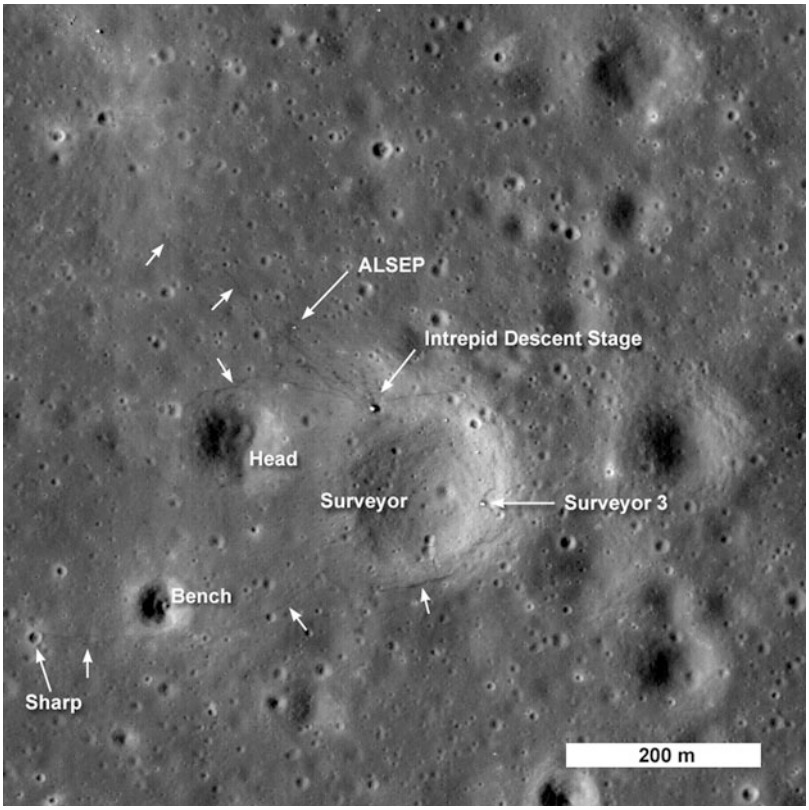
In order to protect heritage in space, approaches must navigate a complex, intertwined area of national and international laws, regulations, treaties, and policies. The archaeological assemblage from the Space Age is from a period that is relatively young and has not been considered worthy of preservation. Also, the exploration and use of space is still a functioning, ongoing, and increasingly complex system. Critical components in space have been, for the most part, inaccessible to the public. The field of Space Archaeology and Heritage requires ways to address interpretation, evaluation, and preservation of this legacy. If it is indeed humanity's heritage – one giant leap for mankind – it needs to be ultimately international or universal in scope. The World Heritage Convention does provide criteria for places on Earth that have "outstanding universal value" (WHC) under which many space sites and objects would qualify, but they are not on Earth. Because the control and management of space heritage lies in a contested legal arena without specific guidance or laws on cultural preservation written into international conventions, agreements, and treaties, most efforts so far have been within nations (especially the USA). The National Historic Preservation Act (NHPA) in the USA of 1966 came 3 years

before the height of the Space Race between the USA and USSR that brought the first humans to the Moon. Historic preservation efforts to date that address space follow USA federal and state laws and the United Nations Outer Space Treaty of 1967 (OST). The Outer Space Treaty asserts that nations which place objects in space or on the surface of celestial bodies such as the Moon are not subject to national appropriation by claims of sovereignty. Essentially, no one nation can own space or, for example, the Moon. But as governed by the Treaty's Article VII, the objects launched into space or on another celestial body are and remain under the jurisdiction of those who put them there (OST; O'Leary 2009a: 774). The Outer Space Treaty also states that space activities should forward humankind's use of space for peaceful purposes, which could include historic preservation. NHPA, the Outer Space Treaty, and WHC do not explicitly cover the preservation of historic sites and artifacts in space. These cultural resources are not on the Earth; they are a recent past property for which archaeologists do not have a large body of expertise and are at a scale different from which most archaeologists work. The resources in space and on other celestial bodies are not within any nation's territorial boundaries. Initial and ongoing costs are factors in any preservation strategy and alternatives for space may be expensive, but these costs and strategies can become part of future mission planning. For the Moon as an ad hoc solution, Stooke (2008) suggests that all early lunar sites (CE 1959–1976) be considered significant and protected from any human impacts in the future. Capelotti (2009: 433) has advocated for lunar parks founded on the same principles that currently guide the protection of sites in extreme environments like Antarctica.

The earliest effort to consider preservation issues of space began with the Lunar Legacy Project in 1999 (Lunar Legacy Website). It is one of the first instances of funded space archaeological research. The New Mexico Space Grant Consortium (NASA) at New Mexico State University, USA, granted monies to B.L. O'Leary and students to focus on the archaeological assemblage at one site, the first lunar landing site created by the Apollo 11 astronauts at Tranquility Base on July 20, 1969. The site was chosen because it is the most iconic of humanity's visits to another celestial body. Also, it was the best test case for the application of US federal preservation law, and one avenue was proposing that Tranquility Base be nominated as a National Historic Landmark (2009a: 775). It is the first time archaeologists looked at a site on the Moon as a historic property and evaluated how it could be preserved for the future. These early efforts presented challenges to NASA, who as a federal agency was responsible for complying with the NHPA, and the USA's Keeper of the National Register of Historic Places, who determines the eligibility of significant cultural properties. There was no doubt that the site was significant but the responses in 2000 of these two entities centered on the perception that the Moon could not have NHLs because it would be perceived as a claim of sovereignty and the USA Keeper did not have sufficient jurisdiction or authority (O'Leary 2009a).

Protection efforts for the objects and structures on the lunar surface at Tranquility Base – not the surface itself – began in three different arenas. The first was involving states within the USA to list these resources on their own registers of significant cultural resources. The objects and structures at Tranquility Base were placed on both the California and New Mexico State Registers of Cultural Properties in 2010 (Westwood et al. 2010; O'Leary et al. 2010). Although largely symbolic, these acts acknowledged that both states had a historic association with the creation of those artifacts and the successful first lunar landing and agreed to protections under state law. Other states are considering similar actions. A draft bill is being considered for the US Congress to declare the Tranquility Base artifacts an NHL.

The second level is at the international level. A resolution by the World Archaeological Congress in 2003 recognized the material culture and places associated with space exploration, and an international Space Heritage



Space Heritage Protection, Fig. 3 LRO Image of Apollo 12 site on the lunar surface (August 2011) (Courtesy of NASA)

Task Force was created that continues to investigate ways of identifying and assessing significance at local, national, and international levels the cultural material in space whose preservation would benefit humankind (O'Leary 2009a: 777). The International Committee on Monuments and Sites (ICOMOS), an advisory body to the World Heritage Convention for placing sites on the World Heritage List, has formally become involved in space heritage by initiating a scientific committee.

Finally, NASA itself has acknowledged the problem of preserving space heritage on the Moon and has become involved in the protection solutions. "NASA's Recommendations to Space-Faring Entities: How to Protect and Preserve the Historic and Scientific Value of U.S. Government Lunar Artifacts" (NASA 2011) recognizes that there are increased technical abilities of space-faring groups including other nations and commercial entities who will go back to the Moon in the near future and provides guidance on visitation to protect both the historic and scientific values at those lunar sites. Guidance is provided on lunar design, mission planning, and sanctioning actions which would mitigate damage to significant lunar cultural resources until such time as a more multilateral approach is developed which includes other nations. One of the most exciting areas of research conducted by NASA is the Lunar Reconnaissance Orbiter (LRO) which is in use, in part, to map the surface of the Moon. Although not designed for such use, its digital imaging capacities provide archaeologists with the best remote sensing of the sites created by the Apollo Program on the Moon from 1969 to 1972 (Fig. 3). The scope and ability of this tool is critical to look at the condition of all early lunar sites and accurately document and evaluate the objects, foot and rover trails, and structures on the Moon and plan for their management in the future.

Future Directions

Space and the environment on the lunar surface especially are relatively benign when it comes to preservation. There are no erosive forces such as wind, water, and organic processes existing on Earth that occur on the lunar surface. With the exception of the effects of temperature changes and micrometeorite bombardment on the artifacts, they are largely unchanged. The trails from 40 years ago are clearly demarcated. The tools that were developed to explore the universe may be used to greatly enhance the preservation of humanity's first steps off Earth and into the universe. Now is the critical time to protect humanity's heritage in space.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Antarctica: Historical Archaeology
- ▶ Behavioral Archaeology
- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Heritage and Archaeology
- ▶ Landscape Archaeology
- ▶ Legislation in Archaeology: Overview and Introduction
- ▶ Space Heritage Protection
- ▶ UNESCO World Heritage Convention (1972)
- ▶ United States: Cultural Heritage Management
- ▶ World Archaeological Congress (WAC) and Cultural Heritage Management

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Further Reading

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Spain and North Africa: Islamic Archaeology

Alberto García Porras
Historia Medieval y Ciencias y Técnicas Historiográficas, Facultad de Filosofía y Letras, Universidad de Granada, Granada, Andalucía, Spain

Introduction and Definition

Interest in the western Islamic world, essentially the Iberian Peninsula and North Africa, is long standing. The presence of well-preserved buildings and monuments and numerous works of art has generated a particular approach since the mid-nineteenth century, sometimes close to exoticism. Appreciation of the arts and antiquities of these societies, whether wiped out and existing only in memory as is the case with Spain, or still present as with North Africa, contributed to the considerable increase and development of studies on Islamic history in these regions. Without doubt, in the case of North Africa, the fact that the area had fallen under the control of Western political powers, mainly France and Spain, helped the development of research, although frequently with a focus on local custom.

However, archaeology was involved only slightly in this process of historical reconstruction until well into the twentieth century. Indeed, at least regarding Spain, it was not until the 1970s that archaeological studies would bring new ways of developing knowledge of these Islamic societies. Despite this, the excellent advances and the indispensable works that appeared from disciplines such as history of art and history of architecture by authors such as George Marçais (1954), Henri Terrasse (1932), Manuel Gómez Moreno (1951), or Leopoldo Torres Balbás (1949) in the first half of the century should not be forgotten. These authors, the most outstanding among a considerable group, established the fundamentals of the study of the art, archaeology, and architecture of Western Islam.

From the 1970s, the situation changed considerably. Theoretical and methodological progress in the discipline of archaeology throughout the 1960s, particularly regarding the chronological sphere of prehistory, had allowed for the development of the discipline in the Mediterranean area, albeit with a certain delay. The archaeology of the Islamic world was no exception. In the case of Spain, many researchers – mostly coming from the fields of medieval history or prehistory – became involved in applying archaeological methodology with a view to enriching knowledge of medieval Islamic society. This was an important catalyst for advancement in historical and archaeological research carried out in al-Andalus. It led to the birth of a new discipline, medieval archaeology, hitherto scarcely explored, which was to develop into pioneering and innovative work on al-Andalus and a vehicle by which to introduce new streams of research.

For North Africa, the influence of countries external to the region was essential. The pioneer in this respect was without doubt the French school, notably improved since the end of the 1960s, which continued to act as an engine for research with the participation of some local collaborators. The first projects that were put into action were directed at increasing knowledge of ancient times and failed to properly appreciate medieval Islamic levels. It was not until the end

of the 1970s and beginning of the 1980s that work specifically addressing the medieval era began. These first studies, applying so-called extensive archaeology, concentrated on the analysis of territory by means of broad archaeological surveys in northern Morocco. Other teams of diverse origin rapidly became involved, including Americans (Sijilmasa, Basra, Djerba, Qsar as Seghir), British (Volubilis), Italians (Rif), French (Rif), and Spanish (Sus-Tekna), and successfully formed mixed teams. The work carried out in the context of these projects has served as a catalyst for the development of Maghrebian research in recent decades. Some of the projects are still active today (Sabra al-Mansuriya) providing information of great interest. In spite of this, research in North Africa shows a certain delay in comparison to developments in the Iberian Peninsula.

From this time onward, those involved in this research began to intervene as of right in the process of the historical reconstruction of western Islamic societies and not only in the limited fields of art and architecture. With a new technical language, at times no doubt incomprehensible to their historian colleagues, they rejuvenated the academic field. Their work began to open new debates of great importance that today continue to arouse scientific discussion, spur the development of the discipline, and increase our knowledge of medieval Islamic history in this region. We will refer to some of these debates in the following section as they serve to highlight the state of current knowledge.

Historical Background

From the Ancient World to Western Islam

At the turn of the seventh to eighth century, the Iberian Peninsula and North Africa were conquered by Muslims. Until then, the evolution of these territories had been similar, although with some distinctions, to that of the rest of the territories that had been integrated into the Roman Empire. In late antiquity the area underwent considerable upheaval due to barbarian invasions (mostly Visigoths and Vandals, with lesser incursions by Suebis and Alans), and a whole series of transformations of the structures of organization belonging to the Roman era took place. These, however, had already begun to be modified before the fall of the last western emperor. If any single thing characterizes this field of study, it is the presence and influence, in varying degrees, of the Byzantine Empire, which saw itself as affected by the Iberian Peninsula and North Africa, lands that would later be controlled by Muslims.

Regarding the Iberian Peninsula, work on this period has centered on various fundamental aspects. First is the study of cemeteries, with particular interest in the analysis of their organization, location, and funerary practices based on the associated material culture, with a view to clarifying the identity of the buried. Second is a focus on Visigothic architecture, especially that used in known churches and the transformation of rural settlements (the end of the late Roman *villae*, the emergence of new kinds of settlement such as farms and small towns) and in the cities, which underwent a process of significant transformation, especially evident in metropolis as distinct as Mérida, Cartagena, Tolmo de Minateda or Recópolis, all of which have been subject to rigorous archaeological intervention.

For North Africa, research has concentrated especially on the second of these themes, the cities and changes that took place in their rural hinterlands. This includes isolated case studies of great interest, especially in the Tunisian area (notably Uchi Maius: Gelichi & Milanese 2002). The prosperity of these North African cities outlasted the fall of the Roman Empire, although changes are evident as early as the fifth and sixth century (abandonment, transformation of certain public spaces, the building of churches, development of fortified elements). The Arabs established themselves in this network of transformed cities at the time of the conquest, and these settlements lasted into the first centuries of the medieval period, due to their continued occupation by urban elites.

These issues were directly linked with lines of investigation that had developed some time

previously in the rest of Europe, although each with their own local characteristics. This wider debate analyzed the changes that took place after the fall of the Western Roman Empire and into the beginning of the early Middle Ages (Wickham 2005: 902-945). After the Arab invasion and conquest of these territories, the situation changed substantially. The factual account and the archaeological discourse changed to the same degree.

Islam in the West: Al-Andalus and the Maghreb

Transformations in Patterns of Settlement After the Muslim Conquest

The Arab conquest of North Africa and the Iberian Peninsula is a watershed in terms of approaches to research. Traditional theories, at least in the case of Spain, accepted only with difficulty the incorporation of this area into the Islamic world. For a long time it was considered that Islam did not result in more than a few superficial cultural or religious changes in this territory, without implying radical developments to the society of the Iberian Peninsula. There were even those who denied that the invasion occurred, considering it more an "orientalization" of society than a conquest and Islamization of the Peninsula.

The work of Pierre Guichard, from the late 1970s, came to deny this view, acting as a starting point for a comprehensive revision of studies on al-Andalus. Influenced by structuralist/functionalist social anthropology, he argued that medieval society in al-Andalus and North Africa presented a social and familial structure belonging to the Islamic world, very different to that which existed in the feudal-Christian area of the Peninsula. This would confirm that the social impact of the Arab-Berber invasion and conquest of Hispania was wide and profound (Guichard 1976, 1990-1991 and Barceló 1997). Initially based on written documentation, he subsequently undertook archaeological research, carried out in collaboration with other French colleagues (Bazzana et al. 1988), to observe and interpret the documented changes to the organization of settlement and material culture of al-Andalus. The work initiated by these researchers served as strong motivation for the creation of a new school of archaeology, dedicated to the study of al-Andalus, which has made new and rich contributions to the process of historical reconstruction.

The analysis of landholding initially occupied the core of these authors' investigations. Originally focused on the study of the various documented settlements in al-Andalus, research soon began to center on the relationships that existed between them, especially between the fortified settlements; the castles (hisn/husun), very common in Andalusian geography; and the rural settlements under their influence, the farmhouses. A common perspective was that this organization reflected the society established in the Peninsula after the Islamic conquest. The fortifications were central to the organization of rural territories in al-Andalus, but instead of showing a morphology and structure similar to the older (feudal) fortifications, analysis of the settlements showed that they were to a greater extent a reflection of a segmented society, tribally organized, and at the same time an expression of the fiscal implementation of the state in rural territory. Settlement organization was thus a reflection of the delicate balance existing between the Islamic state and the rural communities that organized the cultivation of the land and defended it in case of danger.

The model suggested by these French authors was contested at the time, as much for the chronology of its proposed implementations as for the functions it attributed to fortified space. Despite including a varied typology of fortified settlements, it seems clear that the model suffered from a certain inflexibility and stagnation, so that as studies developed, some of its aspects underwent revision and development.

Rural territories have been documented where the presence of fortified settlements is minor or practically nonexistent. However, in some regions it has been possible to sequence the development of fortifications through the Middle Ages, from an initial stage in which diversity indicates a process of social transition between the Visigothic period and a fully Islamized one. Here, the introduction of Arab-Berber population groups played a fundamental role alongside the integration of the diverse communities present in the initial

Andalusian phases, moving toward Islamization not only in religious terms but also as regards linguistic, cultural, and social practices (Acién 1989).

Authors such as M. Acién (1995), E. Manzano (2006) or S. Gutiérrez (1996) have emphasized this process, including the changes that can be observed in the material culture of this period as well as the fortified settlements and rural centers, in their discourse. These changes refer especially to the practices and centers of production of ceramics and their networks of distribution, as well as to the importance and influence of urban centers, all of which reflect the degree of continuity or disruption between the late Roman and Muslim worlds.

This process of Islamization, which was not without conflict and resistance, started from an advanced stage of destructuralization within the Roman world, which is generally confirmed in various ways: in the transformation of late Roman settlement patterns, with documentation of a clear tendency to occupy high ground and occasionally "marginal" zones; in new forms of cultivation in productive areas; and in the transformation of the urban network, with decline, abandonment, and new foundations. All this was accompanied by profound changes to artisanal productive structures and in networks for the exchange of products. These are most clearly demonstrated by changes to the ceramic corpus, with the appearance of non-standardized repertoires made using basic techniques and with relatively localized distribution. This transitional process continued until the end of the tenth century, when it is generally agreed that the process of Islamization of al-Andalus society was largely complete.

The culmination of the process coincides, according to this view, with the establishment of the Umayyad caliphate of Córdoba and is visible in the consolidation of the settlement model discussed above, as well as in changes to material culture, especially in the ceramic record. From this moment wheel-made vessels and glazed dishes appear more frequently.

Clearly this interpretive model, in incorporating new factors and variables, brings greater complexity to the general discourse, while the localized studies that developed during the 1990s in particular Andalusian geographic zones have shown that the rhythms and profiles of the process vary from one area to another, presenting specific regional characteristics.

This model of land use underwent important transformations over time. During the Almohad era, a process emphasizing the construction of fortresses apparently played out, especially in the east (Azuar 1988), although this phenomenon could equally apply to the rest of al-Andalus. Other changes related to occupation and in places cultivation of the land. For the final stage, the Nasrid period saw fortified nucleation of notable complexity, with the appearance of new materials and elements in these structures indicating the penetration by urban influences of these areas (Malpica 1996, 2008), along with the more obvious presence of Nasrid power (Acién 1999).

Regarding North Africa, research has not allowed similar conclusions to be drawn. The rural settlements, still incompletely studied, do not evidence similar organization. Although the Arab invasion and conquest initiated a process of profound social and cultural transformation, the result in terms of settlement is not comparable. Fortifications, while still numerous in this territory, do not assume the same importance they apparently reached in al-Andalus. However, the occupation of space by small nucleated settlements dedicated to the cultivation of their hinterland and based largely on the use of irrigation techniques does seem to extend through North Africa, although the scales varies at a regional level.

It should be noted that this interpretative change can be attributed as much to developments in archaeological methodology as to the fields of enquiry themselves. If at first, research was fundamentally based on territorial analyses, beginning with extensive landscape surveys from the middle of the 1980s, the development of techniques of spatial analysis, the emergence of urban archaeology, and the development of ceramic analysis have permitted the incorporation of new elements into the discourse. These elements have favored the development of new theories and a surge in new fields of study. We will focus on these below.

Key Issues/Current Debates

Settlement and Resource Exploitation: Hydraulic Archaeology

The explanatory model outlined above was initially directed to a great extent toward rural settlement, without actually excluding cities. It was because of this that some researchers naturally departed from the model and began to highlight the close link between fortifications and the exploitation of resources, in particular cultivated fields and irrigated agriculture (Cressier 1991).

The configuration of Andalusian territory in terms of these parameters from the tenth and eleventh centuries meant the construction of a new rural landscape featuring smaller units of population in the form of small nucleated towns called *alquerías* (from the Arabic *al-qarya*) and their associated hinterlands. The analysis of these small towns, little known due to their long occupation and difficulties of archaeological analysis, has contributed some knowledge of these productive spaces.

In this way the field of hydraulic archaeology has emerged and broadly developed within Andalusian studies. The works of T.F. Glick (1970) and, above all, of M. Barceló (Barceló et al. 1988) and H. Kirchner (Kirchner & Navarro 1993), developed primarily in the eastern area of the Peninsula and in the Balearic Islands, have laid the foundations of this new discipline. Following the proposals of P. Guichard, these researchers have linked the design, construction, and management of these irrigated spaces to the farming communities, generally organized in clans. From this perspective, the existence of these spaces, rather than solely being determined by geographical character or similar variables, is considered to be a social choice, and the criteria that govern them have been developed and should thus be explained by rural communities' own characteristics. The design of these spaces indicates a considerable organizational effort on the part of these communities, and their management cannot be understood unless from cooperation and collective effort within the community. The development and evolution of irrigated land thus denotes strategies and formulas for growth in these groups.

The creation of these agricultural systems marked a considerable modification of Andalusian rural ways of life, although on a local scale. This involved the application of catchment, distribution, and complex storage techniques, on occasion originating from the east. At the same time came the introduction and acclimatization of new crops, previously unknown in the Iberian Peninsula or North Africa, the products of which were not suitable for prolonged storage. This can only be explained in light of an economic context facilitating their dispersal.

Without casting doubt upon the importance of these agricultural areas in medieval al-Andalus and the Maghreb, in recent times new paths of investigation are being explored that incorporate problems associated with nonirrigated land and livestock in the rural Andalusian lifestyle. These issues are currently little known.

The "Alquerías" and Modes of Habitation

These rural groups, which were characterized by high homogeneity and social cohesion as well as administrative autonomy, were established in the *alquerías*. The settlements' morphology, as far as we know, reflected the characteristics of its community of rural landowners or workers. They appear to be very distinct from settlement forms occurring in the rest of the European continent (Guichard 1988). The *alquerías* are perhaps one of the least archaeologically known aspects of the rural Andalusian world. Very few have been carefully investigated archaeologically (Jolopos, Castillo del Río, Torre Bufilla, El Castillejo, Ponta do Castelo –Carrapateira, etc.) and those that have show diverse characteristics (open or walled fields, concentrated or dispersed, etc.), although they present a similar urban organization, comprising various cores connected by intricate lines of communication, which do not follow an orthogonal organization, and where large public spaces are virtually absent.

The inhabitants of these small nucleated villages managed a vaguely delimited territory in which were located areas exploited for

agriculture, livestock, or as woodlands. These spaces or lands were framed by statutes and particular legal recognitions (Trillo 2004).

The dwellings that made up these small towns, despite the existence of variation in dimensions and typological form, reflect a single model from the tenth century onward. This is based on the existence of a central courtyard around which were rooms in an L- or U-shape (Bazzana 1992). The presence of a hall, a space reserved at the heart of the home for the intimate activities of the familial sphere, appears to be a specific feature. The rooms, while still presenting a marked multifunctional character, emphatically separate areas of private repose from those designated as the kitchen or as rooms for daily life. The profiles of these dwellings, where they have been analyzed in detail and in light of data concerning the domestic assemblage, are those of an extended family where characteristics of relatedness were clearly present (García 2001). The materials used for their construction were varied, although walls of rammed earth appear most frequently. In any case, their construction made use of materials found close to the settlements and did not require any complex techniques so that it could be undertaken within the community.

The Urban Sphere

The city is one of the most extensively studied aspects of Andalusian archaeology in recent years and could even be considered to be one of the most dynamic, as the flow of new data coming from archaeological interventions has been continuous; syntheses of the subject, however, have been more scarce. In any case, research has managed to move beyond the milestone that was in its day marked by the work of L. Torres Balbás (1970), who emphasized the topographical characteristics that were present: the planning of roads, the forms of water supply, the presence of certain characteristic elements, etc.

The majority of authors that have dealt with this subject have agreed that there was a lack of continuity between the ancient or late Roman and the Andalusian cities, even where topographical or occupational levels of both periods exist. At this time, changes to the urban network were substantial, erasing any functional heritage and changing its characteristics in a fundamental way that barely conserved the memory of what had gone before.

One of the preoccupations of recent times has been the origin of these cities. There is no doubt that the Arab-Berber invasion and conquest resulted from the occupation of existing urban centers in the Peninsula, whether or not they were already immersed in a process of marked decline. The formation of the first cities in Andalusia during the amiral period was a result of the transformation of certain existing centers, as happened in the case of Toledo; the Visigothic capital itself, Sevilla; Córdoba; Mérida; Valencia; or Zaragoza, among others, and of foundations connected to the new power that emerged in a spontaneous way from preexisting rural settlements. Foundations linked to the process of conquest do not seem to be documented on the Peninsula, as were Kufa and Basra in Iraq, Fustat-Misr in Egypt, or Qayrawan in Ifriqiya.

As noted, the fact that ancient cities remained in occupation after the conquest has not been interpreted by those authors that have studied them as a result of continuity. The documented changes in these cities radically modified their structure and urban physiognomy and have been interpreted as a symptom of a break with the urban past, reflecting a new society, very different from the original. The most typical example is Córdoba, capital of al-Andalus, which experienced spectacular growth, especially in the surroundings closest to the location of an intricate network of recreational houses or suburbs. Some of these have been the object of archaeological intervention, which has allowed us to bring to light a large portion of the city, with planned urbanism, probably a result of the arrival of a new population attracted by the conversion of the city into the residence of amiral and caliphal power. Transformations can likewise be observed at a smaller scale in the other aforementioned cities.

Some cities emerged as a result of the evolution of a more or less complex rural space.

One of the most well-studied examples and the current object of an ambitious research project is Madinat Ilbira (Granada). This city, located just a few kilometers from Granada, is currently buried. Recent archaeological interventions indicate that it originated from a group of distinct dispersed nucleations (Malpica 2006).

Thus, the cities of al-Andalus again show the huge changes produced in the settlement network over the two centuries following the Arab-Berber conquest (as seen above in the case of the fortifications). They highlight the milestones of the process by which Andalusian society was transformed, not in itself dissimilar to that observed in other Islamic areas (Guichard 1998).

Cities, in any case, did not remain unchanging through the Andalusian period. Various authors have considered the evolutionary process of the urban context in recent times, presenting a descriptive and explanatory scheme of its forms of growth and topography (Navarro & Jiménez 2007). A great increase in urbanization occurred during the eleventh and twelfth centuries, lasting until the end of the Middle Ages, during the Nasrid era, when certain specific and differentiated characteristics developed, just before the definitive conquest of the Peninsula by Christians (Malpica & Garcia 2011).

As in the Iberian Peninsula, urban archaeology is one of the most developed areas in North Africa. The cities of Ifriqiya and the Maghreb, as indicated, had survived with some strength during the first medieval centuries, in spite of being occupied by Vandals and Byzantines. The Arabs occupied these cities, privileging some over others or founding new centers as in the case of Qayrawan (670). The present urban forms maintain a direct relationship, as happened in al-Andalus, with the structure of this new tribal society. This society assumed a protagonistic role with consolidating elements such as the mosque and the palace, the seat of power, which as political center acquired major dimensions (Guichard 1998). These cities based their growth and strength on cultivation of the land, converting themselves into nuclei receiving the rural surplus (Boone & Benco 1999). Thus, a dense network of cities of various dimensions was established and hierarchically organized. The transfer of trade routes for ivory, slaves, and sub-Saharan gold from the eastern edge of the desert to the west impacted on this urban network, creating various ideal spaces for the establishment of cities linked to the commerce of these goods, while the old centers linked to agricultural cultivation suffered notable decline (Boone et al. 1990). Ceramics found in various archaeological excavations have shed light on this process (Redman 1983-84), especially in the settlement of Qsar as Seghir, in the north of Morocco (Redman 1986). The pattern can equally been seen in the north of Morocco, in the mountains of Rif, where, following a broad and extensive program of archaeological surveys, it has been observed that the urban centers that emerged in the interior maintained close links with the rural communities of their hinterlands, for the most part occupied by Berbers. The rise of Almoravid and Almohad power, which extended through the Maghreb and the Iberian Peninsula, contributed to the emergence of port cities on the northern coasts of Morocco (Cressier 1992).

Material Culture: The Production of Ceramics

Another development of recent decades in the Peninsula has been the study of the ceramic production. Great advances in this research took place at the end of the 1970s, when G. Rosselló (1978) published the results of studies on the ceramics of Mallorca. This signified a substantial revision of the field, acting as a catalyst for countless subsequent publications in conference proceedings and specialist journals that offered an overview of ceramic production in al-Andalus. Initially, the primary concern of researchers was to construct a new analytical methodology specific to these materials and to create a morphological corpus. This established a firm basis from which successive studies have been launched.

Within only a few years, particular aspects of analysis began to emerge and develop. One of these concerned the ceramics of the first

Andalusian era. The work of S. Gutiérrez (1988) in eastern Spain produced a group of material previously unknown in scientific literature, which was given the name "paleoandalusí" ceramics. These comprised a group of crude, handmade, or wheel-turned ceramics that in many cases show mixed characteristics. Chronologically, the group is placed during the eighth and ninth centuries in the early Andalusian period and has been interpreted by archaeologists as a manifestation of this transitional amiral period. Similar wares have been documented in North Africa of the same date.

It was not until the consolidation of the caliphate that glazed or varnished material of eastern origin appeared (Cano 1996). Thereafter, we see a diversification of forms, the development of specific functional groups (table ceramic, kitchen and storage wares, etc.). Well-formed and well-fired ceramics with complex finishes indicate the establishment of production centers in al-Andalus, with complex techniques applied in each phase of manufacture (selection and manipulation of clays, turning, coating, and firing). This resulted in a new economic and social context. The materials created in these new workshops, located in urban centers of medium and large size, were widely distributed throughout al-Andalus although it would be the eleventh and twelfth century before they reached the last corner.

At this time, and during the last Andalusian centuries, ceramic materials in various forms reached the highest levels of technological sophistication, both as highly decorated luxury pieces and as domestic utensils (Fernandez 2008). These products, of high formal, decorative, and technological quality, would be the object of regular trade throughout the twelfth, thirteenth, fourteenth, and fifteenth centuries when the commercial processes of the West were developing. High demand for these articles explains the frequent appearance of Tunisian and Andalusian materials in eastern contexts and in various faraway places (Italy, France, England and the Northern and Baltic Seas, etc.). In the Nasrid period, the impact of this trade on ceramic manufacture is clearer, with the production of luxuries becoming to some extent detached from that of domestic products. It was during this period that the ceramic artworks known as the "jarrones de la Alhambra" (vases of the Alhambra) and the tiles that decorated Nasrid palaces were created.

Future Directions

It should be noted that medieval archaeology in al-Andalus and the Maghreb exhibits very uneven levels of development. In North Africa, archaeological research still lacks depth in some of the areas outlined above (material culture, rural settlement, exploitation of resources, etc.), requiring a greater volume of basic studies. In al-Andalus, research is developing along new lines as some existing fields of study show signs of exhaustion. Among those aspects that show promise for future development, we should highlight landscape archaeology, material culture studies (especially underdeveloped aspects such as archaeometrical analyses), the archaeology of production, the archaeology of agriculture, zooarchaeology, etc. All these fields of investigation, as yet largely unexplored for the medieval Iberian Peninsula and North Africa but on which there are already publications of interest, offer enriching perspectives on historical and archaeological research.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Arabian Peninsula: Islamic Archaeology
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Hydraulic Engineering: Geoarchaeology
- ▶ Islamic Archaeology and Art History
- ▶ Landscape Archaeology
- ▶ Medieval Archaeology

- ▶ Medieval Urbanism
- ▶ Military Activity in Islamic Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Rural Life in Islamic Archaeology
- ▶ Spain: Nationalism and Archaeology
- ▶ West Africa: Islamic Archaeology

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Spain: Archaeological Heritage Management

Amalia Pérez-Juez
Department of Archaeology, Boston University, Boston, MA, USA

Introduction and Definition

After the fall of the dictatorship and the adoption of a democratic political system in 1977, Spain was divided into different regions called autonomous communities. These regions are responsible for managing the archaeological heritage located in their territory, and although there is a national framework law – *Ley de Patrimonio Histórico Español*, LPHE – dating to 1985, each one of them has since passed its own legislation. The way that heritage is defined in these texts, using different adjectives such as cultural, historic, and artistic-historic, has implications for the way archaeological remains are considered and preserved. Ultimately, the regional government decides the general policy and actions that are very much related to their general political tendency in a specific region. For instance, if a region has its own language (e.g., Cataluña or Galicia), the archaeological policy will emphasize local and indigenous sites rather than more recent ones or those that deal with a more homogeneous idea of culture, i.e., the Roman period.

The main responsibilities of the Spanish central government with respect to archaeological heritage management, through its Ministry of Culture, are the looting of sites and the export/import of cultural property (LPHE 16/85, article 6b). This issue has become a very sensitive one since the ratification of the Treaty of Maastricht in 1993, which opened up the borders between the European Union member states. If goods can travel freely throughout Europe, does that include archaeological heritage objects as well? The Spanish law is very clear about this: it is forbidden to export archaeological objects more than one hundred years old or inscribed in the General Inventory of Movable Property (*Inventario General de Bienes Muebles*) without authorization from the Ministry of Culture (LPHE 16/85, articles 5.2 and 30). But then again, what do we do with Spanish Civil War remains (1936–1939) found during an archaeological excavation that are younger than a hundred years old? Are they not eligible to receive the same protection? Some of the regional governments have passed their own legislation regarding this issue, and there is a very engaging intellectual debate about using age as a means to catalog, and therefore protect, archaeological remains (Pérez-Juez 2012).

The other principal contribution of the LPHE 16/85 is the creation of different databases, registers, and legal instruments that provide protection to situations and cases forgotten in previous legal frameworks. Among the new legal instruments, the main one is the BIC – *Bien de Interés Cultural* – that could be translated as property of cultural interest (LPHE 16/85, arts. 9-13). It is a narrowly defined tool which, after compliance with a specific administrative procedure, becomes the subject of very strict

Spain: Archaeological Heritage Management, Fig. 1 Talayotic site in Menorca. This Iron Age settlement is a good example of recent monumental sites excavated and restored in order to incorporate them in tourist itineraries. In this case, Menorca, one of the Balearic Island, receives a high number of tourists that visit restored archaeological sites during the summer

protection. The concept of BIC has given rise to doubts and has not prevented the destruction of heritage not listed in the inventory or any of the rest of the categories created in the law (Perez-Juez 2006).

Key Issues

The new regional administrative model, which transferred almost all cultural responsibilities to the regions, has led to an increased investment in local archaeological sites. Since the first decades of its implementation, investment was focused primarily in those sites that deal with indigenous cultures from before the Roman arrival (Celts in the north or Iberians in the east). Issues of identity and the desire to promote a decentralized political and administrative system influenced the sites that were chosen to be excavated and opened to the public. This policy has resulted in the restoration and interpretation of numerous archaeological sites throughout Spain, many of which are difficult to preserve but necessary to foster local involvement and community awareness. Some of the sites have also been grouped in itineraries or routes that integrate different regions, promoting the touristic side of archaeology. The "Via de la Plata Route," The "*al-Andalus*. Routes: the Andalusian Legacy," or The "Iberian Route" are some good examples of the regional governments' goal to preserve archaeological heritage within a more inter-regional landscape (Fig. 1).

The regional governments have created diverse ways of preserving and managing their archaeological remains, but all are based on the idea that heritage belongs to the entire community, despite location on private or public land. This means that any archaeological site must be open to the public if deemed necessary by local authorities. Landowners of the site are also obliged to preserve it, and the destruction of archaeological remains, even those on private land, is a crime that is already generating some interesting legal verdicts. In this regard, the destruction of part of the Phoenician/Carthaginian necropolis of Puig des Molins, Ibiza, by private constructors provides the best – and first – example of a court decision for crimes against cultural property. In 1994, the final verdict sent the defendants to jail as well as condemned them to the payment of three hundred and fifty million pesetas, or 2.103.542,37 euros (Costa et al. 1996). This decision established

a precedent for future cases and finished with the impunity that crimes against heritage had enjoyed for a long time.

Sites on public land can be managed both privately and publicly. This choice is generally made with regard to the specific location of the site, i.e., near a tourist center, in a place with easy access, close to a big city, etc. As tourism is Spain's most important industry, there has been an important effort to restore and present some monumental sites located near coastal tourist regions. Therefore, Roman and Islamic sites, e.g., Ampurias, Segobriga, or Madinat al-Zahra, with their beautiful architecture, have been the main focus of public investment. However, a renewed interest in prehistoric sites and local cultures has resulted in the restoration and interpretation of non-monumental sites in the last few decades. This is the case for all the caves in northern Spain with rock art (Cueva del Castillo, el Pendo, Covalanas, or Tito Bustillo) and other sites with Paleolithic remains like Atapuerca.

European Union Legislation

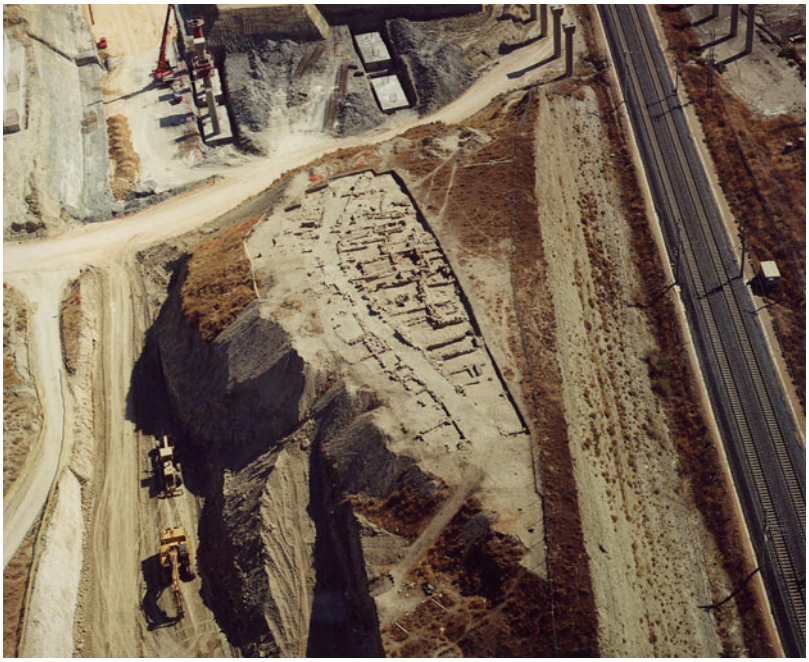
In addition to the division of the country into regions, one of the recent major forces of archaeological heritage management has been the compliance of Spanish legislation with that of the European Union. The main piece of legislation is the Council Directive 97/11/EC of 3 March 1997, amending Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment, generally known as EIA (environmental impact assessment). These directives have been transposed into Spanish national law in the *Ley 6/2001, de 8 de mayo (BOE nº 111, de 09.05.01)*. and Real Decreto Legislativo *1/2008*, de 11 de enero.

This piece of legislation is based on the principle of preventive action and requires, among other things, that archaeological investigation occur before any new construction proceeds, either private or public. The construction of the high-speed train system, airports, and other types of infrastructure has generated numerous archaeological excavations that have yielded an abundance of archaeological data that need to be preserved and studied. The challenge is where to store and exhibit these millions of pieces, whether to build or expand museums or other cultural institutions, and the means to curate the new collections. Public authorities are responsible for seeking out ways of storing, preserving, and showing all the materials that come from the removal of tons of deposits, but in most cases, it becomes a question of budget and space. Some regions, like the Balearic Islands, are assessing their own ways of dealing with this material that has been produced by the economic growth of Spain. Purging some of the findings is one of the proposals on the table, which entails both positive and negative aspects, but might be against the general idea of preserving the past (Fig. 2).

Spain has ratified almost all of the conventions on archaeological heritage preservation and management (e.g., Lausanne, Malta). However, these documents are not always enforced and in many cases they are an indication of the most common practices or remain pure inspiration for internal decisions. In other words, the recommendations made in these conventions will not always be enforced by national or regional policies.

Current Debates

Despite all the new challenges that democracy, economic growth, development, and new European legislation have brought to Spanish archaeological heritage management, the future looks promising. Thanks to the investment in research, restoration, and opening of sites, there has been an increase in public awareness and, therefore, community involvement and private investment. Foundations, local associations, and even corporate engagement are changing the way in which we look at the entire preservation and enjoyment of our heritage. Research has also benefited from this change and new projects are focusing on non-monumental sites. In fact, projects that include research and public outreach are the ones being



Spain: Archaeological Heritage Management, Fig. 2 El Cerro de la Gavia, Madrid. This Iron Age site was discovered and excavated during the construction of the high speed train tracks in the outskirts of Madrid. The excavation was paid for by public works funds

most supported both by public and private institutions (Pérez-Juez 2010).

A good example of such a joint venture is the project on the paleoanthropological sites of Atapuerca, Burgos, included on UNESCO World Heritage list because of the importance of its fossils for the study of human evolution. In this amazing site, fossils belonging to three different hominin species (*Homo antecessor*, *heidelbergensis*, and *sapiens*.) have yielded important information about the arrival of humans in Europe and their survival and adaptation in the last 1.2 Ma (Arsuaga et al. 2003).

As it relates to heritage management, the sites of Atapuerca have inspired a dual management strategy in which public outreach is equally as important as scientific research, and public outreach programs partially fund research while also promoting community awareness and support. Atapuerca's administration structure involves many entities, including a foundation dedicated to managing private funds and providing legal status to the project. There are also visitor centers, an experimental archaeology park, a research center, and a museum, all of which have promoted the sustainable development of the region, helped to preserve the site, and engaged the community in its preservation.

In 2007, the regional government of Castilla and León (the autonomous community in which Atapuerca is located) created the legal instrument of "Cultural Space" in order to provide a better management framework by expanding the protection of the area beyond the actual sites. In 2009, this same government developed a specific management model with the idea of protection but also of making the sites the epicenter of an economic development in the region: the "Atapuerca System, Culture of Evolution." The Atapuerca System has implemented a more coherent way of managing different bodies and institutions providing a common goal: preservation and sustainable development of the region. It includes most of the abovementioned infrastructure: visitor centers (existing and new ones), the National Center for Research on Human Evolution (CENIEH), the Human Evolution Museum, and others. This integrative formula is new to Spanish heritage management but reveals a current trend that will probably become very successful in the near future (Figs. 3 and 4).

Spain: Archaeological Heritage Management, Fig. 3 Atapuerca site, Burgos. Atapuerca is a good example of a scientifically productive site combined with a very intense public outreach program. In fact, some of the funding comes from private donors that request specific outreach activities for their companies

Spain: Archaeological Heritage Management, Fig. 4 Atapuerca: archaeological summer camps. School kids identifying animal bone. The archaeological camps were developed by the Atapuerca Foundation as part of the public outreach program

Finally, the recently approved "Historical Memory Law" (2007) has raised new questions about archaeological heritage because the excavation of burial sites, bunkers, trenches, battle fields, and other remains from the Spanish Civil War unearths archaeological material that must not only be preserved but also interpreted, displayed, or reburied. The challenge for managing this new heritage not only concerns preservation but also deals with family stories and political messages that can be sent along with the historical information. Although the method used is clearly archaeological, there is still some debate about the remains being unearthed – bullets, water bottles, buttons, buckles, or even guns –some of which will end up in museums and some of which will be reburied, namely, human remains (Fig. 5).

Spain: Archaeological Heritage Management, Fig. 5 Excavated Civil War remains in the Madrid region (1936–1939). These trenches were excavated during the construction of the high speed railway, as part of a contract archaeology project, and shed light on a very important historic period that had not received any attention before the end of the 20th century

Future Directions

The management of archaeological heritage in Spain has evolved from the idea of protecting only beautiful monuments in the nineteenth century to a very broad understanding of what archaeological heritage means. New legal instruments to protect both movable and nonmovable heritage are key for the future, as regional governments gain more responsibility and decentralized policies seem to dictate the actual actions. The challenge for the twenty-first century is to harmonize all the existing legislation – regional, national, and international – and enforce it in a way that brings research and public outreach together.

Another important challenge for the twenty-first century is the revision of the legislation that deals with fiscal incentives in the research and preservation of cultural heritage. The current Law of Patronage approved in 2002 (Ley de Mecenazgo 2002) is short on benefits given to private investment and does not really promote private engagement.

Finally, the new approach to archaeological heritage management within a specific landscape, tightly linked to a community that takes into account all the stakeholders around it, is probably the main idea for the future. Some new challenges arise from this holistic vision of heritage, such as the sustainable development of a region, social cohesion around it, or the construction of an identity. Archaeological heritage management, then, becomes a cultural, social, economic, and political tool that needs some cautious understanding. Heritage can foster a very unique feeling of cohesion within a territory that implies a need and a challenge to use this as a means to preserve and study a site, not to use it as a political weapon (Pérez-Juez 2010).

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage and the Public

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Spain: Nationalism and Archaeology

Margarita Díaz-Andreu
Departament de Prehistòria, H. Antiga i Arqueologia, Facultat de Geografia i Història
Universitat de Barcelona, ICREA-University of Barcelona, Barcelona, Spain

Introduction and Definition

Spain is a nation of nations. It was not always so and this is not an assertion that everybody would agree with. However, it better describes today's political reality than any other possible model. In this entry, the relationship between archaeology and nationalism in Spain will be analyzed, paying particular attention to how this has changed over the last 200 years.

Nationalism is based on the idea that "humanity is naturally divided into nations, that nations are known by certain characteristics which can be ascertained, and that the only legitimate type of government is national self-government" (Kedourie 1993: 1). Although this definition seems to indicate a direct relationship between one nation and one type of self-government, in practice the way in which these two concepts are connected is very flexible and there is a wide range of options on how this link is modelled. At one extreme, it is possible to find nation-states such as the Czech Republic in which a single national feeling exists. In contrast, other nation-states have followed a very different model, and in them several nationalisms exist side by side, complementing another level of nationalism. One example of the latter is the United Kingdom of Great Britain and Northern Ireland, formed by England, Scotland, Wales, and a fourth more problematic nation, Northern Ireland.

In the last two centuries, Spain has moved from one model to the other. The debates about the nature of nationalism in Spain are not unrelated to the development of archaeological practice in the country. These debates are in the background of archaeologists, work. At the same time, new proposals archaeologists make impacts the way in which the nature of nationalism is perceived but through this work archaeologists are also involved in these debates, thus becoming active participants in the negotiations shaping the future of the nation.

Historical Background and Key Issues

Christopher Columbus' arrival in America in 1492 thanks to the sponsorship of the Catholic Monarchs was the beginning of a series of historical events that turned Spain – or, more accurately, the different kingdoms on the Iberian

Peninsula reigned over by the Catholic Monarchs and their descendants – into a mighty early modern empire. After many decades of decadence, the opportunity created by the Napoleonic invasion of Spain (1808–1814) was seized by many colonies to proclaim independence from the metropolis. Spain thus entered the nationalism era as an impoverished country with only a few remaining colonies. Before this, from the sixteenth to the eighteenth century, Spanish antiquarians had actively shared the interest of much of the Western world in the classics and classical archaeology. Excavations of Roman monuments and the search for statues, inscriptions, and coins dominated this research. It was combined with an interest in their own national past, as reflected in Ambrosio de Morales' *Relaciones Topográficas* (1575, 1578). The monumental past left behind by the major civilizations in the Mesoamerican and Andean areas was also the focus of attention of both Spanish and local scholars. Information about American ruins had been known since the sixteenth century, and some archaeological monuments, including Palenque in Mexico, were excavated at the time partly thanks to royal funding. The language of the past became a new way of expressing power, abandoning in this way the religious discourse.

The end of the Enlightenment saw the first signs of the regulation of antiquities within the framework of the creation of the modern state. From 1752 the Royal Academies of History and of Fine Arts had been in charge of archaeological excavations and the Academy of History proposed the first ban on the illegal export of antiquities in 1779. The law passed in 1803 to protect monuments and antiquities would be in place for a century, despite the Napoleonic invasion and the many political changes in the history of Spain.

Nineteenth-Century Archaeology in Spain and Nationalism

Spain satisfied the four criteria that nations had to fulfill to be accepted as such (Hobsbawm 1990: 18). The first was the threshold principle, by which only states dominating large territories could qualify as nations. This principle allowed countries such as France, Britain, and Spain to be considered as nations and included others in the Americas, such as the United States and the new countries born out of the decolonization of Latin America. Spain also met the other three criteria: having a long-established elite with a literate and administrative vernacular, having the ability to conquer, and being a historical state (Hobsbawm 1990: 37-38). It was this last condition that convinced politicians and learned individuals all over the Western world of the importance of history and archaeology. Archaeology was – and is – important to nationalism, because by definition nations have a past. This past is constructed through a narrative with data coming from archival documents, philological genealogies, and antiquities. Archaeology, therefore, was one of a range of disciplines that fed national history and national identity. However, in the nineteenth century, the professionalization of archaeology was only partial, as there was a widespread belief in the preeminence of historical documents over material culture remains. At that time, therefore, most scholars dealing with antiquities generally earned their living by other means and satisfied their curiosity regarding the historical roots of their nation in their leisure time. Spain was no exception to this.

King Fernando VII's death in 1833 brought to an end the attempt to continue with the Ancient Regime status quo that had begun with the defeat of the Napoleonic troops in 1814. The modernization of the country led to the dissolution of the monasteries as a way of controlling ecclesiastical power. This involved a change in the ownership of many buildings and in some cases of large territories previously owned by the Church, as well as a sudden increase in the number of antiquities and works of art in circulation. All over Spain two types of institution were set up to deal with this situation: provincial museums and Provincial Commissions for Historic and Artistic Monuments (Comisiones de Monumentos Históricos y Artísticos). The responsibility of the latter was to care for and protect buildings, monuments, and artistic objects that, because of the "beauty of their construction, their antiquity, their origin, their particular use or the historical memories (recuerdos) they impart," should be

preserved (Royal Order 2 April 1844). The first learned archaeological societies, including the Spanish Academy of Archaeology and the Archaeological Society of Tarragona, were also founded during this period. Antiquities were also discussed in new learned journals such as *El Artista* and *Semanario Pintoresco Español*.

The building of the modern state went one step further in 1856 with the establishment of the Higher School of Diplomacy (ESD, Escuela Superior de Diplomática), set up to educate archivists, librarians, and museum curators (first called antiquarians and then, from 1900, archaeologists). This school would be the main learning center for professional archaeologists until 1900, when its lecturers were integrated into the mainstream university system. Most of those taught there went on to work in museums and also children's secondary schools, and from their posts many engaged in archaeological activities and published in the journal related to the ESD and the professional body for museum curators, archivists, and librarians.

In addition to this institutionalization, the influence of nationalism on Spanish archaeology can be seen in the geographical areas and fields of research and the interpretations proposed. The dominant Madrid-based model of Spanish nationalism, which emphasized the Castile-Andalusia axis as the embodiment of the Spanish national spirit, was clearly reflected in the first major national history, Modesto Lafuente's *General History of Spain* (1850–1867), which would become a key factor in the formation of a Spanish national consciousness. Lafuente's work stressed a series of heroes such as the native Viriatus, one of the "unschooled warriors that Spanish soil has always bred" (Lafuente 1850: 22). It highlighted the heroic resistance of Saguntum and Numantia against the Romans but also showed pride in the Spanish contribution to the Roman Empire. However, Lafuente's account of the medieval period occupied many more pages than those devoted to the previous epochs, giving pride of place to the reconquest of the Christian kingdoms in the territory under Muslim rule. The discourse so well expressed by Lafuente and followed by most contemporary scholars was not however devoid of contradictions. Together with the emphasis on Christianity as a key element in the Spanish spirit came a penchant for the reminiscences of Islamic Spain, including Andalusian folklore and Islamic monuments and antiquities. There were also contradictions regarding earlier periods: whereas Roman ruins were perceived as the embodiment of the pedigree of civilization on Spanish soil, the protohistoric deeds of the Celtiberian town of Numantia were hailed as an early demonstration of the brave and resilient character of Spaniards.

The unification of Italy in 1860 (completed in 1870 with the inclusion of Rome) and Germany in 1871 made it much more acceptable for previously divided territories to claim a common ancestry and to be recognized in the international arena as such. Importantly for Spain, the key role played by the vernacular language in both Italy and Germany also made it conceivable for areas that already formed part of a nation-state, but in which a different language was spoken, to claim their right to political independence. In Spain such areas existed in the most developed industrial regions including Catalonia and the Basque Country (as well as in less prosperous areas such as Galicia, the Balearic Islands, and the Valencian Country and in many other areas of Spain where peasants spoke dialects that were not easy for Spanish speakers to understand). Barcelona, and to a great extent also Bilbao, became culture hubs and in them cultural and social elites developed a sense of a separate ethnic identity. Alternative versions to Lafuente's unitary understanding of Spain emerged, all of them stressing the plural nature of the Spanish nation. Catalan historians delved into one of the most important periods in their own history, the flourishing Middle Ages, and recalled Catalonia's role in the reconquest. The attraction towards the Catalan past as a whole was reflected in the appearance of learned societies whose interests covered not only the province of Barcelona but also the four Catalan provinces and, to a great extent, all the areas of Spain where Catalan was spoken, including the Valencian Country and the Balearic Islands. Examples of these learned associations

were two rival Catalan Societies of Excursions established in 1876 and 1878.

Professional archaeology, however, was still directed from Madrid: official training continued to take place at the Madrid-based ESD and the National Archaeological Museum, opened in 1867, had the largest number of professional archaeologists. The areas in which scholars undertook their studies were revealing – whereas throughout the Spanish territory scholars limited themselves to studying the antiquities found in their own provinces (or language areas as in Catalonia), Madrid-based archaeologists managed to deal with the whole of the Spanish territory, thus mirroring the centralized administration of Spain. Interestingly, most of the studies undertaken by members of the National Archaeological Museum dealt with antiquities from Castile and Andalusia.

Monarchy, Republic, and Dictatorship: The Changing Context of Archaeology in the Twentieth-Century Spain

The twentieth century started in Spain with a sense of gloom –Prime Minister Cánovas had been assassinated in 1897 and the last colonies of the once mighty Spanish empire had been lost the following year. The Spanish role in the scramble for Africa had also been minimal. Politically, however, the regime created by Cánovas in 1875, the Restoration, continued seemingly unaffected for two more decades until 1923. Thus, Spanish politics remained anchored in a *caciquismo* that systematically riddled parliamentary elections and allowed the two major parties to alternate in power. However, this status quo was increasingly challenged, especially by the growth of Catalan and Basque nationalism. A mixed formula was proposed, particularly in the case of Catalonia, where it was not necessarily independence that was being sought but self-rule within a Spanish federal state.

Catalan nationalism had emerged in the last third of the nineteenth century, beginning with a strong sense of regionalism that was increasingly transformed into nationalism. In his seminal book, *The Catalan Nationality* (1906), the Catalan politician Enric Prat de la Riba claimed that the origin of the Catalan nation lay in the pre-Roman Iberian peoples who spread over the whole area where Catalan was spoken, from Murcia to the Rhône. He suggested that even then a special phonetic system seemed to indicate the distinctiveness of the language spoken at the time in comparison to neighboring areas. The Roman conquest had regrettably meant the disappearance of the Iberian peoples, whose ethnos would only be revived during the medieval period.

The new atmosphere in Catalonia encouraged the institutionalization of historical and archaeological research. The Institute for Catalan Studies (Institut d'Estudis Catalans, IEC) was founded in 1907. Its remit was to investigate everything to do with Catalan culture, language, and history and its sections included one for archaeology. One of its founders and presidents, the architect Josep Puig i Cadafalch, began the excavation of the ancient Greek colony of Emporion, seen as the origin of the superior intellectual prowess of the Catalan nation in comparison with other areas of Spain. In 1917 Puig i Cadafalch succeeded Prat de la Riba as president of the Mancomunitat de Catalunya, a limited form of self-government enjoyed by Catalonia between 1909 and 1923. Both the Mancomunitat and the excavations in Emporion came to an end with the imposition of General Primo de Rivera's dictatorship (1923–1930).

Also associated to the IEC was Pere Bosch Gimpera. He became interested in archaeology while in Germany on a training grant and was given the first chair in the field shortly after his return in 1916. Significantly, his Ph.D. dealt with the Iberian culture. Until he had to leave Spain and go into exile in 1939, he was able to develop the teaching of prehistory at the university and form a group of students – mainly Pericot, Castillo, and the Serra Rafols brothers – and in 1935 he had also managed to open a museum with collections coming from older institutions. In his writings Bosch Gimpera clearly followed Prat de la Riva in considering Spanish prehistory as a precursor of a multicultural Spain. This thesis was best expressed in his major work *Ethnology of the Iberian Peninsula* (1932).

In the Basque country, the study of prehistoric archaeology was also encouraged, although the main institution was a learned society, the Sociedad de Estudios Vascos (SEV), known in Basque as Eusko Ikaskuntza (Society of Basque Studies). This meant that the three main experts in prehistoric archaeology had to combine their interest in archaeology with the activities involved in their own jobs. Although two of them, Telesforo de Aranzadi and Enrique Eguren, worked in universities; they taught areas other than archaeology and therefore were not able to train future Basque practitioners of prehistoric archaeology. The third, Father José Miguel de Barandiarán, tried to organize the infrastructure of Basque archaeology from 1916 onwards. He founded the Laboratory of Ethnology and Basque Folklore (Laboratorio de Etnología y Folklore Euskera, in 1916) and the Seminar of Ikuska Prehistory (El Seminario de Prehistoria Ikuska in 1921), later known as the Centre for Prehistoric Research (Centro de Investigaciones Prehistóricas, in 1925, part of the SEV) (Barandiarán 1988: 44). He also fostered the journals Euskalarriaren Alde and Anuario de Eusko-Folklore (created in 1921), which from 1927 included a section on prehistory. Like Bosch Gimpera in Catalonia, Barandiarán stressed a straightforward relationship between prehistoric and modern Basque culture.

Madrid had many more archaeologists than anywhere else in Spain. The university was an example of this. Whereas other universities in Spain had either one chair or none at all, Madrid had one until 1911 and then three: one of Epigraphy and Numismatics for Antonio Vives; one of Archaeology for someone who had long experience in museums and would eventually become the director of the National Archaeological Museum, José Ramón Mélida; and a third of Islamic Archaeology, given to the Andalusian, Manuel Gómez-Moreno. The last two were also involved in setting up a research center, the Center for Historical Studies (Centro de Estudios Históricos). As happened in France, those dealing with the earliest periods of prehistory were involved more in the natural sciences. The person in charge of organizing prehistoric archaeology was Francisco Hernández-Pacheco, Professor of Geology at the University of Madrid from 1910. His alliance with the Count of Cerralbo led to the establishment of the Commission for Paleontological and Prehistoric Research (Comisión de Investigaciones Paleontológicas y Prehistóricas, CIPP 1914). However, during the First World War the exile to Spain of one of the scholars who had held a chair at the Institute of Human Paleontology in Paris, the German Hugo Obermaier, changed the balance of power. Tensions between Obermaier and Hernández-Pacheco led to the creation of a chair of Prehistory for Obermaier at the University of Madrid and the effective isolation of Hernández-Pacheco and the CIPP. Nationalism not only was an influence in politicians´, decisions to provide with more funding for the instittutionalization of archaeology in Madrid, as the capital of the Spanish nation-state but also encouraged archaeologists from Madrid to undertake research in the whole of the Spain, unlike their Catalan or Basque counterparts.

The Franco Dictatorship

The tensions of the first three decades of the century resulted in a bloody Civil War in 1936–1939. In contrast to the abuses of archaeology that would take place in both Italy and Germany, in Spain there are relatively few major examples of misuse of archaeological data. This was simply because the periods archaeologists were researching were not part of the nationalist discourse and politicians did not find it necessary to make use of archaeology to the same degree. However, this does not mean that it was not affected. Despite of only three major archaeologists – Obermaier, Bosch Gimpera, and Barandiarán – having to go into exile, a few died and, significantly, all those who remained in their posts had to survive a political purge. The new regime created an office to organize archaeology. This would have been an excellent idea had the person chosen to preside over it not turned out to be highly incompetent. Prof. Julio Martínez Santa-Olalla proved to be a manager influenced by his own likes and

dislikes and lived in fear of anybody who tried to overshadow his newly acquired power. He kept for himself and his cronies much of the state funding on excavations. The funds he gave himself were related to archaeological projects about which very little was ever published. He also promoted nonprofessionals by funding their fieldwork while starving those working in universities of much needed funds. As a consequence, a divide was created between professionals and amateurs, one that still survives today. The anti-Santa-Olalla alliance brought together professors from Madrid (Antonio García Bellido, Martín Almagro Basch), Barcelona (Luis Pericot, Alberto del Castillo) and other young professors from elsewhere in Spain who had trained in Valencia-Madrid and Barcelona (Antonio Beltrán, Juan Maluquer). They were also the ones involved in the International Congresses of Prehistoric and Protohistoric Sciences.

Declarations of support for the Spanish nation as the regime understood it were very explicit, especially in its first years. They came in the form of exhibitions and introductions and prefaces to publications. Alternative nationalisms were hidden under the rubric of regionalism in Catalonia and the Basque Country. To complicate the situation, the professor in Barcelona for the first 15 years of the regime, Martín Almagro Basch, was not Catalan. He trained most of the future generation of Catalan archaeologists and skillfully placed them in the newly created chairs at universities all over Spain. The Catalan professor, Luis Pericot, mainly devoted his time to finding funds to allow others to work. He managed to convince private sponsors (the British and American magnates Leslie Good and William L. Bryant) and also obtained much funding from the American Wenner-Gren Foundation. In the Basque country, Barandiarán returned from exile in 1953 and some institutions were founded, some similar to those mushrooming in other parts of Spain – mainly the Vizcaya Provincial Government Department of Archaeological Research in1958 and the Province of Alava Archaeological Institute in 1966. There were others that focused more on the Basque country, such as the Aranzadi Institute for Archaeological Research (Instituto de Investigaciones Arqueológicas Aranzadi, created in 1962). Archaeology was first taught at a Basque university in 1964.

The Last Forty Years

It has been almost 40 years since the dictator Francisco Franco passed away in his sick bed and Spain went through a relatively smooth transition to democracy. The country is now a quasi-federal state with many of the state areas of responsibility devolved to the 17 Autonomous Communities. Archaeology is, therefore, managed in 17 similar but distinctive ways, each with its own heritage law which is, however, governed by the Spanish Historic Heritage Law of 1985. At first the Autonomous Communities enthusiastically encouraged archaeology in their territories, either in the form of excavations, research, or museum exhibitions. Gradually, however, with the introduction of commercial archaeology, governments began to realize that they could save money by making building contractors pay for it. The loss of politicians' zeal for archaeology may also be related to the way in which the discipline presents its results today – characterized by a high degree of technicality resulting in a distancing of the knowledge archaeologists are producing from the attention of the general public. National histories need an understandable and credible past in the form of a discrete number of archaeological cultures. These are then identified with a particular ethnic group considered as the origin of the modern inhabitants of the nation. This is not what archaeologists write about in their more specialized publications, and consequently both politicians and the general public favor a more "Disneyfied" version of the past. In the current economic climate, it is not surprising that many archaeologists without permanent positions working for the Autonomous Communities and other bodies, as well as in contract archaeology, are seeing their careers curtailed. It looks like we may be entering a new period in the relationship between archaeology and nationalism in Spain.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Archaeology and Politics
- ▶ Nationalism and Archaeology
- ▶ Spain and North Africa: Islamic Archaeology
- ▶ Spain: Archaeological Heritage Management

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Spatial Analysis in Field Archaeology

Bisserka Gaydarska
Department of Archaeology, Durham University, Durham, UK

Introduction and Definition

Spatial analysis deals with the use of space in the past. Such analyses are performed at two main scales: (a) *intra-site level* (some archaeologists argue for further differentiation within a site, defining micro and semimicro levels) and (b) *inter-site* or landscape level. Both analyses are concerned with finding patterns of distribution, whether of finds and features (usually at site level) or of sites and monuments. Spatial analysis at both site and inter-site level may also contribute to the elucidation of *sequence*. While the employment of some methods at both levels is broadly similar – e.g., *GIS*-based mapping or various statistical analyses, others are unique for each level. For example, GPR is more suitable for the establishment of intra-site patterns, while digital terrain modeling is more cost-effective on a landscape level. The number of methods and techniques used in spatial analyses is ever-growing and diversifying.

Key Issues

On Site (Intra-site)

On site, the plotting of artifacts and features allow the identification of certain activity areas

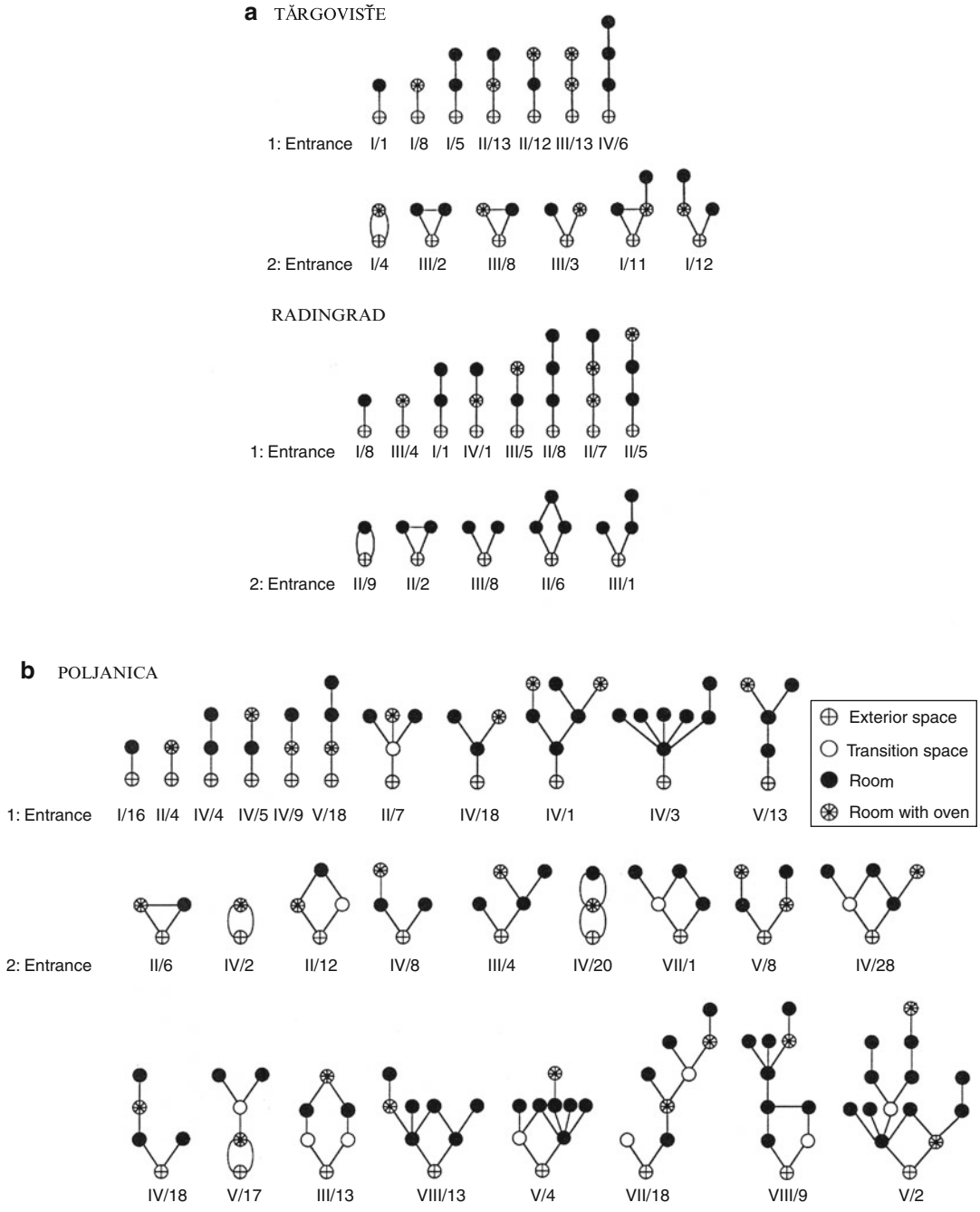
(marked by objects), sleeping areas (blank spaces in a building), community areas (open spaces in a settlement), and so on. The mapping of finds may also indicate intrusions that are natural (the course of a stream) or anthropogenic (the line of a ditch) that are otherwise hard to see. Most often the analyses are performed after excavation and fieldwork is finished, which is why proper recording of locations during the investigations is crucial (see the entry on ▶ Recording in Archaeology in this encyclopedia). Analysis of the context records and an understanding of taphonomy and deposition (see also the entry on ▶ Site Formation Processes in this encyclopedia) is key for the correct understanding of, e.g., whether matching fragments of artifacts found in different contexts alludes to contemporaneity of the features (Kobyliński & Moszczyński 1992) or to the social practice of curation (Garrow et al. 2005). The relative size and disposition of structures and the routes between them are used to infer the relative importance (hierarchy) of buildings and the social routines practiced within a settlement.

At a smaller scale, *access analysis* explores the use of space by mapping the relative ease with which rooms may be approached within a house, allowing archaeologists to propose the location of high-ranking or special users. An eloquent example of access analysis was used to study social inequality on Bulgarian tells (Chapman 1990). Four more or less fully excavated tells (Ovcharovo, Targovishte, Radingrad, Poljanica) served as the basis for an analysis of the development of social space throughout their use (Fig. 1). The settlement maps showed the houses, the number of rooms within them, and access to each room from the main entrance. At Targovishte and Radingrad (Fig. 1a), one or two rooms were accessible from the entrance and two or three further rooms reached in succession with minimal choice. By contrast at Ovcharovo and Poljanica (Fig. 1b), houses eventually contained up to 11 rooms with multiple choice of access, a pattern that was held to reveal to the successful reproduction of social inequality. The simpler access pattern at Targovishte and Radingrad was interpreted as being owed to a relatively unstratified community, and it was suggested that failure to find an adequate material way to contain social rivalry led to the relatively short lifetime of these two tells.

In the Landscape (Inter-site)

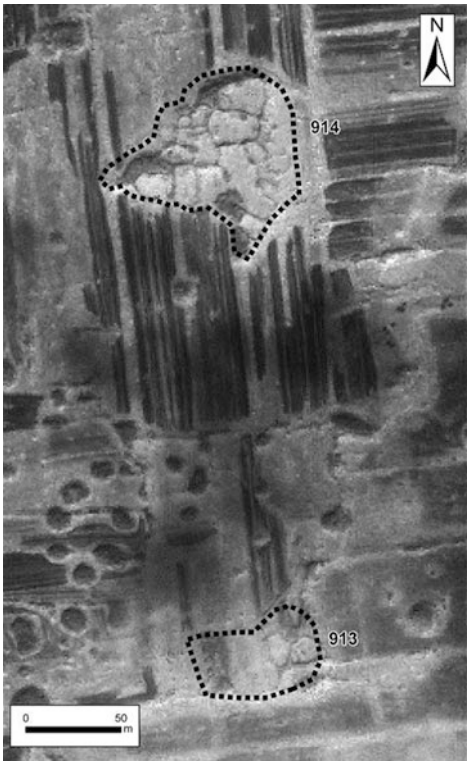
In one of the most commonly practiced types of landscape investigation, the documentation of surface finds can provide information about the intensity of discard and, thereby, infer occupation (see the entry on ▶ Surface Survey: Method and Strategies). The mapping of features registered by noninvasive techniques (such as *aerial archaeology* and *subsurface investigations*), supplemented by detailed archival research (including historical records), is also used to create a narrative picture of landscape habitation. In most modern studies, a combination of survey methods is applied. The spatial particularities of the mapped distribution of features and artifacts in a landscape usually provide the basis for studies of settlement patterns; subsistence strategies; political, military, and ideological utilization; and reorganization of the landscape. The recognition of time depth is important in a landscape, as it is in an excavated site. The idea of a *palimpsest* (Aston & Rowley 1974) acknowledges that landscapes are "layered" as century follows century, giving so-called diachronic patterns. Thus, the establishment of changes over time by interrogating the evidence for erased episodes of human occupation, or identification of multiple phases of occupation, is a major task assisted by spatial analysis.

Early examples of spatial analysis at the landscape level generated maps with dots, representing sites and/or finds to which various analyses would be applied to improve the pattern using statistical packages such as *cluster analysis*. Such analyses set out to define not only the location of sites, but their relative importance (from their size or the quality of finds). The sites discovered are most often seen as settlements, but the same principles have been applied to cemeteries, burial mounds, and hill forts. *Central place theory* uses the size of settlements to construct dependent territories around them. The land was also routinely modeled by surveying the surface in three-dimensions and representing it in the form of *contours* or *hachures*.



Spatial Analysis in Field Archaeology, Fig. 1 Access levels of Bulgarian tells showing number of rooms and complexity of house organization (**a**) Targovishte and Radingrad; (**b**) Poljanitsa

More recent landscape studies have added to the power of spatial analysis by collecting different variables (for example, placenames, surface finds, settlement locations) and entering their coordinates into a computerized data base to make a series of digital maps. The stack of digital maps forms a *geographic information system* (GIS), which can be interrogated in a large



Spatial Analysis in Field Archaeology, Fig. 2 Structures in the North basalt study area of Homs, Syria, showing settlement clusters (After Philip et al. 2011)

number of ways in order to bring out spatial relationships between variables that are often unsuspected. The surface of the landscape itself can also be digitized using *LiDAR* imaging. The data collected from the air is used to generate a three-dimensional surface on the computer – a *digital terrain model* (DTM). Using graphics programs, the DTM can be viewed from different angles to offer a realistic vision of the landscape from different locations, in different periods (*hillshade models*). The same database can be used to generate models showing which parts of the land could be seen at other parts (*viewshed*). These new tools enable the ancient landscape, its settlement patterns, and the routes through it to be envisioned in considerable detail.

A recent project in the area of Homs in Northern Syria examining the distribution of settlement types was able to group them in revealing new combinations (Philip et al. 2011). Traditionally, the area of southwest Asia is perceived as a tell-dominated landscape and the southern marl-based part of the study area confirmed this observation. The northern study area, however, with its basalt environment seemed to have facilitated a different type of occupation. Single and clustered irregular and rectilinear units of different sizes, a stone enclosure, and many cairns mostly on slopes and ridges were mapped, revealing settlement clusters (Fig. 2). Functional and chronological differentiation was established between the grouped irregular and the grouped rectilinear structures, thus suggesting changing strategies of engagement with the landscape. Several "waves" of occupation/settling have been proposed, starting with the well-documented settlement expansion in southern Syria during the Chalcolithic/Early Bronze Age and reoccurring in Roman and Byzantine periods, mostly associated with field systems – a pattern of land use that remained in place till modern times. The presence and mapping of thousands of hitherto overlooked cairns poses questions about the long-term landscape management of a stony environment that is intimately related to perpetuated social practices. The main result of this project is the demonstration of the diversification of the settlement patterns in Northern Syria in both space and time.

Cross-References

- ▶ Aerial Archaeology
- ▶ Recording in Archaeology
- ▶ Site Formation Processes
- ▶ Surface Survey: Method and Strategies

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"Speculative Phase" of Archaeology

Debbie Challis
Petrie Museum of Egyptian Archaeology, University College London, London, UK

Introduction

The "Speculative Phase" is so named due to the nature of speculation that was involved in archaeology before it was formed as an academic discipline and established professional practice and training. Archaeology was speculative in every way: financial, individual, exploratory, for publicity, and to aggrandize nationhood. (Unfortunately financial speculation has never left the practice of collecting antiquities.) Many of these factors continued beyond the "Speculative Phase" and played a part before it. This entry covers the move from the collection of antiquities to archaeological excavation during the nineteenth century and also considers how archaeology was sponsored as well as the role of the "explorer-archaeologist." It argues that a shift to classificatory systems and detailed observation was informed by developments in the natural sciences. Further, it contends that "informal imperialism" in Europe and North America was crucial to the development of archaeology in this phase and the role of archaeology in more formalized and military colonialism is examined in this regard.

From my perspective as a museum professional in Britain, I point to the legacy of the "Speculative Phase" in museums in debates around restitution as well as the display and repatriation of human remains. Related to these contentious issues is a greater curatorial comprehension of our own history, which is in turn presented to the wider public, and the re-emergence of the importance of amateurs and local societies in contemporary practice within British archaeology. There is a vast scope for future directions within this field and as a result this entry can only point to the importance of cross-disciplinary and international connections within scholarship, the continuing impact of "hero archaeology" and how this is related to the study of the role of the workforce in this period.

Definition

The "Speculative Phase" of archaeology is defined as covering the move toward excavation in the field and the construction of archaeology as a professional and academic discipline. It describes the shift away from amateur antiquarian organizations and "armchair" scholars to a more formalized involvement of institutions, such as museums, universities, and learned societies as well as the role of related individuals (Díaz-Andreu 2007). These institutions and individuals had an impact on archaeology across the world, but were based in Europe and North America during this period. Nationalist and imperial motivations also became more important in the collection of antiquities for display in museums (Trigger 1989).

The "Speculative Phase" of archaeology could encompass an extremely broad historical period and geographical area, extending from interest in the past in antiquity and ending with the formation of the study of archaeology as a discipline in universities in the early twentieth century. It has been defined previously in relation to American archaeology as lasting from 1492 to 1840 (Willey & Sabloff 1993). This definition begins with the removal of antiquities from monuments and rudimentary excavations in the early nineteenth century, but positions the main "Speculative Phase" as covering excavations from the 1840s to the 1870s. It gradually finishes in the 1880s and 1890s when archaeology was established as a subject in universities in Europe and North America. This period sees a gradual

growth of more descriptive analysis and advanced methods in excavation.

A defining feature of the "Speculative Phase" is the intertwining of archaeology, the history of art and anthropology. These areas were formed as separate academic disciplines at around the same time. Classical archaeology and art history, for example, were closely interlinked due to the aesthetic writings of Winckelmann and Hegel. The Parthenon Sculptures, removed by Lord Elgin and his associates from Athens during the 1800s and bought for the British nation in 1816, were placed within "the territory of art through the deployment of concomitant discourses" through references to the marbles as "works" associated with the artist Pheidias (Whitehead 2009: 83). Archaeology was allied to anthropology in other areas, particularly in North American, Southeast Asian, and African archaeology (Christenson 1989).

Ethnography and archaeology were particularly intertwined with regard to prehistoric periods in all areas of archaeology. This intertwining can be seen clearly in the work of the anthropologist and archaeologist General Augustus Henry Lane Fox Pitt-Rivers. Pitt-Rivers' theory of the "evolution of culture," based on Darwin's *On the Origin of the Species* and ideas around "social Darwinism," was reliant on the idea of typology. Typologies were based on objects with similar functions being placed in a chronological sequence on the basis of design. An idea that was later crucial to the work of the archaeologist William Matthew Flinders Petrie. The Pitt Rivers Museum in Oxford still organizes Pitt-Rivers' collections and objects from across the world in these typologies. Pitt-Rivers also applied this idea to his work in field archaeology on Paleolithic, and other, sites in England and Ireland.

Historical Background

Collections of classical sculpture had been made by wealthy patrons in Europe since the Renaissance (Haskell & Penny 1981). The "Speculative Phase" moves from armchair scholars to excavation and mapping of actual antiquities and sites in the field. An early example of this shift is the scientific expedition of artists, antiquarians and engineers, known as the "savants," who were sent to assist the army in the French military invasion of Egypt in 1798–1801. The savants also mapped archaeological sites, making accurate drawings and collected antiquities. Their observations and findings were published as the *Description de l'Égypte* between 1809 and 1820. The impact was as much on contemporary style and fashion as archaeological practice. However, the *Description* set an exceptional standard for recording investigations of ancient sites and monuments. Arguably, though, the more immediate influence of the French expedition was on the removal of antiquities from sites elsewhere, usually from the South or Eastern Mediterranean, for public display in national museums.

The removal of the sculptures from the Parthenon and other monuments on the Acropolis by the British peer Lord Elgin and his team in the early 1800s was accompanied by a less well-known collection of drawings and maps of the buildings on the Acropolis (Gallo 2009). The subsequent sale of the so-called Elgin Marbles marked a shift from a private collection of antiquities built up through auctions in Italy and elsewhere and the removal of objects either from a building in situ or excavated from the ground. The group of architects and antiquarians known as the Xenion Society excavated sculptures from the Temple of Aphaia in the Greek Island of Aegina and from the Temple of Apollo in Bassae in the Greek Peloponnese. They sold the antiquities at public auction: the Aegina sculptures to the Crown Prince of Bavaria in the first instance for display in his new museum the Glyptothek in 1812 and the Bassae sculptures to the British Commandant of the Ionian Islands for display in the British Museum in 1815. These rudimentary excavations and removals were speculative in a financial sense as well as in a theoretical one and were dictated by contemporary artistic taste for Greek sculpture. Nevertheless, they mark an important shift from collection to excavation, however rudimentary.

Travel and related literary observation was important in developing early archaeology. It was such literary speculation made by travellers around the mounds and ruins found in western parts of North America that gave rise to the myth of the "mound builders." This myth held that the "mounds" could not have been built by Native Americans but must have been erected by a "more civilized race" that had since migrated or disappeared (Willey & Sabloff 1993). This myth continued until late into the nineteenth century, despite surveying of the mounds by E.G. Squier and E.H. Davis in the 1840s, later published as *Ancient Monuments of the Mississippi Valley* in 1848. Squier and Davis' work had the support of the American Ethnological Society and was published by the newly formed Smithsonian Institution. This institutional support for the surveying and connection to a learned society was indicative of the move from an amateur to a more professional focus. The mound builder controversy was also typical of theories around migration and archaeology based on ideas of "racial" hierarchies and diffusionism that existed well beyond the "Speculative Phase."

Emphasis on successive development was supported by the use of classification systems. For example, the periodization of "prehistory" was put into three ages: the Stone Age, the Bronze Age, and the Iron Age by the Danish curator and archaeologist Christian Jürgensen Thomsen. Thomsen based these three ages on accounts from archaeological reports and typologies of different grave goods in the early 1800s. He equated these with different layers in the ground. Thomsen's "three ages" had a profound effect on the understanding of prehistory and typologies more generally; in fact, these ages are still reflected in the display of objects in the Pre-History Galleries of the National Museum of Denmark in Copenhagen today. The publication of Thomsen's *Primeval Antiquities of Denmark* by J.J. Worsaae in 1849 meant that the "three ages" would have a major impact in the English speaking world (Stocking 1985: 72–73). The shift from speculative to systematic archaeology was also assisted by developments in the natural sciences such as Charles Lyell's *Principles of Geology* (1830–1833), which defined geology as "the science which investigates the successive changes that have taken place in the organic and inorganic kingdoms of nature." Lyell's *Principles* illustrated how fledgling disciplines with aspirations to scientific status could define themselves. The process of successive phases of geological development also influenced the idea of the "great chain of being" within art, anthropology, and archaeology. The "great chain of being," or "chain of art," defined civilizations in successive phases of excellence and merit, with the Greek art of fifth-century BCE Athens at the top.

Key Issues/Current Debates

One of the key issues in this period is national aggrandizement and the role of the state in funding international archaeological excavations characterized by the "informal imperialism" of northern European countries. The Eastern Mediterranean particularly documents the move toward large-scale excavation in the 1840s through the expeditions of Charles Texier in Turkey (1833) for the French Ministry of Culture, Charles Fellows in Lycia Turkey (1841–1843) for the British Museum, and Paul Emille Botta in Assyria (1842–1845) for the Louvre and Austen Henry Layard (1845–1851) for the British Museum. Although it should be noted that Britain and France had very different approaches toward funding and the role of the state in archaeological sponsorship. The French Ministry of Culture had a far more direct approach, while the British had a "public-private partnership" between individual "explorer-archaeologists," the British Museum and the Foreign Office (Hoock 2007) for which careful diplomacy was essential. The interest of German States in excavation and purchasing antiquities had already been illustrated by the sale of the Aegina sculptures in 1812. After German unification in 1871, the German Archaeological Institute and related national museums played a much larger role in competing for excavation permits at sites and

"Speculative Phase" of Archaeology,
Fig. 1 "Lions in the Court of Konak," from Newton & Pullan 1862, Plate XV

antiquities well into the twentieth century. Similarly, the formation of societies and museums in the United States of America as well as increasing interest of the Ottomans in the ancient past of their own Empire meant that from the 1870s Britain and France no longer carved up the Eastern Mediterranean between themselves.

The nebulous role of diplomacy within "informal imperialism" was an important factor of the "Speculative Phase" of archaeology and has not been fully investigated. A good example of the connections between excavation, collecting for the nation and diplomacy is in the 1852 appointment of Charles Newton, a former assistant curator at the British Museum, as vice-consul in Lesvos, at that time part of the Ottoman Empire, with a remit to collect antiquities (Gunning 2009). Newton's appointment and subsequent excavations at the Mausoleum of Halicarnassus and surrounding area in 1856–1858 heralded a different approach to archaeological excavation (Fig. 1).

Newton created a team to excavate that was composed of professional engineers, artists, surveyors, and photographers, as well as local Turkish workers and British sailors from the Royal Navy. He made tentative steps in field excavation through mapping and photography, which was followed by Richard Popplewell Pullan's excavation at Priene in Turkey in the 1860s and his grid-mapping system (Fig. 2).

Newton took the credit for the discovery of the Mausoleum of Halicarnassus, a lost "wonder of the world," though it has since been proved that the engineer Robert Murdoch Smith located the site of the Mausoleum. This subsequent discovery damaged Newton's posthumous reputation but illustrates the importance of claiming credit for discoveries.

The "Indiana Jones" image of a charismatic heroic archaeologist was also formed during this "Speculative Phase." The display of these antiquities in a museum, and usually in the national museum, led to public interest fuelled by media coverage as well as the lionizing of the archaeologists themselves (Stiebing 1994). Giovanni Battista Belzonni was an earlier example of a "showman archaeologist" and was literally a showman before travelling to Egypt in 1815 and collecting antiquities.

As noted above, a key emphasis in the "Speculative Phase" is on the archaeologist as heroic explorer. Archaeologists in Britain in

"Speculative Phase" of Archaeology, Fig. 2 "Great Stone Outer Face," from Newton & Pullan 1862, Plate VIII

particular needed to campaign to get funding and public support for their excavations from government and museum bodies. Austen Henry Layard is probably the most high profile example of this kind of "explorer-archaeologist" and he energetically publicized his discoveries in Assyria through publications of travel/archaeological books, lecture tours, newspapers and magazines (Fig. 3).

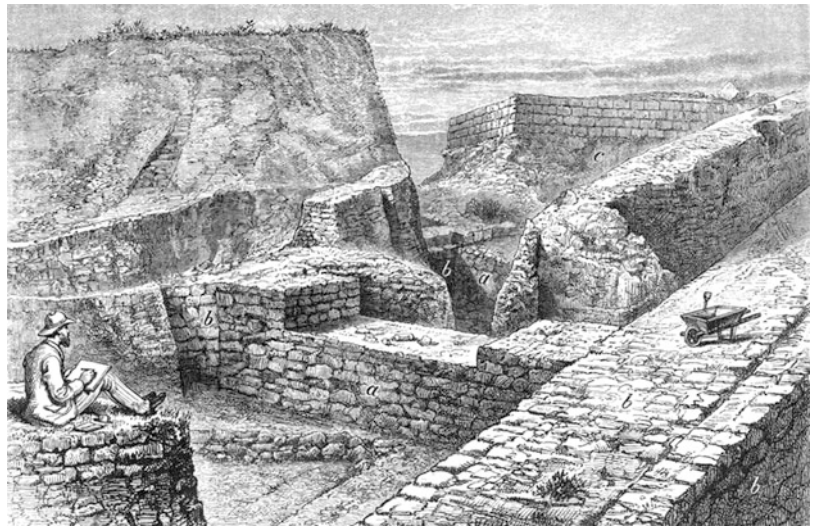
Layard tapped into public interest in biblical archaeology to gain support from an apathetic establishment at the British Museum. Although these budding archaeologists made claims in advancing scientific methods, and in many cases did so, the hasty practice of Heinrich Schliemann at Troy and the fabricated evidence of Louis Palma di Cesnola in Cyprus undermined their importance in the role of professionalizing archaeology (Challis 2008). Explorer-archaeologists continued in importance after archaeology had been established as a discipline, such as Hiram Bingham III searching for Machu Picchu in Peru in 1911. Archaeologists who also had professional positions in the late nineteenth and early twentieth century, such as William Matthew Flinders Petrie, Arthur Evans or Howard Carter, are still individually associated with particular sites or areas of archaeology (Fig. 4).

The combination of creating teams of people with different areas of expertise as illustrated by Newton's excavations in Halicarnassus combined with public interest in archaeological excavation led to the "big digs" of archaeology, which were "generally centered on a major site of great historical and cultural importance (Dyson 2006: 124)." The term "big scholarship" more properly describes the Olympia excavation carried out under the direction of Ernest Curtius by the German Archaeological Institute between 1875 and 1881 (Marchand 1996). The excavations at Olympia pointed to the future of classical archaeology with an excavation team of around 500 workers with different areas of expertise. At the same time, the charismatic if controversial Heinrich Schliemann was carrying out far less exacting excavations at the site of Hisarlik (Troy) in Turkey (1870–1873, 1878–1879, 1882–1883, and 1888–1890) and then Mycenae in Greece (1876–1878). These were "big digs" in every sense: big in scope, ambition, publicity, ego, and controversy (Traill 1995). Yet even

"Speculative Phase" of Archaeology, Fig. 3 An example of magazine interest. "Our artist sketching the entrance gate of the Acropolis at Mycenae," from *Illustrated London News* 1877

Schliemann's last excavation at Troy was informed by new methodologies in archaeological stratigraphy.

The German Archaeological Institute is an example of the growing professionalization of learned societies and their part in establishing the discipline of archaeology. Formed out of the "Instituto di corrispondenza archeologica," founded in Rome in 1829, by 1871, it was a Prussian state institute and then in 1874 it became an imperial institute and a linked department, or "school," was also opened in Athens. The French Academy of Science had been established in the seventeenth century but had become particularly important in disseminating archaeological study and excavation reports after the French expedition to Egypt. It was the "German model" that guided efforts in

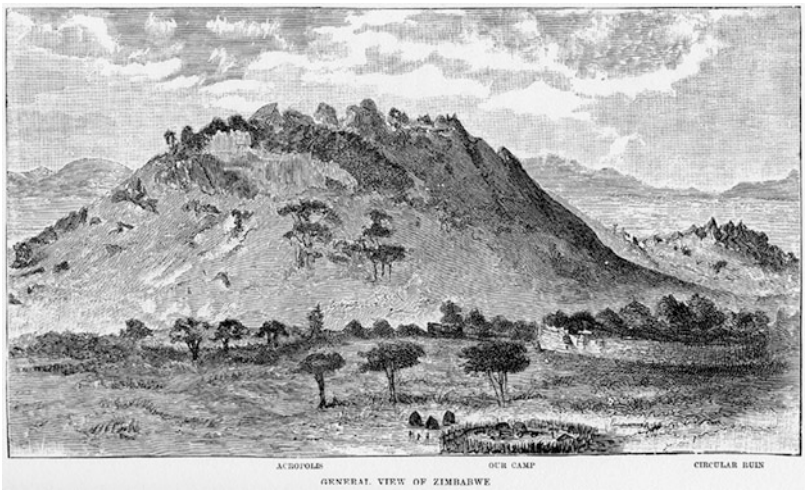


"Speculative Phase" of Archaeology, Fig. 4 Heinrich Schliemann recording Troy, from Schliemann 1886, Plate 19

Britain and America in establishing archaeology as a scientific profession (Kehoe & Emmerions 1999). The British Archaeological Association was formed in 1844 and the British Association for the Advancement of Science, founded in 1831, and its yearly conference covered many areas of both British and international archaeology. Societies around bespoke geographical or historical areas tended to develop separately, such as the Palestinian Exploration Fund in 1865 or the Egypt Exploration Society in 1882.

Positioning archaeology as a science was key in this period. Development in the natural sciences continued to influence the formation of professional archaeology. Charles Darwin's evolutionary evidence in *On the Origin of the Species by means of Natural Selection* (1859) and the work of Alfred Russel Wallace stimulated a change in classification and descriptive procedures as much as the application of Darwinian ideas. Darwinian evolutionism was hugely influential when archaeology began to establish itself as a discipline in universities during the 1880s and 1890s. The advocation of progress predicated in evolutionism was bound up with ideas around the hierarchy of "races" and civilizations, with "white" European races and civilizations considered most advanced. The "mound builders" controversy in North America illustrated that these ideas were entrenched before evolutionism. A "speculative" but culturally diffusionist example of a similar belief that had serious political consequences was the "discovery" of the medieval site (eleventh to fifteenth centuries CE) in Southern Africa known as Great Zimbabwe (Robertshaw 1990). The site was "discovered" by the German explorer Karl Mauch in 1871 and his publication was followed by the surveying work of the British archaeologist J. Theodore Bent in 1891–1892. Both Mauch and Bent considered the large stone city to be too architecturally complex to be built by the African Shona people who lived in that area and claimed that it must have been built by a northern Semitic race, akin to the Phoenicians, who migrated in antiquity (Fig. 5).

This was not based on any empirical evidence. It is a sign of the increased emphasis on evidence and the professionalization of archaeology that Bent's 1892 *Ruined Cities of Mashonaland* was a popular success but criticized for "sketchy records" by scholars. Despite this the colonial impact of his archaeological theory was dramatic. Cecil Rhodes' British South Africa Company occupied the lands around the Great Zimbabwe and "the site became a symbol of the justice of European colonization, which was



"Speculative Phase" of Archaeology, Fig. 5 "General Views of Zimbabwe," from Bent 1892: 91

portrayed as the white race returning to a land that it had formerly ruled" (Kuklick 1991: 135). Although Gertrude Caton Thompson proved Bent and Mauch wrong in 1928, their views held currency amongst "white" settlers until well into the late twentieth century. Formal colonial policies and land ownership were parallel with the greater professionalization of archaeology.

International Perspectives

One of the greatest legacies of the "Speculative Phase" of archaeology though is perhaps the acquisition of antiquities for museums – an area that would be worthy of another entry in itself. One of the pressing issues for museums today, in Europe and North America in particular, is the issue of restitution or the repatriation of antiquities from museums to source communities and nations. This is particularly pertinent to museums in Britain with regards to the British Museum. Many of the excavations carried out by explorer-archaeologists were covered by related legal agreements made within the networks of diplomatic links and "informal imperialism" that were at work during this period. Some of these agreements, such as the firman with the Ottoman Empire about the "Elgin Marbles," were made between countries or empires that no longer exist and are not recognized as legally binding by the successor modern nation state. Other collections were taken without such agreements, such as punitive expeditionary forces by the British in Ethiopia in 1867–1868, or under a system now considered defunct by the modern nation state, such as the "partage" system in Egypt.

The emphasis in debates about restitution is generally placed on anthropological items, particularly on human remains or items of religious importance, but these claims affect archaeological collections as well and not just cause célèbres such as the Rosetta Stone. The development of nationalisms and the use of heritage in defining a nation has become important in post-colonial societies and nations. Many calls for the demand of antiquities, even if not made formally, are well-known. For example, a punitive expeditionary force was sent by the British government to the Kingdom of Benin in 1897 and took intricate bronze plaques, among other items, from the city. Known as the "Benin bronzes," Nigerian officials and others have condemned their retention in various museums in Britain. There is a vast literature on this area. The point here is that the complexity of these cases requires knowledge of this "Speculative Phase" of archaeology and what impact it has on contemporary ideas about cultural knowledge and ownership.

A related area to the above is the collection, retention and display of human remains for archaeological purposes made during this phase.

The overlapping of archaeology and anthropology is particularly important in this area. Skulls and other human remains were amassed for research around human development and "racial" theory in museums and related research institutions (Fabian 2010). Indigenous communities were/are particularly affected by the collection of both ancestral and recent human remains during the "Speculative Phase" and beyond. Many countries now have ethical codes around the retention and display of human remains in museums and institutions, for example the *Native American Graves Protection and Repatriation Act* (NAGPRA) in North America. In Britain the Department of Culture Media and Sport issued "Guidance for the Care of Human Remains in Museums" in 2005 which was drawn up in relation to the 2004 *Human Tissues Act* and issued on behalf of the museum sector. The *Human Tissues Act* covers material under 1,000 years old but there are also growing sensibilities within the sector and amongst the public about the display of older human remains, such as mummies and bog bodies. Again this is an issue that is not simply limited to current understanding of the "Speculative Phase."

The impact of the "Speculative Phase" on forming disciplines of archaeology and classical archaeology in university museums has become of greater interest for curators trying to understand the history of their collections in order to interpret them within the history of the institution for a wider public. This can be seen in the 2011 redisplay of the Greek and Roman antiquities at the Fitzwilliam Museum, University of Cambridge, in which the collecting history and connecting disciplines of the history of art and philology are considered. The major revamp of the Ashmolean Museum at the University of Oxford, which reopened in 2009, placed the history of the collection of its objects at the center of its museum narrative, including a display on Arthur Evans in Crete that incorporated Schliemann in Mycanae and other related archaeological discoveries made before the discipline of archaeology was formed.

Another direction in Britain related to museums, both the British Museum and local museums, and local archaeological services is the Portable Antiquities Scheme (www.finds.org.uk). The Portable Antiquities Scheme is a voluntary scheme to record archaeological objects found by members of the public in England and Wales. Finds Liasion Officers positioned at museums or archaeological services around the country actively work with metal-detector users and people within their area to record finds. This is partly due to the 1996 *Treasure Act* which means people have a legal obligation to report any finds of material over 300 years old. In some ways this heralds a return to the importance of the amateur through metal-detector users carrying out "speculative" archaeology, but combined with professional expertise and support.

"Speculative Phase" of Archaeology, Fig. 6 Hussein Osman excavating at Abydos, 1899–1900 (On a Flinders Petrie excavation). Photograph Album belonging to Margaret Murray. Petrie Museum of Egyptian Archaeology Archives

Future Directions

Much of the research around the "Speculative Phase" of archaeology is relatively recent, dating to the last few decades with a surge of

scholarly interest from the late 1980s. As a result there are a great many future directions for the study of this area, which are facilitated by cross-disciplinary international groups such as the History of Archaeology Research Network (HARN). Also, as "International Perspectives" records, there are many contentious areas that attract wider public attention needing careful examination and reflection. The future directions highlighted here are just a few of many possible areas.

A current and future direction of work is on the influence of "showman archaeology" from the "Speculative Phase" to the present. The idea of "showman archaeology" (and the male gendering is a feature of interest in itself) has never really disappeared even after the professionalization of archaeology and the formation of different disciplinary areas. Explorer-archaeologists cultivated a public persona to generate more publicity to get recognition for their excavations, objects and themselves. They needed to do this before there was formal government and institutional funding. Arguably "showman archaeology" became even more important in the film and television age as it gives a personal focus and narrative to the distant past. Mortimer Wheeler was one of the first to use film reel to raise awareness of excavations in Britain in the 1920s and 30s, and then enhanced his celebrity by appearing on radio and TV quiz shows in the 1950s and 1960s. Wheeler himself stated that he did this to gather funding and public interest. With the *Indiana Jones* film franchise and other "archaeological" films and games such as *Lara Croft*: *Tomb Raider* and *National Treasure*, archaeology and adventure are molded together in public consciousness. Zahi Hawass, the former Minister of State for Antiquities in Egypt, presented himself as an "explorer-archaeologist" on television and to the public, even merchandising related clothes. Arguably by doing this he attracted more funding and tourists to Egypt, but along the way also generated fierce criticism.

An important future direction is consideration of the role of the workforce in the archaeological excavations carried out during the "Speculative Phase," both the people recruited from the local area around the excavation site and those drafted in by the leading archaeologist to take part, such as members of the armed forces. The continued focus on the explorer-archaeologist neglects the importance of these other people that were directed on excavations, particularly those in colonial or "informal" colonial conditions, and their role in both finding and interpreting material (Quirke 2010). Researching this information is hard, particularly for the "Speculative Phase" in which formal lists of workforces are not frequently retained in archives. However, archaeological reports and journals as well as other media from the period can often give information about the workforce. This information would add to greater understanding about the workforce's role in the "Speculative Phase" of archaeology and give a more nuanced account of the role of European and American explorer-archaeologists and the institutions that supported them (Fig. 6).

Research should be continually interrogating how many of the assumptions made during the "Speculative Phase" are still with us, implicitly or explicitly, particularly those based on out-moded classification systems and ideas of "racial" hierarchies. It is important to point out that the contemporary illicit trade in antiquities, for example, continues to be reliant on speculation in every respect.

Cross-References

- ▶ Nationalism and Archaeology
- ▶ Spain: Nationalism and Archaeology

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Squash: Origins and Development

Tim Denham
Archaeological Science Programs, School of Archaeology and Anthropology, ANU College of Arts and Social Sciences, The Australian National University, Canberra, ACT, Australia

Basic Species Information

Multiple species of *Cucurbita* underwent domestication in the Americas (e.g., Sanjur et al. 2002). The most significant group of crop plants is descended from *Cucurbita pepo*, including pumpkins, acorn–summer squashes, marrow, and zucchini. Today, these vegetables have multilayered cultural associations and significance in the regions around the world in which they are grown.

The reconstruction of the processes involved in the early stages of domestication of *Cucurbita pepo* is complex. However, several key stages of early domestication in the Americas have been documented archaeobotanically and, together with genetic data (e.g., Decker-Walters et al. 1993; Sanjur et al. 2002), suggest multiple "independent" domestication events.

Major Domestication Traits

The archaeobotany of squash domestication has been based on macrobotanical remains of rind fragments, fruit stems or peduncles, and seeds (Smith 2006). Wild and cultivated forms of *Cucurbita pepo* are differentiated in archaeobotanical assemblages based upon seed size and the size and morphology of peduncles. Individual specimens are then directly radiocarbon dated (AMS) to provide a robust chronology, thereby avoiding taphonomic problems arising through the dating of archaeobotanical finds by association (Smith 1997; also see Dillehay et al. 2007). Using this method, two independent domestications of squash have been inferred: "the pumpkin lineage (*Cucurbita pepo*

ssp. *pepo*) in Mexico by 10,000 years ago, and the acorn–summer squash lineage (*Cucurbita pepo* ssp. *ovifera*) in the eastern United States by 5,000 years ago" (Smith 2006: 29).

Timing and Tracking Domestication

A large-seeded form of *Cucurbita pepo* was cultivated in the vicinity of Guilà Naquitz Cave in the Oaxaca Valley of Mexico around 10,000 cal BP (Smith 1997, 1998, 2006). At this time, people also harvested wild *Cucurbita* gourds. The increase in seed size is characteristic of domesticated *Cucurbita pepo* ssp. *pepo* and is considered "good evidence for the adaptive syndrome of domestication—an automatic adaptive response by squash plants to new seed bed selective pressures associated with deliberate and sustained planting" (Smith 2006: 28). By 8,400 cal BP, over 1,000 years after initial cultivation, the increased size of fruit peduncles suggests selection for larger fruits, with a steady rise in fruit size continuing thereafter (Smith 2006).

Another large-seeded form of *Cucurbita pepo* has been identified and inferred to have been cultivated in the vicinity of Phillips Spring, Missouri, United States of America, around 5,000 cal BP (Smith 2000, 2006). The archaeobotanical assemblage indicated exploitation of wild *Cucurbita* gourds and domestication of *Cucurbita pepo* ssp. *ovifera*. Variations in fruit morphology, fruit size, and rind thickness suggest sustained human selection for c. 2,000 years after initial domestication of *Cucurbita pepo* ssp. *ovifera* (Smith 2006: 29). Fritz (2007) and others have postulated that acorn–summer squash was dispersed and planted in North America before 5,000 cal BP.

Microfossil techniques, principally phytolith analysis, have also proven useful to document the exploitation and dispersal of squash in the Americas (e.g., Piperno et al. 2009). Many species of *Cucurbita* were widely exploited by foragers and farmers in the Americas (Piperno & Pearsall 1998), making the differentiation of species and domestication status important aspects of phytolith research (e.g., Piperno & Stothert 2003). Additionally, gourd and squash artifacts have themselves provided evidence, in the form of starch residues, for other plants consumed during Preceramic times in the Americas (Duncan et al. 2009).

By the time of European conquest and colonization, squash was part of the maize–bean–squash diet that sustained communities across the Americas. Bruce Smith (1998: 147) has stated that this domesticate triad was cultivated from "Argentina to Ecuador, up through Central America and Mexico, and as far north as southern Ontario" (Smith 1998: 147). Not only were these crops nutritionally balanced, but they also complemented one another agronomically and were beneficially planted together in mixed plots.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Beans: Origins and Development
- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Eastern North America: An Independent Center of Agricultural Origins
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Maize: Origins and Development
- ▶ Phillips Spring: Agriculture and Domestication
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Stahl, Peter W.

Deborah M. Pearsall
Department of Anthropology, University of Missouri, Columbia, MO, USA

Basic Biographical Information

Peter William Stahl is an archaeologist and zooarchaeologist with primary interests in New World archaeology and ethnography and a geographical emphasis in the Northern Andes and tropical lowlands of South America. Stahl was born December 10, 1953, in Val-D'Or, Quebec, Canada. He is married to Ann B. Stahl, an anthropological archaeologist with research interests in Africa. They have two children.

Peter Stahl received his B.A. in 1975 from the University of Toronto (Victoria College) and M.A. in Archaeology in 1978 from the University of Calgary, where he worked with J. H. Kelley. He attended the University of Illinois, Urbana-Champaign, for the Ph.D., working with D. W. Lathrap. Stahl's dissertation, *Tropical Forest Cosmology: The Cultural Context of the Early Valdivia Occupations at Loma Alta*, was completed in 1984. After positions as a Research Fellow at the University of California, Berkeley (1984–1985), and University College, London (1985–1988), Stahl began a long association with the Department of Anthropology at Binghamton University (SUNY), Binghamton, New York, from which he retired in 2011 as Director of the Archaeological Analytical Research Facility and Professor of Anthropology. He is currently with the Department of Anthropology at the University of Victoria.

Major Accomplishments

Peter Stahl has practiced zooarchaeology – the identification and interpretation of preserved bone assemblages from archaeological sites – for some 35 years. Zooarchaeology assumed a prominent role in archaeology during the final quarter of the twentieth century with the emergence of cultural ecology and ecological anthropology (Reitz & Wing 2008: 11-30). Stahl has participated in significant developments in each of the facets of modern zooarchaeological research, methodology, anthropological research, and biological research.

As faunal data have become increasingly important in archaeological research, understanding the processes of accumulation and deposition of faunal remains, or taphonomy, became a central methodological issue in the

interpretation of archaeological faunal assemblages. Stahl has contributed to this line of research. For example, he studied the structural density of camelid skeletal elements to explore the archaeological correlates for *ch'arki* (dried meat) production in the prehistoric Andes, concluding that faunal data from the Chavin site, Peru, did not support the consumption of imported *ch'arki* (Stahl 1999). His study of faunal materials from a large bell-shaped pit at the Pechichal site, Ecuador, is a textbook illustration of how understanding assemblage accumulation and deposition allows inference of both hunting practices and ecology, the latter inferred from the natural histories of naturally entrapped fauna (Stahl 2000).

Investigating relationships between human populations and animals contributes to anthropological research in diverse and significant ways. Peter Stahl's contributions in this area are many. He has most recently investigated the association between humans and native foxes in early Holocene South America, arguing that humans had an intimate relationship with foxes that predated the introduction of domesticated dogs and which represented an early example of an indigenous cosmology that considers selected animals as social beings (Stahl 2012). Native South American domesticated camelids and *cuy* (guinea pig) appear in Andean Ecuador well before the area was occupied by the Inca Empire, but were not domesticated there (Stahl 2003). Stahl argues from the rarity and the elite context of these finds in Ecuador that animal domesticates were part of ancient terrestrial and later maritime trade linking Ecuador and the Central Andes of Peru, trade controlled by, and benefiting, elites.

Stahl is an articulate advocate for revising standard Amazonian archaeology. In his 2002 invited article in *The Review of Archaeology*, he argues cogently for a perspective on Amazonian prehistory that recognizes the importance of historical circumstance in shaping prehistoric and contemporary cultures and that emphasizes the environmental, cultural, and agricultural heterogeneity of the lowland tropics. He advocates research using complementary sources and methodologies, which "...demonstrate the potential of an integrated anthropological research paradigm for producing nuanced and sophisticated interpretations of a least-known continent and people" (Stahl 2010: 218).

Peter Stahl was an early voice for the contributions of archaeology (1996) and zooarchaeology (2008) for exploring issues related to Holocene biodiversity in the Americas. The archaeological record of environmental transformations during the 10,000 years of the Holocene, while far from perfect, illustrates the dynamism of prehistoric biodiversity and the interplay of environmental events and anthropogenic effects. Zooarchaeologists can contribute greatly to understanding biodiversity through the study of past human landscapes; this is the perspective of historical ecology:

> When we consider humans as conservationists and resource managers or epiphenomenal optimal foragers, we avoid the real position that indigenous populations created the very ecosystems that we wish to conserve.... Archaeologists, by definition, excavate and explore anthropogenic landscapes through time and space; therefore we are historical ecologists. (Stahl 2008: 12, 13)

Cross-References

- Alpaca and Llama: Domestication
- Archaeological Theory: Paradigm Shift
- Guinea Pig: Domestication
- Historical Ecology in Archaeology
- Landscape Domestication and Archaeology
- Site Formation Processes
- Vertebrate Taphonomy in Archaeological Research
- Zooarchaeology

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Stakeholders and Community Participation

Paul A. Shackel
Department of Anthropology, University of Maryland, College Park, MD, USA

Introduction

From the 1970s, there has been growing momentum in the discipline of archaeology to share significant discoveries with the public. The types of public archaeology programs have changed since this time, from public tours, to public participation at archaeology sites, to stakeholders playing a role in the development of research programs in their communities. Barbara Little's (2002) edited volume on the *Public Benefits of Archaeology* shows how archaeology is becoming much more broadly perceived by the public and practitioners. She writes that archaeologists are increasingly using the discipline for "purposes of education, community cohesion, entertainment, and economic development" (Little 2002: 1). Following is a brief overview of the development of community archaeology programs and the archaeologists' changing role with stakeholder. With several international examples, this overview provides a conceptual framework for why it is important to work with stakeholders and the benefits to the discipline and community. It does not provide a complete overview of the literature. An interactive wiki on community archaeology – http://en.wikipedia.org/wiki/Public_archaeology – furnishes an overview of the growing literature on this topic.

Definition

Community archaeology involves communities in the planning and the implementation of the project. The goal of community archaeology is to make a difference and/or a contribution to the community. Noel Chrisman (2006: 168) provides seven broad principles for scholars collaborating with communities. They are valuable for helping to develop bonds with communities and descendant groups. To summarize, these principles state:

1. Proposals and procedures must be consistent with community's culture, values, and beliefs.
2. Collaboration with the community is necessary in identifying its wants and needs.
3. The participation of community members is integral to realistic planning, delivery, and evaluation of a project.
4. Collaboration with existing organizations and their leaders is a must.
5. The design and implementation of projects must make sense to the community.
6. Anthropologists must respect the people with whom they work.
7. Anthropologists must be agents for change by working with people, not on them.

Key Issues/Current Debates/Future Directions/Examples

The discipline's growing ethical accountability encourages us to include stakeholders in the decision-making process of the research design, fieldwork, and, at times, the interpretation of the archaeological findings, thereby empowering

communities to identify and connect to their past. The basis for a well-run community archaeology program is sharing the decision-making processes between the archaeologist and the stakeholder. The archaeology program at Ozette, a late prehistoric/historic whaling village in northwestern Washington State, is one of the earliest internationally known community archaeology programs. The Makah Tribal Council invited archaeologists to examine archaeological features uncovered by a mud slide. The project ran from 1970 to 1981 with the Makah Tribe playing a major role in the decision-making process along with the archaeologists throughout the project (Kirk & Daugherty 1974). At about the same time, Australian archaeologists were developing a dialogue with indigenous communities. These communications developed as the government recognized that indigenous people had the right to control their cultural resources through the "land rights" movement. This form of inclusion was more about obtaining consent for research rather than developing broader dialogue, greater community participation, and sharing in the decision-making process (Greer et al. 2002: 266).

The sharing of the decision-making process and the building of social capital between different communities and between community and professional is an important matter for archaeologists to consider when working with communities. There are, however, different views about what social capital is and how it can be used. For instance, sociologist Pierre Bourdieu (1977) explains that social capital can be used to produce or reproduce inequality. Bourdieu demonstrates how individuals can gain power through social connections. Robert Putnam (2000) uses the concept in a different way. He shows how social capital produces civic engagement, which can lead to a broad societal measure of communal health. Social capital develops in collectives and it is important for building and maintaining democracy. Putnam believes that social capital can be measured by the amount of trust and reciprocity exists in a community or between individuals.

Putnam also writes about bonding and bridging social capital. Bonding social capital is exclusive and homogenizing and is often exclusionary. Bridging social capital refers to the networking between socially heterogeneous groups. It can help create many benefits for - societies, governments, individuals, and communities. The relationships and networks that bring people and communities together are essential for a healthy self and a vital community (Hirzy 2002: 14). Connectedness through social networking is essential for the social, physical, and economic endurance of a community, and a sense of heritage can develop with consensus building between the different stakeholders.

In many ways, Bourdieu and Putnum's divergent views of social capital can help describe many public archaeology programs and how archaeologists view community participation in them. If a community archaeology program is developed from the outside, or the top down, it stands the chance of alienating people by not recognizing the inequalities that exist in the contemporary community. For instance, when a corporation or a university comes into an unfamiliar place, creates a research design for excavations, and develops a public archaeology program without input from the local population, they are creating a strategy that can alienate a community and separate them from their past. Democracy is not in play, and bridging between communities is not effective. When outsiders control the meaning of a community's past and only emphasize the exotic, or reinforce the consensus history, the public interpretation of an archaeology site stands a greater chance of alienating and disenfranchising the local community.

In 1997, Karolyn Smardz (1997: 103) wrote that archaeology should "stop taking archaeology to the public for archaeology's sake and start doing it to meet the general public's educational, social, and cultural needs." Civic engagement can be one way to address this imbalance. The civic engagement movement in archaeology is about the creation of a shared past. It is a growing trend in many professions, and its implications run much deeper than traditional

public outreach programs. Civic engagement can take many forms and designs, but in all cases, it is a collaborative effort that does not presume what the community needs. Therefore, there is a deliberate shifting from the practice of *outreach* to the practice of *inreach*. *Inreach* is the practice of working with communities on research projects and reinforcing the ideals of collaboration. It is a way of making the discipline relevant to a broader audience. *Inreach* also becomes important when we challenge the consensus views of the past. For instance, archaeologists working with the Northern Cheyenne developed an important collaborative project that challenged the consensus history of a significant event related to their tribal history. Working with the tribe, archaeologists set out to find the escape route and eventual slaughter of many Northern Cheyenne. History relates that they escaped their imprisonment at Fort Robinson and were pursued by the US Calvary. Commonly held accounts, supplied by the military, differed significantly from Northern Cheyenne oral history regarding routes taken. Through this collaborative work, archaeological findings confirmed the correctness of oral history accounts related to the Outbreak of 1879, which differed from the military account. This work allowed for the commemoration of this trail and massacre (McDonald et al. 1991).

Community archaeology programs that develop on a grassroot level can help foster a form of democracy building by creating connections between different groups to present a common past. Carol McDavid (2004: 164-165) proposes that archaeologists should use available media, like the internet, to hold conversations between archaeologists and the public rather than developing presentations for the public. Community participation can become part of a democratizing process whereby the control over the interpretation of the past is decentralized and made more egalitarian. Pearson and Ramilisonina (2004: 236-237) use case studies from the Outer Hebrides and southern Madagascar to propose that archaeologists can work hand-in-hand with indigenous groups, breaking down the cultural and political barriers and work with a common interest in the study of the past.

There are many examples of archaeologists working with American Indian communities, and recently there has been a profusion of historical archaeologists engaged in local communities and making a difference, some addressing questions related to social justice (Swindler et al. 1997; Dongoske et al. 2000; Watkins 2001; Little 2002; Derry & Malloy 2003; Shackel & Chambers 2004; Colwell-Chanthapohn & Ferguson 2007; Little & Shackel 2007). These works include many of the principles noted by Chrisman.

Moser et al. (2002: 229), working in the ancient Port of Quseir, Egypt, detail a unique community project. Traditionally, outsiders have come into Egypt to perform archaeology and the local communities have been excluded from the discovery process. They have also been omitted from developing their own local heritage. The project at the Port of Quseir provides another set of guidelines for the development of a community archaeology program. They include:

1. Communication and collaboration
2. Employment and training
3. Public presentation
4. Interviews and oral history
5. Educational resources
6. Photographic and video archives
7. Community-controlled merchandising

Much like other community archaeology programs being developed around the world, this archaeology project has developed whereby the local community can benefit from the research by participating in the development of their local heritage and also receiving financial gains (Marshall 2002).

Community groups and organizations have significant assets that can lend to the success of any archaeology program. Communities have "a deep knowledge of their communities and constituencies, the capacity to seek nontraditional outcomes, and experience with community building. We have to resist the impulse to dictate the agenda, and ensure that all questions relating to attitude, approach,

ownership, access, and trust are resolved to everyone's satisfaction" (Kertzner 2002: 41; also see Archibald 2002: 3). While some archaeologists are increasingly taking into consideration the needs and desires of the communities, the goal of inclusiveness and developing bridging social capital can be a complex matter, especially when research strategies and interpretations are negotiated with the various stakeholders. Choices are made about research goals, issues of significance, and what issues, interpretations, and conclusions are worth sharing with the larger audience. In every project, archaeologists make decisions about the politics of their research agenda. They are faced with questions of either supporting the consensus history or changing the status quo.

Lisa Breglia (2007: 98), working with communities in the Yucatan, cautions us to recognize that "1) archaeology does not always represent what the local people understand as their heritage; and, what's more 2) public or community outreach, though it may be practiced with the best of intentions always carries the potential danger of ethnocentrism." A case study of a collaborative project whereby the archaeologists were in danger of not understanding the local heritage is situated in Saskatchewan, Canada. There, thousands of Doukhobors fled Tsarist persecution in Russia in 1899. One sect of Doukhobors practices communalism, pacifism, vegetarianism, and the avoidance of alcohol and tobacco. Archaeologists found alcohol bottles and butchered bones in the archaeological assemblage. The descendants were upset with the findings because they were proud of their ancestor's convictions. One descendant told the story that her grandparents had to feed the non-Doukhobor farm workers meat, or they would leave the farms. Therefore, the descendant proposed that the evidence of meat was a product of her grandparents serving farm hands, rather than her grandparents breaking religious prohibitions (Brooks 2007).

Archaeologists can take a role in either a participatory or a collaborative approach. The former develops from the outside, when the latter is part of a shared activity. An increasing number of archaeologists are committed to the idea that communities have a sense of their own past and they want to be part of decision-making process regarding their own heritage development. This changing perspective in the discipline is paralleled by changes in anthropology as a whole, and while the discipline has changed significantly, archaeologists are only beginning to realize the importance of community involvement. Community participation means that scientists are no longer the cultural brokers. Practitioners are beginning to recognize that many histories can exist in any one place, and these stories of the past are continually being shaped and reconstructed. Archaeologists are in a good place to address these changing perspectives and they need to respond effectively to these challenges and opportunities. As practicing archaeologists, our charge can be to help change society for the better.

Cross-References

- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community and Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Descendant Communities in French Guiana: Amerindians
- ▶ Indigenous Peoples, Working with and for

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Standardization, Storage, and Dissemination of Environmental Archaeological Data

Sarah Whitcher Kansa[1] and Eric C. Kansa[2]
[1]The Alexandria Archive Institute, San Francisco, CA, USA
[2]UC Berkeley & Open Context, Berkeley, CA, USA

Introduction

Archaeological researchers rely on computers for many data collection, analysis, presentation, and scholarly communication needs. Through the

Web, researchers can now disseminate all the information they collect in excavations and analyses, not just the resulting synthetic reports. However, while technologies can store and transmit these data, approaches to data documentation, quality improvement, semantic description, and data preservation see active research and development.

Definition

Most datasets are now "born-digital," giving the researcher community new opportunities for sharing them via the Web. Despite hesitation and incentive concerns (see Harley et al. 2010), there is a growing expectation for access to primary datasets so that other scholars can reanalyze them with new questions and perspectives (Kansa & Whitcher Kansa 2011). However, as data sharing assumes greater primacy in professional communications, researchers need supporting services to adequately describe and document, preserve, disseminate, and understand and reuse digital data.

Documentation, use of appropriate standards, storage, and dissemination are all aspects of "data stewardship." These help ensure that data are sufficiently described and preserved in a way that allows for well-informed future use. To guide researchers in data stewardship, the Archaeology Data Service (http://archaeologydataservice.ac.uk/) and Digital Antiquity (http://www.digitalantiquity.org/) have authored invaluable guides to good practice (http://guides.archaeologydataservice.ac.uk/). These guides introduce metadata ("information about information") requirements, recommended practices for data formats (especially recommendations for use of open and nonproprietary file formats), and archival practices.

Key Issues/Current Debates/Future Directions/Examples

Standards

The term "environmental archaeological data" encompasses a wide range of data pertaining to the study of past human interactions with the environment. These data come from highly multidisciplinary investigations and analyses, including (but not limited to) paleobotany, zooarchaeology, soil chemistry, micromorphology, archaeomalacology, geomorphology, and isotopic analyses. Datasets vary widely in terms of size and character. Some data result directly from the output of instrumentation, and others are created by individual researchers and may include both quantitative and qualitative data.

In order to facilitate informed reuse and preservation, all of these data need alignment to certain standards. However, there are many kinds of "standards." Some standards refer to technical specifics of data formats, instrumentation settings, and the like. Metadata description and documentation represents another type of standard. Finally, some types of standards reflect concerns over the appropriateness of data collection methods and data quality. In all cases, conforming to community expectations regarding standards facilitates data reuse.

As is the case with most archaeological data, metadata about context, broadly defined, is required to make use of paleoenvironmental datasets. Given that resources and human effort are scarce, certain forms of documentation should be prioritized. For example, published data should include some fundamentals, including discussion of methods, research aims, and data collection practices. Baseline contextual information (geographic, stratigraphic, and chronological) also needs to be provided. Shared data need to be decoded (or coding systems need detailed documentation) to facilitate informed reuse and comparison with other datasets. In many cases, it will be important to provide key technical metadata documenting the specifics of instruments used, geographic coordinate systems, other aspects of data collection methods, and information about post-processing software and algorithms. In addition, the "scholarly" provenance and context is also critical. Who collected the data and under what sponsorship and institutional setting? What are the licensing conditions on sharing and adapting a dataset? Many of these

attributes are recording using the Dublin Core metadata standard.

Different repositories may have different specific technical requirements for expressing these metadata. Variability in data documentation results from different institutional settings in research as well as different research needs and traditions. Also, data documentation and metadata needs will not likely stay fixed. Researcher needs and expectations change, and these changes will drive changes in how data need to be documented. Thus, while standards can be very useful in helping others understand and reuse data (Atici et al. 2012), data repositories and dissemination services need to accommodate diverse and changing needs and expectations in different disciplinary communities. Thus, standards and research designs will coevolve, particularly once data dissemination becomes a more commonplace practice.

In many cases, standards have been extremely useful for meta-analyses and collaborative research. While many researchers recognize the value of shared standards, data are often very heterogeneously developed and described, as noted above. In many areas of environmental archaeology, there are only a few instances where researchers adhere to common data collection standards and protocols. For instance, the suite of measurements proposed by Angela von den Driesch in her 1976 *A Guide to the Measurement of Animal Bones from Archaeological Sites* is widely used by zooarchaeologists. However, though many researchers may use this protocol, they may express and encode these measurements in very different ways.

Because it is unlikely (and even ill-advised) for researchers to use only one data collection protocol and database structure, other methods need to be developed to relate researcher datasets together. Most commonly, researchers use ontologies to relate different datasets together. Ontologies are formally described conceptual systems, usually expressed in such standards such as RDF/OWL or RDF/SKOS. Ontologies define different concepts and various logical relationships between concepts. Different datasets can be related to a common ontology so that these data can be compared, even though these datasets individually may have different and idiosyncratic terminologies and organizations. It is often a goal to use the logical rules and relations expressed in an ontology to make inferences on datasets related to the ontology. Digital Antiquity, with the tDAR system (http://www.tdar.org/), is doing pioneering research in relating datasets together using different ontologies. Their initial experiments have focused on zooarchaeology. This approach toward data integration is more feasible in this subdiscipline because of the widespread use of common data documentation conventions.

Ontologies may vary widely in how generalized and how specifically they model different concepts. Open Context (http://opencontext.org) uses a highly generalized ontology to model data, while the ontologies used in tDAR's experiments can have some very specific concepts. Different ontology strategies have different costs and benefits. Generalized ontologies lack the specificity needed for many research applications, while specific ontologies can often be very complicated, difficult, and costly to apply. Research applications will probably help identify the "right" mix between generalized and specific ontological models. In the case of zooarchaeology, some aspects of recording probably can and should see more specific modeling (such as taxonomic identification, bone element identification, and fusion data). While other aspects of zooarchaeological data may see less need to for such specific modeling.

In addition to ontologies, the architecture of data repositories in environmental archaeology plays a role in data interoperability and reuse. tDAR offers powerful features to give researchers options to use multiple ontologies to relate different datasets found within the tDAR repository. Open Context takes a different approach and exposes data on the Web to make it easier to use with the so-called Linked Open Data (LOD) methods. With LOD, Open Context data can be referenced to common vocabularies and ontologies via Web URIs (stable hyperlinks) and related to other data sources published to the Web. Open Context uses LOD methods to

identify biological taxa according to Web identifiers published by the Encyclopedia of Life (http://eol.org), a major database of taxa. Again, the different approaches taken by tDAR and Open Context involve a different set of trade-offs. Open Context's use of Encyclopedia of Life identifiers may help relate data via the open Web to a large interdisciplinary community, but tDAR's ontologies more customized for zooarchaeology may be more immediately useful for research in that subdiscipline. While different, these approaches are not mutually exclusive and can be complementary. These differences highlight how the semantic interoperability of environmental archaeological data remains an active area of research.

Explicitly recorded data documentation and formal ontologies are important and often critical needs. However, they are not the only issues involved in data preservation, reuse, and interoperability. Human factors are also critical needs. The background and tacit knowledge of experienced specialists can be invaluable to understanding an old dataset, even without detailed documentation (see Atici et al. 2012). In addition to understanding domain-specific problems in data collection practices and research methods, the research community also needs to develop informatics skills and expertise, so that they can better understand the use and limitations of different approaches to semantics and data integration.

Preservation and Dissemination

Researchers tend to have poor data curation practices. Most individuals keep data on their own hard drives, perhaps backing them up on some external digital media (optical disks and the like). Such devices and media are prone to failure and obsolescence in very short time horizons. Not only do digital media degrade rapidly, but file formats and supporting software are also prone to rapid change. For digital data to be usable for the long term, they need continual and active curation by dedicated professionals.

Formal digital repositories have developed specifically for archaeology, including the Archaeology Data Service in the UK and Digital Antiquity in the USA. Both of these organizations actively curate data, migrate files to new formats as required, and perform other vital repository functions. A somewhat different approach is taken by Open Context, where it does not act as a digital repository itself, but rather archives data with the digital repository maintained by the University of California, through the California Digital Library (http://www.cdlib.org/). Digital repositories, whether discipline-based or based in a "memory institution" like a library, play an essential role in the long-term secure storage of environmental archaeological data. At the same time, data preservation is complemented by data reuse. Data that sees active use will likely see more investment in preservation.

With regard to data dissemination and reuse, professional expectations are rapidly evolving. Though archaeologists routinely manage complex and highly structured digital data, dissemination and communication objectives traditionally remained decidedly oriented toward print or digital analogs of printed documents (such as PDFs). The prevailing norms and expectations for print publication mean that researchers tend not to share the primary data they collect, thus precluding reuse and reexamination of these data. Though data sharing is still rare, it is gaining traction as a key issue in scientific communications (Costello 2009; Nature Editors 2009). Scholars have discussed a multitude of semantic (Kintigh 2006), technological (Snow et al. 2006), data preservation and longevity (Richards 2004; Carraway 2011), intellectual property (Kansa et al. 2005), and professional incentive concerns (Costello 2009; Kansa 2010) regarding data sharing. In the UK and in now the USA (with Data Management Plans required of National Science Foundation grant-seekers; see NSF press release on May 10, 2010: http://www.nsf.gov/news/news_summ.jsp?cntn_id=116928), funders of research increasingly expect greater data professionalism, archiving, and transparency.

Since use can promote data preservation, the research community also needs innovative approaches in scholarly communication that promote data dissemination and reuse. Many of the data preservation repositories discussed

above also emphasize services for data dissemination and reuse. Different dissemination services require different levels of investment in data documentation and data quality verification and improvement. As discussed above, common data and semantic standards can help make data dissemination and reuse much more efficient. However, semantic standards can be complex and time-consuming to apply, and overly rigid or misapplied standards can also constrain interpretive choices and inhibit methodological innovation. Therefore, the application of different metadata and semantic standards is not necessarily straightforward, and data dissemination services will vary in their expectations.

Besides standard alignment, data dissemination may also involve some degree of editorial review and quality improvement. In some environmental science disciplines, many journals require deposit of data related to an article in Dryad (http://datadryad.org), a disciplinary data repository. While journal editors and reviewers may or may not review the actual datasets deposited in Dryad, policies requiring the dissemination of datasets aim to improve the scientific reproducibility of the analyses and interpretations presented in journal articles. So far, no archaeological journals require dataset dissemination, but the Digital Antiquity and Open Context teams are in active discussions with various archaeological publications to encourage such dissemination.

In the case of Dryad, most datasets entering this repository supplement the content of a journal article. This approach helps align researcher incentives, which reward journal publications, and community interest in data dissemination and preservation. However, this approach may have a disadvantage in that datasets are of secondary importance and shared to comply with policy requirements. These data may or may not see any review or editorial scrutiny, and may not see much effort in data cleanup or documentation beyond the minimal requirements the repository.

Another approach to data dissemination is to make data publication a primary goal of scholarly communication in itself. If data dissemination provided some of the same professional rewards and recognition as conventional journal and book publication, then researchers may invest more effort in improving data quality and aligning data to appropriate standards. Editorially supervised "data publishing" models can make data dissemination reach the levels of quality needed to enable confidence in reuse (see Costello 2009). Editorial review processes may help researchers improve data integrity and intelligibility, promoting greater data quality and facilitating informed reuse. The Journal of Open Archaeological Data (http://openarchaeologydata.metajnl.com/) and Open Context are currently developing data publishing services where datasets see editorial and peer review prior to dissemination.

It is likely that multiple models for data dissemination will be needed to serve the needs of environmental archaeology. In some cases, data repositories will take data directly from researchers, and in other cases data dissemination may follow more elaborate editorial review and quality improvement processes. Appropriate dissemination choices will vary depending on the nature of the data. There may be less need for editorial review for data automatically generated by instrumentation, whereas editorial processes may be more appropriate for data manually created by researchers.

However, in all cases, the goal of data sharing and archiving is to facilitate reuse, possibly including integration of data from multiple sources. In order to facilitate data reuse, the research community needs to pay particular attention to the legal and licensing requirements of data reuse and interoperability. Copyright and other intellectual property restrictions may greatly complicate, if not altogether prohibit, many uses of data expected by the scientific community. To encourage reuse, datasets need to be released either to the public domain, or under very liberal and open licensing conditions. For instance, Digital Antiquity and Open Context both require deposit of data under the Creative Commons Attribution license (http://creativecommons.org/licenses/by/3.0/), which freely permits reuse provided attribution is provided to the data creators. Dryad mandates even greater openness, requiring dedication of

datasets to the public domain using Creative Commons' CC0 "no rights reserved" framework (http://creativecommons.org/about/cc0). Use of Creative Commons licenses is especially encouraged because these widely used standard licenses facilitate legal interoperability of data. In addition, Creative Commons licenses are also represented as standard metadata, facilitating the discovery and explicit identification of legally interoperable content.

Cross-References

- ▶ Archaeological Informatics
- ▶ Archaeology Data Service (ADS)
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management Technology and Training
- ▶ Digital Archaeological Data: Ensuring Access, Use, and Preservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Zooarchaeology: Methods of Collecting Age and Sex Data

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Star Carr, Archaeology of

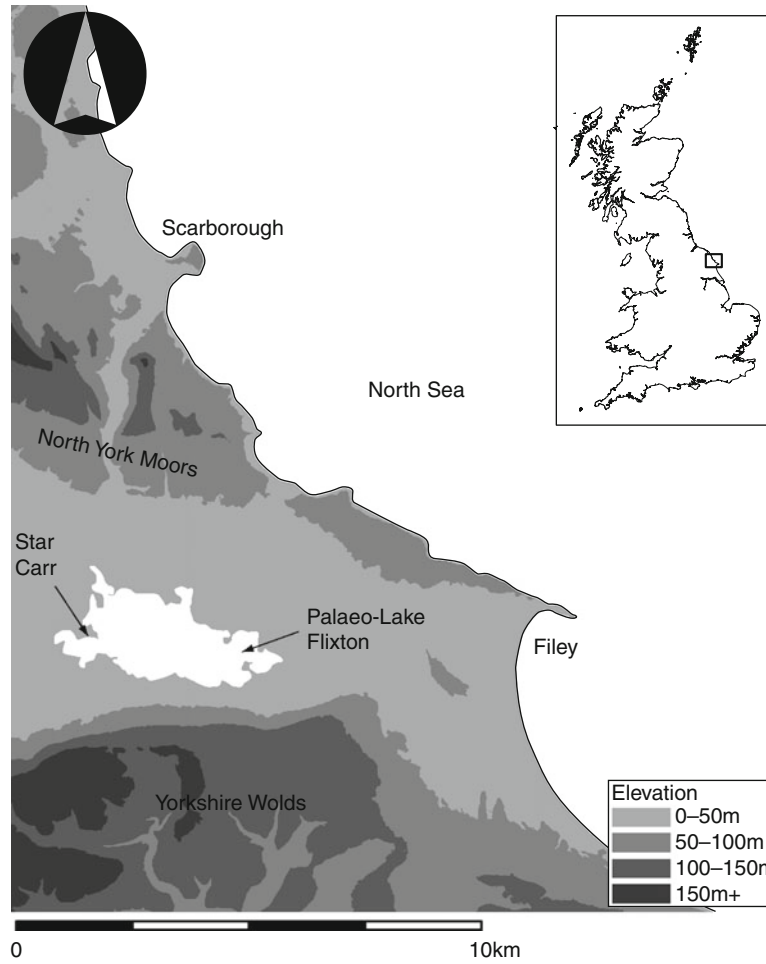
Chantal Conneller
Archaeology, University of Manchester, Manchester, UK

Introduction

Star Carr is an Early Mesolithic site, dating to c. 9000–8500 BCE. The site is located in the Vale of Pickering, North Yorkshire, UK, near to the coastal town of Scarborough (Fig. 1). During the early Holocene, a large body of water, known as Lake Flixton, was situated at the eastern end of the Vale of Pickering. Star Carr was located on the western shore of this lake. The lake gradually infilled with peat, resulting in excellent preservation of organic remains.

Definition

Star Carr has dominated understandings of the British Mesolithic. This is partly due to the wide variety of organic finds recovered from this



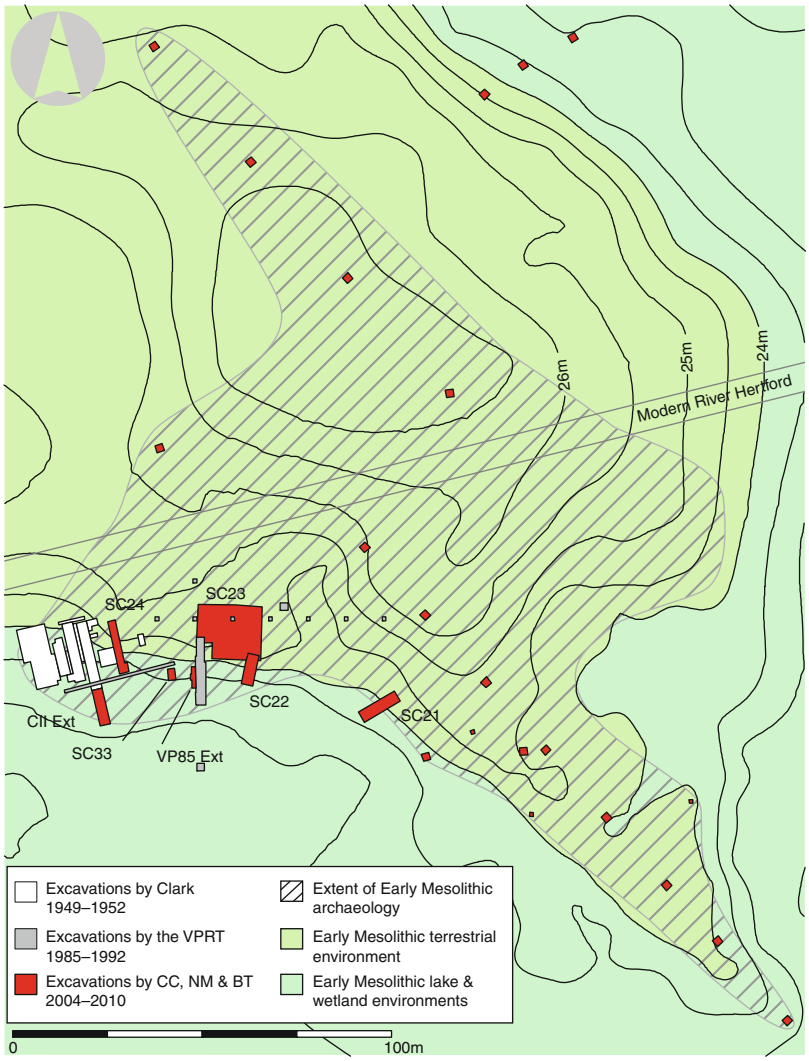
Star Carr, Archaeology of, Fig. 1 Location of the site (Image: Barry Taylor)

waterlogged site, but also due to the influence and interpretation of the original excavator, Grahame Clark. The site has been reanalyzed numerous times, with interpretations varying from a base camp, to a hunting camp, to a ritual site. In addition to Clark's excavations (1949–1951), fieldwork has been undertaken at the site in 1985 and 1989, and more recently between 2004 and 2011. These new excavations uncovered a large timber platform and a small dwelling structure.

Key Issues/Current Debates/Future Directions/Examples

The discovery of Star Carr was due to the exemplary work of a local archaeologist, John Moore, who had been surveying the Vale of Pickering for prehistoric flints since 1947. Star Carr was Moore's site 4, discovered when flint and bone was seen eroding from the edge of a drainage ditch. Moore sent some of the flints he had recovered to Grahame Clark at Cambridge (Clark 1954). Since the late 1930s, Clark had been dissatisfied with the sort of culture-history accounts he himself had undertaken for his Ph.D. Influenced by Scandinavian archaeology which had a long-standing history of interdisciplinary collaboration with the natural sciences, Clark sought a waterlogged site on which to test his new economic theories. Star Carr seemed the ideal candidate.

Clark spent three summer seasons between 1949 and 1951 at Star Carr. While Moore's excavations next to the drainage ditch revealed an extremely dense scatter of lithic material in the



Star Carr, Archaeology of, Fig. 2 Excavations at Star Carr (Image: Barry Taylor)

dryland area of the site, Clark focused on the wetland deposits because he was predominantly interested in the recovery of organic material (Fig. 2). A density of 36 pieces of flint per square yard was taken to delimit the limits of the occupied area, making a settlement 18 × 18 m in extent (Clark 1954). Using these criteria, Clark believed he had excavated the entire site and his subsequent interpretations were predicated on this supposition.

The excavation yielded an extremely broad range of material culture, while the waterlogged deposits, as Clark had hoped, produced numerous organic artifacts. Particularly impressive were 21 antler frontlets. These consisted of trimmed and attenuated red deer antlers, still attached to part of the skull. The interior of the skull had been smoothed, and two holes perforated, presumably to facilitate their use as headgear. Using ethnographic analogy, Clark suggested these could either be interpreted as hunting aids, or as costumes in ritual dances. In addition to the frontlets, stone, bone and tooth beads, elk antler mattocks, bone scrapers and bodkins and 191 barbed antler points were found. To give an indication of how significant these finds were, previously only six barbed points had been known from the whole of Britain. Also recovered were more than

a hundred grooved antler blanks, presumably intermediate stages in the manufacture of barbed points. Also present was an accumulation of wood, which Clark interpreted as an "occupation platform."

In addition to the worked wood, bone, and antler, faunal remains revealed that a wide variety of animals had been exploited: red deer, roe deer, elk, pig, and aurochs; also smaller creatures – hedgehog, hare, and beaver; a number of fur-bearing carnivores – pine marten, fox, dog, badger, and bear; and a great variety of different birds – crane, stork, red breasted mergaster, red throated diver, great crested grebe, little grebe, lapwing, buzzard, and duck. No fish bones were recovered. Pollen analysis revealed that the lake was surrounded by woodland of birch and pine, with willows by the lake edge. The lake itself was fringed with reedswamp, while waterlillies grew in the open water (Clark 1954).

The original site report (Clark 1954) sealed Star Carr's reputation. Clark interpreted Star Carr as a seasonal site, occupied by not more than four or five families for periods of midwinter and spring and abandoned in the summer. He inferred the presence of men by the recovery of hunting equipment, and women (and thus children), on the basis of analogy with Eskimo groups, from skin working equipment. Particularly important for the future directions of archaeological thought were Clark's considerations of seasonality and subsistence. He placed considerable emphasis on the seasonality data (Clark 1972), which Frazer and King inferred from the antlers of red and roe deer and elk to indicate winter occupation. Clark suggested the site had been occupied at least twice, on the basis of the observation that some charcoal spreads were separated by organic mud and also on vertical patterning in the distribution of barbed point types. The food remains would, it was estimated, have been sufficient to feed the occupants for 6 1/4 years; Clark, thus envisioned repeated visits at particular seasons over a period of years.

Although the site of Star Carr has subsequently undergone many revisions and reinterpretations, Clark's investigations remain an impressively vivid picture of the way of life of a group of Mesolithic hunter-gatherers. As an example of what can be achieved by asking new questions and examining new classes of data, they seemed to call into question the value of earlier excavations.

Two decades later, Clark returned to the Star Carr data in order to expand his interpretation of the site (Clark 1972). Influenced by the concept of the ecosystem, he undertook a site catchment analysis of Star Carr, listing the available resources during the supposed winter stay and relating the number of red deer in this territory to the calorific requirements of a human group and thus deducing the necessary level of the annual cull. Clark attempted to reconstruct the whole settlement system by suggesting, on the basis of the migration patterns of red deer, that human groups had a similar upland/summer, lowland/winter pattern as their prey and that the people who wintered at Star Carr spent their summers hunting deer on the North York Moors.

Following Clark's retirement in 1973, the site was the subject of numerous reinterpretations during the late 1970s and 1980s. Over these, the shadow of Clark's work loomed large, as subsequent commentators focused on similar concerns, namely, seasonality, site function, and the relationship of Star Carr to the surrounding environment.

Caulfield (1978), in an early review, made the point that the red deer MNI indicated by antlers substantially exceeds the MNI represented by postcranial remains. This suggests that, because of their use as raw material, red deer antlers were collected and cached, and thus should not be used to indicate the season of inhabitation. More recent authors have pointed out that though Star Carr was originally interpreted as a site of winter occupation, substantial evidence exists for a human presence at other times of the year. Jacobi (1978) pointed to the presence of newborn elk and roe deer, which were likely to have been killed in May or June and of unshed roe deer antlers, a feature habitually used to indicate

summer seasonality in southern Scandinavia. Grigson (1981) noted the presence of migratory birds which probably visited the area between May and June. The macrobotanical evidence reveals burnt reed shoots and aspen catkins which would have grown between March and June (Mellars & Dark 1998).

In their classic study of the site, Legge and Rowley-Conwy (1988) analyzed tooth-wear to assess seasonality of occupation. They found a clear pattern in the roe deer age structure, with all ageable animals appearing to have been killed in May or June, when the youngest animals were about one year old. The pattern among the other animals appears slightly more ambiguous, though Legge and Rowley-Conwy believe none are incompatible with an occupation lasting between May and September, or if an elk mandible is disregarded, between mid-May and the end of June. More recent work by Carter (1997, 1998) based on radiographs of red and roe deer tooth development suggests winter occupation, a return, after half a century to Clark's thesis. It should be noted though that these interpretations follow Clark in attempting to pin down a minimum season of occupation into which all evidence can be fitted; the evidence as it stands could equally encompass visits at a number of different seasons of the year, or even year round occupation.

Site function has equally been an area of some controversy. Some commentators have followed Clark in interpreting the site as a residential base camp (Pitts 1979; Price 1982). Others have suggested more specialist use as a camp for tanning hides (Pitts 1979), a butchery camp (Caulfield 1978), or as a kill site (Andresen et al. 1981). The main support for the interpretation of the site as a base camp is the rich material inventory and evidence of varied activities; the main evidence against is the faunal assemblage, which, with an emphasis on scapulae, mandibles, and lower limb bones does not suggest the sort of prime cuts of meat expected for a base camp. Legge and Rowley-Conwy (1988) compared the faunal assemblage with those recorded by Binford (1978) during his ethnoarchaeological work with the Nunamiut. They found closest similarity between Star Carr and a Nunamiut hunting camp. A hunting camp is a location where faunal remains are brought following minimal processing at the kill site. At the hunting camp more extensive processing of carcasses is carried out and the prime cuts and joints of meat removed to be consumed at the residential site.

While the faunal assemblage is undoubtedly unusual for a base camp, recent excavations at the site and the oral histories of site excavators indicate that Clark was extremely selective in his recovery of faunal remains. Only the best preserved pieces that were identifiable to species were retained. As a result, not too much should be read into the patterns of faunal representation. As many authors have commented (Jacobi 1978; Pitts 1979; Price 1982; Mellars & Dark 1998), attempts to find a single function or a single seasonality of occupation for such a large and complex site are doomed to failure.

In 1985 and 1989, small-scale excavations were undertaken at the site (Fig. 2). The 1985 trench was excavated by Tim Schadla-Hall and the Vale of Pickering Research Trust in order to collect environmental samples. Because it was believed that Star Carr had been excavated in its entirety, artifactual material was unexpected. However lithics, fauna, and a single barbed point were recovered. Most significant was the discovery of a platform of hewn aspen timbers. These were split timbers, lain parallel and perpendicular to the shore. Schadla-Hall's trench was extended in 1989 by Paul Mellars and a series of small testpits were excavated in the dryland area of the site; all produced lithic material, indicating the site was even larger than Clark had envisaged (Mellars & Dark 1998).

In addition to the discovery of the timber platform, the main achievement of the 1980s work came from Petra Dark's program of environmental work that accompanied it. As well as refining knowledge of the vegetation sequence, Dark used close interval radiocarbon dating of charcoal from her cores to elucidate the periodicity of occupation. She suggested, assuming

macrocharcoal as a proxy of human activity, that the site was visited for a period of around 80 years, followed by a gap of around 100 years, when occupation was rare, followed by a period of rather more intermittent occupation lasting around 150 years (Mellars & Dark 1998). These findings further highlight the complexity of the site and the problems associated with a single monolithic interpretation of the activity that generated it.

Further light has been thrown on Star Carr as a result of a long-term survey of the shore of palaeolake Flixton by Tim Schadla-Hall between 1976 and 2005. In addition to the reconstruction of the palaeotopography through auger survey, 2 × 2 m testpits were excavated around the shore of the lake at 15 m intervals. This program has revealed numerous additional Mesolithic sites, and a greater understanding of the local context of Star Carr (Conneller & Schadla-Hall 2003). What is clear from this work is that Star Carr is unique in its local landscape. No other site has the same range of material culture. Clark recovered 191 barbed points at Star Carr; only two additional examples have been recovered from sites elsewhere in the Vale of Pickering, one from Moore's site Flixton 1 and one from Schadla-Hall's site, No Name Hill. No further beads or antler frontlets have been found.

Star Carr thus seems to represent a special place within the landscape of the Vale of Pickering. The site appears to have been a focus for the deposition of animal remains in the shallow waters of the lake edge (Connellier & Schadla-Hall 2003). The respectful, patterned deposition of animal remains can be witnessed among other early Mesolithic groups (e.g., Hansen 2003) and among contemporary hunter-gatherer groups, where it is seen as essential in order to ensure that animals continue to give themselves up to the hunter (e.g., Jordan 2003). At Star Carr, these actions appear most focused on the deposition of red deer antler, suggesting both that red deer was the most spiritually important animal and that the antlers (or perhaps the head more generally) were considered to represent the soul or essence of the deer (Conneller 2004).

In 2004, excavations led by Chantal Conneller, Nicky Milner, and Barry Taylor recommenced at Star Carr (Fig. 2). The first large-scale excavations of the dry land area of the site have revealed a small dwelling structure, consisting of a 2.5-m pit surrounded by a ring of posts 3.5 m in diameter. This structure is surrounded by dense scatters of lithic material and animal bone, indicating a wide range of activities were undertaken on the dry land. Furthermore, fieldwalking and testpitting indicate that a continuous spread of lithic material extends for c250 m. In the wetland area of the site, the wooden platform glimpsed in the 1980s excavations has been found to extend for at least 20 m along the lake edge, suggesting the sort of communal endeavor more commonly associated with Neolithic communities. However, the recent excavations have also revealed that Star Carr is under threat. Recent agricultural drainage has resulted in considerable peat shrinkage. Oxidation of the upper deposits, combined with a seasonally fluctuating water table, has concentrated highly acidic sulfates at the level of the wetland organic artifacts (Boreham et al. 2011). As a result, almost all the bone and antler has entirely decayed, while worked wood is now relatively poorly preserved. Though Star Carr is still yielding new information, in a relatively short period of time, the organic material that made it so famous will be lost forever.

Cross-References

- ▶ Clark, John Grahame Douglas
- ▶ Dog: Domestication
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ European Mesolithic: Geography and Culture
- ▶ Hunter-Gatherer Settlement and Mobility
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Star Carr: Environmental Archaeology

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Star Carr: Environmental Archaeology

Barry Taylor
Department of Archaeology, University of York, York, UK

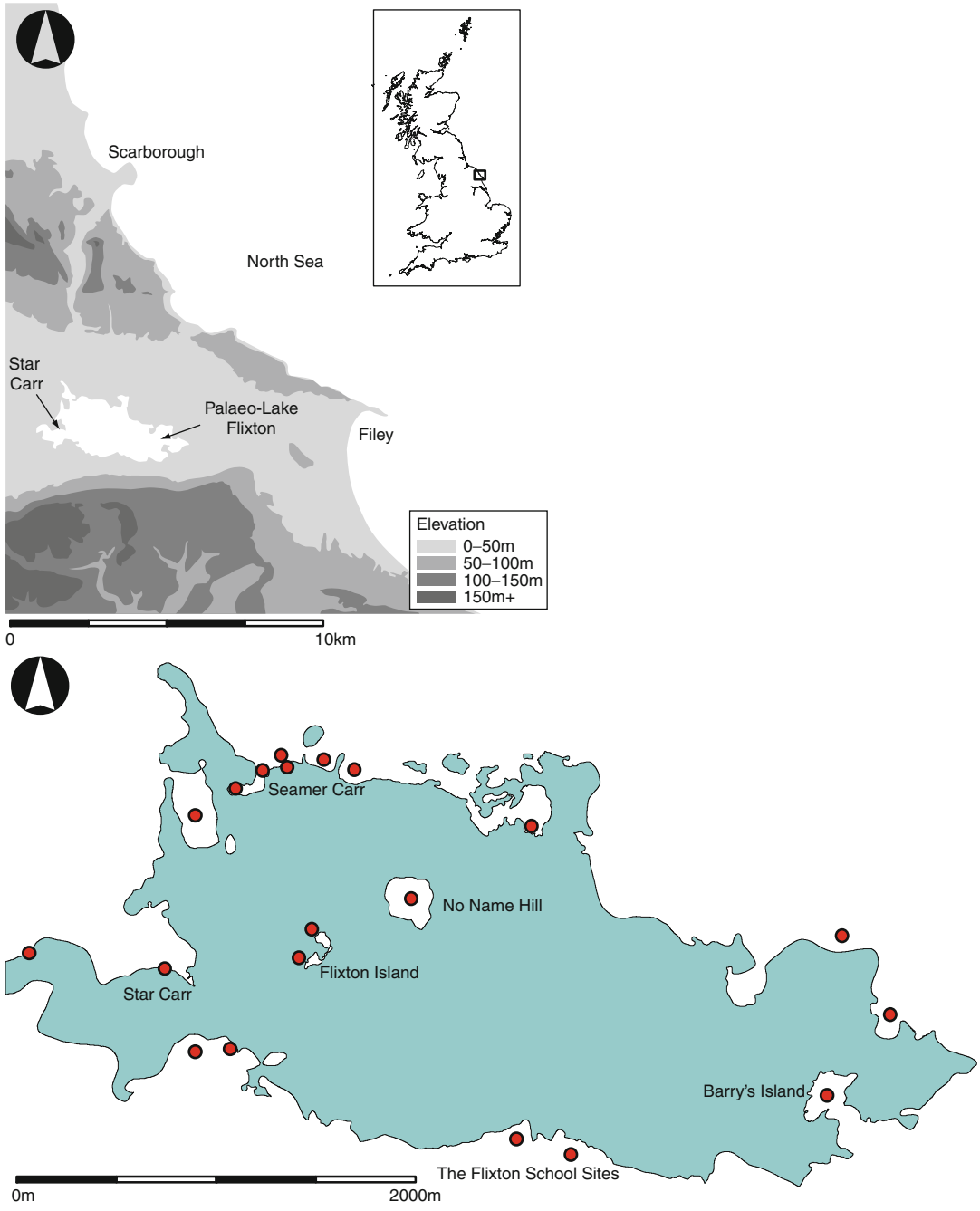
State of Knowledge and Current Debates

Introduction

Since its discovery in the late 1940s, Star Carr has remained one of the most famous, and perhaps most important, early Mesolithic sites in Britain. The wealth of archaeological material, including well-preserved organic remains, recorded at the site has revolutionized our understanding of the period. Analysis of the artifact assemblages has led to a new understanding of technological processes, such as antler working (Clark 1954; Elliot & Milner 2010), depositional practices (Chatterton 2003), and even the way Mesolithic people may have perceived and understood their world (Conneller 2004). The discovery of large structures, such as buildings and timber trackways, has also challenged traditional views of early Mesolithic society (Conneller et al. 2012). However, the importance of Star Carr also lies in the long tradition of paleoenvironmental research that has been carried out at the site. From the first excavations in 1949 to the current program of fieldwork, paleoenvironmental analysis has been undertaken as an integral component of the archaeological investigations. As well as describing the nature of the environments that formed at Star Carr, this work has helped to provide a chronology for the human occupation of the site, detected evidence for the deliberate management of plant communities, and described the way in which people responded to changes in the local environment. The result is a detailed record of how early prehistoric hunter-gatherers interacted with the world around them.

Background

Star Carr is an early Mesolithic wetland site located in the eastern Vale of Pickering (North



Star Carr: Environmental Archaeology, Fig. 1 (**a**) Location of Star Carr and the paleo-Lake Flixton in relation to Britain and (**b**) the relationship between Star Carr and other early Mesolithic sites around the paleo-Lake Flixton

Yorkshire, UK), a low-lying valley separating the uplands of the North York Moors and the Yorkshire Wolds (Fig. 1a). During the time the site was occupied (c. 9000–c. 8600 cal BCE), it lay on the shores of a large lake (the paleo-Lake Flixton) (Fig. 1b). By c. 6000 cal BCE, the lake had in-filled with deposits of marl, lake mud, and peat, while peat-forming wetlands had expanded

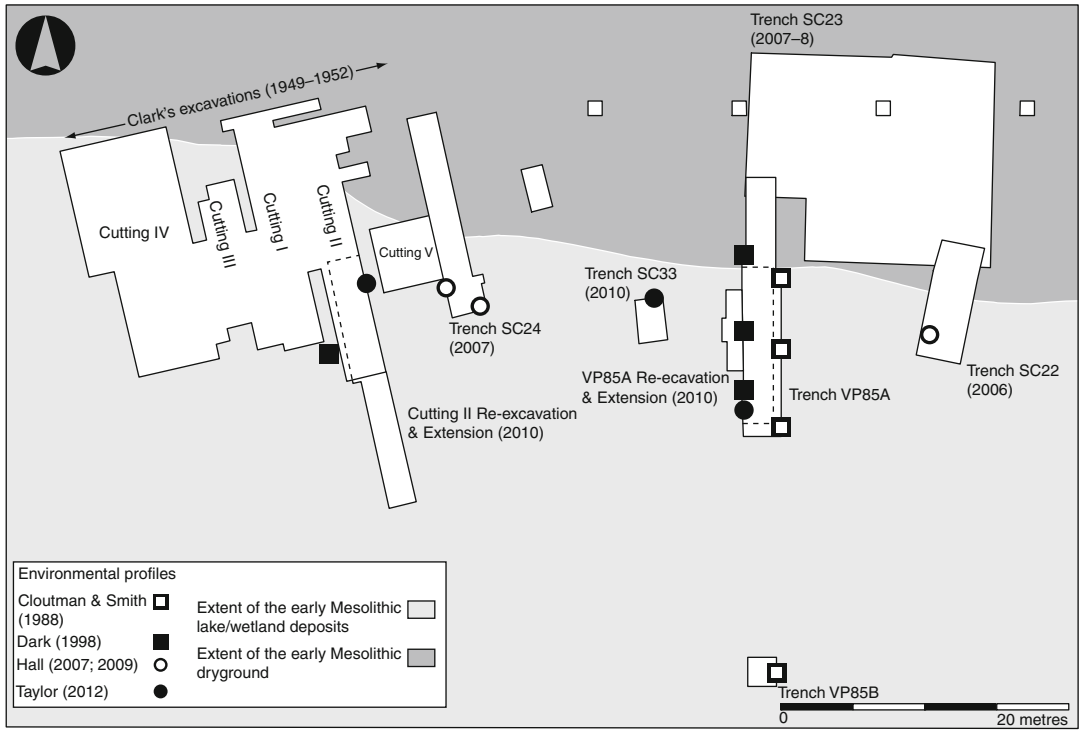
across the dry ground, burying the site and much of the surrounding landscape. This has helped to preserve a range of organic materials, including artifacts made from bone, wood, and antler, faunal remains, and plants and insects, that have provided a wealth of information on the lives of the people who lived at the site.

Evidence for Mesolithic activity at Star Carr was first recorded in the late 1940s by John Moore, but the site came to international attention through the excavations carried out by Grahame Clark between 1949 and 1951 (Clark 1954). For Clark, the importance of wetland sites to the understanding of the Mesolithic had been demonstrated by excavations in southern Scandinavia (such as Mullerup and Holmegård) and northern Germany (particularly Duvensee). The excavators of these sites had recorded a wealth of material culture made from bone, antler, and wood and had employed relatively new paleoenvironmental techniques, such as pollen analysis, to reconstruct the environmental conditions contemporary with the periods of occupation. Lamenting the absence of such sites in Britain and the lack of information they provided, Clark argued that it was necessary to "*. . . excavate in water-logged deposits, either in a bog settlement or immediately contiguous to a settlement on dry land, since here alone were the physical conditions necessary for the survival of a broad range of organic materials. . .*" (Clark 1954: xxi).

Clark's involvement with the Fenland Research Committee (FRC) in the 1930s had also shown how wetland sites could provide entirely new forms of evidence for past societies through the integration of archaeological and paleoenvironmental studies. The careful, systematic excavation of sites such as Peacock's Farm (Cambridgeshire) had allowed archaeological material to be related directly to the analysis of peat and other wetland sediments, pollen, and plant macrofossils. As well as providing information on the ecological setting of the sites, this also allowed archaeologists to consider how changes to the environment had affected patterns of human activity and how prehistoric communities had shaped and manipulated the local vegetation.

The preservation of pollen was particularly important as it provided a means to date sites by relating them to the known succession of vegetation that had developed across northern Europe. Such work had already been undertaken in Scandinavia, where a relative chronology for many of the Maglemosian sites, such as Mullerup, Svædborg, and Holmegård, had been established through the pioneering work of Knud Jessen, Tage Nilsson, and Johs Iverson (e.g., Nilsson 1947). By the late 1930s, Harry Godwin had established a comparable record of British vegetation and, with his wife Mary, had shown that pollen stratigraphy could be used to date artifacts in relation to the well-documented sites in Denmark and Sweden (Godwin & Godwin 1933). In the absence of direct forms of dating, this provided Clark with a method to relate artifact assemblages from Britain with those from continental Europe on the basis of chronology rather than the less reliable methods of typology.

Research into the environmental history of the lake had already begun several years before Clark's first excavations at Star Carr. During the mid-1940s, John Moore had started to record the sedimentary sequence within the basin, successfully identifying the presence of the paleo-lake (Moore 1951), and Harry Godwin had recorded a pollen profile from the area in 1948 (Clark 1954). However, Clark's work was at an altogether different scale, combining the techniques of archaeological and paleoenvironmental research to create a detailed record of the human occupation of the site. In this, Clark was heavily influenced by his work on the FRC, resuming his collaboration with Harry Godwin and engaging a range of other specialists from the Subdepartment of Quaternary Research at the University of Cambridge as well as individuals from numerous other institutions. He was also supported by several members of the zoology department at the British Museum, particularly Francis Fraser and Judith King who undertook the analysis of the faunal remains. This truly interdisciplinary study set a new standard for Mesolithic archaeology and began an era of well-integrated research that continues to this day.



Star Carr: Environmental Archaeology, Fig. 2 The main areas of excavation and the environmental sampling points at Star Carr (excavated areas are colored *white*)

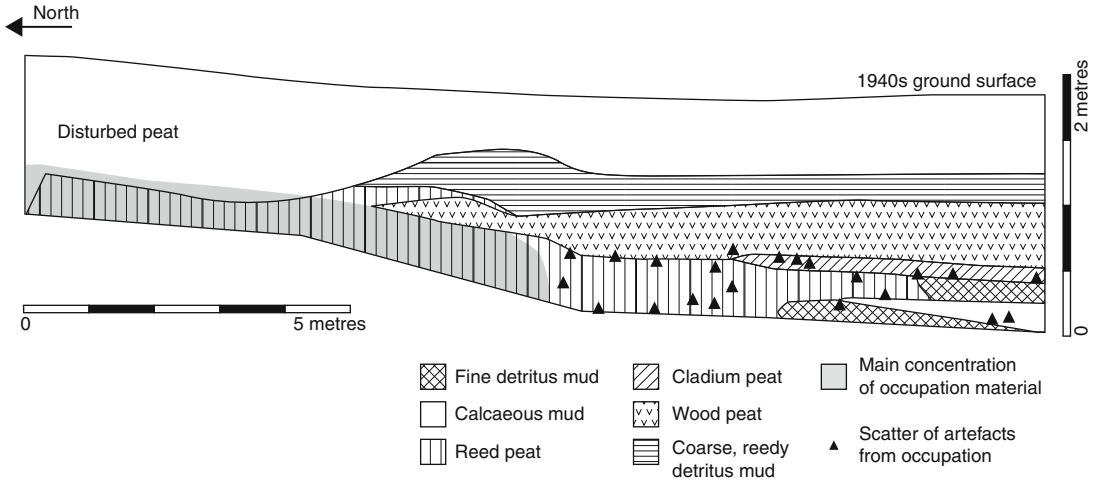
A History of Environmental Research

Clark, Godwin, and Walker 1949–1951

From the summer of 1949, Clark undertook three seasons of fieldwork at Star Carr, excavating a series of long trenches (referred to as cuttings), through the sediments that had formed at the edge of the lake (Clark 1954) (Fig. 2). During the course of these excavations, Clark recorded an incredible assemblage of bone and antler artifacts, as well as worked flint, antler-working waste, animal bone, and antler. Much of this material was associated with a deposit of largely unworked "birchwood," which Clark suggested had been deliberately laid down to form a stable surface, upon which the inhabitants of the site had lived (Clark 1954: 9).

While Clark undertook the excavations, Godwin and his student Donald Walker set about establishing the environmental history of the site through the analysis of the peat and lake sediments exposed in the trenches and the pollen and plant macrofossils that had been preserved within them (Clark 1954: 56-61). By relating the artifacts recorded by Clark to the site's stratigraphy, they were able to place the evidence for human activity within the environmental sequence and establish the ecological setting of the site during the time it was occupied (Clark 1954: 58) (Fig. 3). A series of cores were also taken through the sediments beyond the extent of the excavations, and the results were brought together to map the spatial extents of the environments that were contemporary with the occupation of the site (Clark 1954: 58).

The results of this work not only established the ecological context of the human inhabitation of Star Carr but also provided information on the site's economy and the timing and frequency of occupation. The paleoenvironmental analysis indicated that activity had taken place within an area of reedswamp that had formed at the edge of the lake, with aquatic vegetation growing in the deeper water and a wood of birch, willow, and aspen growing on the drier ground at the shore



Star Carr: Environmental Archaeology, Fig. 3 The peat stratigraphy recorded by Godwin and Walker and its relationship to the archaeological evidence for human activity (After Clark 1954: 59 Fig. 27a)

(Clark 1954). Although there was no evidence for deliberate management of the local vegetation (Clark 1954: 67), Clark suggested that at least some of the plant species present at the site may have been exploited for food, drawing parallels with other sites where plant remains had been recorded from domestic contexts (Clark 1954: 13-15). Godwin and Walker also noted that reeds had been able to grow within the main areas of activity (Clark 1954: 58), suggesting that the site had been uninhabited during the spring months (Clark 1954: 67).

As well as establishing the character of the environment at the site, Clark used the results of the pollen analysis to relate Star Carr chronologically to the Maglemosian sites of Northern Europe. Typological similarities had already been noted between these and sites in England on the basis of flint technologies, while Mary and Harry Godwin had used comparative pollen analysis to show that two antler harpoon points discovered in North Yorkshire were contemporary with Maglemosian examples from Denmark (Godwin & Godwin 1933). A comparison of the pollen data from Star Carr, however, showed that the site was earlier than many of the Danish sites, a finding that appeared to be supported by differences in both flint and antler-working techniques (Clark 1954: 179-180). This led Clark to conclude that Star Carr represented an earlier form of the Maglemosian "culture" that was still influenced by traits from the Upper Paleolithic (Clark 1954: 191).

In addition to the evidence from the ecological studies, Clark also made good use of the faunal remains that he had recorded from the excavations and that had been analyzed by Fraser and King. They identified the species of animals that were present and established the minimum number of individuals that were represented within the assemblage. On the basis of this analysis, they showed that the inhabitants of Star Carr had hunted a wide range of different animals but that red deer were the most important to the economy of the site. By calculating the approximate amount of meat produced by butchering these animals and estimating the dietary requirement of a postglacial hunter-gatherer, Clark also estimated the total length of time the site had been in use, which he placed at six and a quarter years (Clark 1954: 14-15).

However, by far the most significant (and highly debated) use of the faunal assemblage was in establishing the seasonality of the site. Based on the time of year that red deer are known to lose their antlers, Fraser and King argued that the unshed material must have come from animals that were hunted between

October and April (Clark 1954: 93), while shed antler could only have been collected in April (Clark 1954). From this it was argued that the site was occupied during the winter and spring months (Clark 1954) and that the inhabitants had moved to other locations during the summer. While this idea of seasonal mobility was largely implicit in Clark's original publications, he developed the idea further in his subsequent reanalysis of the site (Clark 1972). Here, he argued that the occupants of Star Carr had moved annually between lowland and upland locations as they followed migrating herds of red deer, an argument that was based upon behavioral studies of modern animal populations.

The Vale of Pickering Research Trust: 1985

In 1985 a new program of work was begun at the site, under the auspices of the Vale of Pickering Research Trust (Cloutman & Smith 1988). The Trust had been formed following the successful completion of the Seamer Carr Project, which had carried out extensive archaeological and paleoenvironmental surveys of the Mesolithic landscape along the northwest shore of Lake Flixton (Cloutman 1988a, b; Milner et al. 2011; Lane & Schadla-Hall forthcoming). Using the skills and experiences that had been gained from this, the Trust aimed to expand upon the work of Godwin and Walker by creating a more detailed pollen record at Star Carr (Mellars & Dark 1998: 14).

Although the work of Godwin and Walker was exemplary for its time, the scope of their interpretations was limited by some of the approaches they adopted. In particular, the pollen analysis, which had only been carried out on a single profile and recorded at a very low resolution, was unlikely to detect subtle or gradual changes to the local vegetation. This, combined with the lack of radiocarbon dates from the environmental sequence, made it impossible to determine the timing and nature of environmental change at the site. However, advances in the techniques of paleoecology, and particularly palynology, and the wider availability of radiocarbon dating provided the opportunity to establish a more comprehensive record of the environments at Star Carr.

Much of this work was carried out by Edward Cloutman, who had undertaken the surveys at Seamer Carr, and was supervised by Alan Smith, who had formerly worked with Godwin at the Subdepartment of Quaternary Research. Based on work they had carried out at other sites, Cloutman and Smith argued that pollen profiles from lake-edge deposits were heavily influenced by the local vegetation and provided an accurate record of the environment that had formed close to the point where the samples were obtained (Cloutman & Smith 1988: 43 & 53). As such, a series of pollen profiles recorded at intervals from the lake edge and into the basin would document the spatial extents of the wetland vegetation and its development through time (Cloutman & Smith 1988). To achieve this, two new trenches (VP85A & B) were excavated through the lake-edge deposits, approximately 25 m to the east of the area investigated by Clark, and a series of pollen profiles were recorded from points along their length (Cloutman & Smith 1988: 38) (Fig. 2). These were correlated using common horizons within the pollen and peat stratigraphies (Cloutman & Smith 1988: 48-51), and an absolute chronology was established by radiocarbon dating.

In contrast to the work carried out by Godwin and Walker, Cloutman and Smith showed that the lake-edge environments had developed throughout the time that Star Carr was occupied. The reedswamp, which had traditionally been associated with the occupation of the site, had expanded into the deeper parts of the lake during the first few centuries of the Mesolithic, and a drier, fern-dominated fen had developed closer to the shore (Cloutman & Smith 1988: 52). Based on the relationship between the pollen and peat stratigraphies and a small assemblage of artifacts recorded during the excavations, Cloutman and Smith argued that it was in this environment that activity had taken place. The pollen analysis also detected an area of wetter ground that had formed around the time the site was first inhabited. This appeared to have been stabilized by the construction of a timber platform, the remains of which had been recorded during the excavation of the trench (Cloutman & Smith 1988).

However, while Cloutman and Smith provided a very detailed record of the changing environments at Star Carr, the chronology established by the radiocarbon dates was problematic. To begin with, the samples taken from the base of the profiles predated the start of the Holocene, leading Cloutman to suggest that older material had become reworked and incorporated into the basal sediments (Cloutman & Smith 1988: 45). Furthermore, many of the dates clustered at c. 9500 BP, which Mellars, drawing on the results of recent dendrochronological work, subsequently argued, were the result of a radiocarbon plateau (Mellars 1990). This, along with the large error range of many of the determinations and the relatively low sample interval of the pollen analysis, made it difficult to establish the date and timing of environmental change in certain parts of the sequence (Cloutman & Smith 1988: 840).

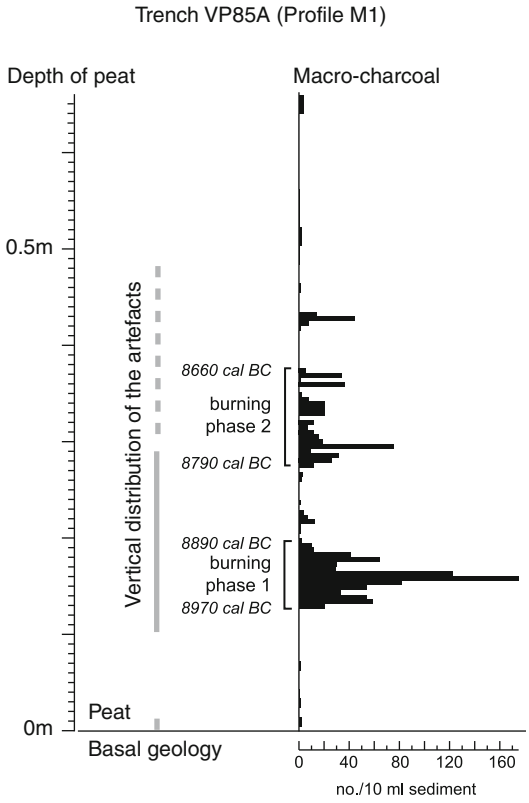
Paul Mellars and Petra Dark (Née Day): 1989–1992

It was partly in response to these concerns that a new program of research was undertaken at the site in the 1990s by Paul Mellars and Petra Dark, again with the support of the VPRT (Mellars & Dark 1998). As well as dealing with the issues of chronology, Dark also sought to refine the environmental record for the site through high-resolution pollen analysis (Mellars & Dark 1998: 112). This, she argued, had the potential to detect discrete changes to the local vegetation, which, if related to human action, could be used to establish the duration and season of occupation, as well as providing evidence for the exploitation of the local flora (Mellars & Dark 1998).

Between 1989 and 1992, three new pollen profiles were recorded from samples taken from Trench VP85A, while a fourth profile was recorded just to the south of Clark's excavations (Cutting II) (Fig. 2). As well as the analysis of pollen, micro- and macro-charcoal were recorded from all of the profiles to identify episodes of localized burning and relate this to evidence for vegetation disturbance (Mellars & Dark 1998: 115-6). A new radiocarbon chronology was also established from AMS dates obtained on terrestrial macrofossils (Mellars & Dark 1998: 117), and "wiggle matching" and Bayesian analysis were used to overcome the difficulties caused by the plateau in the calibration curve (Mellars & Dark 1998: 119-121).

Dark's research broadly supported the environmental sequence that had been outlined in previous work at the site, documenting the expansion of fen and carr across the former lake edge. However, Dark also argued that some of the changes to the wetland vegetation recorded by Cloutman and Smith were unlikely to be the result of natural plant succession (Mellars & Dark 1998: 155) but had, instead, resulted from the deliberate clearance of the lake-edge flora. The most significant of these was a rapid decline in grass (Poaceae) pollen, much of which was thought to have derived from *Phragmites* reeds, which corresponded with an increase in micro- and macro-charcoal (Mellars & Dark 1998: 130). This, Dark argued, had been caused by the deliberate clearance of the reedbeds by fire (Mellars & Dark 1998). A similar decline in grass pollen and a corresponding increase in charcoal was recorded from the profile to the south of Clark's Cutting II, suggesting that the reedswamp in this area was also cleared at around the same time (Mellars & Dark 1998: 158) and a second phase of burning occurred approximately a century later in both parts of the site (Mellars & Dark 1998: 157).

Dark also established the time of year that the first phase of burning occurred, based on the presence of carbonized fruits, bud scales, and juvenile reed tissue within the deposits, and used this to infer the season of occupation at the site (Dark 2004). She argued that the *minimum* period during which the burning took place was between late April and the end of August but that it could have occurred as early as late winter (February) and as late as the end of September (Dark 2004: 41-2). However, Dark noted that occupation did not have to be continuous and that the site may have been revisited at different times of the year. She also pointed out that plant remains would not be able to detect evidence for burning during the winter, as they do not produce identifiable structures, such as fruits or bud scales at this time of the year (Dark 2004: 42).



Star Carr: Environmental Archaeology, Fig. 4 Concentrations of charcoal and the vertical distribution of artifacts in Trench VP85A (After Dark et al. 2006: 189)

Both the evidence for burning and the revised dating of the environmental sequence were also used to establish a chronology for human activity at Star Carr. First, Paul Mellars compared the vertical distribution of the artifacts in VP85A with the dated peat stratigraphy, which suggested that the archaeological assemblage had been deposited over a period from c. 8700 to c. 8400 cal BCE (Mellars & Dark 1998: 210). Subsequently, Dark used the deliberate burning of the local vegetation to establish a more detailed chronology of the site (Dark et al. 2006). Based on the dating of the charcoal record, she argued that the first phase of burning began c. 8970 cal BCE, lasted for approximately 80 years (slightly longer at Clark's site), and was broadly synchronous across the site (Mellars & Dark 1998: 159; Dark et al. 2006: 191). In both of the trenches, it also coincided stratigraphically with the larger part of the artifact assemblage, leading Dark et al. to suggest that it represented the main period of occupation (Dark et al. 2006: 191) (Fig. 4). A second phase of burning occurred in the area around VP85A from c. 8790 cal BCE, lasting 130 years, while a further episode occurred approximately a century later in the area covered by Clark's excavations. As these both corresponded with smaller quantities of artifacts, Dark et al. suggested that there had been "a shift in the main focus of activity to other parts of the lake edge zone" (Dark et al. 2006: 198). Crucially, direct dating of the faunal assemblage and material culture has broadly supported these interpretations (Dark et al. 2006; Conneller et al. 2009), indicating that the charcoal record is a reasonable proxy for human activity at the site.

Reinterpretations and Debates

In the decades following the publication of his excavations at Star Carr, Clark's interpretation of the site remained largely unchallenged. However, from the late 1970s, several key points of his work became the subject of extensive critique: the interpretation of the faunal assemblage and what this said about the time of year the site was occupied, and the seasonal basis for mobility and the depositional context of the artifact assemblage. In both cases, the debates surrounding these issues led to new interpretations of the function of the site and its relationship to the wider pattern of activity within the surrounding landscape.

Changing Interpretations of the Faunal Assemblage

Species Representation and the Season of Occupation

The analysis of the faunal assemblage from Star Carr formed the basis for Clark's interpretation of the site as a winter base camp, inhabited by seasonally mobile hunters following herds of migrating red deer. However, in the late 1970s, Seamus Caulfield (1978) argued that the original analysis and the conclusions drawn from it were fundamentally flawed. The central point of his

argument was that Fraser and King had included the shed and unshed red deer antler when calculating the number of animals represented in the assemblage and the time of year they had been killed (Caulfield 1978: 15). However, a reassessment of the data showed that the antler was overrepresented in comparison to the post-cranial elements of the skeleton, suggesting that it had been brought onto the site, possibly for use as raw material (Caulfield 1978: 18). As such, its inclusion by Fraser and King had over emphasized the importance of red deer and had produced a potentially inaccurate record of the time of year the site was occupied.

However, subsequent attempts to establish the seasonality of Star Carr based on the existing data met with mixed success. Discounting the red deer from the assemblage, Roger Jacobi (1978) argued that the faunal evidence indicated that activity had extended into the early summer. In contrast, Mike Pitts (1979) and John Andersen et al. (1981) used a combination of the botanical and the faunal evidence to argue that there was no single season of activity and that the site had either been occupied all year round (Pitts 1979: 33) or had been visited at different times of the year (Andresen et al. 1981). Based in part on the reassessment of the faunal assemblage, Andersen et al. also suggested that Star Carr had acted as a temporary hunting site, where animals had been killed and subsequently butchered, rather than an area of settlement (Andresen et al. 1981).

In the face of these varied and contradictory readings of the data, a comprehensive reanalysis of the faunal assemblage was carried out by Tony Legge and Peter Rowley-Conwy (1988). Accepting that the adult red deer crania with unshed antlers were an unreliable indicator of seasonality, they focused instead on the age-at-death profile of the younger animals based on tooth eruption data. This showed that young roe deer and, where age could be established, young red deer were being killed in the summer (Legge & Rowley-Conwy 1988: 25 & 38), while the presence of adult red deer crania that had shed their antler indicated a kill around April or May (Rowley-Conwy 1988: 30). Furthermore, only one individual (a juvenile elk) showed conclusive evidence for a kill later in the year (Rowley-Conwy 1988: 31-2), leading Legge and Rowley-Conwy to conclude that a summer occupation was most likely (Rowley-Conwy 1988: 94). These conclusions have since been refined through work carried out by Richard Carter who used radiographs of juvenile roe and red deer jaws to establish a more precise season of death. This showed that the young roe deer were killed slightly earlier in the year (Carter 1997 cited in Mellars & Dark 1998: 216), while at least one juvenile red deer was probably killed in the winter (Carter 1998: 855).

Drawing together the work of Carter, Legge and Rowley-Conwy, and Dark, Mellars argued that Star Carr was probably occupied between late spring (April/March) and early summer (June or early July) (Mellars & Dark 1998: 216). However, the ability to draw such conclusions from faunal and botanical data has been criticized by a number of researchers. Nicky Milner, for example, has argued that inferring the season of occupation on the basis of faunal data is fraught with difficulties, noting in particular that seasonally diagnostic material can be imported onto a site (as was the case with the red deer antlers) and that some activities leave no evidence of when they were undertaken (Milner 2005a: 34). Furthermore, indicators of activity at different times of the year are often assumed to form part of the same phase of occupation, rather than separate episodes of activity carried out on separate visits to the site (Milner 2005b: 58). As such, they tend to reduce variable and complex behavior into a single seasonal event (Milner 2005b).

With this in mind, the data from Star Carr could easily reflect multiple visits to the site at different times of the year, especially if the apparently anomalous evidence for the hunting of animals in autumn and winter that was recorded by both Legge and Rowley-Conwy (1988) and Carter (1998) is considered. This point has also been made by Dark, who has stated that while the evidence for burning at Star Carr spanned several months of the year, occupation at the site may have been more intermittent and that the data could reflect a series of discrete events

(Dark 2004: 42). It is also important to note that none of the seasonally diagnostic material has been dated and that the evidence for activities in different months may not be contemporary. Overall, the evidence for a single season of occupation is far from unambiguous, and it remains possible that the site was visited on multiple occasions throughout much, if not all, of the year.

The Economic and Seasonal Basis for Mobility

Clark's model of a seasonal pattern of upland-lowland migration has also been critiqued, most notably by Legge and Rowley-Conwy (1988). They argued that the studies of red deer behavior that Clark drew upon were not applicable to Star Carr as they were based on open rather than wooded landscapes (Legge & Rowley-Conwy 1988: 13). Furthermore, they noted that deer in wooded environments do not migrate over long distances and would not necessarily have been absent from the vicinity of Star Carr during the summer season (Legge & Rowley-Conwy 1988). Similarly, they argued that the other animals that were being hunted and killed at Star Carr either were nonmigratory or would have been present in the area during the time of year the site was occupied (Legge & Rowley-Conwy 1988: 38).

But while the specific details of Clark's argument have been critiqued, the underlying assumption that Star Carr related to a wider pattern of seasonal mobility and resource procurement has persisted. Legge and Rowley-Conwy, for example, suggested contact between Lake Flixton and the nearby coastal areas, stating that these would have provided a range of resources "at seasons complimentary to that in which Star Carr is known to have been occupied" (Legge & Rowley-Conwy 1988: 95). This initially found some support from carbon isotope analysis carried out on the remains of a Mesolithic dog at Seamer Carr (Site K), just 1,200 m to the northeast of Star Carr, which showed evidence for a significant marine component to its diet (Clutton-Brock & Noe-Nygaard 1990) (see Fig. 1b). Arguing that the results could serve as a proxy for the diet of humans (Clutton-Brock & Noe-Nygaard 1990: 649), Clutton-Brock and Noe-Nygaard suggested that the inhabitants of Seamer Carr spent most of their time at the coast and that the sites around Lake Flixton (including Star Carr) represented temporary inland hunting stations (Clutton-Brock & Noe-Nygaard 1990: 650).

However, the veracity of this argument has been questioned on both methodological and interpretive grounds. To begin with, Petra Dark argued that the marine values were the result of carbon from the lake water entering the food chain via animals grazing on aquatic plants (Day 1996), though this has been refuted by Rick Schulting and Mike Richards (2002, 2009). Schulting and Richards (2002) have also questioned whether the diet of a single animal is representative of patterns of human activity spanning several centuries. As they note, visits to the coast may have occurred infrequently and not necessarily as part of a seasonal inland-coastal migration, while the dog itself may have been traded and need not reflect the movement of a human population (Schulting & Richards 2002: 331). These critiques have been supported by a more recent isotopic study on the remains of two dogs from Star Carr, neither of which showed evidence for a marine diet (Schulting & Richards 2009: 502).

Alternative Interpretations of the Faunal Remains

While the interpretation of the faunal assemblage has been dominated by the debates surrounding seasonality, several researchers have focused on the cultural attitudes towards the animals themselves. In particular Pollard (2000), Chatterton (2003), and Conneller (2003, 2004; Conneller & Schadla-Hall 2003) have all suggested that elements of the faunal assemblage and the artifacts made from bone and antler may have been deposited through deliberate acts of disposal that were related to concepts of animal agency. Pollard and Chatterton have separately argued that this involved treating the remains of animals with respect in order to ensure successful hunts in the future (Pollard 2000: 125-6; Chatterton 2003: 78). Conneller has also taken a slightly different view, arguing that the artifacts made from red deer, and particularly the barbed points and the antler frontlets, were used in transformative

practices in which aspects of animal identity could be taken on by humans (Conneller & Schadla-Hall 2003: 102-3; Conneller 2004).

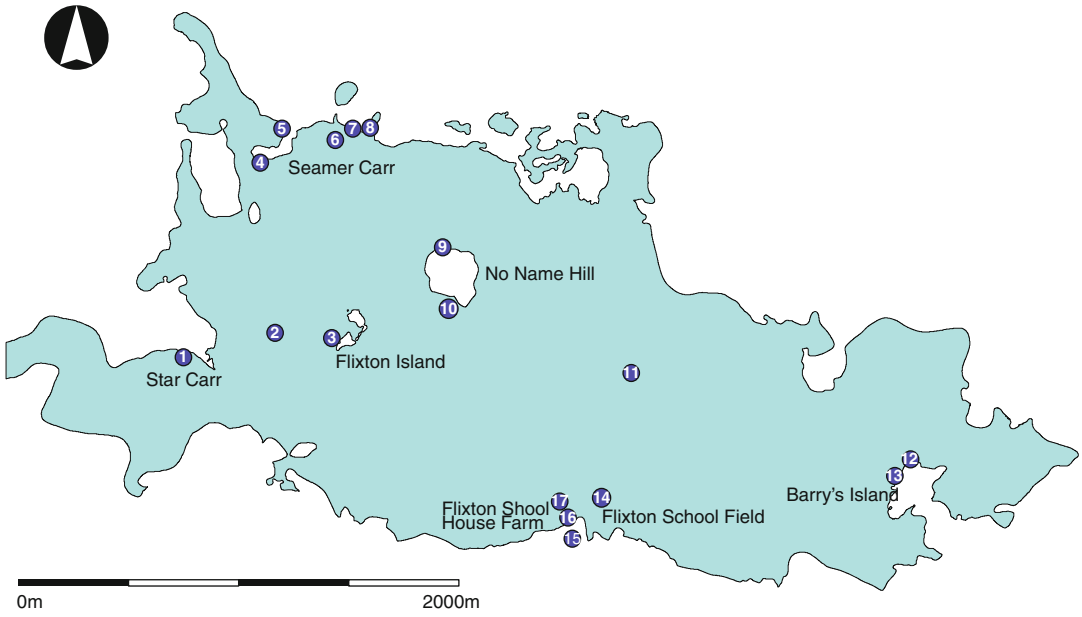
The Context of Deposition and Site Function

The depositional context of the material culture recorded by Clark has also been debated, leading to a number of reinterpretations of the forms of activity that the assemblage represents. Clark himself had argued that the artifacts had been deposited into an area of reedswamp that lay at the edge of the lake and represented an area of occupation (Clark 1954: 12). However, since the late 1970s, several archaeologists have argued that the assemblage was actually deposited into standing water, making it an unlikely place for inhabitation (e.g., Price 1982; Chatterton 2003). As a result, the assemblage has been variously reinterpreted as a dump of material discarded as waste, the remains of specialized craft activity (particularly tanning and antler working), or the results of culturally prescribed acts of deposition and disposal (e.g., Price 1982; Pitts 1979; Chatterton 2003; Conneller 2004). These reinterpretations have themselves been critiqued by Paul Mellars, who has argued strenuously in favor of Clark's original narrative (Mellars & Dark 1998; Mellars 2009).

Unfortunately, Clark's excavation records lack the necessary contextual detail to resolve this debate, and researchers have had to rely upon other, less direct, forms of evidence often leading to contradictory conclusions. Doug Price, for example, cited the preservation of the bone and antler to argue that they were deposited into standing water, while Paul Mellars used the spatial distribution of the flint artifacts to argue for in situ activity in a relatively drier environment (Price 1982; Mellars & Dark 1998: 218-221). Richard Chatterton has pointed out that the deposits from which much of the archaeological material was recorded contained aquatic plant material (Chatterton 2003: 70 citing Clark 1954: 58), though Mellars has countered this, suggesting that this could have been washed in by periodic flooding or represented the waste from plants collected for food (Mellars 2009: 506). Finally, both Chatterton and Mellars have used the paleoenvironmental work carried out by Dark to determine whether the area investigated by Clark would have been beneath or beyond the water level of the early Mesolithic lake (Chatterton 2003: 70; Mellars & Dark 1998: 221; Mellars 2009: 506). Unfortunately, alleged discrepancies in the topographic survey of the site (Mellars 2009: 506) have meant that the two authors came to very different conclusions.

However, recent archaeological and paleoenvironmental research at Star Carr has begun to resolve this issue. Since 2004 a new program of fieldwork has been carried out at the site, which has included the excavation of trenches through the lake-edge deposits and the re-excavation of some of the areas investigated by Clark and the VPRT (Milner et al. 2011; Conneller et al. 2012). This has recorded further evidence for Mesolithic activity, including timber platforms and artifact assemblages, as well as providing an opportunity for new paleoenvironmental investigations. In particular, the analysis of plant macrofossils taken from the section of Clark's Cutting II, VP85A, and several of the new trenches has provided a very detailed picture of the environments that were forming at the site (Hall et al. 2007; Hall 2009; Taylor 2012). By relating this work stratigraphically to the archaeological evidence, it has been possible to develop a precise contextual record of the various episodes of human activity (Taylor 2012).

This work has shown that there was no single context of deposition and that artifacts were deposited into a range of different environments, the nature and extent of which changed during the time the site was inhabited (Taylor 2012: 351; see also Taylor 2011: 78-80). The earliest artifacts were deposited into shallow standing water close to the lake shore, with swamp vegetation growing in situ. However, as the peat began to accumulate, the depth of water at the lake edge became shallower until the area eventually became terrestrialized, and trees and fen plants became established (Taylor 2012: 360). Yet despite the changing nature of these environments, artifacts continued to be deposited across the lake-edge wetlands. In some places, the material appears to have been discarded as waste from

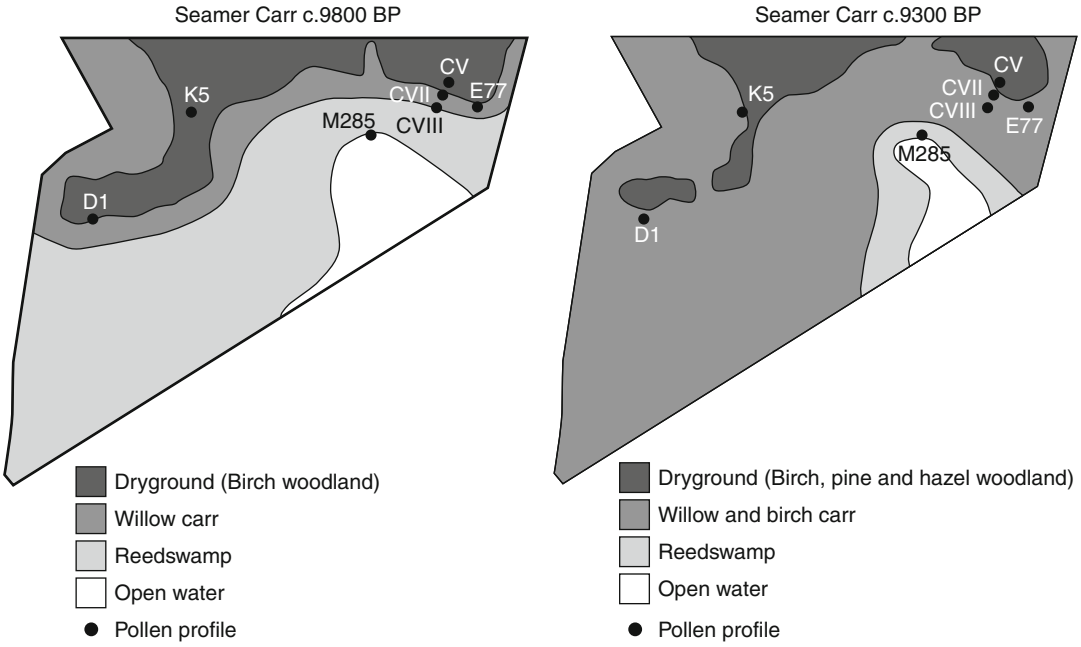


Star Carr: Environmental Archaeology, Fig. 5 Location of environmental profiles within the Lake Flixton basin (excluding those recorded by Godwin and Walker). *1* VP85A1-3 and VP85B (Cloutman & Smith 1988) and M1-3 and "Clark's site profile" (Mellars & Dark 1998), *2* deep lake profile (Mellars & Dark 1998), *3* AK87 (Lane & Schadla-Hall Forthcoming), *4* D1 (Cloutman 1988b), *5* K2 and 5 (Cloutman 1988b), *6* M285 (Cloutman 1988b), *7* CV, CVII, and CVIII (Cloutman 1988b), *8* E77 (Cloutman 1988b), *9* NAQ and NAZ (Cummins 2003, Taylor 2011 & 2012); *10* NM (Cummins 2003); *11* profile D (Cummins 2003); *12* LAL (Cummins 2003); *13* LAP (Cummins 2003); *14* FS95 (Cummins 2003); *15* PCC (Cummins 2003); *16* Trench F (Taylor 2011 & 2012); and *17* core 1(Taylor 2011 & 2012)

nearby areas of craft activity; in others, it may have been deposited more deliberately, while in some parts of the site, the artifacts represent tasks that were being carried out in situ within the wetland environments (Taylor 2012: 351-2). What is more, the nature of activity associated with the wetlands changed as these environments developed. The use of the timber platforms, for example, occurs at a time when the depth of water was becoming shallower and conditions at the lake-edge boggier (Conneller et al. 2012). As the deposits began to form above the level of the lake and the wetlands became more terrestrialized, activities that had formerly taken place on the dry ground, such as antler working, were carried out within the fen itself (Taylor 2007). This explains some of the very contradictory interpretations of the site. Clark and subsequent researchers have treated the faunal and artifactual material as a single assemblage. However, the recent work has shown that the site is, in fact, a palimpsest, reflecting successive phases of activity, taking place in very different environments, and spanning several centuries. It is not, therefore, surprising that studies of the animal bone have been unable to show a single season of occupation nor that the material culture reflects very different forms of activity indicative of different types of environmental conditions. The key to understanding Star Carr is to appreciate the diverse character of activity and its relationship with the changing character of the wetland environments.

Paleoenvironmental Research in the Wider Landscape

Since the late 1940s, paleoenvironmental investigations have also been carried out across much of the basin, documenting the environmental history of the lake and establishing the ecological context of other areas of Mesolithic activity (Fig. 5). As at Star Carr, much of this work



Star Carr: Environmental Archaeology, Fig. 6 The spatial extents of the early Mesolithic wetland environments at Seamer Carr (After Cloutman 1988b: 33 Fig. 7)

has been carried out as part of archaeological investigations, creating a well-integrated record of both the human and environmental histories of the landscape.

The first large-scale investigations were carried out by Godwin and Walker who recorded the stratigraphy of the basin through a series of auger transects and used pollen and plant macrofossils to document the changing character of the wetland and terrestrial vegetation. Their results showed that the lake had formed at the start of the late glacial interstadial but had been colonized by swamp and fen environments during the Mesolithic, leading to the eventual in-filling of the basin (Clark 1954: 61-9). Since the mid-1970s, however, more intensive programs of work have been undertaken, first under the auspices of the Seamer Carr Project and then the VPRT, which have created a far more precise record of both the topography and the vegetational history of the area.

To begin with, large-scale auger surveys have been carried out across the former lake, mapping much of the buried Mesolithic land surface including almost all of the shore, the adjacent terrestrial landscape, and substantial parts of the basin (Cloutman 1988a; Lane & Schadla-Hall forthcoming). The augering has also recorded the sequence of sediments that formed within the lake, while pollen analysis has been carried out in order to document the changing patterns of vegetation. Perhaps the most intensive program of work was carried out at Seamer Carr by Cloutman, who recorded eight pollen profiles from locations along the shore, within the deeper lake margins and on the terrestrial landscape (Cloutman 1988b). By correlating these on the basis of common horizons within the pollen stratigraphies, Cloutman was able to map the expansion of different wetland environments into the lake as well as documenting changes to the adjacent terrestrial vegetation (Fig. 6). Since then, pollen profiles have been recorded by Jim Innes at Flixton Island (Lane & Schadla-Hall forthcoming) and by Gaynor Cummins at No Name Hill, Barry's Island, and Flixton School Field (Cummins 2003), establishing the character of the vegetation around each of these sites. Both Cummins (2003) and Dark (Mellars & Dark 1998) have also documented the regional pattern

of vegetation through the analysis of pollen from the deepest parts of the basin. More recently plant macrofossil analysis has been carried out at Flixton School House Farm and No Name Hill (Taylor 2011, 2012). At both sites profiles were recorded at intervals from the lake edge into the deeper lake margins and correlated using radiocarbon dates to provide a precise record of the timing of wetland succession (Taylor 2011; 2012).

When brought together, this work has created a very detailed record of the environments that were forming within and around the lake at the time that Star Carr was occupied. The lake itself was over 4.5 km long, with a complex and varied shoreline interspersed with embayments, small promontories, and larger hilly peninsulas (Taylor 2011: 65). Around much of the shore, low hills overlooked the lake, while areas of low-lying ground created small boggy hollows and seasonal ponds (Taylor 2011). By the start of the Mesolithic beds of *Phragmites* reed, sedges and other wetland plants were well established along much of the shore, with floating aquatic plants growing in the deeper water (e.g., Cummins 2003: 281). Along the shore, willow, aspen, and birch were growing at the water's edge, and birch woodland, interspersed with areas of open grassland, covered the surrounding terrestrial landscape (Cummins 2003: 280). As at Star Carr, these environments developed rapidly as the accumulation of sediments caused the lake to become shallower, allowing swamp vegetation to expand into the basin (e.g., Taylor 2011: 76). By c. 8500 cal BCE, the sediments at the lake edge were forming above the level of the lake, and fen plants and trees had begun to colonize the wetlands (Taylor 2011).

These analyses have also helped to show how Mesolithic people engaged with their environment. In a detailed study of the lithic assemblages from sites around the lake, Conneller observed that the assemblages that were recorded from the wetland deposits lacked evidence for in situ knapping and were dominated by flakes and blades (e.g., Conneller & Schadla-Hall 2003: 100). These, she argued, reflected the use of flint at the wetland's edge for tasks that included the cutting of material (Conneller & Schadla-Hall 2003: 100). Macrofossil analysis at one of these sites (No Name Hill) showed that some of the flint had been deposited into reedswamp that was growing in shallow standing water over 5 m from the shore (Taylor 2011: 77). This, it has been argued, showed that people were carrying out tasks *within* the wetlands, possibly including the clearance or collection of reeds for use as food or raw materials (Taylor 2011). Other parts of the flint assemblage, again dominated by flakes and blades, had been deposited in waterlogged sediments that had formed at or close to the shore (Taylor 2011). Although this material may reflect a range of different activities, it is possible that part of the assemblage was deposited while working antler, as several pieces of antler-working waste were recorded nearby (Taylor 2011).

As at Star Carr, there is also evidence that Mesolithic people were deliberately manipulating and managing the wetland vegetation in the wider landscape. High-resolution pollen and charcoal analysis carried out by Cummins has shown that the reed and sedge beds at No Name Hill and Flixton School Field were cleared by burning for prolonged periods and on multiple occasions (Cummins 2003). Although the reason for the burning is debated, the most common argument is that it formed part of an economic strategy that was designed to maintain predictable and reliable resources around the landscape. Regular burning of the reed beds would, for example, increase their biomass and encourage their expansion while at the same time preventing other plants from colonizing the area (e.g., Mellars & Dark 1998: 231; Cummins 2003: 297). This would create large, productive, stands of reeds that could then be exploited for either food or raw materials. Alternatively, it has been argued that the burning of the reeds would promote the growth of young shoots and create openings at the edge of the lake, attracting animals to the area and making them easier to hunt (Cummins 298-9; Mellars & Dark 1998: 231-2).

The environmental work that has taken place around the former lake has also helped to relate Star Carr to the pattern of activity within

the surrounding landscape. Cummins, for example, showed that activity at other locations around the lake (No Name Hill and Flixton School Field) was broadly contemporary with Star Carr, based on the dates for the charcoal sequences at each of the sites (Cummins 2003: 292). As at Star Carr, the dating of the charcoal records from these sites also showed that they were occupied (or revisited) for decades at a time (Cummins 2003: 291-2). Similarly, the macrofossil analysis at No Name Hill has shown that activity within the wetlands spanned the period over which these environments changed, with evidence for tool use within the swamp and the later fen and carr (Taylor 2011: 77-8). It also demonstrated that very similar kinds of activity were taking place in the same sorts of environment at the two sites. When seen in this context, it becomes clear that activity at Star Carr was part of a much broader pattern of occupation that was focused around the shores of the lake.

Conclusions

In the closing sentences of the Star Carr monograph, Clark wrote that his excavations had "opened up rather than closed a field of prehistoric research" (Clark 1954: 191), and it is a testament to the importance of the site that this statement remains true to this day. While Clark's work at Star Carr laid the foundations for Mesolithic archaeology in Britain, the subsequent reinterpretations and the new excavations they inspired not only have refined our knowledge of the site but also have changed the way we understand the period as a whole (Conneller 2003). The issues of seasonality that dominated discussions of the faunal assemblage throughout the 1970s and 1980s have led to more critical debates surrounding the idea of seasonal mobility during the early Mesolithic (e.g., Milner 2005a & b). Furthermore, renewed analyses of the faunal assemblage as well as the material culture from the site have led to altogether new approaches to the study of animals and how they may have been perceived by humans (e.g., Conneller 2004). Similarly, the traditional view of Mesolithic society as consisting of small, highly mobile groups has been challenged by many of the new discoveries at Star Carr: the deliberate manipulation of the environment, the temporally extensive nature of occupation, and the construction of large structural features such as trackways (Conneller et al. 2012). Writing almost 50 years after Clark, Conneller wrote that "to change our understanding of Star Carr is to change our understanding of the British Mesolithic itself" (Conneller 2003: 82). Let us hope that over the next 50 years, Star Carr will continue to challenge our perception of early Mesolithic societies.

Cross-References

- ▶ Clark, John Grahame Douglas
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ European Mesolithic: Geography and Culture
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Star Carr, Archaeology of

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Starosele Middle Paleolithic Site with Hominin Remains

Yuri E. Demidenko
Crimean Branch, Institute of Archaeology, National Ukrainian Academy of Sciences, Simferopol, Crimea, Ukraine

Introduction

The site of Starosele was discovered in the 1950s with Middle Paleolithic artifacts apparently associated with human child remains, possibly transitional to *Homo sapiens* or modern *Homo sapiens*. The discovery was seen as a kind of Eastern European sensation or mystery, mainly due to the Levantine Skhul/Qafzeh hominin discoveries also in Mousterian archaeological context, found in the 1930s. New excavations in the 1990s at Starosele have helped to clarify many archaeological, anthropological, and chronological aspects of the site's finds.

The site is located within the Kanly-Dere, a side, currently dry box canyon in Eocene limestones running north into the Bakhchisaraiskaya valley at the village of Starosele, now within the northern edge of the town of Bakhchisarai in southwestern Crimea. The site is not a cave as was suggested during its excavations in the 1950s but, as became certain during the 1990s excavations, rather an accumulation of sediments on a rock platform along the base of the eastern side of the canyon, 11–13 m above the canyon bottom.

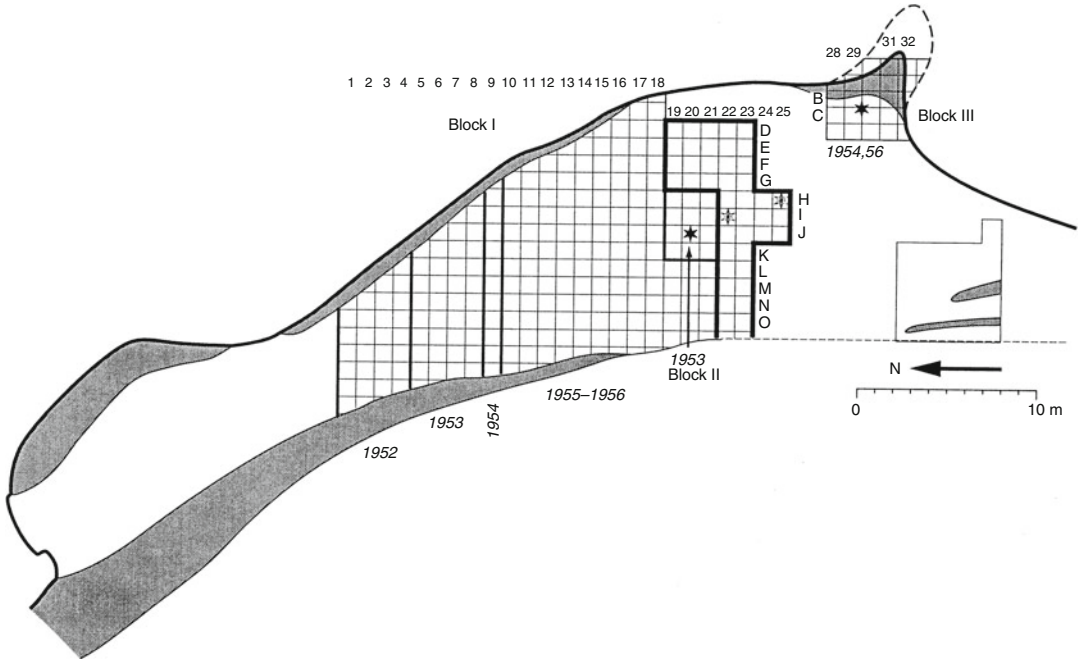
Key Issues/Current Debates/Future Directions/Examples

Starosele: Discovery and the 1950s Excavations

The Middle Paleolithic flint artifacts were found in 1952 on a rock platform in Kanly-Dere canyon by N.P. Katsur, an associate of the Bakhchisarai Museum. A young archaeologist from Moscow, A.A. Formozov, then conducted excavations there from 1952 to 1956. The excavation data were described in a series of articles and a book (Formozov 1958) and can be summarized as follows (see also Demidenko 1998).

Formozov excavated a total area of c. 250 sq. m (Fig. 1). Only during the last two field seasons, in 1955 and 1956, when c. 140 sq. m. were excavated in the main site area, were both a 1-m^2 grid system and several datum points established. Vertical subdivision of the deposits (with an overall thickness of 2–4 m) albeit with no separation of different lithological horizons was also done in 1955–1956 when artifacts and fauna were collected separately from deposits above and below a level of thick limestone slabs. In addition to abundant flint artifacts (c. 12,000 pieces) and fauna (c. 60,000 items), a human child burial was discovered in 1953; separate bones of an adult woman were identified only after the 1954 excavations during analysis of the fauna. The burial came to be known as the famous "Starosele child," while the other remains with fully *Homo sapiens* morphology were generally ignored.

Formozov himself came to the following conclusions after the first Starosele excavations: despite considerable vertical stratigraphic artifact



Starosele Middle Paleolithic Site with Hominin Remains, Fig. 1 Starosele site. Plan of the excavations at the site: the 1950s excavations, and the 1990s with heavier line. *Stars* indicate human burials: J-20 – 1953 Starosele child; C-29/30 – 1954 adult female remains found in fauna materials; I-22 – 1993 infant; H-25 – 1994 adult (Modified after Marks et al. 1996: Fig. 2)

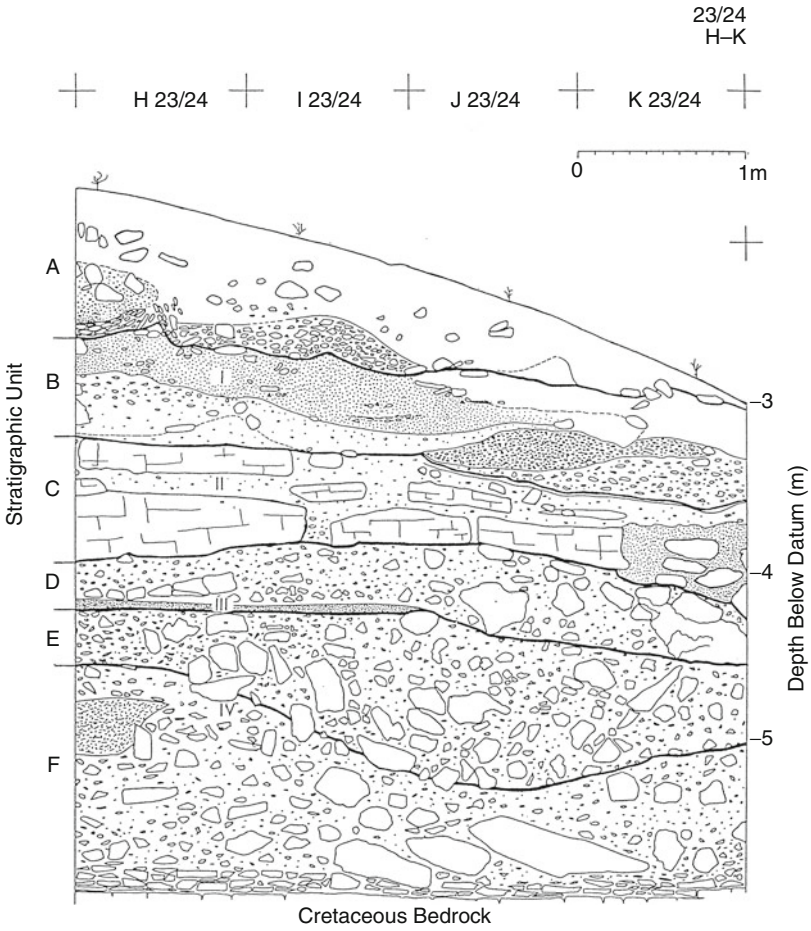
distribution, the site represented a continuous human occupation during the Last Interglacial, in the 1950s in Soviet archaeology considered to be Late Mousterian; the flint industry was homogeneous throughout the site and was Mousterian "with a bifacial tool tradition"; the Starosele humans were engaged in specialized hunting of *Equus hydruntinus*; the "Starosele child" was contemporaneous with the site's Mousterian occupation; and the child was evolutionarily "transitional" between Neanderthals and modern *Homo sapiens*.

Starosele: Interpretations after the 1950s Excavations

The Starosele geochronology was considered to be mainly Last Glacial due to the presence of mammoth, woolly rhinoceros, reindeer, and arctic fox (Ivanova 1965; Klein 1965).

Archaeologically, V.N. Gladilin (1976, 1985) proposed the most interesting and valuable interpretations for the Starosele lithic assemblages. He considered the industry to be a separate Starosele type within the East European Micoquian. Although he discussed the site's flints as a single unit, he noted some differences for artifacts above and below the limestone slabs. Accordingly, he considered Starosele to contain two Mousterian layers and hoped for future lithic analyses by layers rather than a single assemblage.

Such analyses were done by V.P. Chabai in the late 1980s in Moscow for his doctorate (Chabai 1991). The presence of Levallois radial cores in "layer 2" (below the limestone slabs) and their absence in "layer 1" (above the limestone slabs) was the only significant difference observed between the two assemblages in the Moscow collections after the 1955–1956 excavations. At the same time, the abundance of both unifacial and bifacial convergent points in both assemblages allowed Chabai to exclude Starosele from the Eastern Micoquian, defining it instead as a separate Crimean Mousterian industry of Starosele type with bifacial tools.



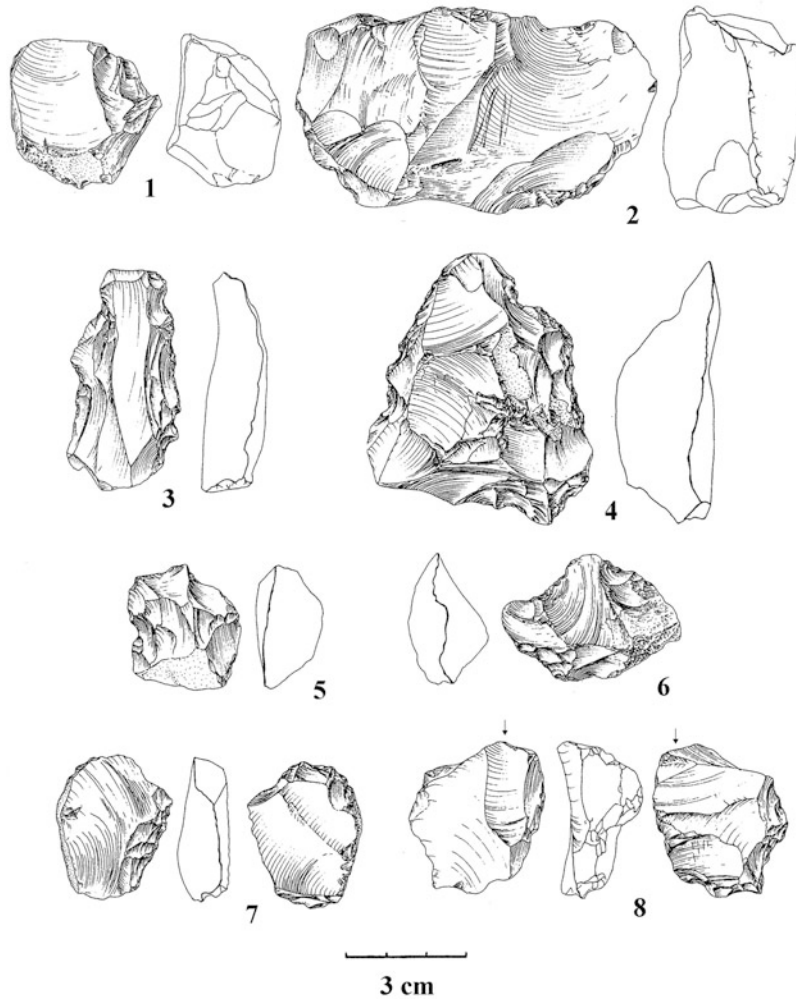
Starosele Middle Paleolithic Site with Hominin Remains, Fig. 2 Starosele site. East/west profile along line 23/24, squares H and K (2 m to the south of Formozov's 1956 profile). *I–IV* – archaeological levels; *A–F* – geological units (After C.R. Ferring) *A* – modern soil; *B* – complex of alluvial and colluvial sediments; *C* – exfoliated limestone slabs with layer of fine sediments in between; *D* – gravels and exfoliated limestone fragments; *E* – boulders in red clayey matrix (Modified after Marks et al. 1996: Fig. 4)

The Starosele child was also viewed differently by different specialists. Doubts were raised about the strict association of the child with the Mousterian layers (e.g., S.N. Zamyatnin, M. Gabori, R. Klein) as well as interpretation of its anatomic features as being transitional to modern *Homo sapiens* rather than fully modern (e.g., G.F. Debets, A. Thoma, V.P. Alexeev). There was thus no common agreement on either the nature of the archaeological context or the anthropological features of the child. It is also worth noting that the Starosele child was never anthropologically defined as a Neanderthal.

As a result, new excavations at Starosele were needed to clarify its geological and cultural stratigraphy, geochronology, and nature of the lithic assemblages throughout the stratigraphic sequence and potentially shed light on the nature of the human remains.

Starosele: The 1990s Excavations

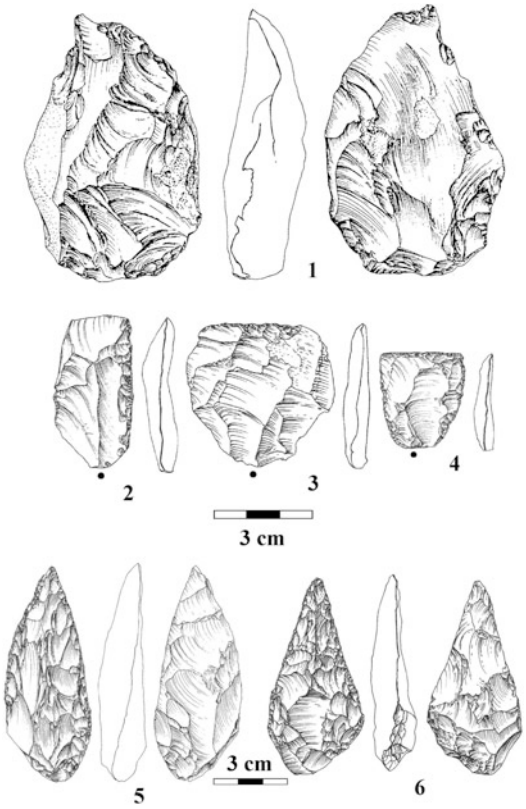
A joint Ukrainian-American research program directed by A.E. Marks was carried out in 1993–1995 (see also Marks et al. 1996; Marks et al. 1997; Marks & Chabai 1998; Marks & Monigal 1998; Chabai et al. 1999; Chabai 2004). An area of c. 40 m^2 was excavated near the southern edge of the 1956 excavation zone (Fig. 1). The c. 4-m-thick profile analyzed by R. Ferring showed the presence of various deposits of different origin (Fig. 2). Four stratigraphically distinct archaeological levels were identified within the sequence. Three of these levels – IV, II, and I (from bottom to top) – are comparable to the 1950s Middle Paleolithic flint industry, containing mainly points among bifacial tools, now attributed as the Starosele industry type of Crimean Micoquian Tradition (Fig. 3). But surprisingly,



Starosele Middle Paleolithic Site with Hominin Remains, Fig. 3 Starosele, level I –selected flint artifacts. *1–2* – cores; *3–4* – denticulates; *5–6* – notches; *7* – lateral end-scraper + ventral side-scraper; *8* – burin + perforator (Modified after Marks & Monigal 1998)

the level III assemblage lacks any such bifacial tools and at the time had no comparisons within the range of Crimean Middle Paleolithic industrial variability. It was only in the 2000s that the present author (Demidenko 2003–2004) demonstrated that the Starosele level III assemblage (Fig. 4) was quite similar to the assemblage from the lower layer at Kiik-Koba. A systematic dating program was also carried out, as well as analyses of the fauna, microfauna, and malacofauna recovered from the different archaeological levels. The proposed discontinuous geochronological sequence can be presented as follows: Early Last Glacial Interstadials (Amersfoort-Broerup & Odderade) for level IV, Lower Pleniglacial for level III, Moershoofd Interstadial for level II, and Hengelo Interstadial for level I.

Finally, new remains of modern humans were discovered during the 1990s excavations. A destroyed infant burial was found in 1993 protruding from Formozov's 1956 line 21 profile. An additional burial of a middle-aged adult was exposed in 1994, some 2 m south of this infant burial (Fig. 5). The infant burial had no clearly visible pit, but the skeleton lay fully within modern sediments, the top of Middle Paleolithic level 1 being some 10 cm below it. The adult burial had a clear burial pit originating in modern sediment and cutting through the Middle



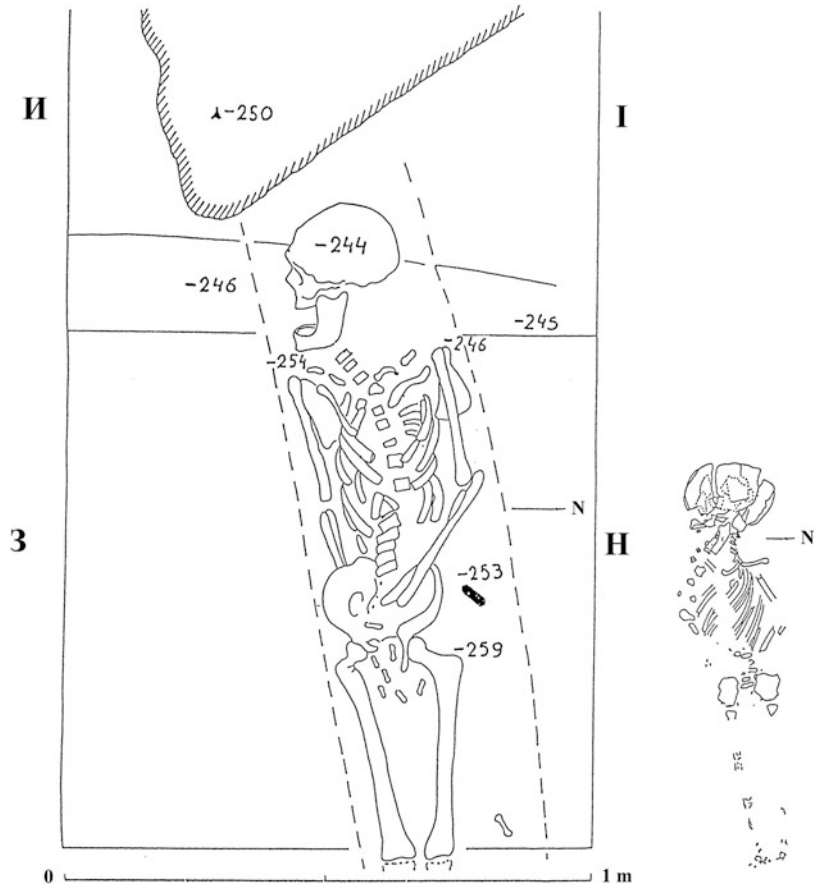
Starosele Middle Paleolithic Site with Hominin Remains, Fig. 4 Starosele, level III – selected flint artifacts. *1* – bifacial perform; *2–4* – various unifacial sidescrapers on bifacial reduction debitage; *5–6* – bifacial leaf points (Modified after Marks & Monigal 1998)

Paleolithic level I sediments, ending on the top of the exposed exfoliated limestone slabs. The infant burial included only the legs and feet, while the rest of the remains were most likely destroyed by Formozov's team when they sealed the 1956 southern profile. The infant's legs and feet indicate that the infant was buried in a semi-flexed position on its right side, with its head oriented to the west. The adult burial, with a complete skeleton in extended anatomical position, was oriented east–west with the head to the west and the face to the south. There were no grave goods, but some Middle Paleolithic flint artifacts and fauna were mixed into the pit fill.

There are many similarities between the 1950s Starosele child and the 1990s modern human burials that make their association highly likely (Fig. 5). All three burials are located within a small area in a line of c. 5 m. Both the 1950s child and the 1990s adult burials were in the same stratigraphic positions – below the uppermost Middle Paleolithic level, resting on top of the exfoliated limestone slabs. There were no grave goods, but some Middle Paleolithic artifacts and animal bones were found above them in the sediments. In addition, both skeletons were in the same position, with the same orientation. Such similarities between the 1990s clearly recent adult burial and the 1950s child burial considered to be of Middle Paleolithic age and being only 3 m apart seriously question the Middle Paleolithic affinity of the 1950s child. Moreover, it is well known that Kanly-Dere canyon was a traditional burial area during late medieval times and a seventeenth-/eighteenth-century Muslim cemetery existed about 100 m from the Starosele site. The two complete 1950s and 1990s human burials at Starosele reflect traditional Muslim burial practices with an extended position on the back, head to the west and face to the south, toward Mecca. Thus, both direct and indirect data strongly support the argument that all of the Starosele human burials, including the 1950s child, are of quite recent, clearly post-Paleolithic age.

Short Summary

The 1990s excavations at Starosele have led to many clarification of site context. Sediment deposition took place during the Last Glacial period over a long period from c. 100,000 to c. 40,000 BP. Human visits of the site were both frequent and episodic, likely separated one from another by no less than 5–10,000 years. Industrially, the Middle Paleolithic assemblages are grouped into two very different industry types – Micoquian (levels I, II, and IV) and Kiik-Koba, lower layer (level III) ones. Finally, the famous 1950s Starosele child is now accepted to be an intrusive late medieval burial with Muslim burial practices, like the other modern human burials discovered at the site.



Starosele Middle Paleolithic Site with Hominin Remains, Fig. 5 Starosele. Drawings of the 1994 adult burial and the 1953 child to scale, showing comparable body orientations and positions (Modified after Marks et al. 1996: Fig. 7).

Cross-References

- ▶ Crimean Middle Paleolithic
- ▶ Kiik-Koba Grotto: Significance for Paleolithic Studies in East Europe and the Former Soviet Union

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Statues and Monumental Art in Archaeology

Jo Anne Van Tilburg
The Cotsen Institute of Archaeology at UCLA, Los Angeles, CA, USA

Introduction

This entry samples a limited range of monumental art from selected archaeological sites in discrete environments within both continental and island settings. All are unique, yet there are discernible threads of common or contrasting human experience and expression. Monumental architecture and sculptural objects, no matter where they occur, are most often the original products of shared social and aesthetic values or religious belief. The upright bluestones of Stonehenge, the repeated notes echoed by the aligned stone statues of Easter Island, and the buried ceramic legions of Zi'an, China, were all inspired by an intensity of human commitment within societies that differed radically in terms of population size, natural resources, food production, and social organization.

Definition

Monumental art is defined here within the context of megalithism. It occurs widely, at all levels of social complexity and in differing local environments; as such, a universality of monumental art is claimed. Nonetheless, discrete development sequences vary according to regional phases or patterns (Mohen 1989: 285). Megalithic sites in Western Europe postdate the oldest painted caves of France, and most were built there c. 5,000 to 3,000 years before the Christian era. Megalithic cultures existed in the British Isles, Northern and Central Europe, the Near East, and the Central Mediterranean. Megalithism featuring earthworks and burial mounds occurs widely at pre-Columbian sites in the Western Hemisphere. Kalasasaya is an architectural complex near Pucara, Peru, including early zoomorphic stelae and later anthropomorphic sculpture. El Infiernito near the town of Ráquira, Colombia, produced megalithic burial structures. The Fraile stela and other monumental art objects in the Tiwanaku region are world famous. Megalithic sites in such places as Madagascar date to the eighteenth century.

Simply stated, a megalith is a large block of standing or upright stone (from the Greek *mega*, large, and *lithos*, stone). A single, isolated upright stone is a monolith (from the Greek *mono*, one, and *lithos*, stone; Fig. 1). Some upright stones in southern Spain, Portugal, Ireland, Scotland, and certain areas of France, whether isolated or clustered in groups, are embellished by incised or bas-relief symbols, most of which are curvilinear abstractions. Highly stylized representations of a corpulent female figure or the outlines of tools associated with male tasks or activities are also sometimes depicted. An iconographic continuity in such two-dimensional art over a wide area is evident. Explanations for similarities in basic symbols are often hotly contested; one interpretation draws on neuroscience and attributes such similarities to the ancient spiritual practice of shamanism (Lewis-Williams & Dowson 1988, 1990).

Megalithism is a function of burial practices and associated with peoples who were sedentary and practiced agriculture. Population and food production models for Neolithic societies are estimated on the basis of the size and extent of related megalithic remains. It is suggested that

Statues and Monumental Art in Archaeology, Fig. 1 Near Crear, Scotland, 2005, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

Statues and Monumental Art in Archaeology, Fig. 2 Rano Raraku, Easter Island (Rapa Nui), 2003, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

populations ranging from 100 to 10,000 persons created megalithic grave sites while living within areas of 3–100 km, respectively (Mohen 1989: 205). The trend over time is from multiple burials to individual graves, suggesting an evolution toward greater social stratification.

Monumental art evolved out of megalithism (Fig. 2). "Monument" and "monumental" are variously defined. It is defined here as an object that is of or related to a sepulcher and may include free-standing, three-dimensional figures as well as architectural embellishment. Figures may be either anthropomorphic or zoomorphic, although distinguishing features of both may be combined and in many areas further stylistic categories are defined (Van Tilburg 1991). Monumental art is characterized as being of good-quality material, immense in bulk or size, durable, and invoking memory. The precise size range varies with individual study areas or regions, and in nearly all cases relative scale is a far better indicator of monumentality than is total length or height.

The monumental art that is the most lasting and of greatest archaeological interest is most often wrought in stone but also fabricated of less durable clay, wood, fiber, and textiles. It is stone, however, that embodies, as material and medium, the virtues of density and durability that translate into symbolic values of power and longevity which, in turn, signal tradition and continuity (Van Tilburg 2006). These inherent qualities have made stone the material in which human culture groups of varying complexity have expressed a denial of time and rejection of death, asserted status, preserved memory, and professed belief.

Historical Background

Discerning the interaction of ancient architectural sites within discrete environments reveals an instructive range of practical, political, and aesthetic variables, as well as patterns of human choice and ecological stasis or change. Modern archaeologists are concerned with how natural resources were exploited by builders and pay close attention to how monumental art objects are situated relative to their respective ancient and contemporary landscape features. Most natural scientists today understand that climates are capable of radical change over long periods of time, and archaeologists, in turn, are concerned with how such changes impact the landscape within which megalithic art objects are situated or were once perceived.

For example, it has been shown in American deserts that basaltic and other hard and dense rocks, when their surface "skin" is broken, subsequently interact with the environment to, in effect, gradually "heal." This takes place over generations and is the result of the surface formation of a patina known as desert varnish. Ancient petroglyphs, created by carvers who incised, scratched, or otherwise pecked away stone surfaces with stone tools, are often re-varnished. More recently made petroglyphs are perceptively different in color, hue, and texture than older ones. This suggests that the stone's changing surface characteristics may be indicators of iconographic progression.

Enduring monumental art objects and architecture in many ancient cultures were produced when observation of the natural world was experimentally combined with human talent, experience, or belief. Nature's extravagant displays of shape and form, for example, may suggest to the perceptive artisan inherent and underlying principles of order. The wind-driven sand dunes of California's Death Valley are natural sculpture in motion. Monument Valley in Utah and the Grand Canyon of Arizona are, to even the unromantic eye, sensitive and captivating natural sculptural installations quite beyond the megalithic scale. The deep, dark caves of Paleolithic France and Spain surely played a role in aesthetic development and ritual behavior.

Statues and Monumental Art in Archaeology, Fig. 3 Tofuku-Ji Temple, Kyoto, Japan, 2000, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

In many cultures the organizing strategy of supernatural belief and social interaction that produced religion was fundamentally related to nature and to the transformative power of nature (Hunt et al. 2010). Many of the world's ancient religions appear to have revered nature. Even today, the Japanese religion Shintō teaches that rocks are endowed with special qualities deserving of respect. Rocks placed sensitively in the landscape are basic elements of Zen gardens (Fig. 3), and complex symbolic meanings are associated with their size, shape, color, texture, and position. A standing stone symbolizes the heavenly realm; a horizontally placed rock symbolizes earth, and a rock placed diagonally represents the whole of humanity.

Statues and Monumental Art in Archaeology, Fig. 4 Kanchipuram, India, 2000, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

Statues and Monumental Art in Archaeology, Fig. 5 Kanchipuram, India, 2000, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

Creation, procreation, fertility, fecundity, and human sexuality are often referenced in stone work embellishing mortuary or temple buildings, with monolithic male and female figures staged independently or paired (Figs. 4 and 5). Male and female genitalia are depicted both graphically and symbolically in two-dimensional rock art and three-dimensional sculpture of many cultures. At other times, the genitalia on sculptural objects are conspicuous in their absence. Major landscape features in some Pacific island cultures were conceptualized as parts of the human body, including especially male genitalia. Entire landscapes are sometimes seen as reclining or standing human figures, usually named for mythic heroes or gods. On the island of Tongareva in the Cook Islands, a sprawling, complicated, and sacred refuge site (*marae*) called Te Papa-o-Sokoau was constructed of stone walls laid out in the form of a headless, sexless human body (Kaeppler et al. 1993; Kaeppler 2008: 151).

The ancient Olmec emphasized the human head in their megalithic stone sculptural objects (Coe & Diehl 1980). They sculpted massive, elaborate portrait sculpture of ruling male personages embellished with the bas-relief signs and symbols of social status and leadership. These heavy objects, moved over great distances, were carved of specially quarried, dense, and dark basalt.

Social organization and the means of food production are two fundamental variables associated with monumental art. Easter Island (Rapa Nui) was organized as an Eastern Polynesian-type chiefdom, with 10 or 12 individual

patrilineal groups (usually described as "clans" or "tribes") descended from the sons of the founding ancestor. Over time, these lineages aligned as two large political entities characterized as confederations (Routledge 1919; Van Tilburg 1994). The ancient carvers created over 1,000 monumental sculptures in human form under this system, with about half of them transported to lineage agricultural lands bordered by traditional fishing grounds. There they were erected on stone platforms (*ahu*) and presided over what is inferred to be mortuary rituals. Most researchers agree that the vertical stone statues of Rapa Nui evolved from stone backrests raised on other Polynesian sacred sites.

Micronesia, on the other side of the Pacific, includes the Republic of Belau (Palau), the Yap Islands, Kosrae, and the Mariana Islands, among others. The matrilineal society of Palau (the Republic of Belau) raised large stone monoliths, some of which are carved with combined anthropomorphic and zoomorphic features. At Melekeok on the island of Babeldaob, a group of nine ancient and grotesque stone monoliths is known as the "Great Faces" (Van Tilburg 1991). Massive terraced earthworks on the same island were sculpted from natural hill formations.

In the Mariana Islands c. 1000 CE, elaborate wood structures known as *latte* houses were raised on monolithic stone columns and capstones that are, in fact, an abstraction of the upright human form. The largest of these structures, most of which served as community meeting houses, is found on the island of Tinian, northeast of Guam. There, one of 18 aligned *latte* is known as the House of Taga.

The megalithic, elite ceremonial center of Nan Madol is on the island of Pohnpei. The mortuary enclosure of Nandauwas is at the heart of the complex and its greatest megalithic achievement. Built sometime around 1200–1300 CE, Nan Madol is a sprawling marvel constructed of stacked prismatic basalt upon artificially created islets, canals, and inlets (Morgan 1988: 58–85).

In island Southeast Asia megalithic stone and wood statues, stone seats, and ornately embellished sacrificial posts are all known.

The Lapita culture emerged about 2,000 years before the Christian era, and its proximate center is in the Bismarck Archipelago. Lapita people spoke Austronesian languages, developed maritime traditions, and are considered to be the founding culture of Melanesia and Polynesia. On the Southeast Asian island of Nias, off the Sumatra coast, vertical stones, isolated or in groups, were called *behu* (Feldman 1988: 39, 49) and often carved as human figures and associated with chiefly houses and burials.

The ancient Aztec, in contrast to the less stratified societies of the Pacific island groups, created a vast and nearly unmanageable continental empire ruled by fearsome deities conceptualized in dual, quadruple, or quintuple forms (Pohl & Lyons 2010). Ornately carved and painted sculptural objects in clay and stone, as well as complex architectural figures, adorned monuments commissioned by rulers who demanded and extracted extravagant tribute from conquered peoples. Human sacrifice was considered a sacred duty and debt to the gods, and festivals were dedicated to warfare and the promotion of agricultural fertility. Religious ideology was inextricably linked to political supremacy, and monumental art supported rituals of idealistic communication and social domination.

Whether the project is a monumental, communal building task of epic social meaning, or a single statue carved at the behest of a powerful benefactor or commissioning chief, stone carving is a challenging task and valued skill in all cultures. Mastery of tools and technique is required but so, too, is a sensitive discernment of cultural values. Ancient craftspeople were required by the norms of their societies to capture and realize key emotional and spiritual content shared by their entire cultures. Most ancient stone sculpting traditions probably grew out of woodcarving, and large wood pole sculptures are the precursors to stone figures in many megalithic cultures. Quarrying, carving, and sculpting any stone require the reduction of resistant material rather than the building up of form that is the goal when other more pliable mediums such as clay or plaster are used. Stone carving was a profession of high status and power.

Statues and Monumental Art in Archaeology, Fig. 6 Bayon, Cambodia, 2009, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

Carvers formed guilds and secret societies with their own proprietary gods, goddesses, and priests. Members had their own emblems and insignia.

The aesthetic success of a three-dimensional carving requires the participation of the viewer as well as the creator. People brought up in Western cultures generally think they perceive three-dimensional form, but few realize that full perception is also the result of being trained to comprehend the empty spaces of landscape or architecture that give shape to objects. Contemplation of an ancient sculpture as an art object in a museum gallery, where it is far removed from its original context, cannot reveal the object's original charismatic or iconographic role and often leads to stereotypical conclusions of dubious value to understanding the past.

Sculpture that is truly three-dimensional should vary when it is looked at from different angles. Sculptures of the human form that are nearly symmetrical provide only half of the potential opportunity the viewer has to perceive the relationship between space and form, setting and object. Fully symmetrical human forms, however, are also unnatural, as anyone can see by studying their own face in a mirror. Symmetry analysis in anthropological perspective has relevance in our attempt to understand the patterns of communications established and facilitated by megalithic and other art forms (Washburn & Crowe 1988).

Sculptures that are presented in relief are most successful when at least some of their elements project outward from the wall (Fig. 6). On some sites the architects and sculptors of the past seem to have used the interplay of sun and shadow on walls carved in relief to create substantial visual drama. That achievement was probably an aspect of stating or creating power through the implied status of the building owners or through ideology.

The natural surface irregularities of unpolished stone are often incorporated into or enhanced as features of two-dimensional rock carvings. Nonrepresentational or supernatural figures of many types are common in the rock art and relief sculpture of many cultures. Uneven, coarse surfaces, natural stone texture, color discontinuation, and other stone surface anomalies often become valuable aesthetic or symbolic assets in carvings that blend opposite imagery (e.g., male/female or human/animal characteristics).

When prehistoric architecture passes into ruin yet continues to remain in the natural landscape of sun and shadow, it inevitably becomes aesthetically the same as a three-dimensional sculpture. Well-constructed stone walls are almost always sculptural, whether they are propped and chinked with skill and an eye to

Statues and Monumental Art in Archaeology, Fig. 7 Ta Prohm, Cambodia, 2009, David Scheinbaum, 2012 (Courtesy of Scheinbaum & Russek Ltd., Santa Fe, NM)

aesthetics or running in linear patterns across a challenging landscape. The ruins of Hadrian's Wall in northeastern England and the more intact Great Wall of China both elicit in modern viewers similar feelings of technological and aesthetic awe.

Key Issues/Current Debates

The study of megalithic cultures is concerned with reconstructing methods of sociopolitical complexity and mechanical engineering, the creation and implementation of ideological structures, iconographic analysis, the natural settings of sites, human and natural resources, and spatial and landscape analysis. Research questions are often posed within such theoretical constructs as experimental archaeology, cognitive archaeology, landscape and ecological archaeology, and iconography. Within each of these subfields are key issues and current debates.

A certain universality of symbol types common in two-dimensional rock art has been discerned in similar natural environment. The neuropsychology of iconography, as noted above, deals with these similarities and their longevity in human culture in the context of the religious beliefs of shamanism. However, also as noted, this interpretation has been aggressively challenged.

The engineering expertise of megalithic societies is examined within the research structure known as experimental archaeology. Sculptural replicas have been devised and manipulated to suggest ancient transport methods. In nearly all cases, common sense has prevailed or provided adequate guidance for these experiments, and variables are usually limited to wood, rope, and the countless hours of motivated human effort. Such methods are most insightful when they seek to elucidate patterns of social organization, religious belief, resource territory size, and food production methods that are well structured (Van Tilburg 1993; Van Tilburg & Arévalo Pakarati 2002; www.pbs.org/wgbh/nova/easter).

All archaeological sites, including especially megalithic sites, must be considered within the physical conditions that prevailed when the site was active (Vita-Finzi 1978). Modern archaeologists often survey large areas and conduct systematic studies of monumental object distribution and spatial patterning (Hodder & Orton 1976). Debate in recent years has dealt not only

with the occurrence of monumental art but also its relationship to natural resource depletion or destruction and social structure collapse. Key issues of global conservation in our modern world have been projected upon the peoples and cultures of the past. The trajectory of stylistic and other changes in monumental art is often related to political complexity but must be anchored by carefully constructed time frames.

International Perspectives

The stone architecture of Cambodia and the toppled statues of Easter Island are instantly recognizable as iconic symbols and graphic reminders that however durable stone is as a material, all prehistoric and other ancient stone buildings and sculpture will diminish with time (Fig. 7). Without strenuous and enlightened global preservation efforts, the forces of weather and time will inexorably wear away the surface of megalithic objects, and the sculptural material itself will ultimately be returned to the natural matrix from which it came. Loss of any part of our shared human heritage is indefensible because science and art pose as yet unanswered questions.

Future Directions

Monumental art often encourages cross-cultural comparisons. This is due to broad pattern similarities such as placement relative to mortuary sites. Yet each culture interacted with the natural environment in its own unique way. Each flourished because food production strategies resulted in surpluses allowing redistribution systems that underpinned building projects. Failure to sustain productivity and to integrate it with social growth is a recurring theme, and the theory of social and political systems collapse is based, in part, on the inferred mismanagement of human and natural resources. Understanding the motivations that created monumental art may provide insight into a more sustainable future.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Andes: Prehistoric Art
- ▶ Europe: Paleolithic Art
- ▶ Form in the Archaeology of Art
- ▶ "Motif" in the Archaeology of Art

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Stature Estimation

P. Willey
Anthropology Department, California State University, Chico, Chico, CA, USA

Introduction

The estimation of stature from human remains is important for understanding the osteoarchaeology of previous populations. Osteoarchaeology employs stature estimations to assess trends, document evolutionary and secular changes, and reveal geographic variation as well as sexual dimorphism and health. Because living conditions affect growth and ultimately affect size, adult stature may be altered. Osteoarchaeologists use information obtained from studying the relationship between stress, environment, and stature to compare better and more poorly adapted populations, and more affluent times with poorly adapted groups and more stressful periods.

In addition to applications involving past populations, stature estimations aid identification of more recently deceased unknown individuals in contemporary forensic contexts. Forensic anthropology uses skeletal stature estimation as part of a biological profile, including, for instance, sex, age, and ancestry. When combined with other characteristics, stature may include or exclude a missing individual as a potential match with a recovered skeleton or corpse. Authorities compare antemortem documents with postmortem stature estimations for further consideration of identification or for exclusion from a match.

Although the goals of the two areas differ, methods used to estimate stature are similar in both fields. The methods involve measurement of a whole skeleton or separate limb bones.

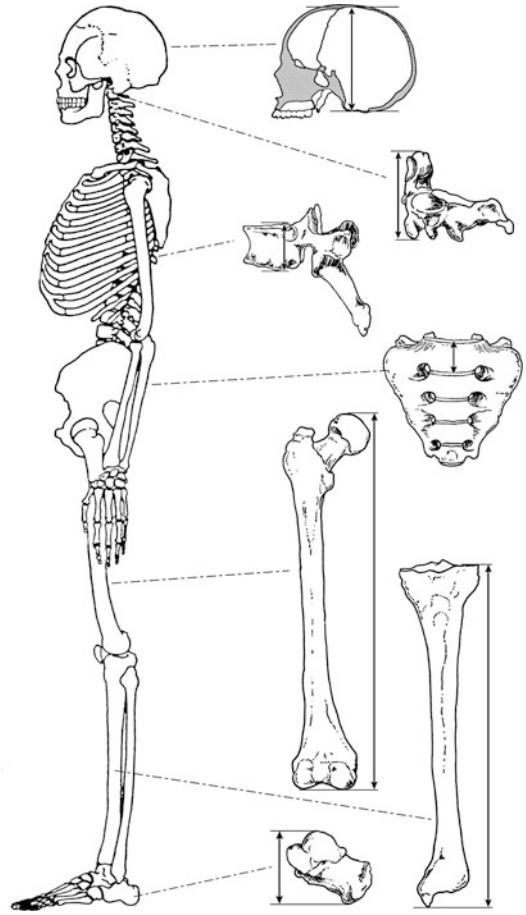
Definition

Stature is a living person's standing height, measured from the top of the head (vertex) to the ground surface while standing in an upright posture, heels placed together, and head positioned in the Frankfort Horizontal.

Approaches

Whether in osteoarchaeology or forensic anthropology, two basic approaches are utilized to estimate stature. The first approach is the whole skeleton or anatomical method (e.g., Fully & Pineau 1960; Raxter et al. 2006). It requires a complete or relatively complete skeleton. Further, its application demands time needed to measure all bone lengths and heights constituting living stature and summing those measurements. Bone lengths and heights measured for this technique (Fig. 1) include skull (basion-bregma), all vertebral body heights, first segment of sacrum, femur, tibia, and joined calcaneus-talus. The atlas and axis require special consideration. The axis body and dens epistrophis are included in the assessment, the latter serving as a proxy for atlas height, which is not measured. Following summation of these skeletal measurements, the soft tissue component contributing to living stature is included. Soft tissue height is estimated using the sum of skeletal elements provided as a set figure based on the summation's interval or by estimation with a regression formula.

Advantages of the whole skeleton/anatomical method approach include accuracy of stature estimation regardless of sex, ancestry, time period, and anomalous numbers of vertebrae. Disadvantages, on the other hand, consist of requiring an



Stature Estimation, Fig. 1 Measurements employed in estimating stature with the whole skeleton/anatomical method following (Raxter et al. 2006)

almost complete skeleton and time needed to measure and sum all elements contributing to height.

The second approach to stature estimation is the regression or mathematical method. One of Karl Pearson's earliest applications of his statistic involved estimating stature of archaeological remains. The mathematical method usually requires complete limb bones (e.g., Trotter 1970), although sometimes analysts employ fragmentary limb bones (e.g., Steele 1970) or smaller, non-limb bone elements (e.g., Holland 1995).

The regression method provides accurate stature estimations when sex, ancestry, and time period are known and if an appropriate standard for those parameters exists. Stature estimations employing this approach are most accurate for the middle of the sample's distribution, those individuals approaching the "average" height of the sample. Shortest and tallest individuals' stature estimations are less reliable. In addition to those previously mentioned parameters, the regression formula with the smallest standard error is the most accurate and should be employed to estimate stature.

The regression approach has advantages over the whole skeleton or anatomical approach if the skeleton is incomplete, or when time for measurement and summation is limited. Its disadvantages, on the other hand, are identifying and having available appropriate standards for the skeleton's sex, ancestry, and time period as well as being near the middle of the size distribution and having "normal" body proportions.

Sometimes both approaches (whole skeleton and regression) are combined to estimate stature. Skeletal or body components are measured and those measurements used in a regression formula to estimate living stature. Examples include regression formulae for flesh-covered, articulated spines, and separate vertebral bodies measured and summed (e.g., Tibbetts 1981).

Key Issues

Some issues related to stature estimation are common to both archaeological and forensic anthropological applications, while others differ depending on goals of the two endeavors. First, common concerns are discussed, and then those issues specific to forensic anthropology are presented, followed by those involving osteoarchaeology.

Common Issues

A person's stature during life varies by time of day (e.g., taller following a night's rest) and the method of measuring (e.g., taller with neck stretched), and presumably shows effects of inter- and intraobserver differences. Such challenges pale beside others, however. Most stature

estimation standards rely on adjusting corpse length to approximate living stature. Few – if any – stature estimation techniques employ base samples with known, measured statures of people while alive and those same individuals' bone lengths following death. This gap in documentation may impact the accuracy of stature estimations.

Issues Related to Forensic Anthropology

One of the aims of forensic anthropology is to identify missing persons, established, in part, by comparing a missing person's antemortem stature with postmortem stature estimation of a skeleton or corpse. Major challenges to making an accurate comparison include assessing antemortem stature records and considering age-related stature decrease of older adults.

Antemortem records often consist of self-reported heights, such as dimensions recorded on a person's driver's license. Those self-reported records may misrepresent actual stature, tending to overstate a person's measured stature. An innovative means of dealing with discrepancies between self-reported documents and actual measurements is "forensic stature" (Ousley 1995). Forensic stature estimates height recorded on self-reported documents rather than actual measured stature. Medical or military personnel records with measured heights may be more accurate sources of living stature than self-reported heights, but this accuracy depends in part on how long before death the measurements were made.

A second challenge in forensic anthropology involves stature decrease in older adults. As adults age, their statures diminish from those of their young adult maximums. Such "shrinkage" is usually attributed to compression and loss of soft tissues. The time when this decrease begins and the rate that it occurs are variously reported. Age when stature decrease commences ranges from 30 to 45 years, and after commencement the claimed rate of decrease varies from 0.6 to 1.6 mm/year or nonlinearly in an exponential fashion. If older adults' antemortem records are accurate and measurements are made near the time of persons' deaths, then age-related reductions in stature estimations should be included when reporting older adults' height estimations.

Issues Related to Bioarchaeology

Archaeological skeletal samples often differ by time period and ancestry from the regression standards employed to estimate stature. Therefore, archaeological applications using the mathematical/regression method pose additional challenges beyond those involved in forensic cases if they deviate from those parameters. On the other hand, the complete skeleton approach is appropriate regardless of body proportions that may change over time and differing ancestries. Unfortunately, complete skeletons are rare in archaeological series, requiring additional methodological modifications.

Combining the best of both approaches, some practitioners apply the anatomical method to those rare complete archaeological skeletons to reconstruct stature using the whole skeleton approach. Regression formulae for those skeletons are then derived employing reconstructed statures and limb bone lengths. The derived regression formulae are applied to other, less complete skeletons from the same time period and region where the standards are established. Alternately, other applications employ prone skeleton length measured in the grave as stature. Recent work, however, shows that skeletal grave lengths measure less than the anatomical method and underrepresent actual statures (Petersen 2011).

Future Directions

Although significant developments have been made in stature estimation during the last several decades, challenges remain.

Forensic Anthropology

The standards and approaches used today in forensic anthropology must be elaborated and developed. Stature estimation should make

continued statistical improvements (e.g., Konigsberg et al. 1998), analyze previously unstudied elements, identify the beginning and rate of age-related decrease in stature, and employ digital imaging techniques. In addition, forensic applications in previously unstudied groups require new stature estimation standards to assess their heights. As international attention turns to areas of recent strife, groups from Latin America, southeastern Europe, Near East, and Africa require special attention in this regard.

Estimating stature from soft-tissue-covered bodies and body segments is a research area ripe for investigation. In mass fatality events (as well as mummified remains from archaeological sites), soft tissues may cloak the skeleton. Lacking time, equipment, or authorization for maceration, stature often goes unestimated. Several recent studies use body segment dimensions to establish height (e.g., Adams & Herrmann 2009). Such approaches employ vertebral column segments, limb lengths, although smaller body segments (e.g., hands and feet) may be useful. Body portion data from anthropometric surveys of living groups exist, and those dimensions provide the raw data needed for accurate stature estimations from body segments.

Subadult stature estimation methods must be developed too. Infants, children, and adolescents die in forensic contexts, and those subadults need identification too. The whole skeleton technique is applicable to estimating stature of subadult remains if the skeleton is complete, has all epiphyses present, and an accurate soft tissue figure can be determined. In most cases, however, there are practical problems with this approach from loss of smaller, fragile elements (e.g., Sutphin & Ross 2011). Employing limb bone diaphyseal lengths in mathematical formulae to estimate stature may be fruitful (e.g., Smith 2007). Beyond the challenges previously mentioned inherent in adult samples (time period, ancestry, and sex), subadult growth allometry (changing proportions among limbs-stature and limbs-trunk-stature) is an additional hurdle requiring attention.

Archaeology

Because applicability of sex, age, and temporally related body portions of modern standards to prehistoric specimens is poorly known, unique approaches have been suggested to overcome these deficiencies. Avoiding the uncertainty and incompleteness of most archaeological skeletons, limb bone lengths (usually femur or tibia) serve as a proxy for overall height. The bone lengths are presented alone without estimating stature. The potential problem with this approach involves allometric changes in trunk-limb and/or interlimb bone ratios through time. Such allometric changes may obscure sexual dimorphism and secular trends.

Application

In previous sections, general principles, challenges, and future directions have been presented. In this section, an example of stature estimation is presented.

To apply these techniques to an individual and examine associated methodological issues, stature is estimated for a donated skeleton with documented height. The selected skeleton is that of an 87-year-old white female (University of California, Davis Donation 05-056). She completed forms as part of the bequeathal process indicating that her stature was 66 in. Following stature estimations employing the approaches presented above, results are compared and discussed.

Whole Skeleton/Anatomical Method

Applying the whole skeleton/anatomical method to this person, all skeletal segments contributing to stature are measured and summed (Table 1). The skeletal sum is employed in a regression formula to approximate the soft tissue component contributing to living stature (after Raxter et al. 2006). Skeletal sum plus soft tissue yields a stature estimation of 166.38 cm (65.5 in.).

Regression/Mathematical Method

The second approach requires sex and ancestry of the person to be determined and formula with the

Stature Estimation, Table 1 Skeletal measurements and lengths used in whole skeleton/anatomical method of estimating stature for a skeleton with documented stature (UCD-05-056). Measurements follow (Raxter et al. 2006)

Measurement	Length (cm)	Comments	Measurement	Length (cm)	Comments
Basion-bregma	13.2		T 8	2.1	T 8-9 fused
Cervical 2	4.0	Osteophytes	T 9	2.3	T 8-9 fused
C 3	1.3		T 10	2.4	Osteophytes
C 4	1.3		T 11	2.6	
C 5	1.3		T 12	–	Congenitally absent
C 6	1.4	Osteophytes	Lumbar 1	2.8	
C 7	1.6		L 2	3.0	L 2-3 fused
Thoracic 1	2.0	T 1-3 fused L 3	L 3	3.0	L 2-3 fused
T 2	1.6	T 1-3 fused	L 4	3.3	
T 3	1.7	T 1-3 fused	L 5	3.2	
T 4	1.8		Sacral segment 1	3.6	
T 5	2.0	T 5-6 fused	Femur length	45.1	Left and right average
T 6	1.9	T 5-6 fused	Tibia length	37.9	Left and right average
T 7	2.0		Calcaneous and talus	6.9	Left and right average
		Skeletal total		155.3	
		Living stature (0.996 × Skeletal total + 11.7 cm)		166.38 (65.6 in.)	

smallest standard error to be identified. Given the sex and ancestry of the person, Trotter's (1970: Table 28) formula for white females' fibula is selected and calculations made. The formula and calculations to estimate stature follow:

$$\begin{aligned}\text{Stature} &= 2.93(\text{fibula length}) + 59.61 \pm 3.57\,\text{cm}\\ &= 2.93(36.8) + 59.61 \pm 3.57\,\text{cm}\\ \text{Stature} &= 167.43 \pm 3.57\,\text{cm}\end{aligned}$$

These regression calculations produce an estimation of 167.43 cm (65.92 in.) with a standard error of ± 3.57 cm.

Comparison and Discussion

Stature estimations using the two different approaches approximate the person's recorded stature (167.64 cm, 66 in.) as well as one another. The whole skeleton/anatomical method underestimates the donor's stated stature by 1.26 cm, while the regression/mathematical method underestimates her stature by 0.21 cm. Both estimations bracket the person's recorded stature and differ from one another by a mere 1.5 cm (0.41 in.). Considering the challenges to applying these approaches discussed below, the estimations' similarities are remarkable and noteworthy.

First, technical issues for the two stature estimation approaches for this individual are considered separately. Then broader challenges applicable to both approaches are presented.

Complicating the whole skeleton/anatomical approach, this specimen's measurements involve vertebral osteophytes and fusion of vertebral segments. Vertebral fusion may explain the shorter stature estimation of the whole skeletal approach than the person's recorded stature. Attempts to measure around and between vertebral osteophytes, however, might compensate for any fusion-related reduction in stature measurements.

Different complications hinder the regression/mathematical method estimation. Congenital absence of one vertebra (T-12) should make this regression estimation greater and presumably

less accurate than the whole skeleton approach. Apparently, however, it does not.

Another deviation involving the regression/mathematical method occurs. Trotter's (1970, Table 28) white female Femur + Tibia formula has a slightly smaller standard error (± 3.55) than the Fibula formula presented here (± 3.57). Under normal circumstances, the Femur + Tibia formula should be employed rather than the fibula formula. Justifying this deviation in method, Jantz and colleagues (1995) demonstrate that Trotter mismeasured the tibia. She omits measuring the tibia medial malleolus. So, her stature estimation formulae with the tibia should be avoided – as done here.

Those issues are specific to the two approaches. More general issues apply to both estimation techniques.

First, there is the effect of age-related reduction in stature of this individual. The donor died when 87 years old and would be expected to display age-related stature loss. Depending on the standard employed, stature loss from her young adult maximum to 85 years varies between 3.2 and 6.4 cm. From the records available, it is unclear if the stature reported on the donor's materials reflects the individual's stature near the time of her death following, but excluding substantial "shrinking," or earlier at her young adult maximum stature. This issue is not resolvable here.

A second challenge is that the donor self-reported her stature. The individual's stature was not measured and recorded while she was alive by an impartial anthropometrist. Self-reported statures tend to overstate measured stature, falsely indicating a taller person than he/she actually measures. One means of estimating this donor's reported stature ("forensic stature") is a regression formula (Ousley 1995: Table 5). Employing the formula for white females with the smallest confidence interval (femur maximum length + fibula length), forensic stature is 66.57 ± 2.3 in. The donor's reported height (66 in.) falls within an inch of that estimation. So, the two statures seem reasonable indications of her height.

Cross-References

- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Osteology: Definition
- ▶ Skeletal Biology: Definition

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Steffy, J. Richard

George F. Bass
Texas A&M University, College Station, TX, USA

Basic Biographical Information

J. Richard Steffy was born on May 1, 1924, in Lancaster, Pennsylvania, and grew up in the nearby town of Denver. From 1942, Dick, as he was known, served in the US Navy, mostly on a destroyer escort in the North Atlantic; he was discharged in December 1945 with the rank of electrician's mate, first class. After earning an associate's degree from the Milwaukee School of Engineering, he joined his brother in his father's local business, which initially did residential electrical work but expanded under Dick to design, install, and maintain electrical systems for factories. He married Lucille Koch in 1951.

From childhood Dick had enormous curiosity about ships. Uninterested in making models for display, his passion was to learn how ships worked, building and destroying research models in order to understand them. Thus, when he read a 1963 *National Geographic* article about a seventh-century Byzantine shipwreck excavated off Turkey, he wrote to George Bass, author of the article, and asked if he might built a research model of the vessel on the basis of its scanty seabed remains. Bass introduced him to Frederick van Doorninck, who was reconstructing the ship's hull on paper for his doctoral dissertation, thereby establishing a collaboration of more than four decades between the three. Steffy was soon lecturing annually to a graduate course on ancient seafaring established by Bass at the University of Pennsylvania.

A visit to Cyprus in 1971, at the invitation of Michael Katzev to study the hull of a fourth-century B.C. Greek ship Katzev had excavated off Kyrenia, led Steffy to abandon his secure job, at age 47 with a wife and two young sons, to make a career as an "ancient ship reconstructor." Partly supported by a UNESCO grant, he spent the next 2 years reassembling the Kyrenia ship's hull from 10,000 fragments of polyethylene-glycol-treated wood, the first such restoration of a Mediterranean shipwreck.

Major Accomplishments

In 1973 he joined the Institute of Nautical Archaeology (INA) Bass and Katzev had created. When INA affiliated with Texas A&M University in 1976, Steffy, Bass, and van Doorninck established a graduate program in nautical archaeology. In addition to teaching a generation of "ship reconstructors," Steffy was soon the "ship expert" on the excavation of the American Revolutionary War *Defence* in Maine, and a colonial vessel raised from South Carolina's Black River. Research as a visiting professor at the University of Haifa in 1981 led to his book, with Lionel Casson, on the Athlit ram. In 1986 he returned to Israel to interpret a first-century BCE boat salvaged from the Sea of Galilee by Shelley Wachsmann. Later he was a consultant for the construction in Greece of a full-scale sailing replica of the Kyrenia ship.

In 1985 Steffy received a prestigious McArthur Award. His 1994 *Wooden Ship Building and the Interpretation of Shipwrecks* is considered the bible of the field he established. Later he coauthored the first volume on the eleventh-century Serçe Limanı wreck. An acclaimed public speaker, he retired from teaching in 1990. He died on November 29, 2007.

Cross-References

▶ Bass, George Fletcher
▶ Hellenistic and Roman Anatolia, Archaeology of
▶ Hellenistic and Roman Egypt, Archaeology of

Further Reading

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Stein, Marc Aurel

Susan Whitfield
The British Library, London, UK

Basic Biographical Information

Born in Budapest, Stein's family life and early education at the Lutheran school in Dresden nurtured his linguistic skills, useful for Central Asia with its polyglot Silk Road past. These were further developed by his university education in Vienna, where he studied Sanskrit and comparative philology, and Tubingen, for a Ph.D. on Old Persian and Indology. After receiving his Ph.D. in 1883, he studied Punjabi in London. He returned to Hungary for military service, equipping him with surveying skills that were to prove essential for desert explorations. Following his return to London in 1887, he secured a post in Lahore. He was to remain in British India for all of his life (Walker 1995; Mirsky 1998).

Major Accomplishments

Aurel Stein was the consummate desert archaeologist, but not of those "tame deserts" of Arabia, America, or South Africa "which might impress the town dweller . . . and in which whole tribes can wander about for long periods sure of finding water and grazing." He fell in love rather with the Taklamakan and Lop Deserts, where "the absence of moisture bans not only human existence but practically all animal and plant life" (Stein 1933: 4–5). His love for these deserts' solitude and harshness was rivaled by that of his passion for interpreting the interaction between history and geography as revealed by archaeology. At their glacier-fed fringes, the Taklamakan and Lop both provided rich evidence of human existence conquering the extreme environments from the second millennium BCE through to the end of the first millennium CE. This was the arena in which Stein spent 30 years of his life exploring and excavating (Whitfield 2004).

He read voraciously from childhood, both of the travels of early travelers, such as Alexander the Great and the seventh-century Chinese monk, Xuanzang, who crossed the Taklamakan on his way to India, and of the excavations of contemporary archaeologists. Among the latter was Flinders Petrie (1853–1942), and Stein noted well the developing archaeological methodology including stratigraphy, seriation, and, most especially, attention to the smallest details. Stein quoted him in the introduction to his first major expedition, "To leave a site merely plundered, without any attempt to work out its history, to see the meaning of the remains found, or to publish what may serve future students of the place or the subject, is to throw away the opportunities" (Stein 1907: ix).

Stein wanted to be a pioneer and set his sights on an expedition to the southern oases of the Taklamakan desert in Western China: it "is not a part of the earth as easily accessible as Greece or Egypt or India" (Stein 1907: x). Among Europeans, only Sven Hedin preceded him to the region, but he had not carried out systematic archaeology.

Steins's First Central Asian Expedition (1900–1901) was meticulously planned and yielded rich finds and documentation about the first millennium Silk Road kingdoms of Khotan and Kroraina (Stein 1907). A second (1906–1908) and third (1913–1916) followed and were equally successful before political changes in China curtailed the fourth (1930–1931) (Stein 1921, 1928). On these he traveled further east into the Gobi and to the sites of Kharakhoto and Dunhuang,

Stein, Marc Aurel, Fig. 1 Stein on his third Central Asian expedition in the Taklamakan surveying using a plane table with his dog, Dash. The British Library, Photo 392/28(739)

Stein, Marc Aurel, Fig. 2 House at Niya, a Silk Road kingdom in the Taklamakan, during excavation by Stein on his second expedition. The British Library, Photo 392/26(191)

where he acquired his most famous manuscript finds (though not through archaeology) (Figs. 1–3).

In the desert, the constantly shifting sands ensured there was little chance for stratigraphy. But Stein was meticulous in his record-keeping, taking notes, plans, surveys, and photographs. Of the Central Asian collections from this period – for Stein was soon followed by others – only Stein's all have a detailed provenance. This feat is the more remarkable, given the difficult conditions, and was achieved by prodigious energy and commitment. His recurring malarial fever and constant dyspepsia did not stop him from working from before dawn to late into the night.

He planned his excavations for the autumn through to the spring: It was not possible to carry enough water for work in the searing summer heat. The winters were equally extreme but he used this to his advantage, taking blocks of ice for water supplies: The settlements he excavated also showed evidence of icehouses. Constantly shifting sands required large teams of local

Stein, Marc Aurel, Fig. 3 The site of Niya today showing the remains of a Buddhist stupa nearby which Stein made his camp on his first visit. Photographer: John Falconer. The British Library, Photo 1235/1(186)

diggers. It is testament to Stein's foresight, preparation, and calm leadership that he managed these expeditions with no loss of human life and minimal loss of animals.

In order to reach the Taklamakan, Stein had to cross over the formidable passes of the Hindu Kush, Karakorum, and Pamir. He planned a different route on each of his expeditions and took advantage to carry out surveys of ancient ruins en route.

But none of these mountains were as challenging as the Kunlun, whose northern slopes provided almost no pasture. It was on a survey here that he had a rare moment when his caution was overruled by enthusiasm, leading to frostbite. He went on forced marches strapped to the back of a yak back across the mountains to Leh, where several toes were amputated (Stein 1921: 1326–7).

His finds in the Taklamakan uncovered unknown languages and cultures and put the eastern Silk Road kingdoms on the map of world history. But Stein did not stop archaeology after 1930. He led four tours of Iran and Iraq (Stein 1940), exploited new technologies in his aerial surveys of the limes of Jordan (Gregory & Kennedy 1985), and in his 81st year finally realized his lifelong dream of archaeology in Afghanistan. Unfortunately, he caught a chill and died within a week of arriving in Kabul: His grave is in the British Cemetery. His Iranian colleague on his fourth Iran tour noted: "Before finishing this report I must inform you of the following: one cannot call this tour a promenade. It should be called a journey of difficulty, of pain, of bitterness, of danger and illness." Stein, on the contrary, wrote that "compared with the Taklamakan and the Kun-lun travel both in these valleys and across the mountains seems very 'tame' work" (Whitfield 2004: 106).

Cross-References

▶ Aerial Archaeology

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Stewardship, Concept of

Alvaro Higueras
Simon Fraser University, Burnaby, BC, Canada

Introduction

Stewardship is today a concept that concerns the ownership, property, control, and promotion of a broad set of material and intangible goods, which include cultural heritage resources.

Definition

A Classic Definition

The role of steward, as in "steward of the castle" or "steward of the palace," is as ancient as the need to have supervision and organization of household or estate affairs. This administrative role probably occurs very early in prehistory as societies create hierarchical and complex administrations. Many references exist in historical documents to their economic and political role in Egypt of the Pharaohs both in the palace and the temples, in the urban settings of early Mesopotamia and its temples, and, more recently, in England in medieval monarchic times. The function of the steward is often exalted in Shakespeare plays: its importance in the management of the riches, gifts, tribute, and taxes making their way to the treasury of the sovereign or, often, in palatial intrigues.

A Current Definition

An intrinsic historical feature to the role of steward is that it manages property and wealth that belong to their masters and rulers. In this sense, the role of steward has changed entirely in the last two centuries. The tendency in contemporary times is that stewards own the heritage, goods, or valuables that they admire. A vital part of the current stewardship scenario is to have a close control over those goods. While the argument is often that they hold the goods in custody for the public good, the fact is that those goods are held under a private property system and are obtained by the acquisition of goods in the free market or, more specifically, cultural heritage markets in auction houses or privately where objects are obtained from looting, commissions, theft, and legal exports (Kimmelman et al. 2006; Renfrew 2009).

Historical Background

The shift in the role of the steward, and therefore the concept of stewardship, is related to change in the economic structure of Western societies. The role of steward has continued to be a prestigious one, albeit its role has moved away from the governmental or the real estate spheres in which it originated (Cline 2003). The role of the "steward" in the period of rising capitalism of the nineteenth century, in contrast to its traditional role in a land-based economy controlling tenants, moved to spheres of urban settings with the predominance of new wealth based on industrial and trading economies with profits invested in cultural endeavors.

The founding of state museums open to the public in Europe in the nineteenth century, and art museums in the United States at the turn of the twentieth century, reveal the intentions of the new stewards: to show their private rooms with their private possessions and to display their antiquities and art in public spaces (and more rarely in their own homes). The crucial difference between Europe and the United States, along general lines of state versus private property, is that the latter reflects the will of their private holdings to be shown, not unlike the humanists of the fifteenth century in Europe and Italy in particular.

The new museums that opened in the United States in brand new buildings designed in neoclassical style had as their core attraction private collections displayed in custody and often bequeathed to them by the new "stewards" (e.g., the Mellon family as the core of the National Gallery in Washington D.C.). These museums would start building their own collections by various means: financing "research parties" to obtain the goods, buying collections or single

artifacts at home and abroad, and continuing to promote to the collectors their image as a worthy depository for private collections to be displayed for the public good. The exact provenience of the objects is often not an issue: it is their artistic worthiness that is central.

UNESCO Über-Steward of World Heritage

The role of UNESCO in setting the bar for the protection of cultural heritage is crucial. UNESCO became the rightful global steward by setting rules at a time when rules of the game of heritage possession were sketchy, lax, and circumstantial. The UNESCO conventions served as the turning point in the legal backup for combating traffic and heritage smuggling. However, the enforcement power of UNESCO or its training and execution capacity is very limited. Physical management of heritage corresponds to others: national, private, academic, or nongovernmental entities.

In the transition from museum-oriented towards a community-oriented trend in stewardship, some important (but non-binding) UNESCO conventions in the late twentieth century changed the way cultural heritage is protected: The Hague in 1954 for cultural heritage in wartime, after World War II, and, in 1970, the convention on preventing the illicit traffic of cultural property. This latter convention would be crucial in the courts in determining which objects enriching the museums are legal or not. In the process, despite the conventions, cultural heritage becomes an ideal target in wartime for the psychological defeat of the enemy (Gerstenblith 2006; Marlowe 2011).

Later on, the UNESCO conventions of 1972 on *World Heritage*, both cultural and natural, and in 2003 on *Intangible Heritage* drastically improved the breath of the concept of cultural heritage (Francioni 2011). In addition, the 2001 Convention on the *Protection of the Underwater Cultural Heritage* was aimed at tackling the most important source of looting and generation of traffic of cultural heritage: the sunken ships along Mediterranean shores.

The process of acquisition of heritage will not stop with the laws promulgated by UNESCO. It is simply the means of the transactions that change, by increasing smuggling and illegal ways to ensure the continuing buildup of museum collections. The recent controversy between Italy and US museums is an example of the diversification of the ways to not stop such collecting drives.

Key Issues/Current Debates

Stewardship, Ownership, and Philanthropy

Since the creation of UNESCO and the concern over heritage, a strong debate has confronted museum managers and academics over the future directions of property of heritage (Merryman 1986). Under the premise that looting continues and museums are constantly adding to their collections, this debate evaluates the damage caused by this continuing will to keep the pace in artifact acquisition. This trend does not necessarily refer to less controversial acquisitions from in-country collections (which often are not exempt of controversy) but from different, often shady, proveniences, especially from overseas locations. A most memorable and enlightening debate in this regard is between the archaeologist Colin Renfrew (Brodie & Renfrew 2005; Renfrew 2010) and art historian John Boardman (Boardman 2006). These two experts do not agree on how tight the control on the trade of antiquities should be (high, according to Renfrew) nor on the primary role of museums should have for the protection of heritage (a leading role, according to Boardman).

The public exposed to this debate see as many benefits in the role of the museums and their *modus operandi* as they see in the strong will for a moratorium and zero tolerance to museum acquisitions, let alone looting and smuggling (see Bauer 2008). The fact that the latter two events continue to co-occur and are very hard to fight enhances the scenario of museums as ideal repositories of what is found in those same lootings – as they are "stewards" with the financial and physical means to secure the future of those artifacts. However, it is not that museums have a first option over the acquisition of heritage. Rather, there is a strong competition with market-driven

forces between world museums and private collectors. The free-market rules of this trade are increasingly negative for cultural heritage as there is a sizeable financial gain to be obtained from the traffic in cultural heritage. The argument of museums as "stewards" and their commitment to the public are only good as long they are able to secure possession of the cultural heritage they deem important to their collections.

Therefore, museums and states that wish to be stewards of cultural heritage will do so by different means. This scenario depends, of course, on the legal system: some countries consider that heritage found on private property belongs to the owner, whereas another set of countries believes that all heritage resources found above and below ground belong to the state. On the one hand, private stewards curate existing heritage but are geared towards acquiring new holdings. On the other, states, often cash-strapped, are geared towards preventing and stopping traffic of cultural heritage, using the arguments of the 1970 UNESCO Convention and helped by bilateral agreements to reduce the smuggling of heritage. A considerable number of heritage resources have been returned to Peru, for example, thanks to its time-limited agreements with the United States.

Stewardship in the Realm of Cultural Heritage

Stewardship in the realm of cultural heritage is not as recognized today as is the role of state institutions, private foundations, or individuals in dealing with health, animal, or environmental issues as key factors in the current wave of sustainable projects in the social realm.

The essence of the concept of stewardship of antiquities (today regarded as heritage) has been at the core of the philosophy of museums and collectors since the nineteenth century. It is apparent that museums are not pursuing this image anymore. In the news, museums involved with legal issues of heritage ownership seem reluctant to increase their presence in the media. Again, in contrast with other institutions, while zoos have become centers for biodiversity, few museums have become centers for cultural dialogue (e.g., the Quai Branly museum in Paris advertises itself as a place "for dialogue between cultures"). This seems the case in ethnographic museums but not in art museums.

In the realm of cultural heritage, the concept of stewardship translates to different scenarios through time. First of all, it changes in the way the "object" of collection is referred to. This parallels the evolution of the clout, stance, and power of the traditional "steward," owner and caretaker of his/her prized possessions, and their dwindling power replaced by other rightful new actors. The "object" of collection then changes from "antiquities" in the nineteenth century, to "material culture" in the twentieth century, and ultimately to "cultural heritage" in the twenty-first century. These three historical assertions relate to how the artifacts and monuments are considered through time. Sites and burials are depleted of their artifacts to be housed in museums in the nineteenth century, while artifacts and skeletal remains are returned to native groups to be stewarded by their ancestors in the twenty-first century. There is a transition from a museum-oriented towards a community-oriented trend in stewardship, passing by a middle stage of broad academic studies of heritage in the twentieth century.

Stewardship in the Twenty-First Century

The role of a stewardship in the twenty-first century (fueled by a new philanthropic drive: the financial basis to stewardship strategies; see Henaff 2003) is as much a role of prime importance in the social sphere as it is a figure of an actor in strategic decisions regarding heritage or, more often, the environment or health issues. Stewardship has indeed diversified, and the fields of action range now from the closed encapsulated spaces of a museum to the open and dynamic areas of archaeological sites.

An intrinsic feature of the current concept of stewardship is that care of material or immaterial good is made despite not holding property rights of those goods. It is the moral concept of considering those goods valuable to society that leads to the investment and patronage in their preservation, integrity, and sustainability.

This is, therefore, a difficult subject because museums are stewards of their own holdings, obtained in property through the years by different means, including acquisitions from proveniences and means that may not have been well thought-out.

Due to this pattern of acquisitions, museums as stewards of cultural heritage have had important confrontations with national governments in the last decade. No museum or country is exempt of "reclamation" issues and often there are contradictions in the debate. For instance, while Turkey has claims over the Pergamon temple housed in Berlin, the Istanbul museum houses the Alexander sarcophagus from Lebanon. This is due to the geopolitics of the time when the Ottoman Empire had control over Lebanon (Waxman 2006). However, neither England nor Germany or the United States had such control over a region rich in cultural heritage (at least those that interested Western museums) as to warrant a "historical" explanation to the presence of those artifacts in their museums.

Issues with Stewardship in the Twenty-First Century

Two issues are especially important for stewardship as the safeguarding of cultural heritage and for the public dissemination of the importance of stewardship in today's society. These two issues concern, first, the strategies that museums will put in place as they ideally reduce their acquisition of cultural heritage that may be tainted by a shady looting provenience and, second, how stewardship is presented to the wider public by the new stewards, namely, communities of local populations interested in preserving and promoting their heritage.

Academic research is crucial in enhancing the public reach of heritage studies. While stewards aim to control (but do seldom manage) cultural heritage, it is the academic study of that cultural heritage from an art history to an anthropological perspective that are a value-added wealth to the monument, artifacts, or site in consideration. In academic studies, researchers do not own the object of study but do build its knowledge database that may or may not be used in strategies of dissemination. It is not always clear to stewards that a good story to enhance the richness of heritage can come from academic sources. Quite often, the script comes from nationalistic or political sources (Cuno 2008). Academics therefore are not very proficient actors in the public process of creating a solid stewardship of cultural heritage.

On the contrary, it is rather the agenda of stewards that influences the acquisitions, research, and display that a museum might present to the public. What right do stewards have to direct the public display of cultural heritage, art in their eyes, and determine the outcome of that display? Might stewards overlook the wealth of information produced by academics? It would seem apparent that stewards have other values with which to measure their possessions, reflecting the aesthetics rather than the social frameworks directing their "contributions" to heritage. I have a specific case in mind: the recent and expensive renovation of the Roman wing at the Metropolitan Museum of Art that fails, at every level, to set the record straight on the decorative patterns in Roman architecture.

The second issue regards the stewardship drive undertaken by communities to preserve their own heritage, whether because it is inherited from their ancestors or because it lies in their current communal lands and they see it in a proprietarily way (as in the case of immigrated populations) (Stapp & Burney 2002; Welch et al. 2009). Is heritage less their concern because they are recent immigrants? Many attitudes by government agencies have alienated the local populations as they use the "ancestry" argument to lead to legal decisions.

Overall, however, the scenarios of communal concern over heritage do not necessarily imply a positive attitude or adequate management of their heritage. The most relevant point in this debate is that today stewardship requires a central concern for sustainability of the heritage not only for the community but for society at large. Believing that stewards have sole control and profit of that heritage

has a negative impact, whereas consideration of usufruct of that heritage for society at large should be of prime concern. By the same token, it is apparent that museums use the concept of public usufruct in a much more convincing way.

In addition, to complicate the case of future growth of community stewardship, a set of internal factors may lead to these enthusiastic but sometimes disorganized scenarios of managing heritage: scarce education levels in local communities; limited knowledge of potential, risks, and obligations at managing heritage; and a too high political input into decision making procedures (Fennell 2008).

I underline the issue of poor risk management because it is not restricted to small, developing communities that wish to steward their heritage. Complex societies such as the case of the city of Rome face chaos in their stewardship role by not establishing long-term management plans to address in an organic manner the risks and needs of an overwhelmingly complex setting for cultural heritage.

Future Directions

Final Thoughts: Strategies in the Twenty-First Century

I suggest that museums may have to change their strategy of stewardship in future decades. Hopefully they will convince themselves that depleting burials and sites so as to have the artifacts adorning their displays or stacking their storerooms is poor policy. Certainly there is a wealth of heritage in storage rooms with which to create novel and attractive exhibits for years to come. What does the recent evidence show in this regard? If contentious arguments between sovereign nations and museums are any indication, perhaps the latter have not renounced to their old ways.

On the other hand, indigenous, native stewardship is on the rise – but with many caveats. The tendency of the last two decades is to have communities and nongovernmental organizations defend their heritage against encroachment of their lands. These communities have had a difficult time, however, dealing with governments, mainly for their lack of strategies to prove the existence of valuable and worthy heritage. This scenario stems, of course, from ignorance in government circles. For instance to prove the existence of intangible heritage with no apparent commercial value is a difficult task. How to prove that a nomadic society which relies for their survival on large extensions of land for a hunting and gathering economy and that such strategy, that land, *is* their intangible heritage?

These questions are clearly important as we live today in a period where the property of cultural heritage (both in the material and intellectual realms) is fiercely debated. In this scenario, more often than not, societies reach the conclusion that artifacts are the property of the first nations, aboriginals, or natives. But this is not a given in young democratic societies. The number of social conflicts stemming from top-down unilateral decisions by governments impinging on local populations shows the high risk for conflict preserving their heritage (Alderman 2009). Governments are hardly steadfast stewards of the heritage in their very own country. Their attitude towards monumental heritage sites is often a reflection of those same market principles at as well.

The stewardship of the future will continue to develop at both the private level and the community level as both groups claim they are "stakeholders" to portions of heritage. However, the strategies they apply will need to change, not the least because both groups often will be stepping on each others' arenas. Both groups will still claim property over heritage. While aboriginal populations will be greatly favored by the legal baggage behind the issue of heritage claims, museums will persevere, as they do own heritage that is, arguably, beyond the control of native communities and countries of origin. Museums will not disappear, but their stewardship goals and strategies must change in these times of a greater awareness of cultural heritage and their original property.

Cross-References

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- ▶ Charter for the Protection and Management of the Archaeological Heritage (1990)
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Site Stewardship Programs

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Stewart, T. Dale

Douglas H. Ubelaker
National Museum of Natural History, Smithsonian Institution, Washington, DC, USA

Basic Biographical Information

Thomas Dale Stewart (1901–1997) was born June 10, 1910, in the Welsh community of Delta, Pennsylvania, USA. Following graduation from high school in 1920 and subsequent employment at the local bank, Stewart enrolled (1922)

Stewart, T. Dale, Fig. 1 T. Dale Stewart. Courtesy NAA, Smithsonian Institution

at The George Washington University in Washington, D.C., focusing on a pre-medicine program. Through family friend John L. Baer and roommate Henry B. Collins Jr. (1899–1987), Stewart was introduced to anthropology, especially as practiced at the nearby Smithsonian Institution (Ubelaker 2000a) (Fig. 1). In 1924, he began to work part-time as a temporary assistant to the legendary Smithsonian Curator of Physical Anthropology Aleš Hrdlička (1869–1943). Hrdlička needed help assembling data and preparing tables for his many publications. With his banking experience, tabulating numbers and balancing accounts, Stewart rapidly became a relied-upon assistant (Ubelaker 2000b). By 1927, Hrdlička's confidence in Stewart had grown to the point that he not only offered Stewart a permanent position but also the opportunity to succeed him eventually if Stewart acquired a medical degree. With such an incentive, following college graduation in 1927, Stewart enrolled in medical school at the Johns Hopkins University in Baltimore, receiving his MD degree in 1931 (Ubelaker 2006).

With his medical degree in hand, Stewart returned to the Smithsonian to work with Hrdlička and began his long and productive career in physical anthropology. When Hrdlička retired in 1942, Stewart was promoted to the position of Curator. Career milestones include initiation of consultation with the U.S. Army Quartermaster Corps in 1948, organization of a human identification project in Kokura, Japan (1954), conducting a seminar in human identification in 1955, becoming Head Curator of the Department of Anthropology (1961), appointment as Director of the Smithsonian Institution's National Museum of Natural History (1962), election to the National Academy of Sciences (1962), organization of a conference on human identification in mass disasters (1968), election as Honorary Member of the American Academy of Forensic Sciences (1974), and recipient of the Physical Anthropology Section Award of the American Academy of Forensic Sciences in 1981 (this award was renamed the "T. Dale Stewart Award" in 1987). Stewart served as President of the American Association of Physical Anthropologists from 1950 to 1952 and as its secretary-treasurer from 1960 to 1964. He received the Viking Fund Medal in 1953 and the Charles Darwin Lifetime Achievement Award in 1993 from the American Association of Physical Anthropologists. Stewart was the Editor of the American Journal of Physical Anthropology from 1942 to 1948. Although he retired in 1971, he subsequently continued research and publication. At the age of 91, his last publication emerged, a monograph on archaeological research at a site in Virginia (Stewart 1992).

Major Accomplishments

Through his numerous publications, meticulous attention to detail, editorial efforts, and congenial manner, T.D. Stewart became internationally recognized as a scholarly leader in physical anthropology. His published works include broad

topics within anthropology but largely center on forensic anthropology, paleopathology (Ubelaker 2012), anthropometry, human paleontology (especially the Shanidar Neanderthals), and the peopling of the New World. Stewart served as consultant to the FBI laboratory on matters relating to forensic anthropology and reported on at least 254 cases for them between 1943 and 1969. He also found time for formal teaching at the Washington University School of Medicine in St. Louis in 1943, the Escuela Nacional de Antropología e Historia in Mexico City in 1945, and the George Washington University School of Medicine in Washington D.C. from 1958 to 1967.

T. Dale Stewart's publications are models of careful research design, broad academic perspective, attention to detail, and accuracy (Ubelaker 2000c). His many contributions to such issues as the complexity of skeletal age changes, Neanderthal morphology, anterior femoral curvature, vertebral osteophytosis, dental alterations, trephination, treponemal disease, and the peopling of the Americas are both highly regarded and long-standing. He published at least 394 works from 1924 to 1992 including several key books and monographs. He provided international leadership in the scholarly development of forensic anthropology, paleopathology, and other areas of physical anthropology.

Cross-References

- ▶ Bioarchaeology, Human Osteology, and Forensic Anthropology: Definitions and Developments
- ▶ Forensic Anthropology and Archaeology in Disaster Response
- ▶ Forensic Anthropology: Definition
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Stoa

Erika Zimmermann Damer
Department of Classical Studies, University of Richmond, Richmond, VA, USA

Introduction

Stoa is an ancient Greek term applied to a type of long, narrow, free-standing building with a colonnaded façade. The stoa developed as an architectural form in Archaic Greece, and was most popular from the fifth through first centuries BCE. The stoa should be distinguished from the colonnaded avenues typical of late Hellenistic and Roman cities and from the Roman *porticus*.

Definition

The stoa is a distinctly Greek architectural form of the portico that appears in a variety of

forms from the Archaic (c. 650–480 BCE) through the Hellenistic periods (c. 323–50 BCE) and is found in sites throughout the Greek world. The simplest stoa was composed of three walls and a colonnaded front, yet this simplest form does not appear often in the archaeological record. Typically, the stoa form had a second inner colonnade that supported a ridge roof. Some stoas had small rooms behind the portico, some had two or more storeys, and some had projecting wings at either end, forming L or Pi shapes. The stoa had a variety of civic and religious functions: although the earliest examples appear in religious sanctuaries, the development of the stoa in the Classical period is linked to Athens, where stoas appeared at the margins of the Agora, the marketplace and civic center of the radical democracy. The characteristic appearance of a Hellenistic Agora came from the stoas that framed it. The stoa served a wide variety of purposes: at the sanctuary of Asklepios at Epidauros, the stoa served as the *abaton*, or sleeping dormitory, for the patients. In sanctuary spaces, stoas frequently housed dedications, and offered shelter to priests and priestesses. In the Athenian Agora, stoas housed magistrates, functioned as public indoor space, held dining rooms, and served as display space for art and military spoils while the uniquely shaped South Stoa in Corinth served commercial functions. The stoa was thus an integral architectural building block of the Greek agora and sanctuary, central to Greek civic and religious life. The function and use of the stoa was multipurpose, but Vitruvius (*Arch*. 5.9.1) offers a basic ancient definition when he states that the stoa was a colonnaded building that serves to protect visitors from both the rain and the heat of the sun.

The stoa and the Greek temple share many architectural elements, but the monumentalized stoa, constructed of stone or marble, appears after the first all-marble Greek temples. In general, the building materials of the Greek stoa are more functional than those of the temple. The tendency in construction overall was to use less expensive materials. Marble was frequently reserved for the façade, while walls were often built of local stone, mud brick, or rubble masonry (Coulton 1976: 142-3). In form, the stoa typically had a Doric exterior colonnade and an Ionic interior colonnade, thus forming a two-aisled interior. Multi-storeyed stoas also used the Doric and Ionic orders, along with interior half-columns with Pergamene capitals, and as time went on, a preference for the more elaborate use of the orders predominates. The single-storeyed form predominates, however.

As the building type developed, the columns began to be built in marble carrying a wooden entablature. The earliest stone porticos employed the Doric order, and this order dominates the archaeological record. The first monumental examples appear in the sixth-century BCE, and are concentrated in Athens and Attica, where the radical democracy demanded new purpose-built architecture to support its governmental functions. The Athenian Agora, with its sequence of stoas built between the late Archaic and Hellenistic periods, provides a good example of the architectural form, and includes the first stoa with projecting wings, and one of the first stoas to incorporate rooms. In the Peloponnese, the South Stoa at Corinth and the Echo Stoa at Olympia are particularly noteworthy for their respective form and function. Ionia and the Hellenistic east present the fullest integration of the stoa into the Greek civic center, and forecast the development of the Roman use of the basilica and the *porticus* used to frame Roman *fora* and Roman colonial centers. The construction of a stoa was an expensive undertaking, and literary and epigraphic evidence demonstrate that most of the notable examples built in and after the fourth century BCE were funded by the Macedonian and Attalid dynasties established after the death of Alexander the Great (Schmidt-Dounas 1995: 23-52).

Key Issues/Current Debates/Future Directions/Examples

There is some debate as to whether Mycenaean porticos provided architectural origins for the classical Greek stoa. Origins in Near Eastern

and Egyptian building types have also been suggested, but Coulton argues that the form has its origins in Archaic Greece (Coulton 1976: 18–23). In the Archaic period, the stoa became an autonomous structure, whose building components develop in parallel with temple architecture. Most known sixth-century stoas were small in dimension, and of lower architectural status than temples. In the sixth century, complete stone architecture became typical for temples, while only two known archaic stoas had stone entablatures. Most stoas of this period were found in sanctuaries, where they served as shelter for pilgrims and as places to display dedications. The two exceptions are the Royal Stoa, the earliest of the stoas in the Athenian Agora, and the stoa on the agora at Sikyon.

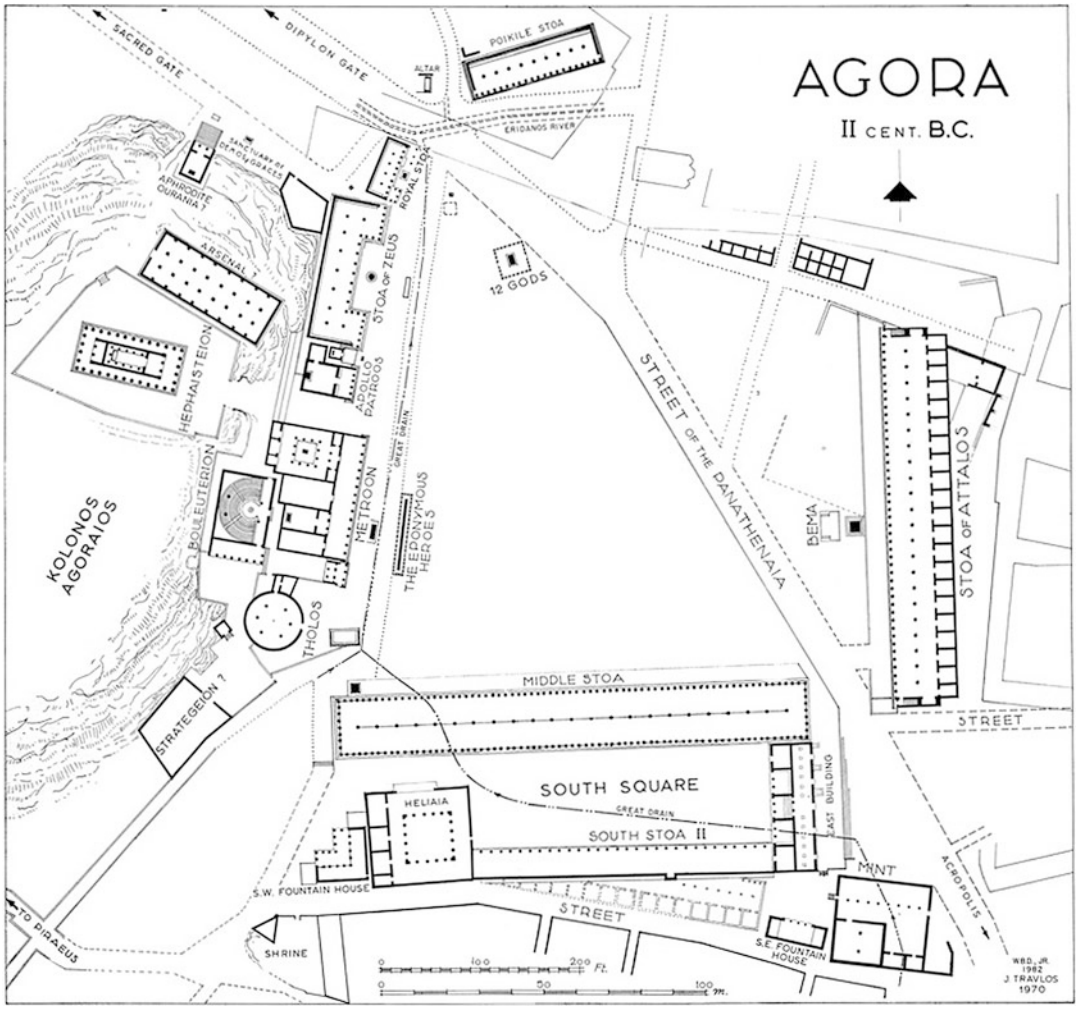
The earliest known example of the Greek stoa occurs at the sanctuary of Hera in Samos, and dates from the seventh century BCE. In form, the South Stoa at Samos was a long rectangular building, 70 m in length, with a back wall in rubble masonry, turning at either end, and two rows of wooden posts, one internal supporting the ridge roof, and 29 external columns forming the façade. In structure, the stoa was similar in size and shape to the cella of the Second Temple of Hera, and it anticipates the development of the Ionic order with the elements of base, capital, and dentils present (Coulton 1976: 27). In c. 478–470 BCE, the Athenians built an Ionic Stoa at Delphi. This building incorporated the polygonal retaining wall of the Apollo Temple and was erected to display Athenian spoils from the Persian wars. The stoa used seven monolithic Ionic columns that bore a wooden entablature, and carried an inscription on the stylobate.

The development of the stoa in the Classical period (c. 480–323 BCE) is exemplified by the series of stoas in the Doric order built around the Athenian Agora. Each was modest in construction but increased in size and in the sophistication of their interior design. These served to define the borders of the agora space: on the west by the Royal Stoa (c. 500 BCE) and the Stoa of Zeus (c. 430–420 BCE), and on the north by a row of herms, the Stoa of the Herms, and the Stoa Poikile (c. 475–460). When South Stoa I was built (c. 430–420 BCE), it created a long uniform façade in the middle of the south side of the agora (Fig. 1).

The Athenian Agora, while it does not have the orthogonal corners of the Hellenistic agora, was nonetheless the first agora closely coordinated in design (Winter 2006: 54).

The Royal Stoa is the first stoa of the Agora and one of the earliest with a stone entablature. Dating from the mid-sixth century, it had a two-aisled interior, with stone columns in the Doric order on the façade and an inner Doric colonnade located behind every third outer column supporting lighter interior wooden beams, while the outer colonnade bore the stone entablature. The stoa was the headquarters for the *archon basileus*, the official in charge of religious matters and law in the democracy, and was where the laws of Solon were displayed. This building has been securely identified by Pausanias' description and by two inscribed bases, dedicated by king archons, found in situ on the building's steps (Camp 2001: 45). The Painted Stoa, or the Stoa Poikile, is located along the northern side of the Agora, and was built c. 475–460 BCE in the Doric order, with internal Ionic columns. The westernmost end of this stoa was discovered during excavations of the Athenian Agora in the mid-1990s, and is currently under excavation by the American School of Classical Studies in Athens. This stoa was decorated with a series of panel paintings depicting mythological and historical scenes of Athenian military exploits, including the Greeks at Troy, an Amazonomachy, and the Battle of Marathon. The Painted Stoa was a public building without a particular function, open to everyone. The philosopher Zeno, who flourished c. 300 BCE, taught his followers, the Stoics, in the colonnade of this stoa (Camp 2001: 68-9).

The Stoa of Zeus Eleutherios, dated c. 430–420 BCE and built in the Doric order, is one of the first stoas to incorporate short projecting hexastyle wings. These wings were capped with triangular pediments crowned by sculptured acroteria. This stoa is also the first to use a three metope span, a structural device that reduced strain on the architrave. In this stoa,



Stoa, Fig. 1 Restored plan of the Athenian Agora in the second century BCE from Camp (1990: 27), Fig. 6

the architects made the frieze out of poros with inset marble metopes to further lighten the load on the columns. Here, too, the interior Ionic columns are spaced twice as far apart as the Doric columns, as will become standard in later stoas. The building is distinguished by the high quality of its workmanship, by the extensive use of marble, and by its dedication to a god. The stoa is the setting for three Socratic dialogues, and according to Pausanias was adorned with paintings celebrating the freedom the Greeks won at the Battle of Plataia, the final battle against the Persians on Greek soil. South Stoa I, a more inexpensive structure built c. 430–420 and dismantled for a replacement c. 100 BCE, featured a Doric colonnade and Ionic interior colonnade in front of 16 rooms. These rooms have off-center doors that allow the space to be identified as dining rooms equipped with couches. Coins found in situ point to the stoa's commercial function, and inscriptional evidence shows that the officials in charge of weights and measures worked here (Wycherley 1957: 46).

The stoas of the Athenian Agora show many of the most significant architectural developments of the stoa in the Classical period, but the stoa in Athens also served a variety of functions, and served to commemorate political and

religious events within a secular building, housing magistrates and their governmental functions, displaying military spoils, decrees, and statues, offering ample public space for general recreation, and acting as dining spaces as well as serving commercial functions.

The Hellenistic period marked the appearance of much larger stoas used to define the space of the agora and the sanctuary. "The stoa is perhaps the most characteristic expression of the spirit of Hellenistic architecture, and determines the architectural form of the Hellenistic agora" (Winter 2006: 55). Some were very long, such as the winged stoa of Phillip II at Megalopolis, which was 155 m in length, or the Echo Stoa at Olympia. Begun in the third quarter of the fourth century, and completed by the mid-third century, the 100 m long Echo Hall at Olympia, located on the east side of the sanctuary, served to divide the Altis into distinct spaces. This stoa is remarkable for its lack of an interior colonnade and its wide roof span (9.97 m), with massive horizontal wooden beams running across the roof above each exterior Doric column. The Echo Hall was intended for viewing the great processions that passed in front of the building, and forecasts the importance of the view toward, as well as the view from, important buildings that is common in Hellenistic design (Winter 2006: 54). The stoa of Phillip II at Megalopolis is the largest and longest of the fourth century stoas, and can be securely assigned to the years between 338 and 330 BCE, after Phillip II of Macedon's invasion of Laconia. In addition to the external Doric colonnade and projecting wings, this stoa unusually had two interior Ionic colonnades to balance the great length of the building.

The orthogonally aligned Hellenistic agoras gained their characteristic form through the framing devices of stoas. In Ionia in Asia Minor especially, the agora was made into a rectangular space through the use of L- or Pi-shaped stoas built on three sides of a rectangular open space with a street along the fourth. The effect was to create a continuous colonnaded façade. While the first Pi-shaped stoa was built at the sanctuary of Artemis at Brauron (c. 420–415 BCE), the most important of the Ionian stoas were found at Miletos, Priene, and Magnesia on the Maeander and were common throughout Asia Minor towns built on the Hippodamian model (Winter 2006: 56).

Height proved a design issue in stoas, utilitarian buildings where space could not be wasted. As stoas grew longer, the height of a single colonnade would tend to disappear into the vastness of the agora space (Winter 2006: 55). In order to create a more pleasing height-to-length ratio, architects adopted two-storey or multiple-storey designs, creating an exterior tall enough to overlook the rooms below. One of the largest known examples of two-storeyed design is the South Stoa at Corinth (c. 165 m in length), expanded in its second phase in the early third century BCE, with 33 shops with rear chambers and a unique water feature. The stoa was two-aisled, with 71 Doric columns outside and Ionic within; behind these columns was a row of 33 shops connected to a second row of storerooms featuring cold storage wells chilled with water from the Priene spring.

The use of two-storeyed stoas grew widespread in the fourth century, and in the Hellenistic period, we also have evidence for multi-storeyed stoas, many of which are associated with the Attalid dynasty at Pergamon. Large multi-storeyed stoas were placed along the terraces of hilly landscapes, and could be created either by placing a second portico above the main one at ground level, or by placing one or more storeys with basement rooms and porticos below the main portico to raise its floor to a higher ground level on the downhill side of a slope and to help retain the terraced ground level. The earliest of these is the East Stoa of the Athenian Asklepieion, built in the mid-fourth century BCE, where there were two superposed Doric colonnades on the façade of a two-aisled portico. The two-storeyed form appears to have developed here to meet the needs of those men and women worshipping and sleeping overnight in the stoa, but is later employed in buildings with a variety of functions.

In the Hellenistic period, there is a special category of Pergamene stoas, built during the reigns of Eumenes II (197–160 BCE) and

Attalos II (160–139 BCE), which have distinctive features. Typically, the Pergamene style preferred a stoa with two storeys and two aisles, and made use of Doric columns on the lower façade and Ionic interior columns, while the upper storey used Ionic columns on the façade and interior double half-columns with palm capitals, supporting a mixed Doric-Ionic entablature (Coulton 1976: 66-72, 126-9). Athens has two representative Attalid stoas, the Stoa of Eumenes II and the Stoa of Attalos II, restored between 1953 and 1956 on the basis of Travlos' drawings by the American School of Classical Studies in Athens and now serving as the museum and warehouse for the Agora Excavations.

Eumenes II built a long stoa, just west of the theater of Dionysus on the south slope of the Acropolis, to shelter the thousands of people who attended the festival and theatrical events (*Vitr. Arch.* 5.9.1). This stoa was built into the steep south side of the Acropolis, so one of its most characteristic features is the large retaining wall and buttresses connected by semicircular arches still visible today. The stoa shows Pergamene style and also the direct influence of Pergamene architects in its construction. The palm capitals and cornice on the upper storey use gray Pergamene marble characterized by large crystalline inclusions, and the mason's marks on the blocks suggest that the stones were carved in Pergamon and imported to Athens after they had been worked. The Stoa of Attalos in the east side of the Athenian Agora was donated by Attalos II of Pergamon to the people of Athens (Thompson & Wycherley 1972: 78). This stoa is also in the Pergamene style, but uses Athenian limestone and Attic marble. Like the South Stoa at Corinth, this stoa had a row of 21 shops behind the colonnades on each storey, and served as the chief market building of the Agora in the Hellenistic period.

Large stoas were also built at the sanctuaries of Samothrace, Delphi, and Delos by Macedonian and Attalid dynasts, such as the Macedonian stoas of Antigonos II on the north side of the sanctuary of Apollo at Delos and of Phillip V on the southwestern corner of the same sanctuary. Comparable in the Hellenistic period are the multi-storeyed market halls exemplified at Aigai, Alinda, and Assos, where the agoras were formed on hillsides with artificial terracing (Dinsmoor 1975: 293). The South Stoa of the Agora at Assos in the Troad in Asia Minor, built in the mid-second century BCE, was one of the tallest buildings in the Greek world with a total height of five storeys, or 22 m, since it was built with two floors below the Agora ground level, and two superposed porticos above ground level (Coulton 1976: 70).

Small two-storeyed stoas from late Hellenistic Delos, such as the L-shaped stoa of the Agora and the Agora of the Italians, may have inspired the two-storeyed porticos and arcades of late Republican and early Imperial Rome (Winter 2006: 56; on the Agora of the Italians, see Trümper 2008). Stoa building declines by the first century BCE. Although new stoas continued to be built throughout the Greek and Roman world, the Roman basilica and portico and the Hellenistic colonnaded avenues largely took over the function of the stoa.

Cross-References

- ▶ Agora in the Greek World
- ▶ American School of Classical Studies at Athens (ASCSA)
- ▶ Urban Planning in the Greek World

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Stone Tool Usewear and Residue Analysis

Richard Fullagar[1,2] and Carney Matheson[3]
[1]Centre for Archaeological Science, School of Earth and Environmental Sciences, University of Wollongong, Wollongong, NSW, Australia
[2]Scarp Archaeology, Austinmer, NSW, Australia
[3]Paleo-DNA Laboratory, Department of Anthropology, Department of Biology, Lakehead University, Thunder Bay, ON, Canada

Introduction

Although strictly speaking the concept of *artifact* refers to what is actually manufactured (e.g., by flaking or grinding), in archaeology the term *stone artifact* commonly refers to any stones that are made, modified, or used by humans (other primates also make and use artifacts; see Mercader et al. 2007). The by-products of manufacture are often also called artifacts in the sense that humans produced them. *Stone tools* are usually defined as those artifacts that actually have evidence of use. For reliable identification of archaeological stone tools and determination of specific functions, analysts rely on *multiple lines of evidence* that might include tool design, usewear, residues, breakage patterns, hafting traces, and archaeological context. Ethnographic and experimental evidence is also important. Usewear and residue analyses have the potential to provide a reliable basis for reconstructing and evaluating the nature of prehistoric tasks, resource utilization, and settlement history.

Definition

Residues in this context generally refer to materials that are transferred and adhere to implements in the course of use or preparation for use. We are particularly interested in residues that are transferred to stone tools (Briuer 1976; Hayden 1979; Loy 1993). Of particular interest is the transfer of residues linked with a specific task (e.g., harvesting cereals or hunting) or processing a particular material (e.g., woodworking or grinding seeds). However, some residues are unrelated to utilization and may reflect incidental contact, burial processes, or even modern contaminants. Some tool residues can survive intact on artifacts for millions of years, while others may deteriorate rapidly and undergo chemical changes depending on their structure and specific taphonomic conditions. Consequently, specific methods of extraction, identification, and analysis have been developed for particular conditions, particular artifact types (e.g., ceramics), and specific kinds of residues (Evershed et al. 1992; Pollard & Heron 1996). The principles of residue analysis are based on the identification of diagnostic microfossils, chemical signatures, atomic structure, and genetic composition, as well as of other properties.

Usewear (or "use-wear") refers to the wear on the edges and surfaces of an implement that is linked with its utilization (Odell 2004). *Microwear studies* sometimes refer to a particular approach that employs

metallographic microscopes at high magnification, especially (but not exclusively) aiming to observe and interpret polishes on stone tools (see below). *Traceology* is a term that may refer to the study of any traces (whether residues or surface alterations), usually in the context of tool use, and can be synonymous with microwear studies. However, these terms are often used synonymously to refer to surface modifications that arise during use, hafting, handling, and storage. Some forms of usewear may incorporate or absorb residues within surface layers, providing a mixture of additive residue and usewear traces. The general principles of usewear analysis are experimentally based and derived from fracture mechanics, tribology, and related sciences. While potentially applicable to all material classes (including artifacts made of wood, bone, stone, glass, shell, antler, ceramic and metal), specific methods and interpretive rules have been developed for particular tool materials (e.g., flint).

Key Issues/Current Debates/Future Directions/Examples

The main forms of usewear on flaked stone tools include scarring, striations, edge rounding, smoothing and polish, and bevelling (Hayden 1979; Kamminga 1982). Each form of usewear provides evidence of function but is rarely sufficient on its own to reconstruct particular tasks. Striations, for example, clearly indicate directionality or motion of tool use but are not diagnostic on their own of particular processed materials such as wood, shell, or skin. On the other hand, hafted flint flakes used for hide scraping sustain highly distinctive edge rounding along with a low incidence of edge scarring and abundant striations perpendicular to the utilized working edge.

The fracture mechanics of flaking indicate that particular properties of scars (e.g., initiation, termination type, orientation, and size) are linked with force application, edge morphology, and the nature of materials worked. For example, low-angled tool edges used to cut even soft tissue are particularly prone to produce scars with bending initiations and axial terminations. Bending scars on low-angled edges like this are rarely diagnostic of particular raw materials. However, low-angled tool edges used to saw bone sustain a highly distinctive bending scar pattern with crushed, rounded prominences, and uniform scar spacing (Kamminga 1982). Particular functional tool types known ethnographically sometimes sustain diagnostic scarring in association with other forms of usewear. For example, stone points used as drills sustain characteristically angled scars oriented at right angles to the circular drilling motion. Stone arrow and spear tips sometimes sustain burin-like impact fractures that, in conjunction with other features (e.g., microscopic striations/polish alignments), may be crucial in determining a projectile's function.

Polish on flint tools has been studied extensively and can be a diagnostic indicator of material worked (e.g., van Gijn 2010). Stone segments hafted as sickle blades sustain a highly characteristic gloss that indicates highly siliceous plants. However, particular forms of usewear are not studied in isolation but in combination with other forms of usewear, other traces of use (e.g., residues), and other lines of evidence such as tool design, breakage, and consideration of the archaeological context.

Grinding and pounding implements (upper and lower stones) sustain surface modifications that include smoothing, striations, and pitting rather than the edge damage that is found on flaked stone tools. Crushing and grinding minerals (e.g., ochre), plants, and animal tissue force residues (including liquids, chemical compounds, and particles) into cracks and imperfections on the tool surfaces. Some grinding stones are selected for the composition of their cemented particles and their suitability for processing particular foods (e.g., grass seeds). Other stones are selected for their toughness and suitability for edge ground tools. Grinding stones and ground stone implements (like axes) with a porous surface or deep cracks provide, under suitable preservation conditions, a reservoir of deeply impacted and absorbed residues related to utilization.

Haft traces can be indicative of particular handles and tool function (Rots 2010). Experiments show that combinations of bindings, sockets, and adhesives affect the type, location, and abundance of scars, striations, and polish.

Residues in archaeology are the minute remains that are transferred to an artifact. The presence of a residue follows Locard's exchange principle which states "with contact between two items, there will be an exchange" (Thornton, 1997). There is a range of residues currently studied by archaeologists, chemists, and archaeometrists. These can include microfossils, fibers, scales, particles, pigments, traces, amorphous residues, and biomolecules. The microfossils studied are predominantly plant microfossils represented by pollen, phytoliths, starch grains, and other inorganic crystals (e.g., schlerieds, raphides, and druzes). The fibers will include natural plant fibers (e.g., cellulose), animal fibers (e.g., collagen and hair), insect fibers (e.g., silk), and historical synthetic fibers. Scales can be observed from fish and reptiles in residues. Particles can include organic particles (e.g., charcoal) or inorganic particles (e.g., metals) which can be found in a residue to indicate metal working. Pigments can also be inorganic or organic but are predominantly inorganic in the archaeological record (e.g., ochre and cinnabar), while traces can include tissues and cells from plants or animals.

Amorphous or absorbed residues can be very difficult to characterize or identify. These amorphous residues can be formed by degraded trace residues including fat from adipose tissues, dried fluids (e.g., blood, milk, egg), or plant exudates (e.g., resins, gums, oleoresins). Many biomolecules can be found in a residue. The most widely analyzed are fatty acids as these are slightly hydrophobic, well preserved, and can be found in large amounts. Many other categories of biomolecules can also be studied, including hydrocarbons, carbohydrates, proteins, nucleic acids, lipids, resin acids, drugs, alkaloids and hormones.

Residue analysis begins with low-power incident light microscopy, continues with high-powered incident light microscopy, and culminates with the removal of the residue off the surface of the artifact for polarized light microscopy and further analysis. This archaeological microscopy approach to residue analysis is usually capable of identifying microfossils, fibers, scales, particles, pigments, and some traces. Further analysis employing histology, immunology, simple biochemical test, absorbance spectroscopy, Fourier transform infrared (FTIR) spectroscopy, Raman spectroscopy, UV luminescence, gas chromatography mass spectroscopy (GCMS), liquid chromatography mass spectroscopy (LCMS), and elemental, genetic, or protein analysis can characterize and identify archaeological residue even amorphous residues and residual biomolecules. Many of these techniques have been developed for specific residues under specific conditions on a definitive artifact type, for instance, absorbed residues on ceramic (which can appear invisible). Residue analysis can be performed on artifacts made from the following materials: wood, bone, stone, textile, metal, shell, ceramic, glass, antler, horn, and feather. Some key residue types include food, resin, antler, wood, bone, lipids, adhesives, sealants, and blood.

Residue analysis characterizes a residue with sufficient detail to interpret the function or process of a particular tool. This interpretation can include post-excavation contamination, environmental contamination, incidental contact, and nonfunctionally related transfer. This will allow the archaeologist to define the tasks with which the tool has been associated. Most residue and usewear analysts will begin by first identifying if there is a residue present on an artifact. This is important in order to identify if an artifact has been used. There are two steps – inorganic or organic and anthropogenic or environmental – that follow the confirmation of a residue. These are critical to determine if the residue is the cause of environmental contamination. Determining if the residue is plant or animal, as well as the tissue and taxa of origin, is critical to establish the association of residue and artifact.

Usewear/residue studies of stone, bone, shell, ceramic, and other implements provide key evidence in the history of hunting technology, food

processing, resource utilization, and settlement history. Complex hafting of flaked stone tools (whether projectile tips or craft tools) may provide an archaeological indicator of technological sophistication and hence human intelligence, with evident implications for tracking aspects of human evolution (e.g., Lombard & Haidle 2012). Similarly, the history of grinding stone functions may provide an indicator of sophisticated resource utilization and the complex processing of toxic foods and medicines, again with implications for the study of human evolution.

Cross-References

- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Ceramics: Scientific Analysis
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Fourier Transform Infrared Spectroscopy (FTIR): Applications in Archaeology
- ▶ Gas Chromatography-Mass Spectrometry (GC-MS): Applications in Archaeology
- ▶ Pigment Analysis in Archaeology

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Stone Treatments in Archaeological Conservation and Preservation

Stefan Simon
Rathgen Research Laboratory – National Museums Berlin, Berlin, Germany

Introduction

Since antiquity, treatments of damaged stone have been carried out with the aim to delay the deterioration of buildings and monuments. Today, the objective of stone conservation is the preservation of these historic and/or artistic values for future generations in the best possible state without compromising the value of authenticity and access. The approach that has been taken to address this challenge has direct links to the emergence of chemistry in the nineteenth century. Chemicals such as water glass, fluorosilicates, linseed oil, and later ethyl silicate were applied as consolidants for stone shortly after their discovery and first synthesis. After World War II, organic compounds, such as acrylic and epoxy resins, were introduced into conservation practice. Nowadays, ethyl silicate and derivatives make up the most prominent group of stone conservation products.

A sound knowledge of the chemical and physical characteristics and of the mechanism through which conservation treatments interact with the

stone is the basis for the selection of the most suitable solution for any conservation intervention. However, only rarely are the products available on the market tailored to meet the specific needs of the field of cultural heritage. Moreover, the extremely wide range of porous building materials (both natural and man-made) corresponds to an equally wide range of decay problems and conservation needs which limits the validity of any hurried, superficial appraisal. Therefore specific, cautious evaluation is needed before choosing any product or equipment for each specific case.

There are two main ways to collect the information needed for such careful evaluation: (1) to survey the condition of monuments that have been treated in the past and for which reasonably good documentation exists regarding the methods and materials that were used and (2) to carry out ad hoc tests (either in the laboratory, in situ, or in both contexts, by outdoor exposure programs). Studying the condition of monuments treated in the past is the closest we can get to a real assessment of the performance of products and methods, after a known time interval and under known environmental conditions. The sine qua non condition is, however, the availability of exhaustive, or at least sufficient, documentation of the work that was carried out. The parameters to measure, the measuring methods, and the evaluation criteria have been under continuous discussion in order to improve the evaluation of the long-term performance of treatments through the past decades.

Definition

The primary goal of a stone conservation treatment is to restore in an efficient and durable way the integrity of weathered zones of the object, improve its mechanical and physical properties to the same level as the sound core, while considering the primacy of "retreatability" over the requirement of "reversibility." Stone treatments, whether for consolidation or protection, involve the use of special products for stone conservation.

Key Issues/Current Debates/Future Directions/Examples

The Athens Charter for the Restoration of Historic Monuments (1931) is the first international document which outlines the principles for the conservation of historic monuments. It recommends "... the judicious use of all resources at disposal of modern technique" to delay the decay, while these measures "should be concealed in order not to impair the aesthetic integrity of the monument."

Thirty-three years later, 1964, the Venice Charter calls in article 10: "[...] Where traditional techniques prove inadequate, the consolidation of a monument can be achieved by the use of any modern technique for conservation and construction, the efficacy of which has been shown by scientific data and proved by experience." Article 2 states that "the conservation and restoration of monuments must have recourse to all the sciences and techniques which can contribute to the study and safeguarding of the architectural heritage."

Often, the primacy of reversibility is attributed to the Venice Charter. However, in stone treatment, reversibility remains an only theoretical option. As most treatments, if not all, cannot be considered as reversible, "retreatability" is the desired characteristic of a conservation intervention (Petzet 1993; Giusti 2006), which has been replacing the concept of reversibility in conservation ethics.

Many papers continued to be published on the results of laboratory tests for stone treatments, both specifically referring to the treatment of specific monuments and to the assessment of a given conservation product or method. Requirements have been specified for different treatments. The research aims assumed that the main objective was not the selection of the "best" product but rather the identification and testing of criteria determined by the stone itself that might lead to that selection (Delgado Rodrigues 1996). Tests for cleaning methods and on the effectiveness of biocides were proposed. The growth in the use of laser cleaning has influenced the experimental studies to evaluate its effects and possible damages.

Since 1985, the Italian NORMAL Committee had dedicated a working group to the problem of evaluating water-repellent products with the specific aim of defining a detailed testing methodology. Evaluation procedures for stone treatments have been discussed at length during the International Colloquium organized by ICCROM in 1995 on "Methods of Evaluating Products for the Conservation of Porous Building Materials in Monuments." The five sessions of the Colloquium were dedicated to the specific problems of testing restoration mortars, biocidal treatments, consolidation treatments, treatments with water repellents, and finally to the important issue of weathering. Each session was followed by a Round Table. A critical evaluation of the papers and of the Round Table discussions was published one year later, in 1996, by the experts who chaired the sessions.

H. R. Sasse and R. Snethlage (1997) have proposed a very comprehensive and detailed methodology for the evaluation of stone consolidation treatments based on their own experience and on a previous proposal by D. Honsinger (1990).

Besides the properties to be measured and the related testing methods, Sasse and Snethlage propose to evaluate the results obtained for each parameter making reference to the unweathered stone and to assess them as "% of the optimum." Limits of acceptability are also proposed. According to these authors, penetration depth, hygric dilatation, and E-modulus have the highest priority among the listed properties. The penetration depth must be related to the thickness of the damaged stone or of the zone of maximum mean moisture; hygric dilatation must not increase against the untreated stone, and the E-modulus must not exceed the E-modulus of the unweathered stone by more than 1.5 times.

Accelerated laboratory tests and field-exposure studies, though considered useful and frequently applied, cannot be directly translated into the prediction of the long-term behavior of stone treatments. Nonetheless, many of the difficult points related to field-exposure and to laboratory-accelerated studies are also valid when these conditions are applied to test the durability of treatments. The limited validity of field-exposure tests, as they are constrained by the existing climatic and environmental parameters, and the risk that too high concentration of damage components in accelerated chamber experiments or too high frequency of weathering cycles may lead to results which are far from reality and therefore not useful for the intended purpose are among the main challenges.

For a critical evaluation of the present situation of testing procedures, as they are nowadays commonly carried out, the various steps of the process can be briefly discussed. The aim of the study must be clearly defined in order to select the products (or equipment) to test, the parameters to measure, the type and number of samples, and all the other experimental details.

Once this has been decided, it will be possible to estimate the time needed for the study and its cost. These two points are not insignificant, considering that time and budget constraints frequently limit the possibility to carry out the study, especially when it is aimed at the selection of products for the conservation of a specific monument, within a conservation project where budget and deadlines have already been fixed.

When this is the aim, it is of the utmost importance to refer to the results of preliminary diagnostic studies (characteristics and condition of the stone, main factors of decay, surface typology, etc.) when planning the experimental details of the testing procedure. To that purpose a strict contact between the laboratory where tests are planned and carried out and the project site is always advisable in order to facilitate the exchange of opinions between conservation scientists and conservator/restorers. This collaboration is especially important when testing cleaning methods. Actually, while their harmfulness could even be evaluated on laboratory samples of the same stone type as the monument, their efficacy has to be tested on the real surfaces, due to the complexity of the various forms of deposits or other dangerous materials to be removed and which are impossible to reproduce artificially.

The last important point of the planning phase concerns the products to test. In the large majority of cases, several products are tested together and compared, as such the results have a relative

validity rather than an absolute significance. Whichever the aim and category of the evaluation, the products must be clearly identified (nature and concentration of principal components, solvents, catalysts, additives if any, etc.). Unfortunately, it is not compulsory for producers and retail dealers to declare the detailed composition of products used in conservation; moreover, to characterize these products is not easy for unspecialized laboratories, especially in the case of organic products. It is, however, advisable to reject products that are only vaguely described and to have at least a "fingerprint" of the product to test, such as a FTIR spectrum. This will also help to check afterwards the quality of the product that, having been tested and selected, will be used for a conservation treatment.

When the tests are carried out on stone laboratory samples, they are obtained either from a monument or from the quarry. The first case, however, is not very common, as the amount of samples required for the testing cannot be obtained from a monument, unless some dismantling has to be carried out. In the second case, the quarry stone condition is usually better than the condition of a stone in need of conservation. This may require a preliminary artificial weathering which will, however, introduce an element of uncertainty in the test results.

The problem is even tougher if the tests concern bricks and mortars. If old, damaged samples are not available, as is very frequently the case especially with mortars, it is necessary to produce new samples similar to the damaged ones, and this requires extra work for their production and the subsequent characterization.

Cubes, parallelepipeds, and cylinders are the sample shapes most frequently used; depending upon the different parameters to measure, different shapes may be needed within a single study. The sample size generally ranges from 3 to 7 cm. The more homogeneous the stone, the smaller can be the size. However, when the depth of penetration and bulk properties are considered important in order to assess the efficacy of the treatment, the use of very small samples should be avoided. Working Group 3 within the Technical Committee 346 of the European Committee for Standardization (CEN) is currently preparing further standards for the evaluation of methods and products for conservation works on porous inorganic materials constituting cultural heritage (http://www.cen.eu/).

Nondestructive tests, such as ultrasonic pulse velocity, are given priority over destructive tests, such as for mechanical strength. Parameters that can be measured in profile along the weathered zones are preferred over bulk parameters of the stone as a whole.

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- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Earthen Architecture in Archaeological Conservation and Preservation
- ▶ Historic Site and Historic Building Preservation: Overview
- ▶ International Heritage Conservation Principles: Historical Overview
- ▶ Nonstructural Sites: Monitoring
- ▶ Stone: Preservation and Conservation

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Stone, Peter G.

Suzie Thomas
University of Glasgow, Glasgow, UK

Basic Biographical Information

Peter G. Stone was born in Manchester, UK, in 1957. After school, he first studied at the University of Stirling, gaining both a bachelor's (B.A.) degree in History and a diploma in Education (Dip.Ed.) in 1979. Over the next few years, he worked as a schoolteacher, teaching History in England, but also teaching English in Greece. In the school summer holidays of 1978 and 1979, and before going to Greece in 1979, he worked as a volunteer at the Coppergate excavations in York with York Archaeological Trust. He was soon drawn even closer to archaeology, completing in 1983 a master's (M.A.) degree in Archaeological Method and Theory at the University of Southampton. This was followed by a Ph.D. at the same university, supervised by Professor Peter Ucko, with the thesis title *Teaching the Past, with Special Reference to Prehistory, in English Primary Education*, combining both his pedagogical experience and his archaeological interests.

Major Accomplishments

Due to working in a number of posts, including as a Project Manager and Coordinator at the University of Southampton for the Archaeology and Education Project set up with Ucko and then in various posts at English Heritage, and with a young family, Peter had the challenging task of carrying out his Ph.D. research on a part-time basis. This achievement both developed in him a wider knowledge and experience of the heritage sector than a full-time student would have gained and also demonstrated his ability to focus on academic research despite many other commitments. It was during his time with English Heritage that he was directly involved with the infamous controversies surrounding the Summer Solstice at Stonehenge, dealing with this issue in the early to mid 1990s, including while working as Acting Regional Administrator for the South West. His experience with Stonehenge helped establish him as an authority on the site, with numerous publications looking at issues around the site's treatment and management (e.g., Stone 1999, 2006), leading to his appointment in 1997 as the Council for British Archaeology's (CBA's) Special Advisor on Stonehenge (later appointing him Special Advisor for Hadrian's Wall, another significant World Heritage Site). The CBA also took advantage of Peter's educational expertise, appointing him Chair of the CBA Education Committee from 1997 to 2003, and he had been

a member of the Schools Committee and then the Education Board for the CBA since the mid 1980s.

However, Peter's involvement in heritage reached beyond the UK into international issues from an early stage; he was instrumental, again with Peter Ucko, in driving the formation of the World Archaeological Congress (WAC). From 1998 to 2008, he was Chief Executive Officer of WAC, and his continued involvement has been credited with providing WAC with administrative continuity and institutional memory (Smith, *pers. comm.* 2011), working from 1986 as head of the unpaid secretariat that enabled the organization to function. During this time too, he was Executive Series Editor for the One World Archaeology (OWA) Series (1999–2003). He also produced as part of the OWA Series several seminal publications on education and interpretation of archaeological and cultural heritage that are still core textbooks (e.g., Stone & MacKenzie 1990; Stone & Molyneaux 1994; Stone & Planel 1999).

He has also been involved with international heritage management issues for much of his career, for example, through extensive involvement with the United Nations Educational, Scientific and Cultural Organization (UNESCO). For example, in 1996 he was appointed as a member of the Advisory and Drafting Team for the World Heritage Education Project and Kit. His work with UNESCO has also included extensive work overseas. He was personally approached by National Museums and Monuments of Zimbabwe (NMMZ) to carry out a review of their education service, compile a report on its future development, and then implement some of that development – in particular a 7-week training program for education and interpretation staff in NMMZ. In addition, sabbatical visits to Australia and New Zealand as visiting lecturer at Flinders and Auckland Universities in 2004 and work in China in 2008 with the International Centre for Chinese Heritage and Archaeology (ICCHA) reinforce the regard in which his expertise is held internationally.

In 1997 Peter joined Newcastle University as a lecturer in Heritage Studies at the Department of Archaeology, which at that time was part of the university's Department of Archaeology. He developed the popular MA program in Heritage Education and Interpretation and was Director of the International Centre for Cultural and Heritage Studies at Newcastle University from its formation in 2001–2005. Following this, he moved to his current position as Head of School of Arts and Cultures at Newcastle University, also becoming a Professor in 2005. He is still involved with teaching at ICCHS, but the extent to which he is able to teach is limited by his Head of School duties. He also continues to supervise a diverse and globally spanning range of Ph.D. candidates.

From a research perspective, most recently Peter has been involved with exploring the controversial issues around heritage management during armed conflict, stemming from his appointment in 2003 as advisor to the Ministry of Defence with regard to safeguarding the archaeological heritage in Iraq in light of the impending conflict. As well as an award-winning publication coedited with Joanne Farchakh Bajjaly (2008) and the development of a touring exhibition in partnership with the Oriental Institute in Chicago exploring the impact of the destruction of cultural heritage in Iraq, this experience has also led to Peter's continued lobbying of the UK government to ratify the Convention for the Protection of Cultural Property in the Event of Armed Conflict with Regulations for the Execution of the Convention 1954. In addition to this, he continues to be interested in other heritage management issues, chairing the Hadrian's Wall World Heritage Site Management Plan Committee and sitting on the National Trust's Archaeology Advisory Panel.

Peter Stone's career has been highlighted with much esteem for his influential and groundbreaking contribution to international heritage studies. The most recent recognition of this occurred in early 2011 when he was awarded the Order of the British Empire (OBE) in the Queen's Birthday Honours list for services to heritage education. Peter currently lives in Northumberland with his wife and four children.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ucko, Peter (Cultural Heritage Management)
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Further Reading

For many of Peter's publications, see www.ncl.ac.uk/sacs/staff/profile/peter.stone#tab_publications.

Stone: Preservation and Conservation

Tom Paradise
Department of Geosciences and the King Fahd Center for Middle East Studies, J. Wm Fulbright College of Arts & Sciences, University of Arkansas, Fayetteville, AR, USA

Introduction

Stone represents a hard substance typically composed of mineral and/or rock matter, which is quarried or simply found, and worked into a specific form and size for a particular purpose such as construction, paving, adornment, or as powders (e.g., pigments). Stone is exceedingly varied in its distribution, characteristics, and application; however, before its broad diversity can be discussed, important definitions must first be addressed.

Definition

Mineral: a class of naturally occurring substances comprised inorganic compounds (carbonate) and elements (carbon) that exhibit a specific chemical composition, crystal structure, and optical characteristic. Specific minerals may include diamond, feldspar, quartz, and talc.

Rock: substance comprised of varied minerals either as individual mineral materials (e.g., graphite) or variable mineral constituents (e.g., granite). Rock can be created in nature through heat and/or pressure (marble) or through the actions of water and time (e.g., limestone). Rocks are basically composed of one massive mineral or simply a mosaic of many.

Weathering: rock surface deterioration caused by various mechanical and chemical processes through in situ influences. Causes are grouped as intrinsic and include characteristics of rock type, permeability, and surface texture, while extrinsic agents represent external or noninherent factors such as sunlight and rainfall.

Erosion: rock surface deterioration and weathering specifically due to the moving action of water and/or wind (e.g., waves, rainfall).

Key Issues/Current Debates/Future Directions/Examples

To understand stone use and treatment, it is crucial to understand their classifications that are based upon their primary environments of formation: heat, water, and pressure. Rocks are divided into three rock types of igneous (primarily fire), sedimentary (primary through secondary deposition), and metamorphic (primarily through heat and/or pressure alteration).

Igneous Rock

These rock materials are often the least likely to deteriorate quickly in art, archaeological, and architectural settings. They typically develop in high-temperature environments (crust, mantle) and are divided into two basic groups: intrusive and extrusive. These rocks are classified based on their formation and composition. *Intrusive rocks* and minerals include those materials that formed in high-temperature settings deep within the Earth or near the Earth's surface (e.g., volcanoes). In general, those rocks forming deep below the surface develop coarse particle sizes (like diamonds and granite), while those forming near the surface have smaller particles. Intrusive stones include granite, gabbro, and porphyry. For example, the stone blocks used to build the site of Machu Picchu (Peru) were cut from granite, while the Pyramids of Giza (Egypt) were originally faced in red granite from Aswan. However, the granite sheets have been robbed over the years leaving the limestone core blocks. The monumental columns of the Pantheon in Rome (Italy) were hewn from granite, while its interior's large circular floor panels were composed of a rare, bloodred porphyry. *Extrusive (or volcanic) rocks* form near or on the Earth's surface and have a fine grain size often as"lava" materials including rhyolite (light colored), andesite (gray, brown), or basalt (dark colored). Volcanic rock may be ejected as well (supercooled) to form igneous glasses like obsidian or scorious (with cavities) materials like pumice. For example, rhyolite (tuff) was used for the popular "peperino" building material in Rome (Italy) and the mo'ai statues of Easter Island (Rapa Nui).

Although all extrusive and intrusive rock materials are found in construction or as artifacts, their overall hardness makes them often difficult to work as structural masonry. However their hardness also makes them resistance to scratching and ideal in adornment, and as small tools.

Sedimentary Rock

These rock materials include some of the most widely used rocks in construction and conservation and include limestone and sandstone. Although most of the Earth's crust is composed of igneous rock, a thin veneer of sediments and sedimentary rock covers most of it. These rocks are formed as layers of crustal sediments become compacted, cemented, and hardened (indurated, lithified). Sedimentary rocks are considered secondary, because they are formed as the result of the accumulation of smaller portions of preexisting rock materials like other sedimentary or igneous and metamorphic rocks. There are three categories of sedimentary rocks that are based upon the type of particle from which it developed. *Clastic* sedimentary rocks are comprised of accumulations of small pieces of broken up rock (or clasts) that have accumulated and lithified over time through compaction and/or cementation. For example, accumulated and cemented beach sand develops into sandstone over time. *Chemical* sedimentary rocks develop when chemically rich water evaporates, leaving floating or dissolved minerals to concentrate. Chemical-type rocks are most prevalent in arid environments where seasonal or ephemeral ponds (playa lakes) develop in closed depressions. For example, salt and gypsum deposits form from repeated flooding and evaporation over long periods. *Organic* sedimentary rocks represent the accumulation of organic debris such as large shells (cochina), fine shell material (chalk), and plant material (coal).

Sedimentary rock materials represent the one of the most widely used building materials and include the limestone blocks of the Pyramids at Giza (Egypt), the carved sandstone Buddha of Leshan (China), and the architecture of Petra (Jordan), the travertine of Saint Peter's Colonnade (Italy), and the elaborately carved salt mine architecture of Wieliczka (Poland).

Metamorphic Rock

From "meta" (change) and "morph" (form), any rock can develop into metamorphic rock

through a change in heat and/or pressure. Over time, with increased pressure, limestone becomes marble, the most popular sculptural and statuary material, and mudstone and shale alter into slate. This change may involve the rock moving into a different environment or the environment changing around the rock material. These recooked and restressed rocks include marble, slate, gneiss, and schist. For example, the Taj Mahal in Agra (India), Il Vittoriale in Rome (Italy), and the US Supreme Court Building (USA) are all constructed of white marble. Other metamorphic building materials are much less common; however, schist, phyllite, and gneiss are used in stone architecture. We must be reminded as well that many rock materials do not confirm to one classification, since the transformation processes may be localized or incomplete. Hence, limestone may have marbleized portions, or granites may have gneissic margins.

Weathering and Deterioration

Since stone materials are so varied in composition, texture, density and integrity, their rates of weathering, influences on weathering, deterioration features, and change in integrity over time are as diverse. So to address stone preservation, one must first examine the broad factors involved in stone deterioration as well.

Weathering is the breakdown of rocks (and minerals, soils, metals, glass, etc.) through the interaction with the atmosphere, climate, biota, and anthropogenic factors (e.g., pollution). The processes of weathering occur in situ and are not to be confused with erosion, which involves deterioration and degradation by influences that involve movement including moving water, wind, ice, and gravity. Weathering is conventionally classified into (a) physical and (b) chemical weathering. *Physical* (or mechanical) weathering involves the breakdown or disintegration of stone through direct contact with climatic influences whereby the weathering by-product is the same as the pre-weathered material. Physical weathering causes the disintegration of rocks without chemical change. For example, freezing water can expand surface cracks in rocks that cause the material to break down and off. *Chemical* weathering, however, involves the breakdown of rock surfaces through chemical reactions influenced directly by the atmosphere, biota, and climate. It is a gradual process as the mineralogy of the stone adjusts to the surface environment and/or to the contact changes (wind, water, humans). New or secondary minerals can develop from the original rock minerals – the processes of oxidation and hydrolysis being the most prevalent. For example, acid rain eroding the surface of a marble statue produces a by-product unlike the pre-weathered rock.

Chemical and physical weathering most often work in tandem. One process is rarely the only weathering agent, but instead, the two influences work together to break down rock material. For example, cracks expanded by physical frost action (cryo-fracturing) will increase the surface area of the weathering rock, exposing more material to chemical reactions and further breakdown. Biologic weathering is a term used for the influence of plants and animals on rock breakdown. Plants and animals may create chemical weathering through release of acidic compounds. For example, lichen overgrowth on rock produces fine roots (rhizines) that physically attach, penetrate, and disaggregate the rock substrate, while oxalic acids released from the lichen roots can chemically deteriorate the substrate as well (Paradise 1997).

Many of Earth's landforms, surface features, and landscapes are the result of weathering processes, in conjunction with erosional forces. In the fields of material conservation/preservation and heritage management, it is imperative that an identification and understanding of weathering and erosional characteristics are addressed before assessment and treatment may be undertaken. Questions as to why sandstone weathers differently than limestone or granite, for example, are crucial in stone conservation and preservation. Hence, a discussion of the diverse weathering influences on the assorted stone materials follows.

Physical weathering phenomena include a number of influences that can degrade the surface of stone, and ultimately lead to decreasing the integrity of the structure as well. *Disaggregation* and *spalling*: in rock materials made up of particles (cochina), minerals (granite), or clasts bound by matrix (sandstone), weathering agents can cause decay through disaggregation. With repeated heating-cooling (thermal stress), and freezing-thawing, the aggregate may loosen from the rock material and fall away, causing surface recession. The expansion of freezing water ($\leq$10 %) may be enough to pry a particle from its substrate. Also, the expansion of a heated surface particle, crystal, or clast may also cause its disaggregation. Disaggregation can be common in environments where temperature ranges are greatest, like deserts. Similarly, salt heaving occurs when salts within or adjacent to the weathering material can migrate (when soluble) into the surface particles to evaporate, crystallize, and expand, causing salt heaving and disaggregation as well. Hydration occurs when rock and minerals expand upon saturation and are pried from the substrate and deterioration as well; this can be a process that involves both physical and chemical weathering processes as well. When rock minerals take up water, the increased volume creates physical stresses within the rock and acts again to pry apart particles, crystals, and rock materials.

Since some rock materials (e.g., sandstone, granite) formed deep below the Earth's surface, when erosion and/or uplift exposes them, this removal of overburden represents a huge decrease in material pressure. Hence, the material will expand causing small (micron) to moderate (centimeter) fractures to develop. This "unloading" can cause large-scale surface deterioration and structural damage through sheeting, peeling, and spalling (Smith & Warke 1996).

Chemical weathering influences include a number of influences that can deteriorate the surface of stone, leading to overall deterioration, surface recession, and damage as well. *Dissolution and hydrolysis* is the weathering process whereby acidic solutions (e.g., acid rain, groundwater) degrade rock material through the acidic breakdown of some rocks (e.g., limestone, marble) and minerals. Hydration is a chemical process, for example, when iron oxides change to iron hydroxides and the hydration of anhydrite forms gypsum. Hydrolysis commonly affects silicate (e.g., arenite) and carbonate minerals in rock (e.g., limestone). For example, water can ionize/acidify to react with silicate minerals resulting in the dissolution of the original mineral. *Oxidation* typically involves the transformation of metals and metallic components. In stone, the most process involves the oxidation of iron or copper through the combination of water and oxygen. This change to iron or copper oxides produces a rust-like stain in iron from the development of new minerals like hematite and limonite or a green stain (verdigris) in copper with the transformation into new minerals like chalcopyrite. This rusting or verdigris decreases the overall rock integrity and hardness.

Conservation, Applications, and Treatments

Contemporary conservation efforts now often examine and monitor deterioration influences and conservation at four different scales: (a) molecular material scales (e.g., microscopic examinations: submillimeter), (b) surface material scales (e.g., rock surface detail: millimeter-centimeter), (c) structural levels (e.g., for partial restoration of a temple: centimeter-meter), and at (d) the broadest urban/regional scales (e.g., classical period city reconstruction: meter-kilometer). All examination, conservation, and monitoring levels must address both extrinsic (i.e., climate, humans) and intrinsic (i.e., stone composition, integrity) influences on stone deterioration, so the techniques used in their conservation must affect these factors directly. Conservation procedures can then (1) reduce material susceptibility to weathering and erosion forces and/or (2) increase its resistance to them. At many sensitive sites like Petra (Jordan) or Machu Picchu (Peru), extrinsic deterioration factors such as human touching, climbing, and treading; may be diminished simply through enforced policies that either prohibit or require certain aspects of behavior: banning entrance and prohibiting climbing, or simply climbing over, on

or near sensitive materials and sites. These simple policies have proved effective in decreasing deterioration including human-induced abrasion and humidity shifts (from respiration, perspiration, and transpiration). Such restrictions may act not only to decrease overall stone weathering and erosion but to also create a sense of patrimony and caring among visitors to these sites. Understanding that all people are a part of our Earth's patrimony, protection and salvation may in fact instill a sense of legacy and heritage – a more pervasive conservation concept.

In addition to policies related to restricting or facilitating behavior, the first step in effective stone conservation and material/structural maintenance involves the removal of salts (efflorescence), plants, and lichens from the surface, whereby their removal, in many cases, can decrease the rate of erosion and weathering. New applications are now being tested (e.g., "cocoons") where a thick poultice is applied to the stone surface to absorb salts and particulates, so that upon their removal, surface pollutants and salts are removed as well. However, early tests have indicated that some of the stone substrate is also removed – a dangerous and detrimental circumstance in stone conservation practices; however, the technique shows great promise.

Once the deteriorating materials have been appropriately cleaned, the use of surface consolidants is increasingly conventional in strengthening stone integrity and fabric. Conservation methods and application are meant to address the influences of intrinsic weaknesses that can accelerate rock weathering and erosion. Over the millennia, on rock and mineral structures, artwork, and monuments, liquids and waxes have been applied in the hopes that disaggregation can be controlled through the better adherence of the components of the stone materials. Vitruvius (15 BCE) described the use of beeswax as a means of consolidating and waterproofing stone, and similar applications have been tried since. These organic applications are increasingly rare; however, inorganic washes such as calcium carbonate plaster and slurry were also widely used then and now. In fact, in sensitive stone materials like Petra's sandstones, plaster applications (for consolidation and/or fresco overlay) were widely applied and are still visible today on chamber walls, façades, couloirs, and staircases, where the carbonate coating has been protected from the destructive influences of sunlight, extreme temperature cycles, touching, precipitation, and woodfire sooting (Paradise 2011).

Contemporary stone surface and near-surface consolidants are categorized as synthetic (organic) polymers, silanes (alkoxy), epoxies, and waxes. Early experimental trials from the 1970s utilizing polymer consolidants (i.e., Paraloid©) are still often evident on limestone and sandstone applications across Asia, Europe, and the Mediterranean (Wheeler et al 1984). Organic resins are typically irretrievable, and over time, they tend to discolor, bleach, and peel.

Silane applications have been used since 1980s (e.g., Wacker OH©) and are organosilicon compounds that permeate the voids in stone (e.g., sandstone), strengthening its mineral fabric and decreasing its overall permeability (and active porosity) by creating a silica gel that fills the voids, binds the clasts, and "waterproofs" the stone. Silane applications have proven to be effective consolidating agents when the whole object may be immersed so that the solutions may penetrate all portions of the sandstone in question, such as a statue. However, when applied to stone such as sandstone in situ, like the façade of a monument, variability in penetration depths and coverage permits moisture to become trapped or enter and mobilize behind the silica skins. Once this occurs, rather than the normal disaggregation of the clast from the rock, spalling and sheet collapse can occur. The results of silane use in conservation will either represent an exemplary warning against future use or an excellent model for continued applications on important deteriorating stone architecture (Paradise 2011).

Overall, the field of rock weathering and stone conservation is relatively new, and theoretical research and applied innovation will continue to help us to more effectively and

efficiently protect our stone cultural heritage. Since our architectural and archaeological rock and mineral materials are so diverse, treatments and applications used to decrease their weathering and deterioration must also be as varied. So as research and technology grows and develops, our ability to preserve our precious past will grow, and our stone heritage will remain for us to experience and cherish longer and longer.

Cross-References

- Bamiyan Buddhas
- Conservation and Preservation in Archaeology in the Twenty-First Century
- Conservation, Restoration, and Preservation in Classical Archaeology
- Cultural Landscapes: Conservation and Preservation
- Dry/Desert Conditions: Preservation and Conservation
- Geoglyphs
- Glass: Conservation and Preservation
- International Heritage Conservation Principles: Historical Overview
- Karstic Landscapes: Geoarchaeology
- Mosaics: Conservation and Preservation
- Preservation Paradigm in Heritage Management
- Rock Art, Forms of
- Rock Art Sites: Management and Conservation
- Stone Treatments in Archaeological Conservation and Preservation
- Valcamonica Rock Art
- Volcanic Activity

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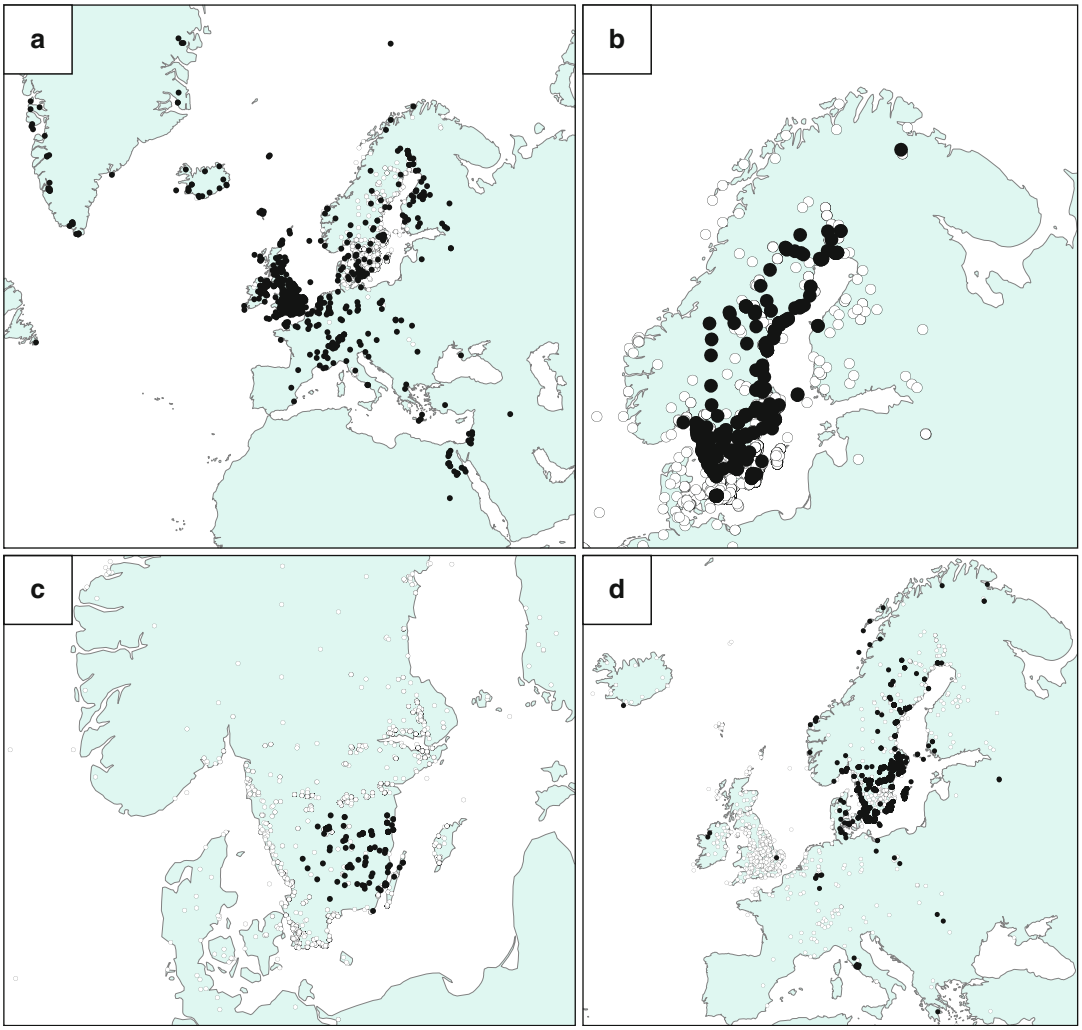
Strategic Environmental Archaeology Database (SEAD)

Philip I. Buckland and Erik J. Eriksson
Environmental Archaeology Lab, Department of Historical, Philosophical & Religious Studies, Umeå University, Umeå, Sweden

Introduction

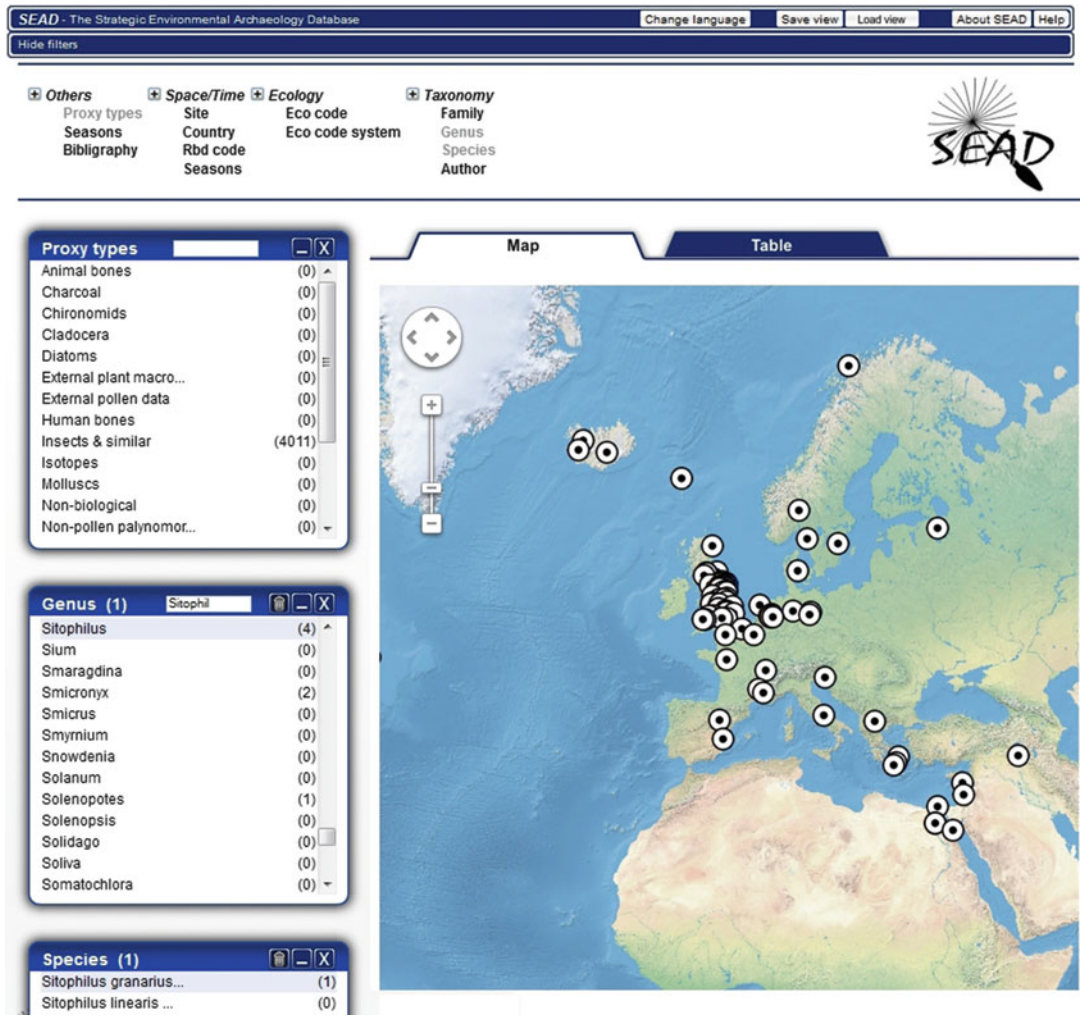
Environmental archaeology encompasses a wide range of scientific methods for analyzing the results of past human activities, environments, climates, and, perhaps most importantly, the relationships between these. Many of these methods are referred to as *proxy analyses*, denoting the illumination of the past as interpreted through the evidence of fossil organisms or properties. These lines of evidence, or proxy data sources, are assumed to reflect past conditions by way of their dependence on them. For example, crops will only grow within a specific climate range; organic waste will lead to increased soil phosphate levels, and burning increases magnetic susceptibility. While it is easier to store, manage, and analyze the data produced by these methods



Strategic Environmental Archaeology Database (SEAD), Fig. 1 Geographical location of sites stored in SEAD (as of 27 May 2012), categorized by data source a) BugsCEP b) MAL c) Dendro (pilot project) and d) Ceramics (see Table 2). Black dots indicate sites from each data source and white dots the entire database. Individual sites may include several proxies or multiple variables for any proxy

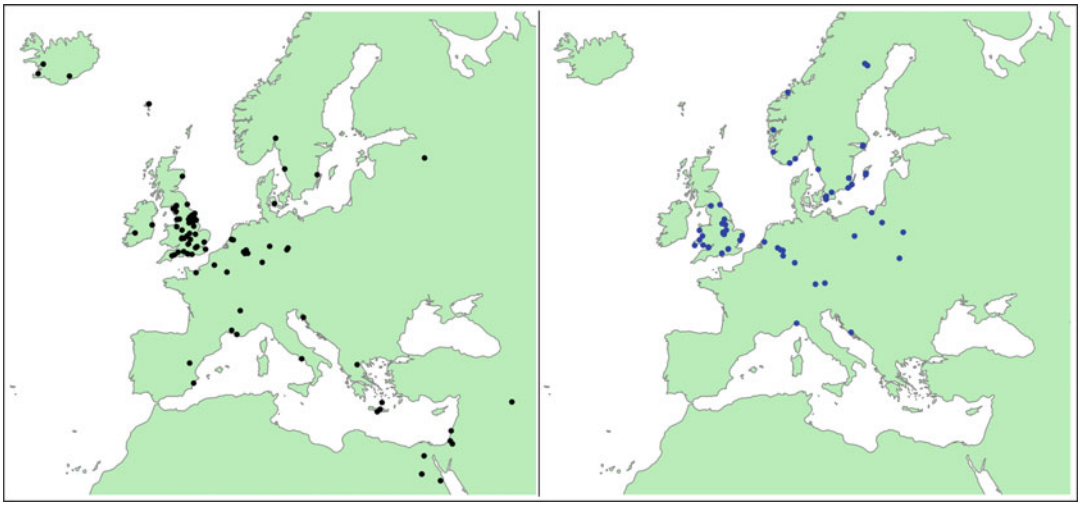
individually, there is much to be gained from multi-proxy integration at the raw data level. Despite this methodological diversity, the common factors of space, time, and context allow us to compare and integrate the results of analyses. This is, however, easier said than done, and without efficient data handling systems, the data rapidly become unmanageable. SEAD represents one solution to this problem and forms a node in an international web of open-access paleoenvironmental and archaeological databases which are driving archaeological science into new realms of more complex, multi-site, multi-proxy analyses and meta-analyses. This entry sets out to describe the system, the scientific implications of which are covered in Buckland et al. (2010) (Fig. 1).

SEAD is interfaced by either a downloadable software package, for data management, or an online-faceted browser system (Fig. 2) with analysis add-ons (SEAD 2012). The browser facilitates multiple-angle research in that it can



Strategic Environmental Archaeology Database (SEAD), Fig. 2 The SEAD online-faceted browser, QSEAD. Available filters (facets) are labeled across the top of the window. Clicking on a label makes the filter available on the left, showing the available content for (multi-)selection. In this example three filters have been activated: proxy type, genus and species. The items Insects and similar, *Sitophilus* and *Sitophilus granarius* have been selected in the respective filters. The map on the right shows the resulting distribution of sites from which the species has been found. Dating and quantitative value filters are also planned. (Base maps made with Natural Earth)

be ignorant of the origin of datasets. In other words, a user may ask for all incidences of a species (e.g., *Sitophilus granaries* in the right panel of Fig. 3) and retrieve data from multiple investigations. The user may then narrow their search geographically or chronologically, expand by adding other taxa or even soil properties, or just export the data, which is fully referenced. The same browser allows the user to interrogate the data from other angles, such as ecology or through the bibliography, for example. The ecology angle is potentially very powerful, in that it allows rapid visualization of sites where the specific environments/habitats are represented, and thus verges on advanced GIS capabilities. The power of this system derives partly from a flexible query engine, designed at HUMlab in Umeå, and partly from the relational



Strategic Environmental Archaeology Database (SEAD), Fig. 3 Fossil and modern distribution of the grain weevil *Sitophilus granarius*, extracted from SEAD (*left*) and GBIF (*right*), respectively, on 29 May 2012. Note that the maps essentially only illustrate the extent of the paleoentomological and entomological record in the databases and not the full extent of the species' distribution (Biodiversity occurrence data from GBIF extracted from portal resources 13289, 7856, 1451, 1454, 693, 12469, 1875, 13690, 13484, 13718, 1477, 14106, 13698, 13777, 11890, 11879, 11872, 12727, 11858, 11927, 12726, 12729, 11900, 1428, 12799, 11569, 11833, 8401; see the *Sitophilus granarius* entry in the BugsCEP database for full data provider list for the fossil record)

database structure which allows intuitive cross-querying between the smallest divisible data entities.

Definition

The Strategic Environmental Archaeology Database (Buckland et al. 2010; SEAD 2012) is a resource for the archiving, management, analysis, and dissemination of environmental archaeology and Quaternary science data. The database covers a large number of proxy data sources, ranging from beetles and dendrochronology to ceramic thin sections and ^{14}C dating (Table 1). It is an open-access project, initially financed by the Swedish Research Council and Umeå University, Sweden, with sub-projects funded by Lund University. The system provides unrestricted access to raw data from archaeological and Quaternary science investigations and has technically no geographical or chronological limits. Although its scope is international, SEAD is registered as a national research infrastructure at both the Swedish National Data Service (SND 2012) and Environment Climate Data Sweden (ECDS 2012). This dual registration reflects the resource's multidisciplinary nature, and the project aims to encourage, support, and empower research that transgresses traditional disciplinary boundaries, just as the data do.

Key Issues

Relating Archaeological and Environmental Data

An essential capacity of an environmental archaeology database is the capability for storing metadata which allows the user to relate sample data and results to the archaeological features from which they are derived. SEAD is not an excavation database and stores only enough information as necessary to locate a sample in an archaeological plan or report. While excavations databases commonly allow the logging of sample names, locations, and purposes (e.g., macrofossil sample, ^{14}C sample), they are

Strategic Environmental Archaeology Database (SEAD), Table 1 Scope of the proxy data currently stored in SEAD as well as potential for expansion and limits. At the time of writing, SEAD contains approximately 1,670 sites from four data sources (Table 2 and Fig. 1), each of which is continually being updated

Proxy data sources	
Biological proxies	*Current:* Insects/arthropods, plant macrofossils, pollen (13 758 taxa) *Future:* Any organism or pseudotaxon can be added to the taxonomic list *Exceptions:* Osteological material, which may be better catered for in other systems (e.g., Neotoma 2009)
Geoarchaeology	*Current:* Soil chemistry (pH, phosphates) and physical properties (conductivity, organic content, color) *Future:* Any quantified or qualified chemical or physical property can be stored *Exceptions:* Spectroscopic data
Ceramics	*Current:* Thin section quantification and properties *Exceptions:* Spectroscopic data
Dendrochronology	*Current:* Support data, historical building metadata, sampling location
Methods	Detailed descriptions and references are stored for all methods (e.g., preparation methods, dating methods, analysis methods)
Dating evidence	
Scope	*Current:* ^{14}C and other radiometric methods, dendrochronology, archaeological typological dates, period classifications, calendar dates and ranges *Future:* Any method and period systems compatible with the current structure
Chronological extent	Theoretically unlimited, but current data range from 2.4 MyBP to present day
Bibliographic data	
References	May be linked to site, sample group, sample and dataset levels as well as to methods, ecological codes, and more
Modern reference data	
Abstracted text	*Current:* Insect habitats and distributions, abstracted from trusted sources, with citations *Future:* Any amount of abstracted text-citation couplets may be entered for a taxon
Coded descriptors or classifications	*Current:* Insect ecology (coded and abstracted texts) *Future:* Any taxon may be classified according to any number of user-defined ecology coding systems. This concept could be extended to cultural classifications (e.g., ethnobotany)
Climate	*Current:* Beetle Mutual Climatic Range (MCR) temperature reference data (see Buckland et al. 2010) *Future:* MCR, or potentially other types of climate reference data, for more insect species and plants
Locational data	
Coordinates	Three dimensional at site, sample group, and sample levels (latitude, longitude, altitude, and project survey grids). Capacity for national grid-based storage
Geographical extent	Mainly European but potentially global
Archaeological data	
	Current: Site, feature, and sample metadata to allow correlation between environmental and archaeological or lithology datasets. Any number of features can be added, and they may be given multiple names (e.g., field label, lab number, museum number). Descriptive information may also be added for structures and ceramics as required *Exceptions:* Coordinates can be stored for samples or groups of samples but not features

generally not designed to hold the results of any analyses. Similarly, archaeological sites and monuments records (e.g., the Swedish FMIS), archiving systems (e.g., the UK's ADS), and inter-archiving portals (e.g., Europeana) do not as yet explicitly store sample metadata, environmental data, or results in a cross-queryable form. However, some systems, such as ADS, do store or link to a number of reports which do hold these data. As well as catering for multiple sample names (e.g., field number, museum number, lab reference), SEAD provides

Strategic Environmental Archaeology Database (SEAD), Table 2 Initial data sources ingested into SEAD. Sites with locational data are plotted in Fig. 1

Current source databases (but no limits to submissions)	
BugsCEP	Bugs Coleopteran Ecology Package database http://www.bugscep.com Buckland & Buckland 2006 See also Buckland et al. 2010
MAL	Environmental Archaeology Lab, Umeå http://www.idesam.umu.se/english/mal/
Dendro	National Laboratory for Wood Anatomy and Dendrochronology, Lund http://www.geol.lu.se/dendro/
Ceramics	National Laboratory for Ceramic Research, Lund http://www.geol.lu.se/kfl/

multiple levels of metadata storage for archaeological features, contexts, and objects. Due to the multi-subject scope of the system, this has had to be flexibly implemented with sets of tables for free text descriptions which are defined by selection from list of predefined types (to which advanced users can add). This also allows for some level of interpreted data into the sample and sample group metadata, setting the context for the environmental data independently of external sources (Table 3).

Taxonomies

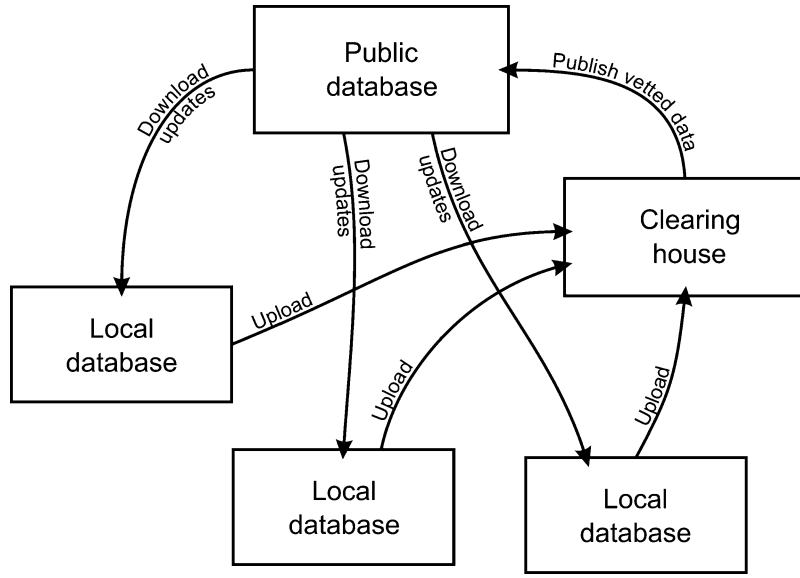
One problem with international databases is maintaining consistency of taxonomic records and providing lists of species in taxonomic order when required. SEAD's approach is to provide a taxonomic master list which allows the entry of any taxon, providing it is approved by the clearing house (see below), as well as synonyms and multiple taxonomic ordering systems. This allows, for example, a species which is present in both the British and North American beetle catalogues to be stored, with the lists having their own exclusive content. If data are entered using a taxonomic list which has water beetles after ground beetles, rather than before, then separate taxonomic coding systems can be implemented to provide for the differences. In such an event, the difficult task is defining the coding system rather than making it fit into the database.

Strategic Environmental Archaeology Database (SEAD), Table 3 Samples and groups of samples can be assigned descriptive metadata of specific types, to help relate them to excavation (field or report) or antiquarian objects. This capacity also provides key data for inter-archive linking. Multiple samples can come from the same feature, and in some cases, where the stratigraphy is complex or has been revised, a sample can come from multiple features. Two examples are provided below

Data context	Field	Data
Archaeological	Feature type	Hearth
	Feature type description	Feature with evidence of burning, the base of a fireplace, probably used for cooking, heating, or metallurgy
	Feature name	H1
	Feature description	Sami hearth at top of ridge
Dendrochronological: building antiquities	Object description type	Building category
	Object description	Secular
	Object description type	Building category
	Object description	Residential building
	Object description type	Building function
	Object description	Mångårdsbyggnad
	Object description type	Building function
	Object description	Two floor

Open Access and Datasets

SEAD is committed to open access and transparency, with all datasets being uniquely identified so that updates can be traced. This allows a user to see exactly on which datasets, and which versions of the datasets, analyses have been performed. It allows future users to redo old analyses with new data and allows for



Strategic Environmental Archaeology Database (SEAD), Fig. 4 Three-tier data management system for entry, clearing, and publication

a transparent reproducibility of any analyses using the database. All data are also attributed to their authors, the originating publications, and source databases or archives and released under Creative Commons licensing (http://creativecommons.org/). The SEAD software will also be released under the GPLv2 with classpath exception licensing system (http://netbeans.org/gplv2-faqs.html for information about classpath exception) so that others may easily expand on the original development work.

Three-Tier Data Entry, Clearing House, and Synchronization

Standard data entry is performed through the downloadable SEAD application, which essentially duplicates the public database on the user's desktop, and initially stores newly entered data locally. The local database may be updated to the latest available public data at any time, and users may choose to submit their own data at will. This flexible synchronization system allows work in progress to be kept private while the user has access to the latest public database and can thus analyze their data in the context of the latest global results. Prior to public release, submitted datasets and accompanying metadata are sent to a clearing house for quality assurance. The clearing house vets the data for mistakes, questionable values, duplications, and missing metadata, in dialogue with the submitting user, and finally makes it available online. These three activities, data entry, clearing, and publication (Fig. 4), are performed in the same downloadable software, removing the need for the understanding of complex data structures at all but the developer levels.

Related Systems and Collaboration

The development of SEAD was initiated at the Environmental Archaeology Lab (MAL) and implemented in collaboration with the Humanities Computing Lab (HUMlab), at Umeå University. The database design and user requirements were outlined primarily in discussions with MAL's research network partners and benefitted considerably from close communication with the BugsCEP (Buckland & Buckland 2006) and Neotoma (2009) projects. Discussions and skills sharing between these projects have ensured compatibility between the databases and will help to ensure the efficient use of public funds by negating the inevitable re-inventing of the wheel when similar projects run independently. A dialogue is also maintained with a number of local or regional database projects and archive centers, especially the UK's ADS and the Swedish SND and ECDS, as well as the archaeological community at large.

The Swedish National Archaeological Resource labs for dendrochronology and ceramics, in Lund, joined the project in 2011 and expanded the scope beyond the original design sketches. After some database redesign, this enabled the entry of large amounts of thin section ceramics data and initial test datasets of dendrochronological data from archaeological and building heritage management sites. Discussions are also currently underway to ensure compatibility with and promote the joint use of the Swedish National Heritage Board's databases and online services, especially the sites and monuments records (FMIS 2012).

SEAD's focus is on environmental archaeology data in its broadest definition, including the ecological and archaeological reference data which are necessary for its interpretation. Where the latter are outside of the scope of SEAD (e.g., detailed excavation data, modern species distributions point data), it must provide sufficient metadata for a user or inter-archive system to form the appropriate links. In this respect, all archaeological and biological repositories could be seen as related systems, and the SEAD team engages in continual dialogue with a number of these. In particular, discussions on design, compatibility, and research opportunities have been ongoing with the European Pollen Database (EPD 2009), the Archaeobotanical Computer Database (ABCD 2009), and the Irish Archaeological wood and charcoal database (WODAN 2009) (see http://sead.se/collaboration/ for more details).

At the time of writing, there are few databases available with a similar multi-proxy, multi-site range to SEAD. Neotoma (Neotoma 2009) is perhaps the closest, the primary differences being that Neotoma is perhaps more orientated towards Quaternary geology than archaeology (although it caters for the latter admirably), and it does not currently aim to store modern reference data to the same extent as SEAD does. However, Neotoma can store coded habitat data, giving a similar functionality to SEAD's habitat summarizing capacity. Neotoma is also able to plot pollen diagrams and age-depth curves online, something which SEAD is not yet capable of doing. The US-based Digital Archaeological Record (tDAR 2012) also overlaps the scope of SEAD to an extent, providing an excellent and well-supported infrastructure for archaeological data with the facility for storing environmental archaeology results. tDAR is perhaps, at least at the moment, more orientated towards project/site archiving than site-independent and inter-site analyses than SEAD. Both Neotoma and tDAR feature advanced interfaces for data management and data interrogation, but without the flexibility of faceted browsing.

Future Directions

While an increasingly large number of archaeological, paleoclimatological, and paleoenvironmental research projects include multiple proxies, these are often interpreted independently. By providing a proxy-independent querying system and data aggregation tools, it is hoped that SEAD will allow for a more integrated approach to environmental reconstruction, especially on the multi-site. In the future, it may not be regarded as a problem when proxy sources do not agree with each other, but rather an opportunity to explore the diversity of real systems.

Databases gain more power through linking, and the ability to simultaneously interrogate both modern and fossil biodiversity data would be a powerful tool for understanding modern distribution patterns and faunal origins and provide key data for predicting the impacts of future climate and environmental change. Closer cooperation with biodiversity portals is therefore desirable, an ideal situation being that international maps of fossil and modern species distributions could be overlain. Unfortunately, the resolution of the data in these systems is as yet too poor to be of use in paleoenvironmental reconstruction (Fig. 3). Many national archives (e.g., Artdatabanken 2012; BRC 2012), however, may hold appropriate raw data which is in the process of being uploaded to international portals such as the Global Biodiversity Information Facility (GBIF 2012). Biodiversity and environmental change cannot realistically be

investigated without reference to human, and thus archaeological, impacts on the landscape. Paleoenvironmental databases and the software for interacting with them are therefore becoming key components in the process of integrating the wide range of fields required to effectively study these issues (e.g., Brewer et al. 2012).

SEAD is intended to be an international resource for any science where paleoenvironmental or paleoclimatic data are of interest. The project aims to not only to become an established archive for these data but also provide a set of well-respected online tools for their analysis and prove instrumental in the development of new theories and methods for examining past climates, environments, and human activities. In order to achieve these goals, SEAD needs users, and it is hoped that the project's open-access policies, along with large database and efficient tools, will encourage a broad and productive audience. The SEAD team and its partners are actively committed to seeking funding and collaboration for projects where the system is either used as an archive or analysis tool, as well as developing the existing tools further. SEAD's initial development phase ends in 2013, after which it will enter routine management phase where data entry, support, and quality assurance are prioritized over development. Further development projects are planned, however, primarily orientated towards the development of advanced online tools, teaching tools, inter-archive connectivity, and Arctic archaeology and cultural heritage.

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Archaeology Data Service (ADS)
- ▶ Digital Archaeological Data: Ensuring Access, Use, and Preservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Environmental Archaeology and Conservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ Molluscs (Invertebrates): Analyses in Environmental Archaeology
- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ Paleoentomology: Insects and Other Arthropods in Environmental Archaeology
- ▶ Paleoethnobotany
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data

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Stratigraphy in Archaeology: A Brief History

Leandro D'Amore
Escuela de Arqueología UNCa, San Fernando del Valle, Catamarca, Argentina

Introduction

The story told here is a summary of some of the actions that gave form to the scientific field that is archaeological stratigraphy. A story whose true nature lies latent, overlaid by a superficial enumeration of chronological dates, superimposed and outdated by social events, an encyclopedic history records the process of development of the current use of stratigraphy in the majority of archaeological investigations. The reading of this history should be viewed from two perspectives which crosscut this narrative. The first relates to the numerous conflicts that reflect a criticism of modern science. The second refers to a history of excavation techniques that define a decisive point in the scientific nature of archaeological practice.

Historical Background

In the seventeenth-century Europe, a uniformitarian vision of Earth's geological history gave rise to the argument that stratigraphy could be explained from principles of superpositioning and chronology, from types of sediment and forms of strata, or through association with fossil remains. This was a naturalistic model of stratigraphy, which gained strength halfway through the nineteenth century when Lyell proposed his methodology for determining the relative sequence of geological strata based on the study of its fossil remains. After this, European archaeology appropriated the model in order to date archaeological strata by the types of products they contained, treating certain diagnostic artifacts as *guide fossils* (Carandini 1997; Roskams 2003). (There are two exceptions to this statement: (1) Towards the end of the eighteenth century, Jefferson (the North American President) is

purported to be among the first to use a stratigraphic view in an archaeological context, in reference to a funerary mound (Wheeler 1995 [1954]); and (2) in an 1816 publication, Smith announces the stratigraphic ordering of fossils according to the strata they belonged to, carried out in excavations in the south of Great Britain, using the term "*stratum*" for the first time (Harris 1991; Wheeler 1995 [1954]).) In that context the meaning of stratigraphy was related to chronological problems in the historical and evolutionary interpretation of prehistory. In the dawn of the twentieth century, all of these ideas crossed the Atlantic, particularly to North America and Mexico, forming the basis by which stratigraphy would be conceptualized as a modern excavation method that would facilitate temporal interpretation and assignation; for many, this meant a revolution in the archaeological vision of the past, arguing in favor of the first New Archaeology (Browman & Givens 1996; Lyman & O'Brian 1999; Schávelzon 1999).

From these first events, the study of stratigraphy in archaeological deposits would always be dominated by both a naturalist vision oriented by the sedimentary content and an instrumentalist vision using it as an excavation technique. Both perspectives were based on a single naturalist-instrumental strategy, in which the use of stratigraphy in archaeological contexts is justified as the only way to build an objective historical scientific knowledge of the past.

To better understand this historical view of stratigraphy, this entry will outline three distinct schools of thought. The first is linked to archaeology's initial approaches towards introducing the study of stratigraphy: a distinctive vertical observation of the past, associated with particular excavation techniques. The second corresponds to the vision of geoarchaeology, which favors the *sedimentary content* of stratigraphy. And, finally, the third is generated from the perspectives of Wheeler and Harris around the study of *interfacial forms and stratigraphic relationships*. In all these, stratigraphy is perceived as representing a temporal metaphor for building archaeological chronologies, regardless of the subject matter used in those sequences (set of artifacts, sediments and interfaces). (The order of these three currents of thought is not a precise temporal sequence, seeing the proposals of Wheeler as contemporary with the perspectives of the first trend and the proposals of Harris as on par with those of geoarchaeology. Nonetheless, each of the three conceptions has their temporal and geographic reference point: the first began towards the end of the nineteenth century, waning halfway through the twentieth century; at first it flourished in Europe but was methodically instituted into the American scene. The second train of thought was established in North America and was becoming known at the start of the 1960s; and the third current occurred in the United Kingdom in the middle of the twentieth century. Development of the last two ideas occurred unevenly in different parts of the world (the Harris Method excelled in the European continent and certain parts of Asia, while geoarchaeology spread across the American continent), and they spread as opposing points of view relative to each other, a position which continues to this day (Waters 1992; Holliday 1992; Harris et al. 1993; O'Brian et al. 2005)).

Key Issues/Current Debates

Verticality

Stratigraphy rapidly came to be associated with the theory of the linear evolution of species, marked by the fossils, which meant interpreting the archaeological discoveries contained in the strata as belonging to distinct stages of human evolutionary development. This perspective was strongly criticized in North America by historical particularism, especially for its use of stratigraphy as evidence for the progress from primitivism to civilized phases. The debate turned on whether the stratigraphic succession of archaeological discoveries reflected stages of evolutionary development, but the criticisms and queries were not directed at the evolutionary model but at its application in case studies in North America (Lyman & O'Brian 1999; O'Brian et al. 2005). This was a transition period for the strategies and modes of field work, in which importance was

being placed on the context of the discoveries (the deposit, the stratum, the cap, the bed, the arbitrary cut), and not just the providing of samples intended for museums (Lucas 2001; Roskams 2003). In Europe, the meaning of context was related to problems of the interpretation of prehistory (Carandini 1997); while across the Atlantic, in North America and Mexico, it was related to an excavation system which gave scientific validity to the explanations of archaeologists (Browman & Givens 1996; Schávelzon 1999). (The considerations of Pitt-Rivers and Petrie are also pertinent. Their work in Europe and the Middle East stimulated interest in America concerning a sectioning method which would consist of excavating trenches on archaeological sites following arbitrary levels; the recovery of artifacts, innovating a three-dimensional recording method for each discovery and positioning them in projection and in profile in the drawings; and the construction of typologies using seriation (Lucas 2001).) It was in this latter research area that stratigraphy was thought of as an analytical tool for an archaeological method and as such there was a gradual awareness of a change in the techniques for excavating stratified deposits.

The study of stratigraphy was introduced by observing the profiles exposed on the walls of excavated trenches or vertical columns of sediment (sample cores). From diagrams of those profiles, the content was observed by levels, interpreting similarities and differences in the overlaying of objects, fossils, and strata. The aim of these observations was to specify the chronological bearing of archaeological cultures in sequences of horizons, but they did not focus on questions of cultural change (Lyman & O'Brian 1999). Stratigraphy was identified with a structure of simple vertical units, from which discoveries were perceived between vertical limits given by discrete and real entities (arbitrary levels or natural strata), rather than from a possible fortuitous cause of sedimentation. These vertical units were not considered geological, but were used as units of archaeological deposition that were incorporated into a time line of the history of the site. In particular, stratigraphy was thought of as an analytical tool from which inferences were obtained once excavation is finished; it consisted of post-excavation observations or ex post facto interpretations, where the reading of stratigraphic profiles confirmed data from the excavation. From this point the systematic incorporation of stratigraphic method into field practices was instituted (Praetzellis 1993; Browman & Givens 1996; Lyman & O'Brian 1999; Schávelzon 1999), signaling the metaphorical use of stratigraphy to represent the passing of time in the constructive history of an archaeological site. But paradoxically this vertical vision of stratigraphy was not sustained by any stratigraphic excavation. (The excavation technique associated with this stratigraphic view was founded on an arbitrary strategy defined by metered levels of a predetermined thickness. The objective was to identify the different depths of the artifacts, without depending on any distinction associated with observation of the caps or the strata during the excavation. In opposition to [this] strong emphasis on the metric [measured], another excavation technique was proposed which consisted of dividing the deposits according to the natural strata that constitute it, such as sand, ashes, gravel, and other types (Praetzellis 1993; D'Amore 2002)).

The vertical view of the stratigraphic superposition was verified and reinforced by diagnostic chronological sequences of pottery groups, developed using the seriation technique applied to data obtained from excavations (Praetzellis 1993). The seriation of ceramic styles was considered a form of stratigraphic vision (e.g., in the proposals of Kidder; O'Brian et al. 2005), but the vertical vision of the profile and the horizontal vision of the excavation remained separate instances of interpretation. All this simplified the idea of stratigraphy to the superpositioning of artifacts and, principally, to a visible, analytical superpositioning related to the requirements demanded of archaeology as a positivist science: to resolve questions of diachrony and cultural change.

The use of the notion *cultural stratigraphy*, which defined an arbitrary stratigraphy of occupation phases and cultural components, was associated with the term *stratification* without

considering the stratigraphic superposition relationships. The process by which the physical structure of a site is separated and organized in strata or caps, horizontal cuts of a predetermined thickness, was not found to have an analytical correlation with the term *stratigraphy*, which would be the interpretation of the deposition sequence and of the stratigraphic relationships of superpositioned strata (D'Amore 2002). This methodological tendency created a permanent conflict by separating into two analyses that which would be only one field of study (superposition relationships). Despite the many complications of these instrumental and naturalistic representational proposals concerning stratigraphy, it was from both its criticisms and the truths attributed to it that a foundation was laid for the later theoretical and methodological premises of two subsequent schools of thought. In this way, the concept of stratigraphy was gradually introduced in relation to its content, but only because of its archaeological or cultural inclusions, and not the contents of the sediment or any other operative entity such as the stratum, coating, or facies. (Maybe an exception would be the idea of sedimentary content that was held in the cases that came from an artificial excavation through natural layers).

Content

In its opposition to historical–cultural procedures, processual archaeology disregarded archaeological stratigraphy (O'Brian et al. 2005). So that, fearful of once more creating a mistaken and hasty causal relationship between sediment and culture, it resolved to incorporate geology in an interdisciplinary way, in order to take care of the excavation sediments, on the one hand, and the explanations of cultural processes in the dynamics of the past on the other (Lyman & O'Brian 1999; O'Brian et al. 2005). In this intellectual context, oriented by an ecological, geographical, and environmental perspective, geoarchaeology was shaped. A subdiscipline viewed the archaeological record as a natural deposit that incorporates, in its sedimentary matrix, the cultural material of successive past human occupations (Butzer 1989 [1982]; Waters 1992); and it raised awareness of a new way to explain the contextual association of sedimentary particulates in archaeological deposits (Stein 1987). (This arises from the uniformitarian premise that the archaeological record has been formed by the same processes that molded the natural landscape (Butzer 1989 [1982]; Holliday 1992; Waters 1992, Waters & Kuehn 1996). The idea beneath this logic is the following: the terrestrial landscape changes constantly, but the laws of physics and chemistry that govern the processes are immutable over time. This uniformitarian principle is based on the interpretation that those absolute processes produce uniform attributes in past, present, and future strata. Sedimentology presupposes that one can reconstruct the processes that formed ancient sediments, because the forces they are subjected to in the present operated just as uniformly in the past (gravity, thermodynamics, fluid dynamics)).

The unit of analysis was the sediment, which is incorporated through the study of the sedimentary particulates, arising from the sedimentological vision of geology. The stratigraphic interpretation is fixed in a rigorous objective description of the differences in sedimentary content of the archaeological site deposits; it consisted of a sedimentological study that based itself in nomenclatures of geological stratigraphy (Gasche & Tunca 1983; Farrand 1984; Stein 1987). The formation of archaeological sediments is thus reduced to the study of human impact over natural soil formation (Butzer 1989 [1982]; Holliday 1992; French 2003). From the depositional study of sediments (sedimentology) and postdepositional study given for soil formation (pedology) comes the interpretation of the stratigraphy of an archaeological deposit (Holliday 1992; Waters 1992). The stratigraphy of an archaeological site was understood to be constituted of cultural remains (surfaces of occupation) buried by a sedimentation that was, almost always, considered natural (burial between high and low rates of natural sedimentation). Consequently, the archaeological record is found preserved in a stratification of rock sediments (lithostratigraphy), in a soil or paleosoil horizon (pedostratigraphic unit), and

also sedimented between the contact of a sediment and the surface of a soil (Waters 1992; French 2003). In this specialized literature, stratigraphy had a secondary application, complementary to sedimentology, where the key was explaining an archaeological site's sedimentation through evidence derived from the geomorphological formation of the landscape where the human settlement was located.

The program of geoarchaeological study was supported by objectives postulated by Schiffer (1987) to investigate processes of formation, preservation, and destruction of archaeological sites: the study of the physical and chemical properties of the soils and sediments, incorporation of ethnographic and comparative studies of modern sedimentary deposits, and the study obtained by experimental replication of sedimentary processes. The driving importance of formation processes meant that geoarchaeology would concentrate on examining the formation of artifact content in the archaeological record, as regards the N (natural) transformations (Stein 1992, 2001). (Compression of the postdepositional processes of formation centers on environmental modifications to the archaeological remains, as defined by dispersion before burial, the postdepositional alteration, the geochemical modification, and even as far as processes that totally destroy the archaeological site. Within the range of site formation processes are included the geomorphological processes of the Late Quaternary associated with changes in the landscape that significantly altered or preserved, spatially or temporally, the archaeological record's evidence of human occupancy (Waters & Kuehn 1996).) From there followed an emphasis on relating a history of human interaction with the environment, to explain economic and ecological behaviors between episodes of environmental fluctuation. (This was the aim of the contextual perspective initiated by Butzer (1989 [1982]), by which he proposes a study of archaeology that hierarchically contextualizes three units of analysis, the landscape, the sediment, and the artifact, and treats the cultural material as an indicator of the human being as a geomorphological agent in the sedimentary cycle of an archaeological deposit).

One stance even included establishing as a problem the lack of standardization in the stratigraphic method, which could have reduced the pejorative conflicts implicated in using many chosen criteria to form a nomenclature (Farrand 1984; Stein 1992). The solution was to adopt a stratigraphic nomenclature associated with a standard excavation procedure, which would permit a precise and objective naming of distinct sedimentary units and would mediate over a plurality of case studies.

For geoarchaeology, this nomenclature represented a classification tool appropriate to the scientific view of archaeology, because the principal units of stratigraphic analysis were distinguished using lithological criteria based on direct observation of the sediment's tangible attributes and fixed in descriptions that were independent of any interpretive discussions about meaning (Stein 1987, 1992; Courty 2001).

The objective was for the stratigraphy of an archaeological site to be observed as multiple sequences independent from one another (lithostratigraphy, ethnostratigraphy, and chronostratigraphy) but analyzed under a singular standardized nomenclature (Stein 1992). (The stratigraphic classification codes of geology, and those created for geoarchaeology, are supported by a sedimentological and pedological classification above any other type of distinguishing criteria. The fundamental unit is lithostratigraphic, while the ethnostratigraphic and chronostratigraphic units are lithological units grouped firstly by type of cultural content and then by correspondence to a particular time period (Stein 1987; Lucas 2001). The lithostratigraphic units are hierarchically more important than the other two, because they result from rigorous objective descriptions of the sedimentary particulates' attributes (they are observational) while the remaining units are defined by interpretation (they are inferential) (Gasche & Tunca 1983; Stein 1992)).

The use of this classification system meant that, in terms of objective rigor, artifacts would be considered as sediment, or one more

particulate of sediment (in essence they continue being *fossils*), the people would be biological agents of sediment formation, and prehistorical and historical time periods would be geological eras. In the beginning it was assumed that archaeology did not require theoretical and methodological premises just for studying stratigraphy; at the most it would require different units of analysis on a smaller scale (Farrand 1984; Stein 1992). This was because it was thought that if they set up a separation, with one archaeological classification and another geological, there would be conflict when carrying out correlations between the microstratigraphy of an archaeological site and the regional geological stratigraphy (Waters & Kuehn 1996).

For geoarchaeology, in the analytical terms of sedimentary *content*, stratigraphy was becoming established as a study of the vertical order of physical contacts (superpositional relationships) between sediments and soils (observable physical units) and recorded by the order of deposition (aggradation) and stability and erosion (degradation). The different types of elements that make up the cultural material were conceived as archaeo-sedimentary particulates or intrusive archaeological inclusions of the natural sedimentary matrix (Stein 1987). The cultural material was treated as if it were one more component among others: physiogenically and biogenically (Butzer 1989 [1982]). Anthropogenic sediment, from its process of sedimentation (or stratification), was considered natural geological sediment (Farrand 1984, Stein 1987). In this context, archaeological sediment was defined as one which contains particles that are affected and altered by cultural processes and therefore contain information about human occupational activity (Butzer 1989 [1982]; Stein 1987). Also, sediments were different when not affected by human beings but could possess archaeological inclusions among its particulates. Various names were given to this category: anthropogenic facies, anthropic soils and sediments, anthrop-soils, archaeo-sediments, anthropic epipedon, cultural cap or layer, archaeological levels, etc. All those terms try to be empirical in the sense that they manifest the material existence of human intervention at the site. Specifically, the archaeological site was defined by *aggregates of sedimentary particulates*, and those aggregates were defined as deposits distinguished by content or homogenous physical properties, of which one could recognize behaviors and patterns at the artifact level and depositional processes at the level of the sedimentary particles (Schiffer 1987). (Each deposit would be the result of a depositional event that made up the sediment's history: the source, the transport agents, and the deposition environment (Waters 1992). The depositional event is a sedimentation formed under constant physical conditions during a specific interval of time (Courty 2001)). The concept of *deposit* and its extension to the category of *sediment* (the content of the deposit) were considered to be the minimal and basic empirical–analytical contexts for identifying and recording exposed excavation profiles.

Forms

Ever since the school of thought begun by Mortimer Wheeler (1995 [1954]) but consolidated and deepened by Edward C. Harris (1991 [1979]), the unit of analysis was no longer the *content* in terms of the sediment or deposit but the *form* of the stratigraphic units as interpretation of the interfaces. More importantly, one no longer dealt with the isolated interpretation of stratigraphy and its archaeological content, but with an understanding of stratigraphy and its archaeological nature as part of one feasible entity to be studied: *archaeological stratigraphy*.

Incorporation of the term "interface" to designate the contact and relational surface that all stratigraphic units have with one another has prompted a relational study of stratigraphy: the interpretation of types of stratigraphic relationships and their configuration in an archaeological sequence diagram (the Harris Matrix). Principally, the idea of an *archaeological interpretation* of the stratigraphy was established, one that would not be restricted to the nature of sediment and artifact relationships but would account for the many stratigraphic relationships interpreted that were social relations between actions and

practices produced at a certain moment during human occupation of the site.

Harris' intellectual approach gained meaning with the idea of denominating an archaeological stratigraphy in its own formal terms, applied only to archaeology (Lucas 2001; D'Amore 2002). His proposal to define four basic principles for archaeological stratigraphy (Harris 1991 [1979]), adapted from the principles of geological superpositioning, began a race by arguing: (1) in favor of identification and interpretation of a stratigraphy of an archaeological nature independent from a geological superposition and (2) the introduction of stratigraphy into a body of theory which encompasses the relationship dynamic of such singular deposits as the archaeological. (Harris had in mind a scientific tool to particularize archaeology as a distinct discipline in two ways: (1) that archaeology would consciously shake loose from certain realities that only made sense for geology and (2) that would question the theoretical reach of certain problems and interpretations surrounding the practice of archaeological excavation (Harris 1991 [1979])). Many supporters of these theoretical–methodological proposals went on to pronounce in favor of a paradigm that treated archaeological stratigraphy as a science in its own right (Harris et al. 1993; Carandini 1997; Roskams 2003). The paradigm took form from six distinctive aspects.

First, it facilitated the introduction, to the stratigraphic record, of archaeological features that had previously not been considered as stratigraphic units, archaeologically speaking, such as pits, ashes, any soil disturbance (chemical or physical), ramparts, depressions, walls, and other features (Harris 1991 [1979]; Lucas 2001).

Secondly, construction of an archaeological stratigraphic sequence in the Harris Matrix format implied a specific stratigraphic excavation process. This meticulous stratigraphic methodology differed from other types of excavation, which was along arbitrary, naturally occurring levels associated with recording the sections, cuts, and exposed profiles; this will gradually be replaced by the introduction of an *open area* strategy and a *record by singular context* using diagrammatic plans (Barker 1977; Praetzellis 1993).

Thirdly, it gives importance to the horizontality of archaeological stratigraphy, specifically the incorporation of a horizontal view of the projected surface outline of the interfaces. This broke the persistent norm imposed by the vertical perspective of drawings and sketches of exposed cores in profiles, sections, and stratigraphic columns (Harris 1991 [1979]). Deciphering the formation sequence of the archaeological deposits came to depend on the interpretation of the stratigraphic relationships, not from mere observation of the exposed profiles but from how those relationships are recorded while excavating, starting from their horizontal extent in space and time.

Fourth is the configuration of archaeological stratigraphy in a multilineal diagram known as the *Harris Matrix*, which expounded a methodology of graphing on a two-dimensional plane to show distinct types of stratigraphic relationships across time, as a three-dimensional representation, and to deal with the various post-excavation problems of stratigraphic interpretation (Lucas 2001; Roskams 2003). (Relationships of superposition (A is behind and later than B; B is before and earlier than A), of contemporariness (A and B belong to the same moment of formation), and of equivalence (A is B) or, in any case, without a direct stratigraphic relationship.) The Harris Matrix consisted of a structure with the form and content of a sequence, where space does not appear to be bifurcated by the trajectory of the time, but that establishes a colligation of the verticality of time (sections) with the horizontality of space (record plans) (Harris 1991 [1979]; D'Amore 2002).

Fifth is the transforming basis of the Harris Matrix sequence in that it principally represents the stratigraphic nature of the superposition, before the topographic order, thus avoiding having to transfer, to the diagram, physical relationships between the units. Then, the archaeological stratigraphic representation came to be the interpretation of stratigraphic relationships, the symbolic dimension of relative time, and not directly an empirical or realistic record of the physical–topographic superposition (Harris 1991 [1979]; Carandini 1997; D'Amore 2002).

Sixth, and most important of all, was the interpreting and correlating of *interfaces* as separate circumscribed units in an archaeological stratigraphic sequence (Harris 1991 [1979]). (A first approach to the idea of *interface* was Wheeler's proposal to excavate following *the natural contour* of the superpositioned strata and to adopt specific criteria for drawing irregular interfacial lines; this type of record was called the *Wheeler-Kenyon System of Archaeological Stratigraphy* (Harris 1991 [1979]; Lucas 2001). However, the visual representation of the interfaces played a second role, given that they were not recorded with a number, as what was done with the strata and its contents (D'Amore 2002). Otherwise the interfaces would continue to be observed and recorded solely from the verticality of the sections and profiles). In its analytical correlation with the excavation record, the interfaces were the surfaces of the horizontal and vertical strata equal to its total area (surfaces of positive accumulation) and were also the cut or extraction surfaces of the preexisting stratification in the sedimentary matrix (surfaces of negative destruction, or *interfacial elements*). (In geology, in the study of natural soil formation, the positive surfaces are associated with beds, deposits or formations, and the negative with discontinuities (Butzer 1989 [1982]; Stein 1987; Waters 1992). In their stratified state, these surfaces remain semiconsolidated and somewhat stable compared to the dynamics of being exposed to the elements during occupation of the site.) In its interpretative correlation, the surfaces were in direct contact with the gradual formation of the strata. Once these interfaces, through a process of stratification, became buried by other strata and incorporated into a sedimentary matrix forming a stratigraphy, they became the possible interpretive correlation of a level of occupation on which took place human actions and practices (Harris et al. 1993; Haber 1996), or the final extension of a sedimentation and natural degradation, in a given moment of site formation (Schiffer 1987; Carandini 1997). From this view of stratigraphy, the artifacts as much as the sediment's particulates were bound by the interfacial limits of the stratigraphic units; and, furthermore, in an archaeological site, the interface was a much more numerous stratigraphic unit than the strata (Harris et al. 1993). Therefore, the character of the interfaces was the principal unit of analysis for constructing a sequence in terms of the Harris Matrix, and not the artifact or sedimentary content of the deposits. Harris and some of his supporters defined the interfaces together as units that denote surfaces *without content* (neither artifacts nor sediments). Unlike a stratum of positive deposition, the interface did not possess depth or substance (Harris 1991 [1979]; Lucas 2001), but did represent time and the stratigraphic relationships. Thus, the interfaces were not identified by their material content, but because they were *action surfaces*, of either deposition or extraction (Haber 1996; D'Amore 2002). Here arose a new way of thinking about stratigraphy, no longer founded in the nature of the sediment, but in the action that produced it, by humans or by nature.

In this way, it was recognized that even when archaeological stratigraphy was a "*heuristic device,*" it allowed, theoretically and methodologically, the definition of patterns significantly linked to human action and natural events, at the level of superposition of stratigraphic units as much as from the cultural content. Arising from this way of thinking, comprehension of an archaeological site began to view it as a palimpsest of action and discrete events. The archaeological site was fractioned into units or contexts that were excavated according to their position and stratigraphic relationships, but it was being defined by limits in time and space, as simple actions and events that leave a positive record (stratum) and a negative one (the cut). Archaeological stratigraphy was no longer a mere repository of objects, of cultural groups or of a direct normative representation of cultures, or cultural epochs; neither did it deal only with overlaid sedimentary caps. Rather, it was conceived as a deposit of actions and events which, given its relationships, form part of a history or histories that can involve material behaviors or leading patterns of sedimentation, representing sequences of rhythms and natural and cultural changes. (Harris' principles of

archaeological stratigraphy were well received in the realm of the formation processes of Schiffer (see preface in Harris 1991 [1979]). With the theoretical–methodological framework of the Harris Matrix, the formation processes obtained a scientific rigor, supported by a type of archaeological excavation practice. The leading alternative was no longer based solely on a different form of building archaeological theory, but from that, the theoretical entities of formation processes tackled their corresponding material in the archaeological sites, aided by the working categories of the excavation record proposed by Harris: strata, interfaces, and interfacial elements. More importantly, these units of study proved to be potential actions and events (natural and cultural) visually identifiable or materially represented in the context of archaeological practice).

Future Directions

Within the archaeological discipline, stratigraphy has become a structure of thought regarding time and linearity, and as such it conditions and restrains the archaeological interpretation of the past. It is a modern metaphor for representing historical time (narrative) and physical time (relative chronology), but this metaphor would be nothing if stratigraphy were not structured by the modern belief in *succession* in a *sequence*. In the daily tasks of archaeological practice, time is naturalized by the temporal metaphor of the sequence and of the stratigraphy: the passage of time is both vertical and sequential.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ British Pioneers and Fieldwork Traditions
- ▶ Çatalhöyük Archaeological Site
- ▶ Dating Methods in Historical Archaeology
- ▶ Dating Techniques in Archaeological Science
- ▶ Excavation Methods in Archaeology
- ▶ Field Method in Archaeology: Overview
- ▶ Field Schools, Archaeological
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Geoarchaeology
- ▶ Site Formation Processes
- ▶ Tells in Archaeology

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Stringer, Chris

Louise Humphrey
Department of Earth Sciences, The Natural History Museum, London, UK

Basic Biographical Information

Chris Stringer studied Anthropology at University College London and subsequently completed his Ph.D. in Anatomical Science at Bristol University in 1974.

He has worked at the Natural History Museum in London since 1973, where he is now a Research Leader in Human Origins and he is also a Visiting Professor at Royal Holloway, University of London. Stringer was awarded a D.Sc. in Anatomical Science by Bristol University in 1990.

Major Accomplishments

Chris Stringer was elected Fellow of the Royal Society in 2004, Fellow of the American Association for the Advancement of Science in 2011 and Honorary Fellow of the Society of Antiquaries in 2010.

For his Ph.D., Stringer studied Neanderthal and anatomically modern human crania in collections across Europe and the Middle East, concluding that anatomically modern humans had not evolved from Neanderthals but had migrated into Europe replacing the earlier Neanderthal inhabitants. As a result he was an early proponent of the Recent African Origin model (also known as Out of Africa) of human evolution which holds that anatomically modern humans evolved in Africa and subsequently migrated across the globe replacing any previous archaic inhabitants.

Recent genetic evidence reveals that living people carry small amounts of archaic DNA and that this is regionally variable, consistent with an African origin for modern humans and limited interbreeding with archaic groups at a local level. Stringer has recently proposed a new model for modern human origins in Africa, which has been termed "coalescent African origin".

Stringer has also had a major role in promoting and collaborating in efforts to produce a sound chronological framework for modern human origins by establishing new dates for key specimens and archaeological sites. This has involved working with specialists in radiocarbon, luminescence, electron spin resonance, and uranium-series dating techniques. Stringer has directed or co-directed excavations at sites such as Westbury-sub-Mendip and Gough's Cave in the UK and Ibex, Vanguard, and Gorham's Caves in Gibraltar.

Since 2001 he has directed the Ancient Human Occupation of Britain (AHOB) projects, bringing together a team of paleontologists, archaeologists and earth scientists to investigate successive

human occupations of Britain and to reconstruct the environments in which these early people lived.

In 2005, the AHOB team revealed new evidence suggesting that humans reached Britain about 700,000 years ago based on the presence of worked flint at a site in Pakefield, Suffolk dating to Marine Isotope Stage 17.

Since then the discovery of more than 70 flint tools and flakes from Happisburgh in Norfolk has pushed back the date for the earliest occupation of Britain and northern Europe to more than 800,000 years.

Stringer has taken a leading role in co-organizing conferences such as:

- "The Origins and Dispersal of Modern Humans" (Cambridge 1987)
- "The Origin of *Homo sapiens* and the Impact of Science-based Dating" (Royal Society 1992)
- "Gibraltar and the Neanderthals 1848–1998" (Gibraltar 1998)
- "Human Origins" (Cold Spring Harbor 2000)
- "The Human Revolution Revisited" (Cambridge 2005)
- "The first four million years of human evolution" (Royal Society 2009)
- "Culture Evolves" (Royal Society and British Academy 2010)

Stringer's books include:

- In Search of the Neanderthals (1993 with Clive Gamble)
- African Exodus (1996 with Robin McKie)
- The Complete World of Human Evolution (2005 with Peter Andrews)
- Homo britannicus (2006)
- The Origin of Our Species (2011)
- Lone Survivors: How We Came to Be the Only Humans on Earth (2012)

Cross-References

- ▶ *Homo neanderthalensis*
- ▶ *Homo sapiens*
- ▶ Neanderthals and Their Contemporaries
- ▶ Out-of-Africa Origins

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Structural Archaeology

Margaret Conkey
Department of Anthropology, University of California, Berkeley, CA, USA

Introduction

To write about the field of "structural archaeology" – where it comes from, what it does, and where we are now – means we must consider structuralism as an intellectual movement and how it impacted archaeology, although this is not all there is to it. It might seem at first that writing about structuralism in archaeology in these first decades of the twenty-first century can only be a historical commentary on an approach, a theory, and a method that we have gone through and beyond. Some researchers today might opine that a structural archaeology has been bypassed by other approaches and subsequent critiques. There are even terms for what developed supposedly "after" structuralist thinking and research, namely, post-structuralism and even structuration. And there are those who might suppose that even these afterlives of structuralism are faded and discarded paradigms and frameworks for the analysis and interpretation of archaeological materials and situations. Furthermore, some would even argue that all of these approaches were never "mainstream" archaeology or, if undertaken, produced only transitory results that have not really stayed with us. But in reviewing what structuralism has

been for archaeology, the case can be made that its influences have been more far-reaching than one might suppose, even in the reactions and rejections of what some structuralist research might appear to be. Robert Preucel (2006: 95) even takes the view that structuralism in archaeology can now be viewed as an "intellectual bridge spanning radically different theoretical programs." Indeed, we are not yet finished with a structuralist legacy and imprint on the archaeology of the twenty-first century.

In this entry, I consider what is meant by structuralism, both in general and especially structuralism in and for archaeology; the historical background to the structuralist movement (what Gellner (1982) called "structuralisme") and to its appearance in archaeology. In some ways, this account will be one in which we can chart the rise of structuralist concerns in archaeology, their impact or what I have called a structuralist "breakout" (Conkey 1989), and then what might be viewed as their "going underground" where they continue to undergird some research and remain a somewhat silent but detectable presence in how archaeologists work. As Alison Wylie (1982) pointed out so astutely in her still salient review and argument for the epistemological issues of structuralism in and for archaeology, archaeology must employ some form of structuralist analysis. From its inception, structuralist theory and analysis have been international in origin and scope, even if they are less manifest in those traditions of archaeological practice that have been primarily cultural historical in approach. But can we consider there to be – to still be – a structural archaeology?

Definition

To begin to cover the definitions and history of Structuralism, with a capital "S," as a major intellectual movement is a daunting task for the landscape of this movement stretches far and wide – from its core incubation in the fields of linguistics and the study of languages to epistemological if not ontological debates and treatises. In this discussion, I take the view that while there is a body of theory and philosophy called *Structuralism*, with its associated methods and analytical imperatives, we can also talk about "structural approaches" that do not necessarily accept all or most of high or "capital S" Structuralism, especially that which is considered to be classic Structuralism. Many entire books about Structuralism have been written over the decades (e.g.,Hawkes 1977; Pettit 1977; Eagleton 1983 among dozens), and anthropology has played a prominent role in the history and development of Structuralism especially through the scholarship of Claude Levi-Strauss (e.g., 1963) and his predecessors in French sociology such as Durkheim and Mauss. Critiques of Structuralism have also been strong in anthropology (e.g., Sperber 1974; Fabian 1983), but as the archaeologist, Chris Tilley (1990), pointed out, Levi-Strauss is indeed a required reading, especially for an archaeology that takes seriously material and visual culture.

As Robert Layton writes in his most useful and admirably succinct chapter on "Structuralism and Semiotics" in the *Handbook of Material Culture*, these two approaches "provide ways of studying human cognition and communication" (Layton 2006: 29). As such, as we will see, there has been some disdain or dismissal (or just plain an ignoring) by many archaeologists who do not believe that archaeology can "recover" cognition or communication of past societies and perhaps certainly not any "meaning," but this is to jump ahead in our account. Structuralist assumptions include a core idea that there are underlying cultural premises to cultural practice and production and that these can be discovered by the analyst. In classic structural thought one might anticipate that the working out of specific cultural structures drew on some universal concerns, usually expressed in the form of binary dualisms, such as male/female, dark/light, wild/tame, public/private, and life/death – dualisms that were often mediated through various cultural acts, productions, or practices, such as myths, or, in the case of Leroi-Gourhan's well-known structuralist study of Paleolithic cave art (Leroi-Gourhan 1965), through image making or art. In this

path-breaking analysis, Leroi-Gourhan was attempting to identify the underlying structures and even "grammars" for the making and placing of specific images of animals or signs in the caves. While recognizing that the meanings of these structural manifestations are not immediately (or ever?) available to us some 20,000 years later, Leroi-Gourhan links the underlying structural generation to cultural mythologies, leading him to suggest that we could understand the patterning of Paleolithic cave art as a kind of "mythogram."

Of course, Structuralism is much more complicated than seeking and finding universals, polarities, and mytho-grammatical structures. Deep debates abound in the literature about fundamental assumptions and subsequent analytical methods by which Structuralists proceed. For example, Gellner (1982) probed this notion of "structuralisme" and its methods with such issues as just how the relevant polarities are to be identified and confirmed: "Not only are the polar extremes (of a text) simply plucked out and then treated as somehow explanatory of the world that the users of said text live in, but no criteria are offered for how one is to identify the crucial polarities of a world from any old contrast that a willing and imaginative observer may locate in it" (Gellner 1982: 122). And he goes on to say, "A descriptive account of the spectra or polarities of a given society or language works with is *not* the same as a generative account of how these spectra are produced. In other words, one should not confuse, so to speak, descriptive or phenomenological structuralisme with a genuinely explanatory kind" (Gellner 1982: 123). So, while strongly critical, Gellner concludes that his criticisms "merely amount to a recommendation of caution in the application of these ideas to fields other than those in which they were originally fruitful" (1982: 123). When we survey the applications of structuralist concepts and methods as put to use in archaeology, we can evaluate them with such critiques and cautions in mind. As we will see below, the "plucking out of polarities" critique is not the only one that archaeologists should take seriously.

Historical Background

There is no doubt that structuralism and one of its handmaidens, symbolic analysis, was one of the more potent theoretical frameworks in the 1960s and into the 1970s in the social sciences and especially anthropology. Although many would readily note that structuralism played an important role in the "turn" to more symbolic archaeologies of the 1980s, structuralism was also an important – but "underappreciated" – role in the development of the processual archaeology of the late 1960s and 1970s (see Preucel 2006: 93-121).

The question here is what is a structural archaeology, as this is a particular approach that first emerged most explicitly by the 1970s. In Anglo-American archaeology it might best be represented by the now-classic work of James Deetz (1977), although structuralism for archaeology was already put forth by André Leroi-Gourhan in France. To a great extent, the kind of structural approach put forth by Deetz (1977) was less concerned with the referential dimension – that is, how the structural patterns that underlay cultural phenomena impact back on the symbolic structure(s) – and more concerned with reconstructing the rules or cognitive patterns that undergirded expressions of folk material culture in early American societies, especially as manifest in such material culture as architecture, gravestone designs, and ceramic preferences. In this classic structuralist study, Deetz was able to take us to a "synthesis of the profound conceptual changes that occurred in America during the 18th century" (Leone 1986: 426) by using oppositions in Middle Virginia folk housing (as analyzed by Henry Glassie (1975)) and using them as a framework for the analysis of many classes of material culture including music. The oppositions included scattered/clustered, framed/open, and artificial substance/natural. With such an analytical framework, the connection to the Levi-Straussian structuralism/*structuralisme* is obvious.

The first sustained archaeological engagement with Structuralism took place at Cambridge

University in 1979–1980. Ian Hodder and his students organized several graduate seminars, the goal of which was to interrogate the dominant views of archaeology, especially the Paleoeconomy school and the New Archaeology more generally. The participants in the seminar included Mary Braithwaite, Steve Cogbill, Sheena Crawford, Linda Donley, Ian Hodder, Paul Lane, Danny Miller, Henrietta Moore, Elen Pader, Mike Parker Pearson, Alison Sheridan, Chris Tilley, and Alice Welbourn, many of whom have gone on to distinguished careers. American scholars were also invited to give presentations including Meg Conkey, Susan Kus, Mark Leone, and Alison Wylie. This seminar resulted in the publication of *Symbolic and Structural Archaeology* (Hodder 1982a), a powerful critique of the New Archaeology. Despite the assertiveness of many of the participants, there was no clear agreement on the ways forward. As Hodder put it in his introduction to the volume, "there are many differences of opinion concerning, for example, the nature of ideology, the degree of determinancy in social changes, the types of structure that should be analysed, and the value of any reference to structuralism" (1982b: 14).

By the 1985 celebration of the 50th anniversary of the Society for American Archaeology, an edited volume was produced that had chapters on what were then considered core topics of contemporary archaeology. One chapter addressed "Symbolic, Structural and Critical Archaeology" (Leone 1986) attesting the recognition of these related but often quite different approaches as having come onto the scene enough in archaeology so as to be included in the volume, along with what might be considered more traditional topics, such as middle-range research, origins of food production, and hunter-gatherer archaeology. In Leone's 1986 chapter, he notes that a key feature of the three archaeologies that he discusses was the recognition and engagement with the idea that the material world (that archaeologists study) is not merely a reflection of past lives and cultures, but that there is a recursive quality to culture: the uses of cultural phenomena "shape our lives, and our lives would be shapeless without" them (Leone 1986: 416).

Thus, a structural archaeology might have several levels at which it would work. The Glassie-Deetz model, along with the Leroi-Gourhan model for Paleolithic cave art discussed above, has focused on trying to discern the underlying patterns or structuring principles that have generated what we can observe today, directly or indirectly, with (in the case of Deetz) or without (Leroi-Gourhan) informing texts. Other analyses in archaeology were also provocative in making inferences regarding the codes or underlying generative patterns that might have produced material culture, ranging from regional wide settlement patterns and architecture, such as at Chaco Canyon in the US Southwest (Fritz 1978), to the making of designs on ceramics. In the latter studies, we would include the work of Dorothy Washburn (e.g., 1977) that identified underlying principles of symmetry for the generation of painted ceramic designs on Southwestern pots. At this level – the making of ceramic designs – Washburn has undertaken a formal analysis of structure and the structuring principles of design, with the suggestion that it is such underlying structures, more so than the use of the actual specific designs, or design elements, that has more potential to inform on the participation by ceramic makers in a "style" and as part of a related social group. Still others began to investigate the idea of practice inspired in different ways by Anthony Giddens and Pierre Bourdieu. Here we can mention the work of Linda Donley (1982) and the Swahili house and the studies of Mary Braithwaite (1982) on design among the Azande in Southern Sudan.

One key feature of these earlier structural approaches in archaeology that derives directly from more classic structural premises is the centrality of *relationships*. In fact, it has been argued by those who have been bold enough to survey the fields of structuralism and semiotics that structuralism induced, as a kind of first principle, a "momentous shift in the nature of perception" (Hawkes 1977: 17-8) that recognized that the nature of things lies not in the things themselves. Rather, the "world is made up of

relationships" – those that we construct and then those that we perceive between things (Hawkes 1977: 17-8). Thus, for the archaeologist, it has been the relationships – between design elements on a pot, between architectural features and concepts of the individual, and between men, what and where they hunt and what they hunt with in comparison with women, what animals they hunt, and what tools they work with – that form the underlying network among "things" that have allowed insightful structural analyses. Seeking out the relationships, the patterns of the relationships and perhaps the cultural referents of the patterns have mobilized many a structural approach in archaeology. On the one hand, this search for/identification of structural relationships has allowed for a recognition and revelation of the connectedness and constructedness of human meaning, especially as a system of signs at a given point in time. Yet, paradoxically, especially for the archaeologist who so often is trying to track changes through time, this feature of the marked synchronicity of a structural analysis – at one point in time – reveals a serious flaw of structuralism, namely, that it was not a social and historical theory of meaning and meaning making; it has been "hair-raisingly ahistorical" (Eagleton 1983: 109). As we will see, with the rise of the 1980s theoretical influences both external to and within archaeology that turned attention onto agency, practice, and the "content" of the cultural productions more so than the "form," such a delimited approach as the more classic structuralist one was subject to serious critique.

Yet before we look at what emerged from structuralism and structuralist approaches to archaeological phenomena, there are important critiques that have been made both more widely and specifically for what archaeology has come to take more seriously since both processualism and early structural studies in archaeology. First, and not surprisingly, as noted above, it was the ahistoricity of much structural analysis that bothered many an archaeologist, and this lack of history and concomitant engagement with change is part of what might be noted as a false contextuality of structuralism. At its most extreme, underlying structures are represented as almost frozen and as static. As such, there is little space or place for the actions of humans; "they play the games but they can't change the rules." That is, many structural analyses sidestep (or ignore) the fact of practical action and the intentions of social actors (which has been a similar critique of the systems approaches of processual archaeology). In fact, the individual subject is "decentered" and the new subject tends to become the system itself (after Eagleton 1983: 112-3).

This concern is also manifest in the usually formalist analyses of structural approaches. As noted (Conkey 1989: 139), the structuralist method, in general, brackets off content and focuses more on forms; it is the structure of relations that is scrutinized. The method, furthermore, is said to be "quite indifferent" to the cultural value of (what might be called) "the text": it is an analytical not evaluative method (Eagleton 1983: 96). While some of the archaeological applications of structural assumptions and premises have attempted to address this and other weaknesses (see in Hodder 1982b; Hodder 1986) in some of the pioneering applications of structuralism to archaeological phenomena (e.g., Leroi-Gourhan 1965), there is no doubt that among the missing are individuals, intentions, and an inquiry into the *contexts* of making and using material culture (in Conkey 1989).

But this is to get ahead of the discussion and to anticipate the retrospectives of the 1980s on inquiry of the 1960s and 1970s, perspectives that view the making of art, architecture, and material culture as a practice rather than as an object. Yet, it could be argued that to take the new views might not have been possible without what can be called the "structuralist breakout." I have previously made (Conkey 1989) an observation that is neither novel nor unique, namely, that inherent in the very nature of what structuralism is predicated upon is the emergence of what became "post-structuralism" in wider theoretical circles and post-processualism in archaeology. For example, with the study of Paleolithic art, what a structuralist approach opened up was that if the images could be understood as a system of

signification, as a system of meanings, then many potential significations were possible. Specific to the studies of Paleolithic art that had previously been dominated by single, all-encompassing "explanations" (such as that the art was "art for art's sake" or it was "hunting magic") was the opening up of the imagery to multiple approaches: the art as a way to solve socio-spatial relationships, as a way to mark time and seasons, and as a way to establish and maintain alliances, among others. Thus, it was then possible to suggest that what we have lumped under one broad category of "Paleolithic art" may well be not just one, but several – and possibly interpenetrating – sign systems.

The wall art of caves – among many other domains of archaeological inquiry – was not something out of scope or reach of a scientific archaeology because now it could be studied systematically and even quantitatively and it put such a previously marginal archaeological phenomenon into a conceptual framework for archaeology that could seriously engage with the cognitive and the symbolic aspects of the human mind. Structural analysis of these images (as with structural analyses of other materials and objects) displaced the question of meaning from the individual boundaries of particular images ("what does this painted horse mean?") to the relationship(s) among the images and their placements within the cave. One could also displace the question of meaning in a different direction, from the individual boundaries of objects, images, and forms to the productive contexts within which the imagery or whatever had become invested with meaning. This displacement anticipated the subsequent concern and focus with the very contexts – and practices, including those of individual agents – that more traditional structural analysis had left out. A "structural breakout" led to more interest not with the structuralism, but with a structural analysis that could begin to make sense of how and why the structures "made sense" in particular historical contexts of social action. To understand the "intentions" that most classic structuralist studies did not really ask about was however another redirection of inquiry. While not inquiring into "intentions" in the sense of getting into the mind of the maker(s), a structural approach could be interested in the intentions of a cultural product so as to "interpret it as being in some sense oriented, structured to achieve certain effects" (Eagleton 1983: 114).

Key Issues

Under the rubric of what constitutes a "structural approach" in archaeology, one can see how many of the goals and perspectives of various different theoretical perspectives can be attempted. Much of the "early" structuralism of the 1970s was congruent with the processual assumptions that understood culture to be an adaptation and to have been systemically organized, including in terms of not just energy and matter but also information. Thus, several studies showed how certain underlying structural patterns – of architecture, material culture – could have been "adaptive" and solutions that contributed to the maintenance of cultural systems. Others suggested that the structures were crucial to the production and continuation of key information, information that was manifest by a kind of resonance among multiple levels at which a structure was operating, from how one arranges people and objects in the local arena to how overarching systems of relationships between polities were played out.

To some extent, the kind of cultural world views that were embedded in and manifest by the architecture of houses and by the kinds of serving dishes used – as expounded by Deetz for colonial America – was structural premises that integrated within and yet differentiated between cultural systems. And above all, one might suggest, despite the objection some might raise about how processual archaeologies were not about the "recovery of mind," the structural studies were simultaneously providing a framework whereby the place of the human mind in constructing meaningful worlds could be within archaeological inquiry. Thus, it is readily argued that one key contribution from earlier structural archaeologies is that material

culture – a key focus of archaeological research and inquiry – was now understood to be meaningfully constituted and that it is formed and ordered by systems of meaning. Further, it conveyed the important idea that categorization and classification organize the social construction(s) of reality. These understandings are, in many ways, integral to some fundamentals of what was to become a post-processual archaeology and the current focus on cognitive archaeology and materiality (Renfrew 1994; Abramiuk 2012).

One current issue is the reexamination of the relationship between Structuralism and the field of semiotics (Conkey 2001; Layton 2006), which simply can be called the "science of signs." Interestingly, in his first version of summarizing and evaluating structural approaches in archaeology (Hodder 1986), Hodder addresses only structural approaches, but by the 3rd edition (Hodder & Hutson 2003), the chapter has expanded to "Structuralist, post-structuralist and semiotic archaeologies." Simplistically, semiotics uses structuralist methods, which treat cultural phenomena that may not be thought of as a system of signs as if it were one. As one of the premier scholars responsible for the formation and elaboration of semiotics, Saussure (a Swiss linguist) has noted: "A science that studies the life of signs within a society is conceivable... I shall call it *semiology*" (Saussure 1959: 16). On the one hand, Saussure understandably developed his ideas in terms of language, recognizing that the linguistic sign has two components: the *signified* or idea and the *signifier* or the spoken sound(s) that conventionally express that idea. On the other hand, he already saw that "there were many other sign systems in human culture that could be studied using the same methods" (Layton 2006: 30).

To use again the example of Paleolithic cave art, a structuralist-semiotic approach meant that one could treat the imagery as a system of signs, and thus attempts at reading the *signification* of the imagery in and on the rock were possible. But as has been noted by many (e.g., Hodder & Hutson 2003: 59-65; Preucel 2006), there are substantively important limitations to the Saussurean semiotics for the study of the material and visual worlds of archaeology, such as the "focus on codes and rules at the expense of social practice" (Preucel 2006: 3). It is a much longer story to discuss the subsequent development of semiotics and how the work of Charles S. Peirce went in important new and different directions that have been shown to have much more viable applications in archaeology (e.g., Preucel 2006). In many ways, semiotic or semiotic-inspired archaeologies are more explicit and more visible on the landscape of contemporary archaeology than are structural ones, which makes for an interesting analysis of why this might be the case.

Another issue is the emerging engagements with theories of practice. Nowhere is this better seen than in the archaeological inquiry regarding gender. This inquiry more fully emerged in the later 1980s and is usually considered as one dimension of the post-processual archaeologies. As with most feminist-inspired theory and research, the trajectory of understanding and studying gender for archaeology has been an evolving one, although one cannot neatly categorize engendered archaeology into subsequent "waves" or even schools. To many, taking on gender has long been a simple expansion of the variables to look at, along with status, class, and ethnic groups, a version of just adding, in this case, gender, with little or no theoretical or methodological ruptures. Often, gender was taken on primarily as yet another structure, as a set of underlying principles or rules about what men do, what women do and how the division of labor was to be organized, and how this, in turn, structured activities and social status. Yet some of the very same critiques of structural assumptions and approaches could be applied to the investigation of gender as structure. In fact, related developments in feminist theory can be said, in their own concerns, to have converged with the critiques of structural approaches as "missing" the social actions, the agency, the practices, and performances of social life. Although classical "practice theory" cannot be heralded for its engagement with gender, performance theory and performing gender (e.g. Butler 1990) were important inspirations for conceptualizing the

workings of gender that went beyond the gender-as-structure and gender-as-structuring approaches, even if some of those were crucial to getting gender on the table as a viable topic for archaeological research.

Future Directions

One of the strongest arguments for what a structural approach can do – and does do – for archaeology was that of Wylie (1982), who advocates that there are various "compelling reasons why archaeologists should adopt some form of structuralist approach" (1982: 39). If you are interested to "the epistemological questions that a structural archaeology raises about the kind of scientific or other knowledge that archaeologists should be striving to realize," you will find in this chapter a still-valid and important discussion. She notes how structural analyses (even those only up to 1980) have opened up domains of not just inquiry but insight and why structural archaeology need not be set aside or dismissed because "its theories are empirically under-determined" (1982: 39). Writing this, on the cusp of what would become post-processual approaches in archaeology, Wylie concludes that the "great value" of a structural archaeology is that archaeologists are now face to face with having to engage with "the cognitive, semiological and symbolic significance of their data as distinctively cultural materials" (1982: 46) and, not insignificantly, of having to figure out methodological ways to do this that, in her view, would help move the discipline of archaeology "decisively beyond" the kind of skepticism and even narrow empiricism that had not just controlled but compromised the potential of archaeological understandings.

Yet some 24 years after the Wylie chapter, Layton notes that archaeology (still) needs to "develop systematic procedures for assessing reconstructions of meanings from past cultures" (Layton 2006: 40). Even though the practice of focusing on dualisms and polarities has been displaced, the critique of Gellner (1982: 123) that the description of the structures is not the same as an explanation of how they came about and were generated may still plague some, but not all, approaches in archaeology that are inspired by structuralisms. At a wider level of inquiry, there has been much debate and discussion about the legacy of the concept of "text" that derives from the early structuralist approaches (and their roots in linguistic theories). As one core concept in the debates and discussion that emerged under the label of "post-structuralism," archaeologists have variously engaged with the relative utility and limitations of the idea that we can "read" the materials of the archaeological record and their relationships "as text" (see in Preucel 2006: 135-46). One legacy of structuralism has been that it often provided an account that was essentializing and totalizing, as in characterizing an entire past culture in terms of a generative underlying structure that itself structured cultural practices. Within-group variations in the construction and reception of meaning(s) were suppressed, along with the already-mentioned features of much original structuralism, namely, history, agency, and the contingency of meaning making.

Yet many of the assumptions and especially the goals of structuralist approaches in archaeology not only did provide the new insights that Wylie was heralding, but also they fused into a variety of approaches that many may see as separate from structuralist ones. Preucel (2006: 120-1) has been especially concerned to note the various seemingly different archaeological programs that have been influenced, if not in part spawned, by a structural archaeology. While partially congruent with many tenets of processual archaeology and, in fact, actually contributors to the formation of processualisms, structural archaeologies also brought an array of new perspectives and insightful other ways of framing archaeological inquiry: information exchange, structural Marxism, World Systems Theory, cognitive archaeology, and even gender. With some of these allied approaches, as with structural ones themselves, there is an inherent critique of the assumptions and an emergence of critiques that move the research framework to another domain (as in the conception of ideology by structural

Marxists that becomes a critique of processual archaeology).

And thus, we can return to an opening point of this summary, namely, that not only have the influence and scope of structural approaches in archaeology been underappreciated but in such initial structural approaches have been the seeds of new and more expansive ways of understanding the past. As such, in the very approaches under the rubric of structuralism in archaeology exist the critiques and a generation of the "beyond structuralism" and, along with it, a "beyond processualism." There continues today a structural archaeology in new forms and with new lines of inquiry.

Cross-References

- ▶ Conkey, Margaret Wright
- ▶ Deetz, James (Theory)
- ▶ Hodder, Ian (Theory)
- ▶ Leone, Mark P. (Theory)
- ▶ Leroi-Gourhan, André
- ▶ Post-processualism, Development of
- ▶ Preucel, Robert W.
- ▶ Processualism in Archaeological Theory
- ▶ Wylie, Alison

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Style: Its Role in the Archaeology of Art

Inés Domingo Sanz[1] and Dánae Fiore[2]
[1]Departament de Prehistòria, Història Antiga i Arqueologia, ICREA/Universitat de Barcelona/SERP, Barcelona, Spain
[2]CONICET-AIA-UBA, Buenos Aires, Argentina

Introduction

The Relevance of the Concept of Style in the Archaeology of Art

Style has been and still is a core concept in the field of the archaeology of art for several reasons, including the fact that it is a twofold term: on the one hand, it refers to a quality of past human actions which is perceptible in material culture, and on the other hand, it is also an analytical tool that allows archaeologists to find continuities and discontinuities in the archaeological record which are relevant to answering questions about the spatial and temporal distribution and qualities of cultural practices.

The concept of style is particularly relevant to the archaeology of art because, among other material culture products, the creation of artworks (be them artifacts or structures) entails the manipulation of form, color, size, texture, volume, etc. in the creation process, which often show recurrent patterns that evidence the underlying operation of stylistic rules and habits. Thus, style studies tackle numerous aspects of image making and display, including the trends underneath the design of visual motifs, their combinations and layout, the techniques used in their production, as well as the types of objects and contexts in which such images were created and displayed, the functions that they had for their creators, and the effects they generated over their users-viewers (Conkey & Hastorf 1990).

Yet, style has also been an analytical tool used by archaeologists to pinpoint visual similarities between artworks, in order to map their spatial distribution and/or to create stylistic sequences. In turn, these have often been interpreted as evidence of underlying archaeological cultures, which produced such similar traits, although such

interpretations have also been challenged and much debated in the last 30 years (Conkey & Hastorf 1990). Such theoretical approaches and debates are reviewed in this entry.

Definition

What Is Style in the Archaeology of Art

Many archaeological research projects on art materials (rock art, portable art, pottery decoration, sculptures, friezes, etc.) have relied heavily on the concept of style, as a tool to classify artistic assemblages, create evolutionary sequences, and explore the distribution of specific artistic traditions in order to discern past identities. Although commonly understood as a way of doing, particular to a specific time and place, this concept has been defined from different and sometimes conflicting theoretical frameworks (Conkey & Hastorf 1990). Some key elements are explicitly or implicitly common to most definitions of the term *style*, which is recognizable when *comparing* a sample of *archaeological images* which show *shared features*, including (a) a common *repertoire of motifs*, e.g., their form, color, and size; (b) a common way of *displaying such motifs* on the media on which they are laid out (ceramic vessel, bedrock, bone artifact, etc.), e.g., their position, orientation, symmetric arrangement, and use of media features (its concavity/convexity/flatness, volume, topography); and (c) a common set of *image-making techniques* (including raw materials, tools, and technical operations to use them). Other features, such as the contexts in which these artifacts or structures were produced and used, as well as the functions and effects they had on their creators and viewers, do not appear in every definition of "style" and are more dependent on each theoretical approach to this concept (see below).

Historical Background

Style from a Normative Culture-History Framework

The first formal use of the concept of style in archaeology and thus in the archaeology of art was developed by the culture-history framework: it conceived style as a set of mental rules that operated within a broader set of cultural norms and which were projected into the creation of images with certain recurrent features that were recognizable in the archaeological record: types of decorative motifs, color choices, artifact shapes, depicted themes, decorative techniques, etc. (e.g., Breuil 1952; Leroi-Gourhan 1968). Hence, style became a diagnostic trait by which archaeologists identified/created "archaeological cultures." Thus, styles' spatial distribution became key indicators of the diffusion of cultural norms from one site or region to another, while stylistic sequences formed by the diachronic succession of styles became the backbone of archaeological periodifications. In turn, styles became chronological indicators for relative dating, motif types, and forms being used in some cases as "fossil guides" to date artworks.

The shortcomings of such theoretical framework are many and have been clearly pinpointed by several authors (see their contributions below). Firstly, these normative approaches to style clearly saw it as a reflection of a mental set of shared rules and, as such, as a passive factor in human life: persons were seen more as the passive "bearers" of style rather than as its producers and manipulators. Secondly, style was mainly separated from function insofar as it was regarded more as the result of repeated norms than as the result of a social practice with certain practical purposes. Thirdly, this perspective was clearly homeostatic since its emphasis on the *shared* rules disregarded the possibility of manipulations, impositions, negotiations, and/or contradictions within the people who produced, circulated, and consumed specific style-bearing artifacts and structures. These issues where to be tackled by the following theoretical approaches.

Style from a Processual Framework

The deep breakthrough generated by the processual framework in archaeology through its explicit and thorough criticism towards culture-history did have a clear effect on the way style was conceived in art analyses. The pioneer work by Binford (1965) led to two key new ideas

about culture, which was now conceived: (1) as "a system composed of subsystems" (Binford 1965: 203) in which "different classes of archaeological remains reflect different subsystems" (Binford 1965: 203) and (2) as "man's extrasomatic means of adaptation (White 1959: 8)" to the environment (Binford 1965: 205). This meant that "people, things, and places are components in a field that consists of environmental and sociocultural subsystems, and the locus of cultural process is in the dynamic articulations of these subsystems" (Binford 1965: 205). Thus, culture "is not necessarily shared; it is participated in by men" (Binford 1965: 205). Such ideas had a deep impact on the way style was conceived by processual archaeologists: culture – and style within it – was not just in people's minds, was not necessarily shared, and was not detached from the environment: culture involved practice and had adaptive functions to the environment. Did style have functions too? The answers to this question had a broad variety of replies within the processual framework.

Binford himself proposed that stylistic variability could be defined as the continuity of "formal attributes, which vary with the social context of manufacture exclusive of the variability of the use of the item" (Binford 1965: 208); that is, style and use (or function) of an item were seen as separate but interrelated realms. To pursue their study, he devised a complex set of interrelated variables to be approached through a multivariate perspective:

(a) *Formal variation* was seen as integrated by morphological variation and decorative variation, which in turn were intersected by the technical dimension and the design dimension (Binford 1965: 205).
(b) *Cultural variation* was conceived as integrated by four variables: techno-morphological, morphological design, decorative techniques, and decorative designs, which, in turn, were intersected by the primary functional variation (directly related to the specific use of an artifact) and the secondary functional variation (a by-product of the social context of production and use of the artifact) (Binford 1965: 206). This multivariate approach was foundational in the analytical separation between style and function, which was later reelaborated by other authors.

Sackett (1977) also made a clear distinction between the style and function operating in three scales: entire archaeological assemblages, artifacts, and attributes that characterize them (1977: 371-372). Yet he did remark that both were contrasting and complementary features. Function was conceived as a feature perceived in the actions, ends, and roles that an artifact performed within its context, while style was conceived as the choices made by a society within a broad range of equally valid alternate means of achieving the same end (i.e., the same artifact) (1977: 371-372). Such choices were socially transmitted and thus had diagnostic value in the archaeological identification of cultural traditions and of the degree of intensity of social interaction between two historically related loci (1977: 371-372).

Breaking away from the processual framework and proposing a neoevolutionist approach, Dunnell (1978) focused on the concept of natural selection as a key to addressing evolutionary processes underlying cultural change. In doing so, and contradicting the processual approach, he noted that "a substantial segment of the archaeological record is not best understood in terms of adaptation" (Dunnell 1978: 192), because stylistic features of material culture were not adaptive. Thus, he proposed that there existed a fundamental dichotomy between function – accountable in terms of evolutionary processes – and style, accountable in terms of stochastic processes, that is, not subject to the bias of natural selection (Dunnell 1978: 192). These concepts have been challenged as well as revisited and refined (e.g., Hurt & Rakita 2001; Shennan & Wilkinson 2001).

Following Dunnell, Meltzer restricts the term style to refer to "those forms in a cultural system that do not have detectable value: those forms are adaptively 'neutral'" (Meltzer 1981: 314). Style, as a residual attribute, is interpreted as added for purely social purposes. On the contrary, functional features do not depend directly on

transmission factors or interaction between groups but may result from adaptations or the development of similar activities in similar environments.

Contrary to these views, a number of researchers have suggested the coexistence of different styles with different functions within the same culture, with differences between religious and secular art, or between civil and domestic art (Schapiro 1952: 294). Similarly, Smith observes the use of two different styles among the Aboriginal people from Barunga (Arnhem Land, Australia) with different functions: a figurative style for non-ceremonial contexts and a geometric style for ceremonial contexts (Smith 1994: 241).

A different approach to style was developed by Wobst, who defined it as "that part of the formal variability in material culture that can be related to the participation of artifacts in processes of information exchange" (Wobst 1977: 321). The author broke the style/function opposition and proposed instead that "stylistic behaviour does have functions" (Wobst 1977: 321). Following core concepts of communication theory, Wobst viewed artifact styles as media through which messages could be encoded by emitters even in the absence of receivers, while, in turn, messages could later be decoded in the absence of emitters. The longevity of artifacts (though clearly some are highly perishable) and the control of the emission of messages via the use of rare materials or high-cost energy investment in the signals were conceived as particular features of this mode of information communication. He also pointed out that the archaeological expectations of stylistic behavior include:

(a) Artifacts with high visibility.
(b) Artifacts which are "potentially encountered by more individuals" and most accessible to them.
(c) "social-group-specific stylistic form[s] should occur only among those messages that are most widely broadcast, that broadcast group affiliation, and that enter into processes of boundary maintenance" (Wobst 1977: 330).

Yet social interaction interpretations done by other authors were severely challenged by Plog (1978), who pinpointed numerous false assumptions underlying several stylistic ceramic studies (e.g., that "all households made the pottery they used" and that "manufacture of ceramics was a female activity") and thus proposed that "one should not simply calculate a similarity coefficient between design frequencies at two sites and assume that it measures interaction and nothing else" (Plog 1978: 368). Following the work of Wobst (1977), Plog (1978), and others, in the 1980s several authors addressed style as a process of social interaction and exchange, both in the analysis of portable art (e.g., Gamble 1982) and rock art (e.g., Jochim 1983; Schaafsma 1985; Smith 1992a, b, 1994).

Style from Post-processual and Social Frameworks

The post-processual and social frameworks challenged several of the ideas about style mentioned above: they share in common the fact that they see style as an active factor in the production and manipulation of material culture, a factor that stems from human agency, can be used as a source of power to do things and over people and resources, and thus, having crucial effects on the social lives of those involved in the creation, circulation, and display of artifacts and structures fashioned with a particular style, operating within a particular context. However, as will be noted below, these approaches do strongly differ in their epistemology: those labeled here as "social" being more prone to neopositivist and dialectical epistemologies combining induction and deduction, while the post-processual ones being more prone to hermeneutic and interpretive epistemologies.

As a pioneer of post-processual archaeology, Hodder contested the adaptationist and functionalist notions of culture and style and proposed that material culture was better conceived as "the environment within which individuals find their places and learn the places of others, their goals and expectations. Yet it also produces new situations and is . . . the medium through which individuals achieve their ends" (Hodder 1985: 5).

Thus, as part of any material culture item, style involved social action, including simultaneously "meaning and experience, subject and object, interpretation and observation" (Hodder 1985: 4). Moreover, the political dimension of style was stressed by pointing out that pottery decoration, for example, could be interpreted as "part of the negotiation of power, defining boundaries, and producing social differences" (Hodder 1985: 4). Many of these ideas are still in use.

From a more social and ethnographic point of view, Wiessner (1983, 1989) defined two key concepts related to the links between style and identity that have generated an important debate in archaeology: emblemic style was defined as the formal variation that consciously transmits information about affiliation to a group, while assertive style was defined as the formal variation that carries information about individual identity. While this distinction is extremely meaningful in terms of the multiple social implications of style as an identity marker, it also has some shortcomings when applied to certain prehistoric archaeological contexts in which the distinction between assertive or emblemic becomes untestable.

A similar set of concepts was devised by Macdonald (1990), who stated that protocol referred to the set of steps undergone in the production of an item within a stylistic framework, while panache referred to the ability of an individual to negotiate and push the boundaries of such protocol for his/her own aims.

In turn, Sackett (1990) elaborated his previous ideas about style and function and proposed a set of concepts: *isochrestic variation* was related to the choices made between variants that are functionally equivalent and transmitted neither intentionally nor consciously through enculturation within social groups, but rather passively and inadvertently (hence, challenging Wiessner's notion of an emblemic style consciously informing about identity); *iconological variation* was related to the active and intentional communication of contents through the creation and selection of specific images and/or designs. Thus, Sackett had proposed a more complex dichotomy:

(i) passive style = isochrestic variation = function

versus

(ii) active style = iconological variation = communication

To this, Wiessner (1989) replied that both aspects of style – functional and communicative – could be passive and/or active, hence breaking such strict dichotomy.

Finally, from a more openly social and materialist theoretical point of view, Earle has analyzed the manipulative uses of style as a justification of social inequality (Earle 1990). The author has pointed out that, among other factors, artifacts and structures created using elaborated art styles, luxury items, and durable materials generate aesthetic, and affective reactions can be very effective means of conferring individual's roles, status, and power due to the fact that they look not just visually appealing but also solid, permanent, and thus unquestionable (Earle 1990).

Key Issues/Current Debates

Current Uses of the Concepts of Style: Key Elements in Style Analysis

In the twenty-first century, style still plays a significant role as a tool to discern social identities and to establish relative chronologies when analyzing art materials and more particularly rock art. While portable forms of art can be dated through the archaeological context where they are found, direct rock art dating is still problematic, and when possible, it generally dates a particular motif or artwork. But an absolute date would only be meaningful to the archaeological study of art if the motif or the artwork can be assigned to a specific stylistic assemblage or unit defined by the reproduction of a certain set of common principles. Only then will we be able to identify artistic traditions, assign them to specific time periods, and explore their geographic distribution, to study the duration and intensity of specific occupations, the boundaries and interactions of specific human groups, and other aspects related with human geography and exchange

networks and their evolution over time (Domingo 2005, 2012).

In order to obtain information about the past through the analysis of artworks, we need to systematically describe and quantify their main characteristics and compare them, looking for similarities and differences to classify them in meaningful units.

But what are the key elements in style analysis?

Style, or the particular way of doing of a specific individual or group, can be found in any step of the process of production (Leroi-Gourhan's 1964 notion of *Chaine Operatoire*), of an artwork, whether technological, formal, or functional. When producing an artwork, there is a range of choices from which the artist can select, either intentionally or simply by following a set of instructions learned in a specific context. The artists' choices can be unique to them or their group, and thus they become stylistic.

To find traces of identity through the analysis of artworks, it is necessary to systematically decompose their process of production, since stylistic behavior can be identified in different steps of this process:

1. Style can be identified in the formal features of an artwork (form and decoration). The study of the formal features is usually approached through visual analysis, including systematic description of different descriptive categories (always adapted to the type of artwork under analysis, whether rock art, portable art, body art, and so forth) and quantification of their frequency to observe if they change over time and/or space. Some of these categories include:
   (a) Motif types (abstract, geometric, or figurative and their subcategories, such as humans, animals, plants, and objects).
   (b) Shape (proportions, modelling, animation, perspective, and so forth).
   (c) Size.
   (d) Formal relations in space (patterns of composition and scenes). Once motifs have been analyzed, it is important to look for regularities in the way they are distributed through the panel or artifact, in order to discover if different rules of composition and arrangement exist. Similarly, compositions and scenes have to be carefully analyzed looking for changes in subject matter.
   (e) Patterns of addition and superimposition. The way the motifs are added to the panels or artifacts can also be specific to a particular individual or group. Do they use specific areas of the panel or artifact? Do they use new sites or surfaces, or do they reuse previously used ones? Do they respect previous motifs or overlap them? How is the morphology of the decorated surface integrated in the composition or scene? Superimpositions of motifs that are stylistically similar may simply be an artistic license to show group perspective. But those including different styles are quite significant for stylistic analysis since they offer a sequence of events, and thus, they are useful to establish relative sequences.
   (f) Analysis of the spatial distribution in the natural and cultural context. The distribution of portable art may provide information on the geography of specific traditions but also on exchange networks. But rock art is fixed to place, and thus it is a relevant source of data to understand the way space was defined and used by a specific group, the duration and intensity of the occupation, and how the perception of a specific place changed over time in the construction of social identities (Lenssen-Erz, 2008; Domingo et al. 2008). When talking about rock art, this is usually explored through landscape analysis.
2. Technological features (medium and production techniques).The way the artworks are made can also be stylistic. From raw materials and resources to produce binders, paintings, and tools, to the selection and preparation of the decorative surface (rock or portable art), the selection of the techniques (paintings, engravings, or carvings), and so forth may all be constraint by cultural practices. While some aspects of the technological process of

production can be explored through visual analysis (selection of canvas, preliminary preparation of the working surface, decoration techniques), others need to be explored through archaeometry (like pigment analysis) or experimentation (like analysis of gestures, potential tools, and so on). Interestingly, as suggested by Gosselain (1992: 90), while the visual aspects of an artwork can be easily replicated by different cultures, non-visual aspects, such as pigment recipes, are more difficult to reproduce and thus provide the opportunity to explore the more stable aspects of social identities. As an example, Groenen suggests that the identification of different painting recipes and different application techniques in the analysis of the hand stencils from Gargas results from different artistic events, in contrast to the single intervention deduced by Leroi-Gourhan through formal analysis (Groenen 2000: 60).

3. Function. When talking about function, we refer to both the utilitarian function (related to the material use of an object) and the non-utilitarian function (related to social, ideological, or spiritual spheres) (Sackett 1977: 370). The same human group can potentially use different styles for different functions, and thus, two different styles do not necessarily refer to two different periods or cultures. Here, the analysis of the context would be central.

To summarize, any integral stylistic study should combine formal, functional, and technological analysis, in order to achieve a more objective approach to style, trying to define different social units and to determine their limits in space and time (Domingo 2012).

Future Directions

The Archaeology of Style in Art Materials

A review of the concept of style and its use in the archaeological study of art confirms its value as a tool to explore past social identities and to construct relative chronologies of different sorts of artworks. Together with the systematic description, quantification, and classification of the artworks, future stylistic studies would certainly need to be complemented with more accurate absolute dates (especially in rock art) to provide a more precise chronological control of the art traditions; more accurate recording methods, in terms of the images, their spatial setting (landscape, topography, bedrock in rock art, or other materials in portable art), and production techniques; and, finally, controlled uses of ethnographic and historical resources as sources of hypotheses or as analytical tools to search for stylistic trends.

Cross-References

- ▶ Art Studies: Normative Approaches
- ▶ Binford, Lewis R. (Theory)
- ▶ Conkey, Margaret Wright
- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ Hodder, Ian (Theory)
- ▶ Leroi-Gourhan, André
- ▶ Paleoart Studies: Scientific Methods
- ▶ Smith, Claire
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Submerged Indigenous Sites

Amanda M. Evans
Tesla Offshore, LLC, Prairieville, LA, USA

Introduction

Land-based archaeological sites may be inundated through a variety of processes, resulting in submerged and potentially buried evidence of past human behavior. Submerged environments create unique conditions of archaeological preservation, especially for fragile materials such as textiles. In some cases, submerged sites on continental shelves or lake shores that were formerly exposed as dry land may represent evidence that predates the terrestrial archaeological record for that same area. Submerged indigenous sites are particularly informative in studies of human migration and patterns of early colonization and occupation but can be challenging to locate.

Definition

A submerged indigenous site is defined as a spatially defined accumulation of cultural material or anthropogenically altered ecofacts, of sufficient quality and quantity to allow for inferences about past human behavior at that location, that through eustatic (changes in water volume) or isostatic (changes in crustal plate elevation caused by sediment loading, or tectonic rebound) processes or intentional inundation are presently located below water.

Historical Background

In the United States, some branches of the federal government have required systematic surveys for the identification of submerged indigenous sites on the outer continental shelf since 1973. In order to develop accurate survey guidelines and assessment requirements, the U.S. Department of the Interior's National Park Service (NPS) funded a study to determine the archaeological potential of the Gulf of Mexico (GOM) continental shelf for both historic resources and submerged indigenous sites (Coastal Environmentals, Inc. [CEI] 1977). The goals of the study included development of a predictive model for the identification of the most likely resources to be found in an open marine environment, and the highest probability areas for the occurrence of these resources. The methodology outlined by the authors is one early example of research specific to submerged indigenous sites, and their recommendations still serve as the basis for methodologies used in modern studies.

According to the study's authors, submerged indigenous sites do not occur randomly, and the authors argued that correlations exist between specific landform types and artifacts or other evidence of past human behavior (CEI 1977: 331). The authors then made correlations between types of landforms and the effectiveness of different survey techniques in identifying these same features in submerged contexts (Table 1). The 1977 study examined landforms in environments across the entire GOM, but not all of the recommendations are applicable to all environments. The authors suggested that any investigation of submerged prehistoric resources take a three-step approach beginning with remote sensing of the area through either small-scale bathymetry or sub-bottom profiling to resolve the upper 9 m (30 ft) of sediment and acquisition of a grab or drag sample of seafloor sediments. If a probable site was indicated by the data acquired in Step 1, then subsequent data should be collected, either in the form of side scan sonar imagery of the area, bottom cores, and or additional grab or drag samples. The final step, if warranted, was recommended as underwater photography/videography, box core sampling, and or diver investigation (CEI 1977: 341). The majority of the recommendations, such as bathymetric

Submerged Indigenous Sites, Table 1 Correlation of terrestrial landforms, cultural period, and effectiveness of survey techniques from the northwestern Gulf of Mexico

	Cultural Period		Survey Effectiveness	
Landform	Early archaic	Paleo-Indian	Sub-bottom profiler	Piston corer
Quarry sites	V	V	Low	Not effective
Salt dome sites	V	V	High	Medium
Spring/sinkhole sites	V	V	High	Medium
Valley margin sites	V	P	Low	Not effective – low
Natural levee sites	V	V	High	Not effective – low
Point bar sites	V	V	High	Not effective – low
Bay margin sites	V	V	Low	Not effective – low
Coastal Dune lake sites	V	V	High	Medium
Shell middens	U	U	High	Not effective

Key: *V* verified or known correlation, *P* probable correlation, *U* unknown
Source: CEI 1977: 333, 340

survey or diver photography, assume that the landform or site is exposed at the seafloor, which is appropriate for environments that include sinkholes and river channels that are readily apparent on bathymetry and side scan sonar data (e.g., Gaffney & Thomson 2007). For sites or landforms that are buried by subsequent sediment accretion, these methods are insufficient; initial survey requires techniques that image the subseafloor, such as boomer systems or other sub-bottom profiler systems.

The methodologies created as a result of this study were developed specifically for landforms correlating with prehistoric indigenous sites in the United States. This includes highly mobile hunter gatherers of the Paleo-Indian and Archaic periods, groups that are not associated with extensive types of material culture. The predictive model included geological reconstruction and landscape change modeling, but it was recognized that few artifacts would likely exist at submerged indigenous sites on the continental shelf. Cultural signatures of human occupation were therefore identified that went beyond artifacts, such as potsherds and lithics, to include signatures more likely to be recovered in core samples, such as shells, faunal fragments, black earth, burned rock, charcoal, and pollen (CEI 1977: 172).

In the years since the creation of the submerged indigenous site prediction and preservation model used on the United States' continental shelf, subsequent studies have been conducted worldwide that add to the theory and methodology of investigating submerged indigenous sites. In 1981, in recognition of advances in paleocoastline reconstruction, archaeologists, anthropologists, geologists, and oceanographers were invited to participate in a symposium addressing Quaternary coastlines and prehistoric archaeology; the resulting papers were published in one of the first edited volumes on the subject (Masters & Flemming 1983). The participants in this symposium noted that, at that time, the majority of identified submerged indigenous sites were the result of chance finds by recreational SCUBA divers, fishermen, or activities related to offshore construction. Site discovery, they maintained, depended on both physical preservation of the site and ease of detection. The participants presented diverse case studies ranging in location from Siberia to Australia, but concluded that several methodologies could be universally applied to site prediction and detection. At the minimum, local geomorphology has to be modeled to identify areas of probable feature preservation; recognizable features (such as shell middens) must exist; and the landscape had to have offered basic requirements such as access to fresh water, protection from environmental exposure, and or availability of food (Masters & Flemming 1983: 611, 622-623). Recommendations for survey and identification of indigenous features were similar to those outlined by CEI (1977): chiefly, bathymetric or subseafloor survey conducted at tight intervals (no greater than 150 m). The authors stressed, however, that this type of survey cannot prove without doubt the existence of submerged indigenous sites, it can only identify the most probable areas in which sites could be preserved (Masters & Flemming 1983: 624).

Parallel to the Quaternary coastlines and prehistoric archaeology symposium, a follow-up study was being conducted in the United States to analyze terrestrial analogues for potential offshore deposits (Gagliano et al. 1982). The results, developed under contract for the National Park Service, analyzed core samples from verified terrestrial prehistoric sites along the northern Gulf of Mexico coast. Lab analyses of sediment core data indicated that the following variables were credible indicators of human activity and habitation: grain size, pollen content, geochemical composition, point-counts, foraminifera species identification, and radiocarbon dating of appropriate samples. Recognizing that site identification could not be dependent upon the presence of anthropogenic artifacts, the terrestrial corollaries were developed so that landscape features could be tested for indicators of indigenous site occurrence without the presence of obvious anthropogenic artifacts such as projectile points (Gagliano et al. 1982: 115).

In order to test the effectiveness of the predictive model and recommended methodology

proposed by the 1977 and 1982 reports, the U.S. Department of the Interior's Minerals Management Service (MMS) funded a study in the early 1980s, concentrated in the relict Sabine River Valley on the Gulf of Mexico outer continental shelf (Pearson et al. 1986). This area was identified as ideal for testing because of a wealth of preexisting geologic data and existing subseafloor surveys conducted on behalf of oil and gas operators that were available to the researchers through the funding agency (Pearson et al. 1986: xix). Eight targeted areas were selected for inclusion in the project based on a review of existing shallow high-resolution seismic data, and then subjected to tight interval seismic survey over the areas of interest to both relocate and further delineate the features of interest (Pearson et al. 1986: 53-76). Survey grids were located in areas where modern water depths range from approximately 8 to 16 m (27–54 ft). Vibracores were acquired from five of the surveyed areas, each measuring 12 m (40 ft) in length. The collected cores, 76 in total, were subjected to a series of laboratory analyses in efforts to identify potential signatures of anthropogenic activity, based on those identified by previous studies (Gagliano et al. 1982). No artifacts, or distinctly man-made materials, were recovered within the cores; however, two cored features included sediments exhibiting characteristics of archaeological deposits. One was interpreted as a possible shell midden, dating to approximately 8,055 +/– 90 BP and the second was interpreted as an area of burnt bone dating to approximately 8,500 BP. The study's authors were hesitant to identify the features as concrete evidence of human occupation, but stated "that they more closely resemble archaeological deposits than known natural deposits" (Pearson et al. 1986: 76-80, 127-162). The results of the Sabine River Valley study supported the theories behind the predictive model created for use in the Gulf of Mexico, and demonstrated the complicated task of identifying submerged indigenous sites from buried contexts offshore. The study area represents a unique type of submerged indigenous context in that archaeological data is not simply submerged, but also buried underneath a seafloor which gives no indication of the underlying features.

The Sabine River Valley is one example of a study to investigate submerged indigenous sites. Numerous studies have been conducted around the world, but are distinct from the Sabine River Valley study in that these other sites are either exposed at the seafloor, located in relatively shallow water depths, or some combination thereof (e.g., Johnson & Stright 1992; Browne 1994; Faught & Donoghue 1997; Momber 2000; Dix et al. 2004; Benjamin et al. 2011). Some research projects have avoided the complications of working in submerged environments by using evidence from terrestrial contexts to address changes in human subsistence and coastal settlement patterns instigated by changing climate conditions (Bailey & Parkington 1988). Estimates from the late 1990s suggested that approximately 550 submerged indigenous sites have been identified globally, dating from the Lower Paleolithic/Early Pleistocene periods, or approximately within the last 2.5 million years (Dix et al. 2004: 5).

Despite 30 years of research in locations ranging from Beringea to Argentina, the methodology used in submerged indigenous site research has remained relatively unchanged from the 1977 recommendations. As outlined by Gaffney and Thomson (2007: 4), the most common techniques used in the investigation of submerged indigenous contexts include seabed sampling and shallow coring, high-resolution 2-D seismic (sub-bottom) profiling, high-resolution 3-D seismic profiling, and high-resolution bathymetric mapping. The acquired remote sensing data or sediment samples/cores are then put into a locally specific context. These paleolandscape reconstructions remain critically dependent upon accurate understandings of sea-level, including isostatic and eustatic changes, and rates of sedimentation or erosion (Dix et al. 2004: 13-30).

Key Issues/Current Debates

The search for submerged indigenous sites is predicated on an accurate assessment of the

landscape from the point in time it could have been occupied through to the present. The synchronic reconstruction of the landscape, or reconstruction of place at a given point in time, provides information about exploitable resources that would have been necessary to support populations, and discrete areas within the landscape where evidence of past occupation is most likely to be found. Diachronic reconstruction of that same place provides information about changes to the site over time that influence preservation of any archaeological materials from their time of deposition, and influence secondary site formation processes.

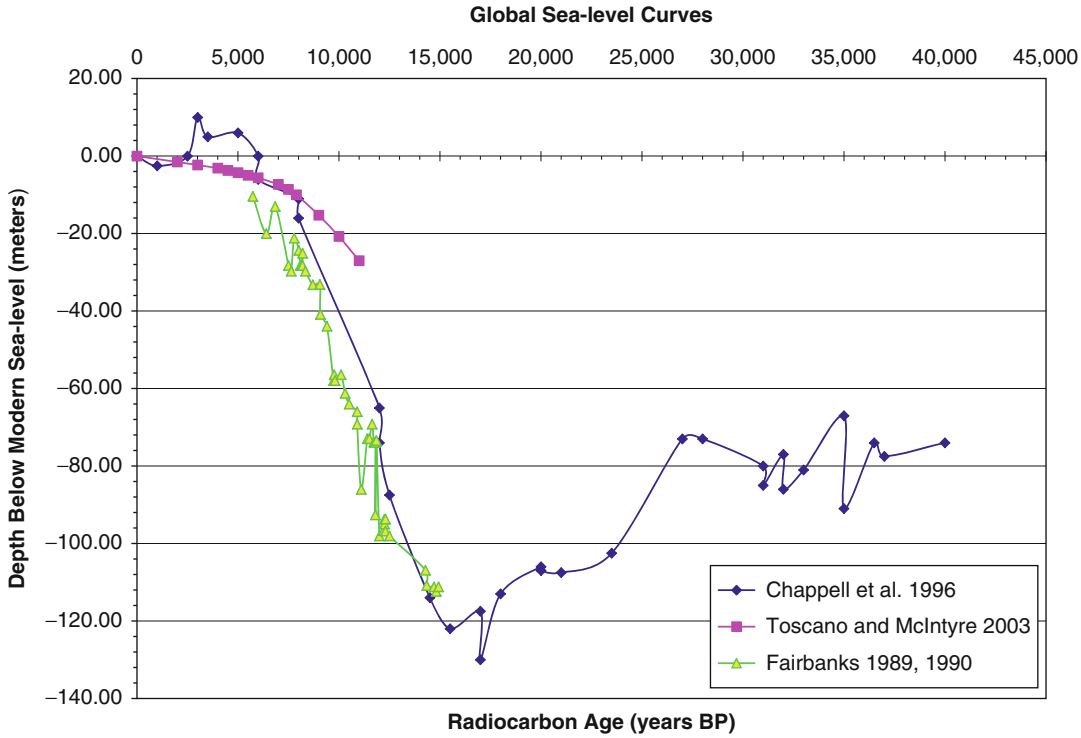
Sea-level change has altered the extent and shape of the world's coastlines and river-fed lakes repeatedly throughout the Pleistocene. The landscape available to indigenous populations was expanded and minimized by these transgressions and progradations, but was also altered and reworked by these same mechanisms. Sea-level curve data is used to determine the possible time period of exposure for a given sediment horizon. Final inundation, or the most recent inundation as sea-level approached the present high-stand, marks the last possible date for potential occupation by indigenous populations as the landscape became part of a submerged environment.

Early sea-level studies were characterized by an assumption that the interconnectedness of the earth's oceans would result in uniform eustatic sea-level change, and that data from any tectonically stable region was representative of global sea-level at that point in time. It is now understood that sea-level is highly geographically and temporally dynamic. Factors that influence eustatic sea-level at any given time may include changes in ocean volume, water mass, and water density. Overall global patterns are influenced locally by relative changes associated with regional land uplift or subsidence, meteorological or atmospheric events, gravity, and eccentricity (Pirazolli 1991: 4-6).

Sea-level change can be assessed by identifying evidence of former shoreline stands and related environments, and by absolute dating of samples taken from sediment and ice. Many sea curves are created by extrapolating change between discrete data points, without regard to estimates of error (Pirazolli 1991: 21). Line graphs of age/depth below modern sea-level represent an oversimplified interpretation of sea-level change. Error ranges for individual data points allow for a more comprehensive, although more complex, visualization of sea-level change within a given data set (e.g., Balsille & Donoghue 2004). Furthermore, oscillations and reversals become exaggerated at smaller time intervals. Positive and negative alternations of sea-level observed at a timescale on the order of a thousand years are likely to become insignificant within the overall pattern of sea-level change when viewed on a scale of tens of thousands of years (Pirazolli 1991: 21). The issue of scale becomes pertinent when sea-level curves are applied to archaeology. Sea-level curves may provide significantly different dates for a single given depth, or provide insufficient resolution for sites occupied over a span of hundreds or even thousands of years (Fig. 1).

The majority of researchers now agree that sea-level change is a locally specific phenomenon, and reconstructions must assume some measure of local variability within trends that would otherwise suggest uniform rates of global sea-level change. Factors that complicate the construction of sea-level curves include, but are not limited to, sediment compaction and local subsidence, recognition of marsh and swamp peats, water depth range of peat formation, sediment load compaction, fluid extraction, and other localized changes in conditions. Awareness of these complications has led to reevaluations of regions once considered to reflect homogenous rates of sea-level rise, and has demonstrated high rates of local variability (Lewis 2000). Archaeological studies of submerged indigenous sites must consider the applicability of sea-level curves selected for use in reconstructing the site's environment. In order to be useful in archaeological settings, rates of sea-level rise must be accurate at the site-specific level.

Technology is an important component of submerged indigenous sites research. As discussed previously, the identification of this type of site requires the use of underwater remote



Submerged Indigenous Sites, Fig. 1 Global sea-level curves demonstrate the variability within the record at different positions on the earth in the recent past (Data recreated from Fairbanks 1989, 1990; Chappell et al. 1996; and Toscano & MacIntyre 2003)

sensing. This is useful in lakes and coastal waters where depths exceed 1 m below sea-level (BSL); however, many sites are located in the transitional shorezone, where water depths are too shallow to allow access by boats. Archaeologists working in these environments must often use a combination of terrestrial and underwater techniques. For example, studies along coastlines often combine terrestrial pedestrian survey and probing with coring and, if possible, remote sensing. This is effective in areas where indigenous sites such as shell middens are present, but would not necessarily identify a hearth or postmold. Magnetometers, which are used to successfully identify indigenous features in terrestrial settings, are not effective in submerged contexts where water depths may not allow for acquisition of data at the intervals required. The reliance on technology in submerged sites research can also make the research too expensive to conduct. Remote sensing equipment, boats, and diving equipment may escalate project budgets beyond that of a similar project conducted in a terrestrial setting.

International Perspectives

Submerged indigenous sites worldwide are beginning to receive increased attention for their potential to contribute information about early coastal populations as well as population migrations. Until recently, submerged indigenous sites research has consisted of studies of individual sites. Recent publications, particularly focusing on submerged sites in the North Sea and northern Europe, have incorporated multiple sites into regional discussions of culture at the time these now-submerged sites were occupied (e.g., Benjamin et al. 2011). Archaeologists in Europe and the United Kingdom have demonstrated the importance of data from submerged contexts.

Survey requirements protecting submerged indigenous sites are also more stringent in this part of the world.

In the United States, submerged indigenous sites receive various levels of legal protection and research interest. Increasing numbers of federal and state agencies are incorporating submerged indigenous site survey and research into their management plans. In places were survey is required in order to avoid inadvertent damage to the submerged cultural resource, requirements focus on remote sensing. Particularly in the Gulf of Mexico region, where earlier studies have demonstrated the potential for submerged indigenous sites, coring is not a requirement. In most cases where a potential submerged indigenous site is identified, the responsible government agency assigns an avoidance mitigation on the target, and no subsequent testing is required. In the United Kingdom, submerged indigenous sites are protected during offshore ground-disturbing activities such as aggregates extraction, and surveys require both remote sensing and physical samples, such as cores (Evans et al. 2009).

Future Directions

Submerged indigenous sites research is receiving increased attention in part because of climate change, and related sea-level rise. The same processes that now threaten coastal indigenous sites inundated sites in the past. Studies of submerged indigenous sites can be used to add to the archaeological record of places, but the mechanisms of inundation may also be used to protect modern sites from erosion related to modern sea-level rise.

Archaeologists must continue to investigate submerged indigenous sites. Although previous studies have focused on the methods used to locate and investigate such sites, there must be new emphasis of the context of these sites and what they mean to the local archaeological record. Sites studied in isolation are interesting anomalies. Sites discussed within the context of their spatial or temporal context provide a more complete story, and help to demonstrate the need for submerged indigenous sites research.

Cross-References

- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Geoarchaeology
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ In Situ Preservation of Shipwreck Artifacts
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Landscape Archaeology
- ▶ Peopling of the Americas
- ▶ Sea-Level Changes and Coastal Peopling in Southernmost Pacific South America: Marine Hunters from Patagonia
- ▶ Submerged Prehistoric Landscapes
- ▶ United States: Cultural Heritage Management
- ▶ Waterlogged Finds: Conservation

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Submerged Prehistoric Landscapes

Joe Flatman
English Heritage, London, UK

Introduction and Definition

Submerged prehistoric landscapes are those areas of former dry land that have been submerged due to both long-term and short-term processes of environmental change, most commonly sea-level rise since the end of the Last Glacial Maximum (LGM) (c. 26,500 and 19,000–20,000 years ago) during the Late Glacial Maximum (c. 13,000–10,000 years ago) (see Mithen 2004). At the height of its extent, sea levels during the LGM were as much as 120 m lower than the present day, exposing large areas of the continental shelves of the world to human habitation. These submerged prehistoric landscapes have been known about since the late nineteenth century and scientifically analyzed since the 1970s (see, for example, UNESCO 1972; Masters & Flemming 1983). One of the most famous and early excavations of such a site is that of Tybrind Vig in Denmark, where a well-preserved Late Mesolithic (Ertebølle Culture) settlement was excavated during the late 1970s and early 1980s (see Malm 1995). Submerged prehistoric landscapes also include inland prehistoric sites in inundated freshwater environments, such as Little Salt Spring in central Florida (Clausen et al. 1979) and the submerged caves of Yucatan, Mexico (González González et al. 2008). More recently, submerged prehistoric landscape studies have tended to move away from such site-specific analyses to wider landscape analyses

of the palaeogeography of the entire submerged regions (see Benjamin et al. 2011).

Alongside areas submerged as a consequence of long-term sea level rise, some submerged prehistoric sites have been submerged due to more sudden events relating to shifts in local plate tectonics, especially earthquakes and volcanic eruptions that have changed, sometimes quite dramatically, local topography (see Flemming 1971). The former, for example, are the cause of the submergence of the 5,000-year-old city of Pavlopetri that lies off the coast of southern Laconia in the Greek Peloponnese; the latter the cause of the destruction of the settlement of Akrotiri, a Bronze Age Minoan settlement on the Greek island of Santorini.

The loss of prehistoric sites either through long-term change or short-term catastrophe is thought to be the origin of many myths and legends of "lost" civilizations, most famously that of Atlantis, and more broadly of the many "inundation" stories that survive in numerous cultures' oral histories, most famously that of the Genesis flood narrative involving the tale of Noah's Ark in the Book of Genesis in the Hebrew Bible and the Christian Old Testament.

Examples

The best-understood submerged prehistoric landscapes at present are those of the European North Sea. Here, work since 1998 onwards (see Coles 1998) has analyzed with ever-increasing accuracy the range and extent of a former submerged prehistoric landscape known as "Doggerland" that used to lie between (and link) Britain with northwest Europe until flooded around 6,000 BCE (see Flemming 2004; Gaffney et al. 2009). A combination of relatively accessible sites, an extremely active marine industry focused on marine mineral extraction, and a proactive legal/management regime (especially funding provided between 2002 and 2011 by the British government under the terms of the Aggregates Levy Sustainability Fund or ALSF) all combined to provide both site-specific and broader landscape analyses for Doggerland that could be compared to relevant terrestrial datasets. The result was an unparalleled understanding of the range and significance of sites in Doggerland as well as a model for the international management of such locations. Much less well understood but arguably more famous than Doggerland is the submerged prehistoric landscape of Beringia that used to link Asia and the Americas and which functioned as the "land bridge" allowing the peopling of the Americas from c. 20,000 years ago onwards. The extreme cold and inaccessibility of this area, especially those parts of Beringia now flooded by the Bering Sea, has led to relatively limited archaeological fieldwork taking place here, although the basic extent and principle of the Beringian landmass has been known since the 1930s (see Hoffecker & Elias 2012).

Key Issues and Current Debates

The tools and techniques required to access and analyze the submerged prehistoric landscapes are now well refined and understood, and the data from such sites sits within a broader matrix of data from terrestrial prehistoric sites. As a consequence, the key issues and current debates of such sites focus most often on [a] mapping the global extent of such sites, especially in lesser-known locations and [b] agreeing the management of such landscapes, especially in relation, where present, to Indigenous Communities who may have ancestral links to the former occupants of these areas. Submerged prehistoric landscapes frequently cross modern international territorial boundaries, and as a consequence, their management is often confused (see Flatman 2012). In addition, existing domestic and international heritage management models and laws are frequently ill suited to the geographical extent and physical sensitivity of such sites. Most such heritage laws are designed to protect relatively well-preserved historic-era wreck sites that lie within a small and usually easily defined area, not characteristics common to submerged prehistoric landscapes that may

cover, at an albeit low density of data, thousands or even hundreds of thousands of square miles of seabed.

Future Directions

Beyond the examples discussed above, many other submerged prehistoric landscapes are known to exist around the world, many barely explored. For example, on the basis of known sea-level changes since prehistory, large sections of the continental shelves of Central and South America, southern Africa, and the Indian Subcontinent must all have originally been dry land and were, presumably, settled by prehistoric communities. Little is known of the archaeology of such areas, although Bailey (2004) has outlined their potential. Some of the most dramatic archaeological discoveries of the twenty-first century are likely to come from such sites, where the range and extent of submerged materials may in time redraw our understanding of the date and nature of early human occupation and migration. In particular, the submerged prehistoric landscapes of Southeast Asia (commonly referred to as Sunda and Sahul – see Allen et al. 1977) may provide new dates for the earliest human occupation of Australia, potentially revising our understanding of when and precisely how that continent was occupied.

Ongoing changes in global climate leading to the warming of the Arctic and seasonal and/or permanent loss of pack ice may in particular lead to the discovery of new data for Beringia in the twenty-first century. As the Bering Straits and surrounding coastlines of Alaska, Chukotka, and Kamchatka are rendered relatively more accessible through this process, industrial developments (especially the search for oil and gas reserves) and more broadly shipping routes (especially the regular commercial use of the Northwest Passage) seem likely to lead to the discovery of significant remains from this prehistoric landscape. How such industrial impacts on these landscapes will be managed (if at all) and what part the Indigenous Communities of these areas will play in that management remains to be seen, but the worry has to be that the demands of industry will sweep concern for the past as well as present communities of such regions aside in the pursuit of short-term financial gain.

Cross-References

- ▶ Arctic Ocean and Bering Sea: Maritime Archaeology
- ▶ Island Nation Sites and Rising Sea Levels
- ▶ Peopling of the Americas
- ▶ Submerged Indigenous Sites

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Sugarcane: Origins and Development

Tim Denham
Archaeological Science Programs, School of Archaeology and Anthropology, ANU College of Arts and Social Sciences, The Australian National University, Canberra, ACT, Australia

Basic Species Information

Sugarcane (*Saccharum officinarum L.*) is one of the world's most important crops, primarily to refine into sugar and increasingly for biofuel. Sugarcane is cultivated for sucrose that accumulates in its stalk, although it was also traditionally grown for its edible inflorescences, for medicine, and as a raw material for weaving and a variety of other uses. Sugarcane is cultivated vegetatively by planting a stalk segment that contains a reproductively viable bud. Although widely perceived to be a traditional snack food, sugarcane has been documented as a staple in parts of the eastern highlands of New Guinea (Daniels & Daniels 1993), and its importance in other regions in the past should not be underestimated, especially for fodder (Fig. 1).

Sugarcane: Origins and Development, Fig. 1 Bound stands of sugarcane growing in a cultivated plot in the highlands of Papua New Guinea (Photo: Tim Denham, 1990)

Sugarcane is an interspecific cultivar predominantly derived from the hybridization of *S. robustum* and *S. spontaneum*. The domestication of sugarcane has not been fully defined, and alternative scenarios exist (Daniels & Daniels 1993). In lieu of more intensive genetic investigations, the dominant scenario suggests initial domestication in the New Guinea region with subsequent westward dispersal and interspecific hybridization in Southeast Asia (Grivet et al. 2004).

Major Domestication Traits

The initial stages of sugarcane domestication have been proposed to involve the anthropic

selection and domestication of a wild ancestor of *Saccharum robustum* in New Guinea (Simmonds 1976: 104-108). Lebot advanced the same scenario in his evaluation of the molecular evidence to suggest (1999: 622-623):

> . . . *S. robustum* is the most likely precursor of sugarcane and was domesticated in New Guinea where human selection of chewing plants with sweet juice and low fibre produced the *S. officinarum* clones. Cultivars were subsequently differentiated in numerous distinct morphotypes via vegetative propagation and selection of somatic mutants.

Lebot (1999: 623) concluded that "*S. officinarum* cultivars are derived from introgressions between wild forms of *S. robustum* and *S. spontaneum* in Melanesia." Lebot envisaged a similar domestication scenario for *Saccharum edule*, a plant cultivated in New Guinea for its aborted inflorescences.

While agreeing that initial domestication of *S. robustum* occurred in New Guinea, Grivet et al. (2004) consider that the resultant cultivar dispersed westward to Island Southeast Asia where it hybridized primarily with wild populations of *S. spontaneum* to produce *S. officinarum*, as well as with other species in various regions to produce other cultivars. Grivet et al. (2004) consider *S. spontaneum* to be a recent introduction to New Guinea.

Timing and Tracking Domestication

Archaeobotanical evidence of any antiquity for sugarcane is almost nonexistent. A putative macrobotanical find from Yuku rock shelter in the New Guinea highlands has been dated by association to 5,750–4,800 years ago (GX-3111B; Bulmer 1975: 31). However, the identification of that find is uncertain (Yen 1998: 31), and its antiquity is also open to question due to disturbance at the site (author's research). A macrobotanical find from Kuk Swamp, collected from a domestic context dating to the last few hundred years, was originally identified as *Saccharum officinarum* by John Hather (Jack Golson *pers. comm.* to Tim Denham, 2012), and the veracity of this identification is still being investigated. Major problems in seeking to identify archaeobotanical samples have been the lack of reference material from other *Saccharum* species and related grasses and the current inability to differentiate *S. officinarum* phytoliths from similar grass morphotypes.

In the absence of reliable archaeobotanical identifications, an inferential method for approximating the antiquity of sugarcane cultivation and domestication comes from historical linguistics. Any derived chronological information is, however, at best tenuous. For example, a cognate term for sugarcane, namely, *CebuS, reconstructs to Proto-Austronesian, the languages on Taiwan before the subsequent differentiation and dispersal of Austronesian languages southward to Island Southeast Asia after c. 4,500–4,000 years ago (e.g., Pawley 2007). Significantly, the word for "chew on sugarcane," which is how the sugar is traditionally extracted within Island Southeast Asia and New Guinea and probably why it was originally selected by people (following Lebot 1999), only reconstructs to Proto Malayo-Polynesian (Pawley 2007); namely, the term was integrated into the Austronesian lexicon only after the languages dispersed southward to Island Southeast Asia.

It is uncertain if the linguistic reconstructions are sufficiently specific, either botanically or chronologically, to anchor an interpretation of sugarcane geodomestication. If they are reliable, then several stages in the domestication of sugarcane occurred before Austronesian language dispersal from Taiwan, including initial domestication of *S. robustum* in New Guinea, westward movement of the derived cultivar to Island Southeast Asia, and subsequent hybridization with *S. spontaneum* to form *S. officinarum*. Linguistic evidence also indicates that the practice of chewing on sugarcane to extract the sucrose-rich juice occurred in Island Southeast Asia before Austronesian languages dispersed there.

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- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Kuk Swamp: Agriculture and Domestication
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Sullivan, Sharon

Michael Pearson
Heritage Management Consultants Pty Ltd, Institute for Professional Practice in Heritage and the Arts, Australian National University, Canberra, ACT, Australia

Basic Biographical Information

Sharon Sullivan is an Australian archaeologist and heritage planning and management advisor and former senior public servant. She grew up in northern NSW, going to school in Glen Innes and Armidale before taking an honors degree in Prehistory, Ancient history, and Australian history at the University of New England (1964). Her honors thesis was on the Aborigines of the Richmond-Tweed River valleys. She completed a Diploma in Education (1965) and a master's degree with honors (1972) with a thesis titled *The Material Culture of the Aborigines of North Western New South Wales*, also at UNE. During her undergraduate and postgraduate studies, Sharon took part in extensive fieldwork locating, recording, and excavating Aboriginal prehistoric sites throughout NSW with Dr. Isabel McBryde and worked as her research assistant 1966–1967.

In 1969 Sharon joined the Resources Division within the National Parks and Wildlife Service of New South Wales, where she was responsible for the location, recording, and management of Aboriginal sites throughout the state, and technical advice on the acquisition and management of historic sites by the service. The success of this work led to the establishment of a dedicated Aboriginal and Historic Resources Section in 1976, which later became the Cultural Resources Section in 1983. During this period she also won a Public Service Board scholarship to study heritage site management in the USA for 3 months (1973). In 1985 Sharon promoted to Acting Regional Director Central Region of National Parks with a staff of 320, this position being confirmed in 1986. In 1989 she became Deputy Director (Field Operations) of the NSW National Parks and Wildlife Service.

In 1985–1986 Sharon was appointed a co-opted Commissioner of the Australian Heritage Commission, in which role she coordinated a national workshop on a National Cultural Conservation Strategy. In 1990 she became the Executive Director of the Australian Heritage Commission in Canberra, subsequently promoted to Group Head of the Australian and World Heritage Group of the Australian Government's heritage and environment department. Sharon left the public service in 1999 and established Sullivan Blazejowski and Associates Heritage

Consultants. Since then she has played a major role in the development of heritage management philosophy and management in Australia and internationally (particularly in relation to World Heritage management) and has run training courses in these issues in many countries.

Major Accomplishments

Sharon Sullivan's leading role in the NSW National Parks and Wildlife Service and the Australian Heritage Commission was during a period of seminal developments in the philosophy and practice of heritage identification and management in Australia. She made many significant contributions to the field, including initiation of the first agency-supported research by Aboriginal people into sites of significance in eastern Australia and developing subsequent approaches with Aboriginal people in methodology and the protection and management of Aboriginal sites. These pioneering protocols and programs in heritage management were the basis for what is taken for granted in Australian Aboriginal site management today. She played a major role in developing national systems of regional and thematic assessment of heritage and cooperative and problem-solving approaches to land-use conflicts that have been reflected in evolving legislation at state and national levels and in heritage management practice at all levels.

Sharon's expertise and heritage management skills have resulted in her appointment to many prestigious positions. She worked with the World Heritage Bureau and the World Heritage Committee reviewing nominations, technical guidelines, and the operations of the committee as well as being for a period the Australian Government's main adviser and international representative on the World Heritage Committee. She is the Chair of the Port Arthur Historic Site Authority (a World Heritage site), Acting Commissioner in the NSW Land and Environment Court, Deputy Chair of the NSW Heritage Council, Executive Councilor of the Australian Institute of Aboriginal Studies, a member of the Australian Heritage Council, a National Committee member of Australia ICOMOS, a member of the Australian Research Council's College of Experts on the Humanities and Creative Arts Panel, and a member of the Institute for Professional Practice in Heritage and the Arts at the Australian National University. In 2001 she completed a Getty Conservation Institute Senior Residential Fellowship. She has done consulting work for the World Monuments Fund (Africa, Cambodia), World Bank (China), ICCROM (Africa), and the Getty Conservation Institute (Africa and China). Sharon was Australian project leader of the Australia-China-Getty Conservation Institute partnership in 1999–2000 to develop a set of Heritage Principles for Chinese site management, which were promulgated by China ICOMOS. She worked subsequently with two Chinese World Heritage sites to implement these principles. Sharon has taught and guided site managers in Australia, USA, Cambodia, Africa, and China and is currently part of a multidisciplinary team working together with UNESCO, the Cambodian Government, and the consulting firm Godden Mackay Logan to prepare a Heritage Management Framework for the World Heritage site of Angkor.

Sharon Sullivan's contribution and standing in the heritage field has been acknowledged in many ways. She is an Adjunct Professor in the School of Natural and Rural Systems, University of Queensland, in the Department of Archaeology and Paleoanthropology, University of New England, and in the School of Anthropology, Archaeology, and Sociology, James Cook University, North Queensland. Sharon was elected a Fellow of the Australian Academy of the Humanities in 1996 and made an Officer of the Order of Australia in 2004 for her "service to cultural heritage conservation, including Indigenous heritage, and to influencing conservation practices worldwide." The prestigious Rhys Jones Medal for Outstanding Contribution to Australian Archaeology was awarded to her by the Australian Archaeological Association in 2005; Honorary Life Membership of international ICOMOS was conferred in 2005, and she was presented with an Honorary Doctorate by James Cook University in 2003 and an Honorary Doctor of Letters by University of New England in 2011.

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Supermodernity and Archaeology

Alfredo González-Ruibal
Institute of Heritage Sciences (Incipit), Spanish National Research Council (CSIC), Santiago de Compostela, Spain

Introduction and Definition

The term supermodernity (*surmodernité*) was coined by French anthropologist Marc Augé in 1992 to define the period commonly known as late modernity. The usefulness of the concept of supermodernity, as compared to other definitions of the later part of modernity, rests on two things: the idea of exaggeration and the retention of the concept of modernity. Regarding the first point, Augé (2002: 26-45) talks of three excesses: factual overabundance (which is associated with an acceleration of historical time), spatial overabundance (the abolishing of distance by electronic media and transportation), and an excess of self-reflexive individuality. We can add a fourth excess: material overabundance. In relation to the idea of modernity that Augé keeps in his definition, it can be said that while some of the notions of modernity might seem to be outdated, as the defendants of postmodernity argue, its core categories are certainly not. I consider that postmodernity is, in fact, a period characterized by an awareness of the risks and flaws of being modern but which has not been able to overcome modernity's troubles. Our current concern with ecological and social catastrophe at a global scale is the demonstration that the

process which started during the fifteenth century is far from finished: we are probably just witnessing its climax.

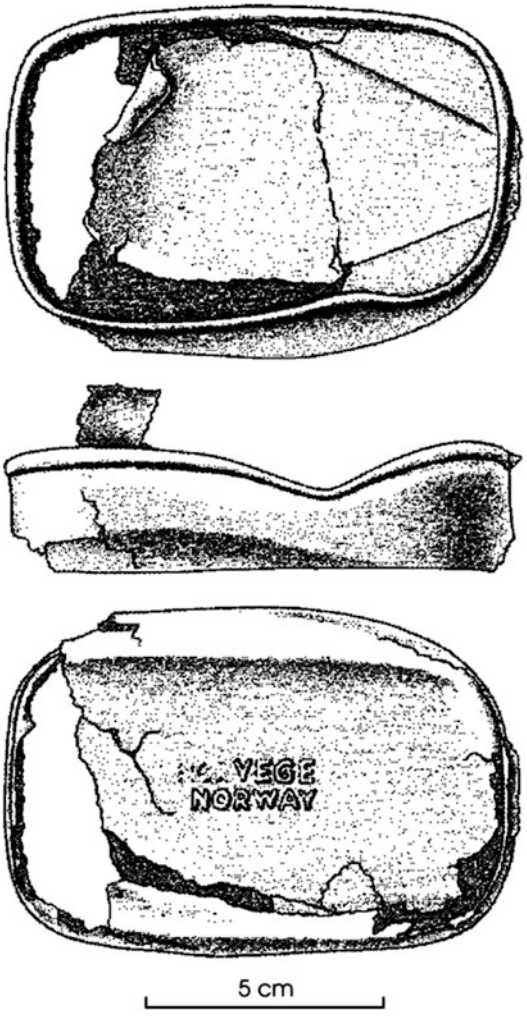
Key Issues/Current Debates

The term "supermodernity," then, captures well the essence of our present period of modern exaggeration. Another question is when to start such a period. Augé does not give clear indications, although it is implicitly understood that it covers the same time span that others identify with post-, high, late, or liquid modernity (Giddens 1991; Jameson 1991; Bauman 2000) and which begins around the end of the Second World War or later depending on the authors. This is the periodization that some researchers follow to define the archaeology of the contemporary as the study of the time that goes "after modernity" (Harrison & Schofield 2010). Although trying to parcel time may seem to be a fruitless historicist exercise, I think that it can also be a way of reflecting on history and time differently. What we need is a periodization of modernity that fits the archaeological record. It is necessary to privilege in our periodizations not the phenomena identified by sociologists, culture historians, or philosophers but the processes of creation and destruction of matter that archaeology has traditionally employed to make sense of time and change. We have to follow the time(s) of things (Olivier 2008: 247-252).

From this point of view, a moment that seems best suited to start supermodernity is the early twentieth century. It has been pointed out that the transition between the late nineteenth and the early twentieth century inaugurates a period in which globalization reaches its first apex and becomes truly global. Globalization is not just the circulation of people, images, or ideas, it is also (perhaps primarily) the circulation of material objects. This was made possible by technologies of transport and communication that abolished distance in the service of an ever-expanding global capitalism (Harvey 1990). The materiality of the world became more and more integrated – more and more similar – and the mass production of objects played an outstanding role in this process. More importantly, and perhaps not sufficiently appraised, the period that begins in 1914 is marked by mass destruction of human lives, societies, things, and the environment at an unprecedented scale in the history of humankind. Interestingly, although the relationship between globalization, production, and consumption has often been emphasized, the globalization of death has been less discussed. Thus, historians agree that the 1914–1945 period witnessed the collapse of the first globalization (Obstfeld & Taylor 2003: 125-126) as opposed to the late nineteenth century, but this is only the case if we pay attention to the movement of free citizens, capital, and consumer goods. If we look at the circulation of soldiers, refugees, war machinery, and destruction, 1914–1945 is actually a period of astonishing global integration (Fig. 1). High explosive has probably contributed as much to globalization as Coca-Cola, if not more.

In fact, should supermodernity end tomorrow, it would be perfectly identifiable from an archaeological point of view, thanks to global destructive processes. The things that demand the attention of intellectual gurus, social commentators, and their many followers seem somewhat banal compared to other issues that are leaving an indelible archaeological imprint in the world. In the long run, postmodern architecture would seem just like an anecdote (like the difference between Baroque and Rococo), and without new media, the pace of global integration and social change would perhaps be a little bit slower, but it would happen nonetheless. It is on the destructive operations of supermodernity that archaeology can provide a distinct and necessary critical perspective. After all, the transformations that archaeology documents more easily are changes in material organizations with high irreversibility (Lucas 2008), and these are also the ones that have further-reaching consequences historically: consider the collapse of the communist regimes, the Second World War, or the end of peasant societies, all of which have left a wake of razed landscapes behind.

If instead of looking at destruction, we focus on creation, the situation is not different.



Supermodernity and Archaeology, Fig. 1 Another kind of globalization: a tin can from Norway consumed by Eritrean soldiers at the service of fascist Italy in the frontier between Sudan and Ethiopia

The supermodern landscapes of creation (Penrose 2007) are also landscapes of oblivion and devastation. Urbicide is not only inflicted during wars (Coward 2008), it can also take the shape of urban renewal (Mullins 2006). In fact, destruction and construction should not be opposed; they are inextricably linked. This is obvious in slash-and-burn agriculture: the forest is felled, burnt down, and cultivated, but later the fields are fallowed and the trees revive with further strength. Similarly, the Neolithic houses of Anatolia and the Balkans were regularly destroyed only to be rebuilt again, energized by the seeds of the ancestors. The Neolithic probably marks the beginning of the strong interdependence between construction and destruction and death and the regeneration of life (Stevanovic 1997; Kuijt 2008). In this context, the destruction of houses would be "a matter of continuity rather than ending" (Hodder 2010: 150). It is not strange that this rationality emerged with the appearance of cultivation, which is also based on cycles of life and death.

Yet with modernity, this logic is no longer sustainable: unlike in Neolithic and other non-modern societies (e.g., Küchler 2002), destruction is no longer a form of continuity, regeneration, and remembrance but of rupture and forgetting. Destruction is neither a form of creating and maintaining relations but of cutting them off: death has become an end in itself. In non-modern societies, even war and predation are ways of extending relations (Harrison 1993, Fausto 1999). The change in the nature of destruction in supermodernity is no better exemplified than in the mass production of nuclear weapons that can wipe out the entire humanity: death for death's sake. Robert Oppenheimer's words epitomize the sense of a new age of total destruction: "Now, I am become Death, the destroyer of worlds." Oppenheimer's famous misquotation is meaningful: the original cite from the Bhagavad Gita is "I am become Time, the destroyer of worlds." But time can no longer destroy things with its slow rhythm as it used to. Augé (2003: 110) says that "only a catastrophe can produce today comparable effects to the slow action of time," only Hiroshima or Katrina.

Spatial Excess

One of the points that makes Marc Augé's definition appealing for archaeologists is his concern with places. According to Augé (2002), the time of supermodernity is marked by a shift from places to non-places: "If place can be defined as relational, historical and concerned with identity, a space that cannot be defined as relational, historical or concerned with identity can be defined as a non-place" (Augé 2002: 83). Non-places do not foster symbolic relationships or a shared

heritage. Their purpose is only to facilitate circulation and consumption in a global world (Augé 2003: 101). Non-places have all the appearance of a dejà vu, which is not innocent: their mission is precisely to neutralize the sense of alienation in a foreign environment (Harrison & Schofield 2010: 256). They eliminate the place-ness of places. Airports, highways, malls, and hotels are typical non-places. Elsewhere, Augé (2003: 71) distinguishes between two categories: non-places of refuge and non-places of image (simulacra). The non-places of refuge are related to emigration and escape. We could include here detention centers for immigrants, customs posts, and refugee camps. The non-places of image are best exemplified in theme parks and tourist resorts – all virtually identical from one corner of the globe to the other.

The idea that the supermodern world is filled with simulacra is shared by other thinkers. It was another French scholar, Jean Baudrillard (1994), who employed the term *simulacrum* to define something which is not a copy of the Real but that actually exceeds reality and creates its own truth. This hyperreality of the supermodern Augé finds it not just in new constructions but also in the restoration of heritage, which creates a sort of historical hyperreality. What is interesting is what the anthropologist opposes to heritage sites: ruins. "The contemplation of ruins," writes Augé (2003: 7), "allows us to catch a fleeting glimpse of the existence of a time that is not the one about which history books speak or the one that restoration works try to resuscitate. It is a pure time, to which no date can be assigned."

Although the existence of non-places has been questioned (Bender 2001: 78), it can still be argued that there are certainly spaces in supermodernity that if not totally devoid of identity, relationality, or historicality are at least hostile to the idea of memory and belonging. Archaeologists have started to study non-places in a way that is akin to de Certeau's (1984) approach to everyday tactics of resistance. Against the idea of monolithic non-places, researchers reveal the practices through which non-places can be appropriated and resisted. "The alienating qualities of these places are fragile: they can be challenged," argue Hicks and Hicks (2006). Without negating the dismal aspects of non-places, in this case a retail center in Wales, Graves-Brown (2007) also points out ways in which the physical barriers that enclose the "concrete islands" that are malls are circumvented in practice. Harrison and Schofield (2010: 256-257), in turn, suggest that archaeology itself can become a critical practice: if non-places are presented as neutral and ahistorical, archaeology has to reveal "the specific histories of these places and the ways in which they are concealed from the public. The peeling carpet, the layers of paint, and the traces of previous styles of airport furniture all carry a sense of the specific history of the airport departure lounge, signaling to the passenger that he or she is in 'this' place rather than some other." A similar approach is that of geographer Tim Edensor (2005), whose work has focused on another kind of non-places: abandoned industrial spaces. Although they are commonly perceived as a black hole in the urban fabric, Edensor shows that they are also arenas for creative engagements with materiality, where the regimented space of the supermodern city is actively subverted. The heterodox uses to which these ruins are put are a hint of another possible city and alternative urban experiences. While this is a valuable approach that can reveal an unexpected side to supermodern spatiality, we can wonder: do we not run the risk of overlooking the power structures that support the existence of non-places by trying to find small cracks in the system? How destabilizing to supermodern power actually are the paths open in the gardens of a shopping center, a peeling carpet, or the teenagers smashing windows in a derelict factory?

Non-places are just a variable of supermodern geographies. Other kinds of spaces exist. Bauman (2000: 98-104), following different authors, proposes a typology of mostly dystopic places, which he labels *emic*, *phagic*, and *empty* (in addition to non-places). Emic places create spatial separations (prisons, ghettos), whereas phagic spaces digest people and suspend otherness – consumer spaces fit in this category. Empty places are those that lack meaning, "leftover places." I have suggested a category of place

Supermodernity and Archaeology, Fig. 2 An abandoned radar-guided antiaircraft weapon system (ZSU-23) in the rainforests of southwestern Ethiopia

that tries to make sense of the politics involved in the spatial excesses of supermodernity: places of abjection. Like empty places, they are also a leftover and a memory gap. However, it is important to emphasize that places of abjection are characterized by an excess of wasted materiality: battlefields, scenarios of massacres, industrial disasters, and shanty towns. When one walks around a war site of the last 100 years, one is struck by the enormity of material waste: concrete, cans, and shells litter vast expanses of empty, forgotten land (Fig. 2). A similar impression can be obtained in slums, whose messy material overabundance stands in stark contrast to the sanitized, empty spaces of privatopias (Penrose 2007: 34-35). Unlike other spaces of supermodernity, places of abjection are only produced by political processes of marginalization and exclusion of (subaltern) people, (abject) matter, and (dissonant) memories.

Time Excess

"The time is out of joint." Hamlet's words resound along Derrida's book, *Specters of Marx* (2006). "Time is disarticulated, dislocated, dislodged, time is run down, on the run and run down, deranged, both out of order and mad. Time is off its hinges, time is off course, beside itself, disadjusted" (Derrida 2006: 20). This is a more eloquent way of describing the state of time in supermodernity than the usual idea of accelerated time. Because it is not only that things go faster or that there is a factual excess, as Augé and others suggest. It is also, more precisely, that time is out of joint, which is also saying that time is both unjust and anachronic (Derrida 2006: 25). Derrida, then, links temporality and morality, both of which are put into crisis by supermodernity.

It is probably this feeling that has led archaeologists to focus on alternative, heterogeneous temporalities (Witmore 2007; Hamilakis 2011), which are also a matter of concern in other fields (De Landa 2000). Archaeologists working in the recent past have to be, more than any other practitioners, ready to appraise nonlinear time to make sense of a world where time is deranged. They have to revalue other temporalities, those of subaltern and non-modern communities, which still survive in the interstices of the supermodern world. They have to make visible these slower, bodily temporalities, as a way to challenge the disarticulated ephemerality of supermodern time. A good way of reclaiming other temporalities is showing its persistence in the present, the time of objects that anchor time, instead of disintegrating it: the time of immutable things, which has been forgotten. Think of a knife, an axe, or a stone wall. They do not call the attention of students of material culture, which are fascinated by cell phones and tablet computers. An archaeology of

Supermodernity and Archaeology, Fig. 3 Ephemeral consumption in the West, durable devastation in the rest: an illegal logging camp dismantled by the police in the Brazilian Amazon rainforest

supermodernity does not only study what is new and changing; it should also vindicate the subaltern artifact that resists the annihilation of time: the humble, elementary object (Olivier 2008: 288) (Fig. 3).

Because the time of supermodernity is not only disjointed and accelerated, it is also a time that continuously abolishes itself. For supermodern societies, there is no past or future: only the instant (Bauman 2000: 125). There is an excess of present. From the point of view of material culture, the relationship of this temporality with planned obsolescence and fashion has already been noticed. Archaeology can, of course, study the ephemeral temporality of supermodern technologies, but it can do something else. Archaeology can show the collateral damages of instantaneity: living the instant, with a total disregard for sustainability in the long term, requires an intensified predation on the environment, which leaves a far-from-ephemeral trail of devastation (cf. González-Ruibal & Hernando 2010). The ephemerality of material culture is certainly not new: it was already noticed at the beginning of the supermodern period, when skyscrapers in New York were torn down almost as fast as they were being built, over a 100 years ago (Yablon 2009: 244-246). The supermodern metropolis is hollowed out of a past; it inhabits an amnesic present. Connerton (2009: 88) talks about "the reign of a perpetual present." Here lies another possible contribution of archaeology: by excavating the foundations of post-mnemonic cities, the discipline can simultaneously show that other worlds are possible and that *there exists* a past. Such an assertion, under the prevailing memory regime, can become a truly political one, especially if this past destabilizes the cleansed histories of progress or romanticized heritage pastiches (Hall & Bombardella 2005).

Material Excess

Material excess is one of the defining characteristics of supermodernity. However, sociologists and theorists have tended to downplay the relevance of matter and have preferred to focus instead on the less tangible aspects of supermodernity, either from a critical or celebratory point of view: networks (Castells 1996), fluidity (Bauman 2000), speed (Virilio 2002), and the virtual more generally. Capital flow, fast consumption, new media, and intercontinental travel give the impression that we are leaving a dematerialized existence: Bauman (2000: 113-118) talks about the shift from a "heavy" to a "light modernity." But is supermodernity truly that light? I would contend that, on the contrary, society has never been heavier and that to consider it light is the result of a process of

purification, sensu Latour (1993), that black boxes the material foundations of supermodernity. I do not intend to rule out the metaphor of liquid modernity altogether, which I think is apt and insightful. The problem is that the metaphor can lead us to forget both the true weight of our present time and that this weight is not equally distributed. There are some regions of the world (those who suffer war or capitalist depredation) where supermodernity is heavier than in others.

The problem is that media gurus and journalists always tend to emphasize processes of virtualization. A good case in point is war, which is usually presented as a high-tech video game. Yet the combat gear of supermodern soldiers is bulkier than ever: only their body armor can weigh up to 15 k (Tyson 2009). And it does not matter how light a Predator drone is and that it is operated remotely; its effects are still strongly material and situated: rubble and splintered bones in a Pakistani or Yemeni village. Archaeology can be a counterbalance to the generalized perception of the world as plastic (Olsen 2003; González-Ruibal 2008: 252-254). An emphasis on fluidity and movement, in fact, may lead us to forget all the material strategies of fixation and circumscription deployed by supermodern powers: movement is always controlled. Those who move and the things that circulate have to be allowed to do so. It is a historical paradox that moments of high globalization come hand in hand with walls and fences: Hadrian's Wall, the Great Chinese Wall, the US-Mexico border fence, and the Israeli West Bank barrier.

Archaeologists have not been the only ones to have paid attention to materiality. Art has shown a fascination with material excess for the last three decades at least. Godfrey Reggio's *Koyaanisqatsi* (1982) is a powerful audiovisual account of supermodernity, in which the mass production and mass destruction of materiality are repeatedly overlapped. A similar aesthetics is deployed by Andreas Gursky (2008) in his monumental photographs of cities, buildings, and crowded spaces and Burtynsky's (2009) equally vast depictions of supermodern landscapes altered to the extreme by heavy industry. These and similar works convey the impression of a deeply material world gone excessive, of superhuman scale and irreparable ecological damage and loss – things for which words alone cannot suffice: "a world beyond words" is the tagline of another visual experiment along this line (Fricke 1992). However, it is important to bear in mind that the art of supermodern destruction is an art of the sublime, with the ethical problems that this entails.

Burke (1834: 32) famously defined the sublime as "Whatever is fitted in any sort to excite the ideas of pain and danger, that is to say, whatever is in any sort terrible, or is conversant about terrible objects, or operates in a manner analogous to terror." Terror, in turn, is associated to power: power is sublime because it can inflict pain and terror and only when power is deprived of this ability, "you spoil it of everything sublime and it immediately becomes contemptible" (Burke 1834: 40). Yet the sublime is not only linked to terror and power but also to pleasure and beauty: "When danger or pain press to nearly, they are incapable of giving any delight, and are simply terrible; but at certain distances, and with certain modifications, they may be, and they are, delightful" (Burke 1834: 33). This is what the art of supermodernity achieves: it creates a distance with terror and pain that renders the destruction of the world produced by supermodern power aesthetically pleasurable and in the last instance, safe and consumable. This can be noticed in Dan Dubowitz and architect Patrick Duerden's exhibition: *Fascismo Abbandonato*. They have been documenting abandoned buildings of the fascist period in northern Italy, particularly youth camps. Theirs is an evocative vision of a failed modernist dream. As it happens with other similar undertakings, the exhibition is aesthetically powerful – but perhaps too much. There is an unabashed aestheticization of the subject. Thus, Duerden and Dubowitz describe the ruins as "huge and sublime" (http://www.fermynwoods.co.uk/archive/water-tower/dan-dubowitz-patrick-duerden/) – a description that would have pleased Mussolini. Herein lays the difference between the

Supermodernity and Archaeology,
Fig. 4 Victims of fascist violence during the Spanish Civil War. Exhumation by Juan Montero (2009)

work of art and the work of archaeology. Although aesthetics are not absent – and do not have to be – in the archaeology of supermodernity (see Andreassen et al. 2010) as well as in critical artistic practice (Blocker 2009), in the balance between terror and beauty, it is terror and power that should prevail: disgust rather than pleasure. Consider two examples of supermodern excess: garbage and violence.

In William Rathje's research on garbage, there is little room left for beauty (of the conventional kind, at least): what we have are mountains of highly polluting rubbish or daily garbage fresh from the bin (Rathje & Murphy 1992). Likewise, the exhumations of victims of political violence disclose piles of bodies, an excess of shattered human matter, which has become a fossil guide for supermodernity (Montero 2009) (Fig. 4). However, archaeology does not only excel at revealing the abject: it also creates stories out of things – all things, no matter how humble or abject. With Gursky's photographs, we are left in awe, but this is a sublime awe similar to that produced by the manicured space of a military cemetery (Augé 2003: 103). Instead, by carefully dissecting ruins, locating artifacts, studying the relation of small objects and structures, and exploring the sites' afterlife, archaeologists can come up not just with a potent imagery but also with detailed narratives. It is powerful stories that we obtain out of garbage from a landfill, a mass grave, or the place of a disaster (Gould 2007). It is also this production of narratives that allows archaeology to construct a critical discourse on supermodernity, not just to stare at it in astonishment and powerlessness. Archaeology, thus, combines a concern for the manifestation of materiality, akin to art, and a commitment to analyzing reality, which relates it to other social sciences.

Future Directions

Supermodernity has been defined here as a period within modernity characterized by excess. I have defended that archaeology can make a contribution to understanding supermodernity by looking into the excesses of time, space, and, particularly, materiality. While the overabundance of the spatial and the factual has often come under scrutiny, material excess

has repeatedly escaped the gaze of theorists and it has mostly fallen to artists the task of manifesting it. Archaeologists, however, are in a good position to join artists in the examination of supermodern materialities. The study of late modernity has been too focused on the ethereal realms of hyperreality and virtuality: the complex semiotics of simulacra and networks have captured all the attention of scholars and philosophers. As opposed to this, I would argue that the mission of archaeology is to address the Real, sensu Slavoj Žižek: the Real is what resists symbolization, "the traumatic point which is always missed but none the less always returns, although we try – through a set of different strategies – to neutralize it, to integrate it into the symbolic order" (Žižek 1989: 69). Culture students abhor the Real precisely because it escapes hermeneutic efforts, but archaeologists are continuously facing the unconstituted, which is "not simply the unsaid, but the unsayable – it lies outside the said, outside discourse" (Buchli & Lucas 2001: 12). Referring to the Titanic, which has been transformed into a sublime object, Žižek (71) argues that "all the effort to articulate the metaphorical meaning of the Titanic is nothing but an attempt to domesticate the Thing by reducing it to its symbolic status, by providing it with a meaning." What archaeologists have to do is to expose the excess of supermodernity beyond symbolization: the raw, traumatic Thing at the core of the Real.

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Chronopolitics and Archaeology
- ▶ Contemporary and Historical Archaeology in Theory (CHAT)
- ▶ Industrial Archaeology
- ▶ Modern Material Culture Studies
- ▶ Modern Ruins: Remembrance, Resistance, and Ruin Value
- ▶ Non-places in Archaeology
- ▶ Rathje, William Laurens
- ▶ Urban Heritage

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Surface Survey: Method and Strategies

Simon Holdaway
The University of Auckland,
Auckland, New Zealand

Introduction

Archaeological excavation takes time, and while it provides a great deal of information about the nature of past activities, it provides only indirect information on how these activities were distributed across space. Surface materials, on the other hand, are quicker to record not because the recording is any less detailed but because the

material to be recorded is immediately visible. For a given set of resources, many more surface locations can be recorded and their contents analyzed. As a consequence, archaeologists working in many countries have conducted surface surveys over large areas. In doing so, they have taken advantage of advances in survey technologies like *Global Positioning Systems* (GPS) and total stations together with software like *Geographic Information Systems* (GIS) and relational databases to greatly enhance their ability to record the spatial distribution of artifacts and sites.

Definition

In both the Americas and Europe, modern survey emerged from the 1970s as a means of investigating settlement patterns, past population densities, and socioeconomic complexity (Whitmore 2007; Kowalewski 2008). Cherry (2003), for instance, combined probabilistic designs with systematic, pedestrian survey on Melos involving people separated by regular intervals, walking across the land surface, recording exposed artifacts. Transect lines, 1,000 m wide and orientated north–south, were staggered across the island. Chronology was obtained from the typology of artifacts, established through earlier excavations, and the probable function of the artifacts was assessed in the field to provide an indication of the functional status of the sites identified. This basic scheme characterized later projects although the intensity of survey (as measured by the spacing between field walkers) and the tendency to survey continuous blocks rather than transects changed as did the concern for processes that might have altered or obscured the surface archaeological record.

Changes in the intensity of field survey are correlated with the numbers of sites recorded. However, increasing survey intensity comes at a cost, since the more time spent surveying in one area, the smaller the region that can be covered. Critics suggested that some intensive surveys were too small in extent to reveal useful socioeconomic interpretations (e.g., Kowalewski 2008). One solution to this problem was to combine the results from a number of independent surveys, thereby permitting the analysis of results from large areas; however, as Alcock and Cherry (2004) indicated, there are difficulties involved in combining the results from multiple survey projects where data recording standards are not equivalent. Making inferences based on the number of sites, for instance, depends on site areas being calculated in the same way between projects, with obvious biases introduced if common standards are not adopted**.** Similar issues occur within individual survey projects. Different processes effect *survivorship* of the archaeological record and hence its visibility, both at the scale of the archaeological site and at that of the individual artifact (Terrenato 2004). Pottery, for instance, degrades with age, depending to some extent on the way it was made. Therefore, ancient sites may be less visible than more recent sites. The complexity of the natural processes involved in any one region means that their impact needs to be considered on a case-by-case basis. Equally important, some activities in the past led to the deposition of many artifacts, while others produced many fewer objects.

Key Issues/Current Debates/Future Directions/Examples

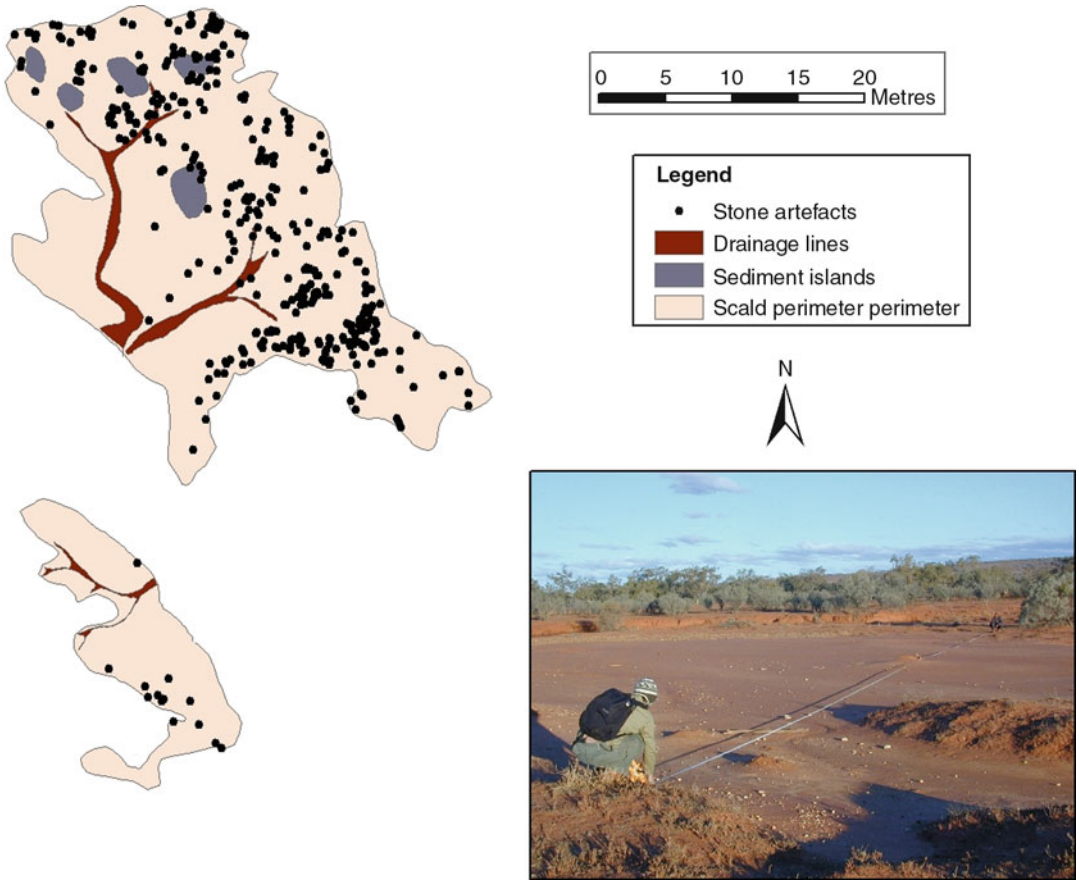
Survey work in arid regions of Australia shares many of the issues raised in the Mediterranean. Surface scatters of stone artifacts as well as the remains of hearths with stone heat retainers dominate the surface record of western New South Wales (NSW). Sites are difficult to define since the boundaries of individual scatters are diffuse. The surface carpet of artifacts in western NSW might be thought of as a single archaeological site of variable density stretching over nearly a million square kilometers. Making useful distinctions across this artifact carpet requires that not only artifact density but also artifact assemblage composition be assessed at numerous locations within a landscape. To do this, self-tracking (robotic) electronic total stations together with GPS are used to locate artifacts individually using a nail as a marker (Fig. 1). They are

numbered individually and surveyed with the total station. Artifacts are picked up and attributes recorded before returning them to the ground (a requirement of the Aboriginal Traditional Owners) (Fig. 2). The total station is also used to map the extent of artifact exposure and any features that obscure surface exposure (e.g., sediment islands, Fig. 3). A distributed system based on a relational database design means that multiple instruments and teams can all work at once, and as a consequence, recording is very quick (overcoming to some degree the intensity versus extent criticisms noted above).

Surface Survey: Method and Strategies, Fig. 1 Self-tracking total stations allow the rapid location of artifacts in three dimensions. *Colored nails* are used to mark stone artifacts

Software allows all sets of information to be integrated together based on a relational database design. The total station writes data files in GIS formats, and the GIS software permits the spatial integration of attribute data. Observations on the geomorphic context of the artifacts are also combined in the GIS. Because each object is recorded with an x, y, and z coordinate, its spatial position can be analyzed in relation to other objects to control for a variety of postdepositional processes (Fanning et al. 2008). Data quality is controlled through "intelligent" data entry software that reduces the chance of human error (McPherron & Holdaway 1996) and through the quantitative analysis of observer bias. An understanding of the relationship between past human activity and the nature of artifact deposition is critical which also involves experimental assessment of the attributes recorded on surface artifacts (Douglass et al. 2008).

Surface Survey: Method and Strategies, Fig. 2 Stone artifacts are marked with nails, numbered with preprinted numbers, and analyzed in the field using portable computers (*inset*)



Surface Survey: Method and Strategies, Fig. 3 GIS plot of the location of stone artifacts (*black dots*) in eroded areas (termed scalds, *inset*) that are used as spatial sampling units for landscape scale surface survey. The GIS shows the location of artifacts in relation to the size of the eroded area and the presence of sediment islands that obscure visibility

Key Issues

Despite the desire to understand "big picture" distributions of archaeological sites by undertaking extensive, low-intensity surveys, understanding why archaeological materials are visible at certain points in the landscape requires that the range of processes that leads to this visibility, both cultural and natural, be understood. The cultural resource of arid regions of Australia, like that in other comparable regions of the world, is dominated by stone artifacts. Because vegetation is sparse, surface visibility is often high and full-coverage regional surveys are possible. Stone artifacts are abundant, as are the remains of heat-retainer hearths with smaller numbers of earth mounds and burials in some regions. Recording artifact scatters by *ground surface survey* is thus a common response.

But the remoteness of parts of Australia, coupled with the abundance of artifacts record in some localities, means that the large-scale regional surveys, like those in the Valley of Mexico (Charlton & Nichols 2005) or in the Mediterranean (Cherry 2003), have only been undertaken infrequently. Australia lacks pottery that, when seriated, might provide the means to develop a chronology applicable to an extensive surface archaeological record. In addition, stone artifacts, while abundant, have not proved amenable to the detailed time-space descriptions used to date sites in other regions of the world. Alternative approaches to survey are therefore needed.

While arid regions may give the appearance of an unchanging landscape, the opposite is often the case. In much of Australia, geomorphic dynamics are such that a land surface results from a set of individual erosion and deposition events operating at different temporal and spatial scales. Averaged over tens to hundreds (and maybe thousands) of years, different parts of the landscape will exhibit accumulation of sediment (i.e., dominantly depositional), removal of sediment (i.e., dominantly erosional), or no change (i.e., residual). Maximum exposure of the archaeological record is found in those parts of the landscape that are dominantly erosional, while least exposure is found where deposition of sediments is dominant. Too much erosion, however, will remove the deposits on which artifacts rest effectively, removing any trace of the archaeological record.

Sediment chronologies, developed by obtaining age estimates from valley-fill deposits or the ages of remnant flood deposits, indicate periods of erosion interspersed with depositional periods. Regional discontinuity in deposition is the norm, leading to a patchwork distribution of land surfaces differing markedly in age and therefore accumulating archaeological deposits of different ages (Fanning et al. 2009). Truly ancient and more recent artifact deposits may be separated by distances of only a few hundred meters. Following conventional site survey techniques, it is tempting to interpret artifact concentrations directly in behavioral terms, as though their content reflects the operation of a single settlement system even though different locations reflect accumulation over substantially different periods of time. Using a geomorphically based approach to survey overcomes this problem.

An appropriate survey strategy therefore requires intensive chronological, geomorphological, and archaeological studies at predetermined localities (Holdaway & Fanning 2008). The formation of the archaeological record is a sedimentary process (Stein 1987), and a geomorphological approach to understanding the history of landscape use is employed as part of the survey design. Particular attention is paid to recording data sets with reference to the time scales over which the archaeological record has accumulated.

This approach to fieldwork has influenced the interpretation of early Australian communities. Archaeologists in the 1980s saw communities as changing in the mid-Holocene from highly mobile groups existing at relatively low population densities to groups practicing extended occupation with increased social complexity (Lourandos 1985). Data to support this "intensification theory" included documenting increases in the number of archaeological sites dating to the mid- to late Holocene. However, critics noted that site preservation might also account for the perceived increase in site numbers (Dodson et al. 1992). For example, at the Rutherford Creek catchment in western New South Wales, it was shown that the number of dated heat-retainer hearths relates to the ages of the surfaces on which they rest. Summing the radiocarbon determinations from the hearths produces a pattern similar to that used to support an increase in site numbers (and by implication population size); yet this pattern was the result of differential erosion and site preservation rather than human behavior (Holdaway et al. 2008). As this example illustrates, it is essential to understand the geomorphological history of the deposits before a behavioral interpretation can be made directly from survey data.

Cross-References

- ▶ Field Method in Archaeology: Overview
- ▶ France: Field Method Origins
- ▶ Nondestructive Subsurface Mapping in Field Archaeology

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Survey Archaeology in the Greek Aegean World

John Bintliff
Department of Classical and Mediterranean Archaeology, Leiden University, Leiden, The Netherlands

Introduction and Definition

The development and current nature of Greek field survey can be divided into chronological stages and a number of contemporary methodological and theoretical issues. We define field survey as the systematic study of the surface remains of past human activity across the landscape, mainly potsherds and lithics but including building remains and field systems.

Historical Background

The First Era, from the Seventeenth to Mid-nineteenth Centuries

This is the age of the "travelers" and their "topographic tours" in search of visible remains of sites known from their reading of the Greco-Roman literary sources. These detailed travelogues (e.g., Wheler & Spon 1682; Leake 1830; Ross 1851) are still useful in the field as they testify to ruins since demolished and ancient sites that frequently are found to have been first occupied in prehistoric times.

The Second Era, Late Nineteenth Century Till the Late 1950s

With the late nineteenth-century and early twentieth-century recognition of the prehistoric pottery sequences of Greece, the customary "topographic fieldtrip" could now add a prehistoric depth to regional pioneer research and even at times be primarily interested in ascertaining the whereabouts of prehistoric settlements and cemeteries. Regional team research such as that at the British School in

Athens, in Laconia (cf. *Annual of the British School at Athens* vols. 12–13 (1906–1907) 15–16 (1909–1910), and 24, 26, 28 (1921, 1925, 1927)), and even more clearly on the island of Melos (cf. *Annual of the British School at Athens* vols. 2–5 (1896–1899), *Journal of Hellenic Studies* 17–18 (1897–1898)), in its keen interest in every period of the past, in the geography and sociology of each area, shows that catholic intellectual sweep which was characteristic of a vanishing Victorian scholarship. On the other hand, these were still unsystematic surveys concentrating on known historic locations or "likely" prehistoric locations, combined with rather random travels punctuated by "spot checks" for sites. Also striking was the work of Tsountas (1908), Wace and Thompson (1912), and Heurtley (1939) in Central and Northern Greece, identifying and refining the pottery from the abundant and easily recognizable settlement mound or prehistoric "tells" that carpet the large plains of Thessaly, Macedonia, and Thrace. On Crete, the distinctive Minoan Bronze Age fabrics and an indefatigable energy in the field allowed Pendlebury (1939/1971) by the opening of World War II to compile and analyze a remarkable density of sites over many subdivisions from Neolithic to Iron Age. On Crete, after important German, Italian, and French contributions to this tradition (e.g., by Fritz Schachermeyr), the final flowering came as late as the 1960s with the extensive fieldtrips of Hood, Warren, Cadogan, and Faure into parts of this large island where prehistoric sites were little known or poorly recorded (cf. *Annual of the British School at Athens* vols. 50–63 (1964–1967), and *Bulletin de Correspondance Hellénique* 84 (1960), 86–87 (1962–1963), 89, 91, 93 (1965, 1967, 1969)).

Some of those undertaking field survey began with the German tradition of historical geography. With the outstanding example of Philippson (1892, 1950–1959) before them, his students analyzed both the geography of settlement and distribution at particular time periods and the factors underlying the striking changes in settlement location observable over millennia in circumscribed landscapes. Particularly noteworthy are the studies by Lehmann of the Plain of Argos (1937) and of Eastern Crete (1939). In the latter example, overall trends for the region were analyzed via a cumulative series of micro-regional natural settlement chambers (Siedlungskammern), in which it was shown that the key resource zones remained the same against a shifting microlocation of settlements. Regrettably this was the endpoint of a nineteenth-century tradition in continental scholarship, and although a limited amount of similar work continued after the Second World War on classical Greek settlement patterns, notably by Kirsten (1956), there is little of note on prehistoric human geography till the 1970s.

The Third Era, the 1960s to the Early 1970s

By the 1960s we have entered an era of far more detailed regional site survey. A well-defined area is crisscrossed extensively on foot at wide intervals or with a vehicle, and all "likely" locations are investigated together with every previously recorded findspot. The date range and period-by-period extent of prehistoric surface sites are estimated, and settlement distributions and site plans published. One figure stands out for this era in the vast amount of ground he covered, sites he discovered, and the meticulous presentation of survey results, Richard Hope-Simpson. In addition to site prospection in Laconia (cf. *Annual of the British School at Athens* vols. 55–56 (1960–1961)) and the Dodecanese (cf. *Annual of the British School at Athens* vols. 57, 65, 68 (1962, 1970, 1973)), he spearheaded the massive, 10-year survey of the province of Messenia which was part of a now classic interdisciplinary investigation into the Late Bronze Age kingdom of Pylos under the direction of William A. McDonald. The Messenia volume (McDonald & Rapp 1972) used the results of some 10 years' extensive survey of this big province (3,800 km^2) to analyze the settlement, economy, and political organization of a Mycenaean (Late Bronze Age) state. Secondary attention was given to the

pre-Mycenaean and historic periods in the same region, while the geographical component was broad-sweep rather than detailed. Created along the lines of major regional projects in Mesopotamia and Mesoamerica, "UMME" demonstrated a whole new battery of research techniques and specialist support. It has changed the nature of Aegean archaeology and set the pattern for all subsequent regional projects. However, in terms of field survey methodology, the Messenia approach went little beyond the extensive tradition typical of this era. The overall achievements of the Hope-Simpson climax phase of extensive survey were summarized in his *A Gazetteer and Atlas of Mycenaean Sites in Greece*, which appeared in 1965 and which was updated with the assistance of Oliver Dickinson in the form of *A Gazetteer of Aegean Civilization in the Bronze Age* (Crete excluded) in 1979 (Hope-Simpson & Dickinson 1979).

The last-named volume has remained central to all discussions of later Greek prehistory. Its intentional limitation to the Mycenaean mainland and islands was compensated for by using Pendlebury's prewar (1939) compendium of Minoan Bronze Age sites on Crete and David French's impressive extensive surveys of Neolithic and Bronze Age sites in Central and Northwest Greece (French 1967, 1972).

Colin Renfrew, for example, in his magnificent 1972 groundbreaking and seminal book *The Emergence of Civilisation in the Bronze Age Aegean*, relied heavily on these sources. He compared regional growth curves in known sites from Neolithic to Late Bronze Age times, based on the extensive survey data. Two modes were identified, a straight line demographic growth (Crete and Messenia) (A) and a mode with two growth phases punctuated by a standstill or decline in the Middle Bronze Age (the norm elsewhere) (B).

During the early 1970s, my own research into the relationship between environment and human settlement in later Greek prehistory based itself in part on the extensive survey data of Hope-Simpson and his predecessors. I also consciously sought to revive the almost defunct historical geography approach of the Philippson School, combining this with the new approach of catchment analysis and other borrowings from locational theory in geography. I took a series of regional landscapes in Mainland Greece, Crete, and the Cyclades (Bintliff 1977), compiled geology, geomorphology, and soil and land-use potential maps for each region, and then studied every recorded prehistoric site in its physical landscape and in relation to its neighbors, employing in the field a detailed catchment approach on a site-by-site basis. Well over 200 sites and their context were thus analyzed, providing a useful database for defining preferences in terms of soils and suggesting the patterns of settlement hierarchy in relation to resources and to territorial space.

The Fourth Era, Early 1970s to the Early 1980s

But already during my years in the field as a research student, a new survey phase had been inaugurated in Greece, one which I was lucky enough to be involved with through my participation in the "new wave" begun by Jameson's survey of the Southwest Argolid (1994) and Blackman and Branigan's survey of the Agiopharango Valley in Crete (Blackman & Branigan 1978). The crucial novelty was the method: intensive, field-by-field survey without preconceptions about favorable site locations. The results were predictable: an unparalleled density of sites of all periods and a proliferation of smaller and less conspicuous sites than were normally encountered in extensive survey.

In the Agiopharango the correlation of Minoan Bronze Age sites with potential cultivable land led me (Bintliff, in Blackman & Branigan 1978; Bintliff 1977) to hypothesize a social module of several related families sharing the use of a single communal stone tomb (tholos), this monument being placed so as to mark the group's lands and often being associated with dispersed settlement units. An analysis of the number of bodies claimed for tombs of this kind elsewhere, applied to the average number of tholoi in use in the Agiopharango, suggested both the number of families per tomb and in total compared favorably with estimates of the potential carrying

capacity of the valley soils. In addition, the data and location of rural shrines were incorporated in a broader theory concerning the mechanisms behind the rise of Minoan palace society, in particular postulating a rural-central place integration via expanding cult systems.

In the light of the vigorous debate in the United States over the selection of survey areas, their size and number, and indeed the whole business of sampling strategies in survey archaeology, it is not surprising to find considerable variability in the exact approach to these problems among the "new wave" of intensive Aegean surveys. The Argolid surveyed, combined with tackled the region of the Southwestern Argolid via a series of manageable blocks, totally surveyed, and combined with extensive prospection in the intervening areas. John Cherry's survey strategy for the Cycladic island of Melos involved a 20 % sample arranged in staggered transects across the island, intensively surveyed (1982). In contrast the Boeotia Survey (Bintliff & Snodgrass 1985; Bintliff 2000a) deliberately avoided small survey units and expanded outwards in all directions from a modern village, although subsequently smaller landscapes spread widely across the province were surveyed for comparative purposes. Following the Boeotia model was the "expanding core" of the Laconia Survey (Cavanagh et al. 1996, 2002). Further landmark surveys include that of Kea (Cherry et al. 1991), the Atene deme, Attica (Lohmann 1993), Berbati (Wells & Runnels 1996), Methana (Mee & Forbes 1997), Asea (Forsen & Forsen 2003), and the Mesara (Watrous et al. 2004).

The Fifth Era, from the Late 1980s

A characteristic innovation of this phase was the mapping of non-site surface pottery, the almost continuous scatter of ancient and prehistoric artifacts that lies between those peaks of surface debris traditionally defined as "sites." Since sites once discovered can vanish in subsequent seasons, while new sites can emerge in localities previously fieldwalked and pronounced to be "siteless," it is also clear that the distribution of recorded artifact concentrations (sites) in any particular season is only a partial sample of all surviving sites. To understand the surface sites as a phenomenon, it became clear that surveys should practice replicable non-site recording on all future Greek surveys, as well as revisiting of areas previously surveyed. It is also likely that land-use patterns might be illuminated through the analysis of non-site scatters, where they may include the debris of temporary shelters or areas of manuring (Bintliff & Snodgrass 1988b; Bintliff et al. 2007). This led to a widespread shift to taking the artifact as the focus of recording, whose distributional patterns led to an analysis of permanent or temporary activity foci as well as "taskscapes" where landscapes of work left visible surface traces. Generally surface finds were quantified using handheld counters, which are now being replaced by palmtop computers.

The way sites were studied has tended to fall into two models since this time. One is a structured sample, where strips, squares, or circles are laid out across the site for density counts and find collection. The other is to grid the entire site and study it as completely as possible. Unfortunately little experimentation exists to compare the two methods, although what has been done suggests that partial samples are less representative of the periods of use and the density trends across sites (Bintliff & Snodgrass 1985). It appears advisable therefore to follow total study.

An important new focus of this phase was the tackling of large nucleations, including ancient cities through surface survey (Bintliff & Snodgrass 1988a; Cherry et al. 1991). The city of Thespiae, which required some 100 ha of survey, took just 2 months to analyze through some 1,000 grid units, although the existence of over 25 periods of occupation and the inherent complexities of unraveling their copresence on the surface have delayed the final publication till today.

The Sixth Era, the 1990s to the Present

Three major trends typify this latest stage (Bintliff 2000b). Firstly the appearance of synthetic survey articles and monographs for

diverse regions of Greece has encouraged comparison of results (Alcock 1993; Bintliff 1997, Alcock & Cherry 2004). The aim was not only to identify methodological issues but to gain a wider understanding of particular eras of Greek prehistory or history.

Key Issues/Current Debates

Methodologies and Theoretical Issues

An urgent need to carry out a stricter *Quellenkritik* or source criticism of Aegean survey has been recognized. Although the enormous flow of results of previous decades provided new and unexpected data, their quality, limitations, and interpretation raise fundamental questions about methods and how we can create "history" out of them. A series of issues can be mentioned briefly:

(a) It has long been recognized, initially by J. Rutter (1983), that some periods of the past have less well-preserved and/or recognizable surface ceramics. Moreover, most Greek sites are multiperiod, so that earlier levels are less likely to be plentiful on the surface. For Mainland Greece, for example, much of the prehistoric record is a "hidden landscape" where small scatters of finds may be all that is left of richer settlements or even be undetected in intensive surveys (Bintliff et al. 1999). The Iron Age and Early Byzantine eras may suffer similar discrimination. Special methods must be applied to tackle such situations.

(b) The rise of off-site survey in the preceding era did not lead to a systematic publication and analysis of finds outside sites. A linked problem is the evidence that settlements themselves seem to consist of occupational cores and haloes of peripheral finds (rubbish dumps, smears of finds pushed out of sites by the weather and plowing, kitchen-gardens, etc.), so that estimates of site size and by implication human populations vary considerably on the basis of where to place an assumed "site edge." Analysis of the inter-site "taskscape" finds (remains of temporary activities in the open countryside) moreover became bogged down into an unresolved dispute on the existence of manuring scatters in the wider landscape (Alcock et al. 1994), often discouraging treatment of off-site densities at all. The present writer hopes that the exhaustive treatment of all these problems in *Testing the Hinterland* (Bintliff et al. 2007) has clarified the situation.

(c) An issue that is becoming central to the current active survey community is the conducting of experiments to examine the effects of varying methods of fieldwork and analysis. New projects tend to follow older ones rather arbitrarily without there being a firm basis of experimental data to judge the advantages and disadvantages of the chosen techniques. It is not clear how much material needs to be collected to form a representative assemblage of finds from a site, surprising since it should be clear that the number of periods found there and the size of the site naturally raise such issues. City surveys can be analyzed on the basis of anything from a couple of hundred to tens of thousands of sherds, depending on the decision of the project leaders. In preparation for the publication of the city of Thespiae survey, we recently calculated that some 300 sherds for *each period* of a large multiperiod site would be needed to ensure a realistic map of activity foci per phase. It is necessary to aim for the "cultural biography" of each site, however small, where intensive field study and analysis of finds should be complex enough to reveal the often very different ways each location has been used in the long term. Such an exercise reveals that most multiperiod surface sites undergo considerable changes in their size and function (cf. *Testing the Hinterland*).

(d) A more penetrating approach to survey is being immensely aided by the advent of new technical aids. Geographical information systems (GIS) speed up and make far

more accurate the laying out of fieldwalking units in the landscape and across sites, while handheld computers can record both study units and their contents in real time. Differential global positioning system (GPS) devices allow highly accurate location of both sites and surface objects in all three dimensions, while laser recording can provide relatively fast images of standing ruins or field sections (road or stream cuttings, ruined buildings, excavated deposits and building foundations). The study of the "phenomenology of landscape," whether that means practical matters of estimating how people moved around the landscape, or investigating more emotional issues of human perception of space, can be speedily estimated through GIS. Considered a surface technology but in reality a subsurface one, the increasing use of geophysical methods offers a nondestructive way of looking beneath the surface finds into the complexity of the underlying built environment. Results can be both spectacularly illuminating (where, for instance, the entire street and house-block plan of an ancient city is revealed; cf. Music et al.) and also a failure, highly dependent on geology, soil conditions, climate, and the type of built environment being examined.

(e) The relatively poor recovery of remote prehistoric sites even through intensive survey, by which we mean Paleolithic and Mesolithic hunter-gatherer sites, has encouraged specific adaptations to field techniques. Curtis Runnels has used predictive modeling to identify locations most favorable for hunter-gatherer activities, then focused research in such small districts, with remarkable success (e.g., Runnels et al. 2005). New field projects in presently marginal landscapes such as the high uplands of Greece have also discovered a far greater density of prehistoric sites where later burial, erosion, or human activities have not been active in concealing or destroying their traces (Efstratiou et al. 2006).

Expansion in Period Interest

The third major theme in the last generation of field survey has been a far greater investment in the landscape history of the post-Roman periods, the Medieval, and Post-Medieval eras of Greece. Increasing success in identifying typical ceramics of subperiods of 1–200 years' duration within these eras has allowed integration with historical sources. Moreover, there exist many thousands of deserted villages and installations such as waterworks, roads, and churches which offer documentation of the built environment in connection with often abundant surface artifact finds (Lock & Sanders 1996; Bintliff 2000c; Sigalos 2004; Davies & Davis 2007; Vionis 2008; Bintliff & Stoeger 2009; Bintliff 2012).

Future Directions

I suspect that the current source-critical phase, coupled with advances in digital data collection, recording, and analysis, will make much clearer how we can reach stronger conclusions on the nature and history of surface sites and the evidence of human activities in the surrounding taskscapes. This will offer historians greater confidence in combining survey results with their own textual reconstructions of dynamic landscapes and townscapes. It seems necessary to propose to future surveys that they cover large contiguous areas, quantify surface finds both off-and on-sites, collect large samples of both of the latter environments, and conduct experiments with different field techniques. Improvements in the resolution of ceramic study through moving from diagnostic wares dated by excavations elsewhere, to classification following a local fabric series, will allow local assemblages to be identified more appropriate to the district under study, as well as bringing to light contrasts between local production and imports.

Comparative studies of survey results should increase so that localized scenarios can be compared with the wider picture of a particular era of the past. A neglected theme here is long-term comparison: can we compare population and land-use levels at different phases of

occupation of the same landscape, and what are the implications of such an analysis (cf. Bintliff 2005 for Boeotia)?

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Survey Archaeology in the Roman World

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Survey Archaeology in the Roman World

Alessandro Launaro
Faculty of Classics, University of Cambridge, Cambridge, UK

Introduction

A considerable feature of Roman civilization was the creation and support of a dense network of urban settlements. In this respect the case of Italy is even more remarkable if one considers that – besides the presence of a megalopolis like Rome (with its one million inhabitants) – there existed about 430 urban centers scattered all over the peninsula. The thousands of cities and towns of the Roman Empire were connected and supplied by a much-celebrated and highly effective infrastructure made up of ports, roads, and aqueducts. More crucially, each urban polity possessed a well-defined territory (*ager*): it was (in part) laid out as a regular grid network of squared cadastral plots (*centuriatio*), and it was specifically meant to provide the inhabitants with most of the resources they needed (e.g., foodstuffs, raw materials). Preindustrial urban populations always required a comparatively higher rural counterpart to support them, and in this regard, the highly urbanized Roman world was no exception. That is precisely why a large number of farmsteads and villages populated the countryside and took active parts in the social and economic life of nearby towns (Lloyd 1991).

This balanced account, however reasonable it might sound, is actually a rather recent achievement. Whereas the archaeological remains of Roman towns, roads, and aqueducts have for long been – and in many places still are – a

prominent feature of the landscape, most traces of rural occupation have gradually faded away or disappeared altogether. Indeed, unlike more imposing stone- or brickwork buildings, most rural houses were simpler structures, often made from perishable materials (e.g., half-timbered wattlework known as *opus craticium*). If it were not for the occasional remains of monumental villas, one would be left to wonder whether the Roman countryside was settled at all. Textual evidence could not be expected to fill such a gap and, more in general, generations of scholars became persuaded that the "Graeco-Roman world was a world of cites" where the "agrarian population, always a majority, most often lived in communities of some kind, hamlets, villages, towns, not in isolated farm homesteads" (Finley 1977: 305).

This would be still the dominant view if it were not for a combination of largely unrelated events that took place following the end of the Second World War (see section "Historical Background"). For the very first time, those feeble archaeological traces of ancient rural settlements were *surveyed* and identified as such. A systematic approach gradually developed and survey archaeology has since provided incontrovertible evidence to the impressive scale of rural occupation and to the liveliness of the ancient Mediterranean landscape (hence it being often referred to as "landscape archaeology"). Given the strong bonds between human settlement and its environmental context, this discipline could have not but embraced a marked holistic attitude and therefore exhibited, since quite early on, a very strong interdisciplinary character. In this way survey archaeology has not just widened our understanding of the Roman world: it has profoundly transformed the way we look at it.

Definition

Survey archaeology is a (sub)discipline which is primarily concerned with the record, analysis, and interpretation of material remains pertaining to past human settlement patterns across the landscape. It relies on a body of techniques that include fieldwalking, aerial survey, and geophysical prospection. It also benefits from its close connection with the environmental sciences (e.g., geoarchaeology, archaeobotany) and further integrates the spatial analysis potential of modern geographic information systems (GIS). When engaged with Roman landscapes, it avails itself of the sheer amount of contextual information which is often available in the form of ancient documents (e.g., literary works, inscriptions, *itineraria*/road maps), later historical accounts (e.g., reporting features that were then visible but are no more), and modern place-names (e.g., often reminiscent of an ancient origin).

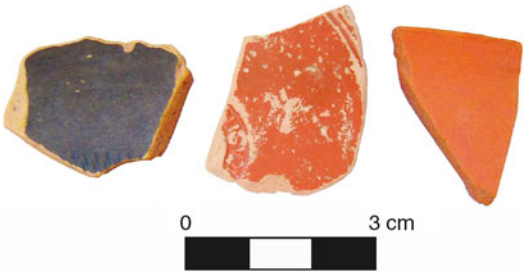
Fieldwalking (or field survey) is certainly the cornerstone of survey archaeology everywhere. It requires a group of surveyors to walk across a field in parallel lines set at a regular distance from each other and to look for archaeological materials laying on its surface (Fig. 1). It is based on the awareness that such materials are spread all over the landscape and that their density varies in relation to the intensity of past human occupation.

Although there are several depositional and postdepositional processes involved, this is a phenomenon which is primarily related to the spread of mechanized agriculture: by reaching deep soil layers (up to 1.5 m), modern plows have disturbed or truncated otherwise sealed archaeological contexts, turning them upside down and therefore making them visible on surface (Haselgrove 1985). This "plowsoil assemblage" (Fig. 2) does indeed provide a sample of what is buried below and when the density of material is especially notable – whether in absolute terms or relative to the surrounding context – they are taken to signal the presence of a site (i.e., a settlement proper). Of course, the visibility and potential for recovery of a site are hugely affected by the nature of the material culture originally associated with it and left over when it was abandoned (in terms of both quantity and quality). From this point of view, the Roman period is exceptionally well attested thanks to its everyday use of pottery and the widespread employment of bricks/tiles in buildings (once fired, clay becomes extremely resistant to decay).

Survey Archaeology in the Roman World, Fig. 1 Systematic fieldwalking in Central Italy

Survey Archaeology in the Roman World, Fig. 2 A dense plowsoil assemblage over a freshly plowed field in Central Italy

Roman finewares are an especially relevant case. Besides their relatively sturdy quality and vast distribution network, their shiny gloss colors (black, red, and orange) have made them extremely visible in the plowsoil and relatively easy to recognize as such (Fig. 3). Furthermore, because such features are specific to well-dated productions (Republican black gloss, early Imperial *terra sigillata*, and mid-/late Imperial African red slip), even heavily eroded sherds do present a significant dating potential. This chronological pattern is mirrored by specific types of amphorae and all these elements taken together help to explain why most surveys have adopted a Roman periodization that is broadly the same (Republican, early Imperial and mid/late Imperial) (Launaro 2011: 85-7).



Survey Archaeology in the Roman World, Fig. 3 Color comparison of potsherds of black gloss (*black*), terra sigillata (*red*), and African red slip (*orange*)

Aerial photography (vertical or oblique) has provided another hugely impressive contribution to our understanding of the Roman landscape. Indeed, more or less substantial buried features can turn out pretty neat from above if the right conditions are met (e.g., crop marks), even though general practice seems to favor some degree of verification in the form of aimed fieldwalking. Among the more recent remote sensing techniques (e.g., processing of satellite imagery), LIDAR (Light Detection and Ranging) is certainly adding a further level to aerial survey as it allows the identification of barely perceptible surface variations over extensive areas (e.g., structures or earthworks of various kinds, even obscured by the cover of deep vegetation). In general, traces of Roman field systems (as still preserved/marked by secondary roads, boundaries, and ditches) are especially recognizable, thanks to their regular grid pattern and consistent (Roman) measures. Remarkable work has been carried out which has combined aerial photographs, cartography, and the original prescriptions of the Roman land surveyors (*Corpus Agrimensorum Romanorum*) to identify large tracts of the landscape wherein centuriation is still preserved (e.g., Chouquer et al. 1987).

Geophysical survey is another approach which is now widely employed – and with outstanding results (e.g., Keay et al. 2000). A suite of available remote sensing techniques (e.g., georadar, magnetometry, resistivity testing) that aim to identify notable variations in the physical qualities of the (sub)soil. In this respect, structural remains will often stand in stark contrast to the context they are buried within and, once mapped, they are likely to provide a draft plan of the site. More specifically, magnetometry has proved a very favored choice across Roman archaeology as it allows a cost-effective prospection of extensive/complex sites and it is especially suited to detect brickwork (strong magnetic signature), from which many Roman buildings were built. It is often paired with on-site fieldwalking and test excavation.

Survey projects usually aim at reconstructing the long-term settlement history of a given landscape (Cherry 1983). As such they adopt a diachronic approach, cutting across several periods of human prehistory/history and thus requiring the collaboration of several experts from different fields. Study areas are usually defined as well-bounded and self-contained environmental regions (e.g., a river valley, an inland basin), the main objective being to recover, analyze, and interpret the way different human societies have engaged with a consistent landscape over time, thus highlighting long-term constants (similarities) and period-specific variables (differences). Although this diachronic approach is duly observed in terms of data collection and analysis, research design tends to make some periods more prominent as a result of the interests – and expertises – of the individual scholars involved. This is especially evident when the study area is instead defined according to period-specific political boundaries (e.g., the territory (*ager*) of a Roman town) or when survey is meant to provide a wider context to a prominent site (e.g., the neighborhood of a villa). A case apart is represented by those projects that are launched by local or national institutions in order to improve knowledge, preservation, and management of the cultural heritage within their own territorial jurisdiction (e.g., official archaeological maps). As such they employ modern administrative boundaries that might bear little or no relationship with both environmental units and ancient territories, while (in principle) they are less inclined to favor one period over the others. Broadly speaking, however, the majority of surveys across the Mediterranean Basin – whatever their stated goals – show the

tendency to be primarily focused on the Classical period, with further emphasis on either the Greek phase (in the East) or the Roman one (in the West).

Historical Background

The origins of survey archaeology in the Roman world lay in a long tradition of studies concerned with the landscapes of Roman Italy. As such they developed out of the Italian humanism of the late fourteenth century (early Renaissance): indeed, with the rediscovery and philological reappraisal of Greek and Latin literature, there came an interest in the sites and places that had been mentioned by ancient authors. This prompted early scholars like Flavio Biondo (1392–1463) to research the ancient topography of Rome and the historical geography of Italy. By their very nature, these approaches were heavily informed by textual evidence and therefore primarily biased toward those features which arose more prominently as the setting of ancient narratives: Rome and the other named cities, together with the main roads which connected them. Such an interest further developed into the early modern era (well into the nineteenth century) as local antiquarians and learned travelers from the Grand Tour strove to explore suburban landscapes in search of ancient monumental remains. By this time the "landscape with ruins" had gained much popularity (e.g., in paintings) and, therefore, such early "surveyors" were primarily attracted in their wanderings by the most prominent (i.e., visible) sites, where standing structures could be actually observed (e.g., necropolises, mausoleums, aqueducts, rural sanctuaries, or major rural villas). By the late nineteenth century, this attitude had evolved into "ancient topography," a more structured enquiry which involved a thorough documentation (e.g., mapping, survey) and a systematic analysis of monumental remains (Potter & Stoddart 2001: 4-10). Nonetheless, the resulting picture was still biased toward urban spaces. The rural landscape – set aside as the idyllic setting of so many works of poetry – was then perceived as nothing more than the territorial extension of primarily urban communities, whose population worked the land by commuting everyday between town and country. This is hardly surprising given the fact that these earlier studies were still strongly inspired by and rooted in ancient literary accounts – from which they also derived the very same urban elite bias.

Things were about to change with the end of the Second World War (Potter & Stoddart 2001: 10-16). During the conflict, the Royal Air Force had extensively photographed large tracts of Italy from above in order to monitor military activities and targets. This marked the first large-scale introduction of aerial photography in the archaeology of Italy as hundreds of, previously unnoticed, features in the landscape were discovered and recorded (Dyson 2003: 55-73). Furthermore, following the war, a strong process of extensive urbanization invaded the suburban areas of most Italian cities, especially Rome. This brought about an impressive alteration of the landscape together with an equally impressive destruction of still-standing archaeological remains, the very same remains that had been the focus of earlier topographic surveys. Aware of this critical situation, John Bryan Ward-Perkins (1912–1981), the director of the British School at Rome at the time, launched teams of surveyors across South Etruria (hence the much-celebrated South Etruria Survey: Potter 1979) to record as much archaeological evidence as possible, before it was too late. This took place at the same time as the first large-scale introduction of mechanical heavy plowing (see section "Definition"), and it did not take much time before these early surveyors noticed how such an impressive destruction had the unexpected result of bringing to the surface a vast array of buried archaeology which otherwise would have gone completely undetected, especially as it pertained to small rural sites. Although lacking the imposing structural remains which signaled the presence of major sites (e.g., rural villas), such smaller occurrences were made prominent by the quantity of archaeological materials (e.g., potsherds, fragments of tiles and bricks). This plowsoil assemblage signaled thousands of sites across the landscape, often interpreted as evidence of

farms and, therefore, of an extensive rural population (i.e., settled in the countryside).

The South Etruria Survey did contribute to a "revolution" in landscape studies as a new, formal methodology was eventually developed and introduced all across the Mediterranean region, aimed at a systematic archaeological survey of plowed fields. Rapidly, it also became clear that an exclusively urban-oriented understanding of the rural landscape was misleading and that these rural settlement patterns had to be understood in their own (environmental) setting. This opened the way to the integration of specific expertises devoted to environmental reconstruction (e.g., geomorphology) and affirmed landscape archaeology as a fundamentally interdisciplinary endeavor (see section "Definition"). Research on Roman landscapes has since benefitted overall from such attitudes as more and more projects have followed – in Italy and beyond (Barker & Lloyd 1991; Potter & Stoddart 2001: 16-23). This has called for a more balanced understanding of the complex relationship between town and country and has warned scholars against the indiscriminate use of just one set of potentially biased evidence. Contrary to old views, John Lloyd (1991: 238) could eventually – and rightfully – claim that "the landscapes now being recovered through archaeology suggest a more complex and economically sophisticated world than we have been accustomed to imagine in the past."

Key Issues/Current Debates

Landscape has provided a most fertile context where to explore several important aspects of the Roman world, from economy to imperialism and from demography to urbanization. As already pointed out, the crucial contribution has been represented by the recovery of a lively and densely populated countryside, thus prompting a significant reconsideration of the integrated relationship between town and country. Cities are no longer merely seen as passive "consumers" of the resources provided by their territories but rather as actively engaged in a complex symbiotic pattern of production, distribution, and consumption of goods and services. They obviously created demand for local rural production, but, being also part of a wider network of towns, roads, and ports, they in turn supplied their hinterland with imported goods and created a gateway through which further surplus could be sent/sold elsewhere. The notion that landscape and cities must be approached as distinct features of a unitary process is today firmly established (e. g., Patterson 2006).

Another important achievement of survey archaeology is having brought about the awareness that there existed several Roman landscapes (Barker & Lloyd 1991). As Roman rule gradually extended over many different regions with different environmental characteristics and long histories of previous human occupation, landscape patterns came to reflect a creative combination of imported ideas and local situations. Therefore, survey archaeology has contributed to effectively undermine easy generalizations about the nature of Roman imperialism, and the actual dynamics of these relationships are now understood to have varied as a result of the political and economic place each region occupied within a growing empire (Mattingly 2011: 123-99).

Placing such an emphasis on what is distinctive and different, however, is at risk of ingenerating a kind of relativistic attitude, an empirical myopia that impedes synthesis at a higher level. After all, what is distinctive emerges more clearly once similarities are appreciated. The need to compare, contrast, and combine data from different surveys is a long-debated issue among practitioners of Mediterranean archaeology. The problem rests on the fact that each project is designed in accordance with specific questions and that each research context will prompt the adoption of appropriate methodological choices to cope with its unique conditions (e.g., intensive/extensive, total coverage/sampling). Such a variety of approaches does result in data whose uniqueness might not necessarily relate to original conditions and that would make comparisons difficult – if possible at all. What is remarkable is that a huge amount of data has been collected over the years and scholars increasingly

feel the need to employ them in a way or another (Alcock & Cherry 2004).

From this point of view, Roman Italy has provided a much favored case study, having been extensively explored by a sheer amount of survey projects (Patterson 2006: 72-88). With all their possible differences, it is quite remarkable that most researches have classified Roman settlements according to broadly similar typologies: villas, farms, and villages. It is indeed possible to recognize two main working criteria: quantity and quality of finds. The former refers to the size of the surface spread, the number of finds, and therefore their density. The latter on the other hand is more concerned with what classes of material are recovered as indicative of function, status, and place of the site within the settlement hierarchy. Although the actual definitions might slightly change, villas are generally understood as large-size and high-status sites, farms as small-/mid-size and low–mid-status sites, and villages as large-size and low–mid-status sites.

Whereas farms and villages have been related with the Italian free peasantry, villas have been traditionally connected with large estates, owned by the elite and primarily worked with slaves. Traditional historical narratives pointing to the decline of the Italian free population, being in turn supplanted by slaves, would therefore require both a gradual disappearance of farms and a coeval growth of villas to have occurred. Remarkably, although this seems to have indeed occurred in some areas (central coastal Etruria, southeastern Italy), in the majority of cases, farms appear to have been much more resilient, usually growing in numbers at the same time as villas did (Launaro 2011: 149-164). Although this can reasonably be taken to suggest a growth of the free peasantry, it does not say anything in terms of actual numbers. Deriving absolute population figures from survey evidence is indeed a traditional ambition of Mediterranean landscape archaeology (Bintliff & Sbonias 1999). In principle, it might sound like a rather straightforward exercise by which one multiplies the average number of occupiers by the number of sites. Besides the fact that there is no reliable way to guess such an average, the insurmountable obstacle is that surveyors simply cannot know how many sites they have actually missed. Although the inability to engage with both these crucial variables seems to seriously undermine any such effort, this has been repeatedly attempted following seminal work on the *suburbium* of Rome (Witcher 2005).

Recovery rates have always represented a critical issue. Surveyors have been frequently surprised by the rather limited amount of evidence for rural occupation dating to earlier phases of Roman colonization, and this was made the more striking when contrasted with the number of actual colonists as reported by ancient authors. Although fieldwalking does still represent the best possible choice to detect smaller/poorer sites, it is ultimately dependent on archaeological visibility. By relying on fineware pottery or amphorae as the main diagnostic materials, surveyors often assume such goods/objects to have been evenly supplied in the first place. This has been shown to be not always the case, especially as one moves down the settlement hierarchy and away from the main distribution centers/networks (Millett 1991). This increasing awareness has brought about a general reconsideration of what surveyors should look for, and it has eventually become clear that coarseware pottery could really make a difference as it was more readily accessed by all levels of urban and rural society (being produced locally and at cheaper prices) (MacDonald 1995). Although coarseware have always constituted the larger part of any plowsoil assemblage, their systematic analysis is still at a relatively early stage. Some regional synthesis has indeed started to appear, but their general application is somewhat limited by the very local character of the objects they endeavor to describe.

International Perspectives

As already mentioned (see section "Historical Background"), survey archaeology has its own origins in a long-established tradition of ancient topography to which scholars of many nationalities have since contributed to. Of course, one can

identify some recurring patterns among practitioners and might be tempted to ascribe them to the existence of specific national traditions. For example, the impressive presence of still-standing archaeological structures across the Mediterranean countryside can in part explain the remarkable resilience of more traditional forms of ancient topography in those countries. It is fair to say, however, that such an attitude has evolved over the last 30 years and has since broadly merged with survey archaeology.

If a real opposition ever existed, it is perhaps that between the intensive survey championed by British archaeologists and the more extensive approaches favored by others (most notably, although not exclusively, American scholars) (Terrenato 2004). It is not specific to "Roman" surveys, but it represents the tension – latent in any archaeological fieldwork – between resolution and coverage. Ideally, both are needed. In practice, however, one comes at the expense of the other. If intensive fieldwalking is the only way to detect smaller/poorer sites, too limited a study area is at risk of being insufficient to represent the wider landscape. On the other hand, an extensive survey will certainly convey a much more global picture, but it is also likely to skew it towards the upper end of the settlement hierarchy, thus failing to provide a fair representation of it. The debate has never been settled and sampling strategies have only provided a partial solution to it. Relevant field practice across the Roman world has thus varied a great deal and is one of the reasons that have often prevented worthwhile comparisons from being achieved at the regional level.

Future Directions

Comparative regional syntheses do indeed represent the necessary step forward for survey archaeology in the Roman world. Although new data keep being recovered as new survey projects arise, the lack of integration and coordination between them – even within same regions – runs the risk of narrowing the perspective, thus leading to many unrelated local histories. In fact, if survey archaeology is to contribute to far-reaching debates about general historical processes whose scale transcended the individual landscape (see section "Key Issues/Current Debates"), scholars have to accept the challenge and envision ways in which these data can be profitably integrated. Although definitive results are still ahead of us, the last 20 years have witnessed an increasing number of attempts that – whatever their limitations or flaws – are demonstrating the way forward (Alcock & Cherry 2004; Launaro 2011: 80-83).

The role and significance ascribed to the plowsoil assemblage is also evolving. Although quantity and quality of finds are still eagerly employed to derive chronologies (i.e., in order to date sites), their distribution patterns across the landscape can be viewed from different angles accounting not only for supply but also for deeper social and cultural meanings mediated by choice or preference (Witcher 2006). In this view, the increasing knowledge of local Roman coarsewares might not only provide more refined ways to date "marginal" sites but also could allow scholars to uncover a complex network of human relationships across the landscape(s) that would otherwise remain largely invisible.

Another growing tendency is to recognize the informative potential of "legacy data" (i.e., old data from past projects). While plowing brings to the surface otherwise hidden evidence, it keeps eroding and consuming such evidence until not only its visibility but its very existence is irremediably affected. The same goes for urbanization: it has never stopped and many more areas have been increasingly built over. This is further complicated by the fact that the process of agricultural expansion of the post-Second World War era has now begun to reverse: lands are increasingly turned (back) to pasture or woodland, therefore dramatically affecting archaeological visibility. From this point of view, older surveys (from the 1950s, 1960s, to 1970s) do represent a mine of invaluable information: they documented surface evidence soon after it was plowed for the first time (i.e., higher integrity and better visibility) and explored extensive areas which are by now "concreted over" or, more generally, made unsuitable

to survey. As new knowledge (e.g., more refined pottery classifications) and new techniques (e.g., GIS analysis) are made available, it becomes therefore possible to process the evidence again by answering questions and test theories which were not considered in the original research design (e.g., the reevaluation work on the *South Etruria Survey*: Patterson & Millett 1998).

Cross-References

- ▶ Centuriation and Roman Land Surveying (Republic Through Empire)
- ▶ Ceramics, Roman Imperial
- ▶ Ceramics: Roman Republican and Early Principate
- ▶ Demography of the Ancient Roman World
- ▶ Economy, Roman
- ▶ Landscape Archaeology
- ▶ Maps, Cartography, and Worldview in the Roman World
- ▶ Surface Survey: Method and Strategies
- ▶ Survey Archaeology in the Greek Aegean World

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Sustainability and Cultural Heritage

Lawrence S. Coben
Sustainable Preservation Initiative, New York, NY, USA

Introduction

The term "sustainability" has multiple meanings and uses in relation to cultural heritage. Most frequently, the term is employed in conjunction with or as part of such concepts as sustainable preservation, sustainable development, or sustainable tourism, though these concepts in practice overlap and are closely intertwined.

Definition

Sustainable Development

These concepts of sustainability derive from and grow out of the World Commission on Environment and Development's (the Brundtland Commission) 1986 report Our *Common Future*. That report defined sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs." (The term sustainable development first appeared in 1972 at the United Nations Conference on Human Environment in Stockholm.) This definition, while vague, called attention well to the problem of overexploitation and damage of natural resources in the pursuit of economic development and implicitly called for the practice of forms of economic development that better utilize and leave adequate natural resources for future generations. Sustainable development thus merges perpetual economic growth with the maintenance and enhancement of environmental values (Throsby 2002), thereby providing sufficient resources for both current and future economic development. The Brundtland Commission's discussion of sustainability also included social and economic responsibility as important components of sustainable development, though in many discussions these components played a secondary role to the environmental one.

Key Issues/Current Debates/Future Directions

Sustainable Development in Cultural Heritage

In the latter part of the twentieth century and early part of the twenty-first century, scholars and governments began to consider and apply a modified concept of sustainable development to cultural heritage (see, e.g., Endresen 1999; MacDonald 2004). At times referred to as sustainable preservation, this discussion of sustainability has followed two distinct though related paths: first, the environmental and energy conservation benefits of the preservation and reuse of historic structures and, second, the potential economic and social benefits of the development of cultural heritage sites as touristic attractions or drivers of economic development.

Sustainable Development and Preservation-Historic Structures

Advocates of sustainable preservation argue that there are tangible ecological and environmental benefits from the reuse and redevelopment of existing historic structures. Such reuse may provide enormous energy savings and preserve resources by obviating the need to mine, harvest, produce, and transport new building materials. These savings may dwarf those of so-called "green" or LEED (Leadership in Energy and Environmental Design)-certified construction, particularly since the energy used to construct an average building is 15–30 times greater than its annual energy use (Rypkema & Chong 2011a). Similarly, a 2011 report of the Preservation Green Lab of the National Trust for Historic Preservation noted, "Building reuse almost always yields fewer environmental impacts than new construction when comparing buildings of similar size and functionality." Current LEED standards give little credit for the environmental benefits of the reuse of historic or existing structures and none for the social and economic benefits.

Various metrics have been developed to measure the environmental benefits of historic preservation, including a building's embodied energy, lifecycle costing, avoided impacts, and reduced carbon footprint. All of these seek to measure energy usage, efficiency, and carbon footprint through the entire process of planning, constructing, and operating a building.

Sustainable Development and Preservation-Economic Development

Recognizing the increasing destruction of cultural heritage and sites from economic development and the potential to create jobs and revenues through tourism and preservation, governments, NGOs, and heritage practitioners have begun to consider the cultural heritage's potential as a driver of economic activity and poverty alleviation. The World Bank in numerous presentations has described its evolving approach toward cultural heritage as one that began with "do not harm," avoiding damaging cultural heritage while implementing other projects (1970–1980), to "specific intervention," investing in particular sites to develop tourism (1980–2000), to the current "integrated approach" that integrates-cultural heritage in local economic development with a focus on historic cities rehabilitation and sustainable tourism. The Inter-American Development Bank's approach has followed a similar arc.

These economic development projects all state that one of their goals is the sustainability or preservation of cultural heritage assets, allowing their use while preserving them for future generations. In addition to the environmental benefits described above, other suggested benefits include the creation of jobs; increased retail and handicraft sales and ancillary revenues, serving as a catalyst for local and regional development; the rejuvenation of declining towns and neighborhoods; gender inclusiveness; and a greater sense of cultural identity for local communities.

Metrics of project success have included jobs and household income, tourism visits and expenditures, and property values, as well as less directly economic social and environmental impact studies (Rypkema & Chong 2011b – see this article for a more detailed discussion of metrics and methodologies). However, measurement of the economic impact of sustainable development has been described as "nebulous" due to the difficulties of data collection (Rypkema & Chong 2011b: 754), and data has been described as "hard to come by" (Silberman 2011: 48). While much anecdotal evidence of the economic benefits of sustainable development exists, to date there is almost no systematic analysis of the economic, social, or preservation benefits or return on investment of these expenditures.

In addition to disputing the economic benefits of sustainable development, critics have argued that sustainable development devalues the conservation and interpretation of cultural heritage. Other critiques of sustainable development have included the funding of projects that are not economically sustainable, damage and potential loss of access to sites as a result of touristic use and development, the commodification of

heritage, displacement of local residents and other changes to local communities, and its lack of applicability to sites without touristic potential.

More recently, sustainability has also been used as a synonym for the stand-alone economic viability of development projects. Organizations such as the Sustainable Preservation Initiative define a sustainable project as one that is self-supporting after an initial grant or investment, in contrast to projects that will not survive without continued funding, normally by an NGO or governmental entity. Sustainable projects do not depend on the continued involvement of such an organization.

Sustainable Tourism

Almost every cultural heritage project includes a tourism component as one of its central features. In response to the potential damage caused by increased tourism, UNESCO, national governments, NGOs, and the travel industry have sought to create a form of tourism that respects and maintains cultural heritage. Sustainable tourism seeks to ensure that travelers conserve and protect both the natural environment and heritage assets, while promoting cross-cultural understanding. In some cases, an important component of this concept is that the tourism supports the community visited and patronizes entities that are locally owned or organized, particularly in poor regions. This issue of who should manage and benefit from tourism and economic development is frequently debated in discussions of sustainability. Many of the benefits and problems associated with this economic development are similar to those described above for sustainable economic development.

Cross-References

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- ▶ Heritage Tourism and the Marketplace
- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
- ▶ Iran: Heritage Preservation and Tourism
- ▶ Journal of Heritage Tourism
- ▶ Southern Africa: Cultural Heritage Tourism Development and Management
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Sustainable Cultural Tourism Policies: Overview

Jessica Facciponti
University of Maryland, College Park, MD, USA

Introduction

For millennia, culture has been an integral part of travel and tourism. Travel to cultural and historical sites as well as to festivals, performances, and events has been recorded since antiquity (McKercher & du Cros 2002). However, up until 20–30 years ago, tourism was largely seen as a benign industry with little negative environmental, social, economic, or cultural impact (Murphy & Price 2005). This lack of sustainable tourism planning and preparedness has resulted in cultural, economic, and ecological damage at many tourist destinations. As a way to address these problems, various nations and international entities have created policies calling for increased sustainable tourism planning and management. This entry will briefly discuss the relationship between culture and tourism, the development of international sustainable cultural tourism policy, and several of its prominent charters.

Definition and Historical Background

The relationship between culture and tourism first must be explained and historically traced in order to achieve a deeper understanding of sustainable cultural tourism policy. Cultural tourism can be defined as "visits by persons from outside the host community motivated wholly or in part by interest in historical, artistic, scientific or lifestyle/heritage offerings of a community, region, group or institution" (Silberberg 1995: 361). Even though a great percentage of travelers often have some element of cultural tourism in their travel itinerary, cultural tourism was originally associated as an activity of highly affluent and well-educated travelers (McKercher & du Cros 2002: 151; Richards 2007). In the late 1970s, the tourism industry began to market travel for cultural reasons as a new and specialized form of tourism to the general public (McKercher & du Cros 2002: 1). Then, by the 1990s, it began to be widely accepted and promoted as a mass tourist activity (McKercher & du Cros 2002).

Tourism and culture have a dynamic and symbiotic relationship. An increase in tourism has a potential to benefit a site, a culture, its surrounding community, and the nation in which it is located. Its economic revenue can encourage the conservation and economic development of a cultural site, tradition, or community. For instance, intangible traditions on the verge of being forgotten in the community can become reinvigorated and preserved.

However, an increase in tourism can also cause substantial harm to a site and its host community. Since cultural and natural resources are finite, a surge of tourists and inadequate tourism planning may lead to cultural and natural resource damage and depletion, cultural and community exploitation, economic leakage, etc.

Thus, the regulation of cultural tourism is necessary to mitigate these negative impacts. Considering this, it is not surprising that the increased marketing of cultural tourism activities by the tourism industry coincided with the popular dawn of sustainable tourism and a spur in the creation of sustainable tourism policies (Butler 1998: 25).

Sustainable tourism falls under the multifarious sustainable development umbrella. It has been synthesized from the cultural and environmental concerns and the principles of sustainable economic development of the 1970s and 1980s. Sustainable tourism is not univocally defined; its definition and usage vary not only between stakeholders but also within and across disciplines. Among social scientists, sustainable tourism can be generally defined as the incorporation and monitoring of economic, social, and cultural goals in the planning and management of tourism at a site (Hall & Lew 1998; Murphy & Price 2005; Saarinen 2006). In addition, all

sustainable tourism plans and policies, as Edgell states, should ideally strive to "integrate the economic, political, cultural and intellectual benefits of tourism cohesively with people, destinations, and countries in order to improve the global quality of life and provide a foundation for peace and prosperity" (1990: 1).

Key Issues

Sustainable cultural tourism policy has been influenced and evolved based on the international community's changing prevalent perceptions of and attitudes toward sustainable and cultural tourism. This section provides a chronological overview of key international sustainable and cultural tourism policies.

The first international cultural tourism policy, the Charter on Cultural Tourism, dates to 1976. It was preceded by substantial growth in the tourism industry and an increase in many governments and political entities' involvement in it due to their discovery of tourism's earning potential (Hall & Page 2006: 397). This increase in tourism's popularity and related discussions led to the United Nations XXI General Assembly designating 1967 as the "International Tourism Year," during which it passed a resolution called the "Importance of Tourism" stating that "tourism is a basic and most desirable human activity deserving the praise and encouragement of all peoples and all Governments" (United Nations 1967). However, cultural and sustainable tourism policy discussions did not become prevalent until the 1970s.

ICOMOS Charter on Cultural Tourism

In 1976, the International Council on Monuments and Sites (ICOMOS) held an International Seminar on Contemporary Tourism and Humanism. The Charter on Cultural Tourism is the result of this seminar. This charter was a revolutionary document in that it acknowledges tourism's irreversible "social, human, economic and cultural" effects, which had not been addressed before by an international body in writing (ICOMOS 1976). It also recognizes tourism as an important growing industry, but opposes "tourism's anarchical growth" and its negative consequences (ICOMOS 1976). To counteract tourism's negative effects on cultural and natural resources, it distinctly calls for conscientious tourism planning and policy regulation. It states, "with the future in mind. . .cultural and natural heritage which must take precedence over any other considerations however justified these may be from a social, political or economic point of view" (ICOMOS 1976).

In contrast, the charter also notes that tourism can have economic and cultural education benefits. It calls for the education of tourists, especially children, regarding the importance of the monuments and sites. Also, it recommends training for community members regarding how to evaluate and develop their relevant tourism site in order to safeguard it from tourism-related threats.

Unfortunately, this document focuses its cultural-based discussion primarily on tangible and monumental sites, which is referred to as "that privileged part of the human heritage" (ICOMOS 1976). Discussion regarding intangible cultural heritage tourism is notably absent, but this issue was developed in later policies over the next 20 years.

Manila Declaration on World Tourism

In October of 1980, Manila Declaration on World Tourism was developed at the World Tourism Conference. The declaration states that everyone should have the right to engage in travel and tourism (WTO 1980). It argues that states should encourage and support their populace's engagement in domestic and international tourism in order to increase the following: social solidarity; national and heritage pride; cultural awareness; and international economic, sociocultural, and political cooperation. The declaration also advises states to provide tourism education and training for their populace (especially their youth). The Manila Declaration ultimately views world tourism as a means of promoting further steps toward world peace.

Furthermore, it asserts that world tourism is more than a "purely economic activity" and should not be the only reason a government chooses to endorse it (WTO 1980). Governments are encouraged to look beyond economic development to also consider and advance the social, human, and cultural dimensions of tourism (WTO 1980). Heritage tourism in this document is still perceived as and limited to physical and site tourism.

Brundtland Report and Agenda 21

By the mid-1980s, discussions concerning cultural tourism and sustainable development became prolific (Hall & Page 2006: 397). In 1987, the World Commission on Environment and Development (WCED) developed the Brundtland Report entitled "Our Common Future." The concepts of sustainability and sustainable development discussed in this document were later adapted for the tourism industry and influential in its sustainable tourism policies. A large concern of the WCED was intergenerational fairness and ethics (Butler 1998: 33). It states that current resource use and development should not compromise the future generation's ability to "meet their own [resource] needs" (World Commission on Environment and Development 1987).

This document and the later Agenda 21 developed at the 1992 United Nations Conference on Environment and Development (UNCED) helped spark sustainability discussions in the tourism field (Saarinen 2006: 1122). UNCED's Agenda 21 identified travel and tourism as a key economic sector with the possibility to make a positive contribution toward achieving sustainable development. It then spurred the formation of the Travel and Tourism Industry's Agenda 21 in 1996 (USAID 2005). Even though these policies primarily refer to the physical and natural environment, their perspectives on sustainable development also influenced future sustainable cultural tourism discussions and policies (USAID 2005).

Charter for Sustainable Tourism

In 1995, the Charter for Sustainable Tourism was created by the World Conference for Sustainable Tourism. It is influenced by the "principles set forth in the Rio Declaration on the Environment and Development and the recommendations arising from Agenda 21" (WCST 1995). The charter states that tourism must respect not only the economic and environmental structure of a destination but also the human dimensions and dignity of the local community in order to avoid negative impacts within the region.

The charter proclaims that the sustainable tourism effort should be a respectful and collaborative one with cooperation throughout all the tourism industry levels, including local, national, regional, and global. It calls for all tourism stakeholders and participants to work together toward the implementation of sustainable tourism activities. Moreover, it recommends that all governments and the United Nations try to develop sustainable tourism plans of action.

It advocates for tourism to "be integrated with the natural, cultural and human environment" (WCST 1995). Tourism projects and strategies should consider their effect on a local community's cultural heritage, aiming to protect not only their physical cultural sites but also their intangible elements such as local traditions and identity. In addition, it proposes that environmentally and culturally vulnerable areas as well as areas that have been degraded by high impact tourism receive special priority for aid and technical assistance.

Ultimately, the charter proposes that tourism planning and management should conserve and protect the natural and cultural heritage of a destination and its host community as well as enhance the local economic conditions while concurrently satisfying tourists' needs (WCST 1995).

The International Cultural Tourism Charter

The International Cultural Tourism Charter was established in October of 1999 by ICOMOS at its Twelfth General Assembly meeting in Mexico. The Charter's ethos states that "a primary objective for managing heritage is to communicate its significance and need for its conservation to its host community" (ICOMOS 1999).

The charter notes the presence of a dynamic and reciprocal relationship between tourism and

cultural heritage relating to economics, management, protection, and cooperation. It declares that there should be a tourism planning process dialogue between stakeholders, which focuses on the equitable treatment of present-day host community, indigenous custodians or the owners of historic property, and the descendant communities and cultures from which that heritage evolved.

Additionally, it proposes that cultural tourism activities should be enjoyable and educational for visitors while also respecting and enhancing the heritage and economic conditions of the host community.

The charter proclaims a duty of respect for heritage objects and values and promotes their management in a sustainable manner for current and future generations. It also discusses the importance of protecting a site and community's "authentic" tangible and intangible cultural heritage (ICOMOS 1999). Moreover, it encourages the use of "detailed, measurable goals" in the cultural tourism planning and policy-making process, especially with regard to the promotion, presentation, interpretation, and protection of heritage areas and cultural activities (ICOMOS 1999).

This charter implicitly suggests that when cultural heritage tourism is adequately managed and planned, it will result in economic and community benefits. As a result, it tries to anticipate and mitigate any possible problems. However, in this short document, it is impossible to analyze and cover all the possible factors that can lead to tourism complications and negative outcomes.

Global Code of Ethics for Tourism

In 1999, the General Assembly of the United Nations World Tourism Organization (UNWTO) adopted the Global Code of Ethics for Tourism. This code of ethics advocates "maximiz[ing] the positive economic, social and cultural effects of tourism . . . while minimizing its negative social and environmental impacts" (UNWTO 1999). It states that all tourism participants should be responsible to uphold this code of ethics and to practice ethical tourism. Thus, tourists should try to protect not only themselves but also the environment, culture, and people of their destination's host communities. In addition, governments and other authorities need to be attentive to and spread awareness about the social, cultural, and environmental vulnerabilities that affect host communities as well as tourists. Local communities should be able to express their culture, livelihoods, and religion, but they should be careful to avoid infringing upon the tourists' beliefs and security.

The UNWTO believes "tourism is a user of cultural heritage of mankind and a contributor to its enhancement" (UNWTO 1999). This code promotes a global human heritage of which everyone is a part and shares, but the local community has specific rights and obligations to the maintenance, profits, and safeguarding of its heritage resources (UNWTO 1999). It promotes the use of sustainable policies and plans that will protect and support cultural heritage resources, traditions, performances, and crafts in order to allow them to thrive and flourish and be accessible for future generations to experience.

Future Directions

Since 1999, there have not been any new prominent international sustainable cultural tourism charters. However, there is a need for change since the implementation of the aforementioned sustainable development and cultural tourism policies has proven to be difficult. They have been sporadically and erratically applied, if at all. This is partly due to their vague and fluctuating policy criteria, assessment standards, and definitions (Font 2005; Murphy & Price 2005).

There is a need for a more consistent framework for which to evaluate tourism programs in order to ensure operation is in accordance to international standards. However, the framework would have to be flexible enough to fit the unique needs of each tourism program. Also, the concepts that would be involved in that assessment are quite complex, and one has to be cautious in employing them (Murphy & Price 2005: 178). For instance, it may be found difficult to set a minimum level for sustainability, and if one is set, it can discourage others from going above

and beyond that level especially if financial incentives are involved.

Furthermore, there are often a plethora of tourism stakeholders at various power levels who can negatively affect the regulation of sustainable cultural tourism. The regulation can be viewed as a local, regional, national, and global issue simultaneously, which can result in a higher likelihood of overlapping regulatory agencies and policies. Ultimately, the best way to ensure the utilization of international sustainable cultural tourism policy is through the collaboration and corroboration of all stakeholders.

Cross-References

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- ▶ International Cultural Tourism Charter Managing Tourism at Places of Heritage Significance (1999)
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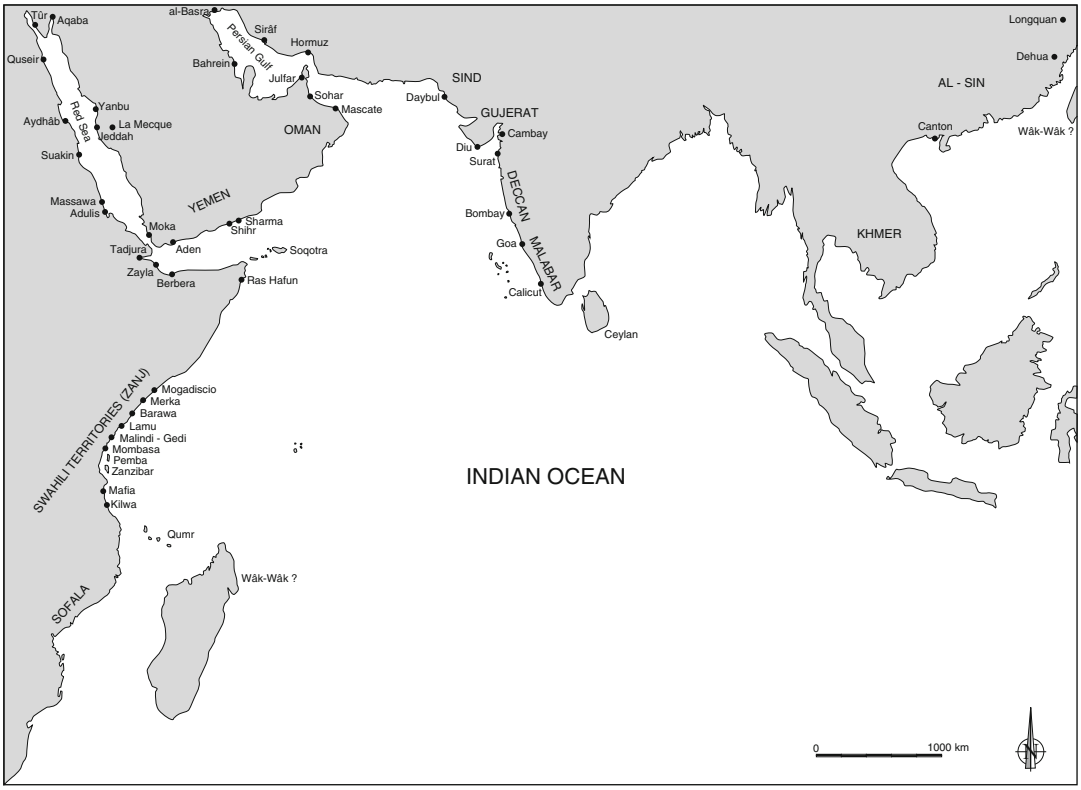
Swahili Archaeology

Stéphane Pradines
Institute for the Study of Muslim Civilisations, Aga Khan University, London, UK

Introduction

At the beginning of the first millenium CE, the discovery of the monsoon winds and the means to use them created a nautical revolution, allowing for major water crossings toward India and Ceylon. Trading between East Africa and the Persian Gulf intensified in the eighth century, but African relations with Islamic merchants were of a different nature to those of earlier times, since they settled in Africa, boosting urbanization. From the ninth century onward, Muslim geographers Buzurg b. Shahriyâr and al-Mas'ûdî mention regular trade relations with East Africa, Zanzibar, Pemba, and



Swahili Archaeology, Fig. 1 Map of the Indian Ocean marking the locations of the principal medieval ports

Sofala (Freeman-Grenville 1962: 9-17), while the most famous story of a Persian navigator is of course that of "Sindbâd the Sailor," who supposedly reached the al-Qumr region, which includes the Comoros Islands and northern Madagascar, between 806 and 807. These sources indicate that as early as the ninth century, there were major shipping routes between Asia and Africa (Fig. 1).

The transition between the eleventh and twelfth century was a period of change. A number of urban East African centers developed at this time as did architecture in stone, used for public buildings, mosques, and enclosure walls. The Swahili city-states were established: Malindi and Mombasa were mentioned in 1154 by al-Idrîsî who spoke also of the island of Angazidja (Anjouan) and Sufala, the golden country. During the reign of Sulaymân b. al-Hasan, from 1178 to 1195, Kilwa made a fortune from the gold trade from Sofala. For this period, the major chronicles of Swahili city-states are precious tools for the archaeologist, the most famous being the Kilwa Chronicle (Freeman-Grenville 1962: 34-49).

A new balance of power developed in the thirteenth century. The Swahili coast was divided into several independent sultanates, including Kilwa, Mombasa, Malindi, Pate, and Mogadishu. In 1212–1229, Yâqût noted the cities of Mogadishu, Merka, and Malindi, but not until Ibn Battûta's work of 1331 do we have a precise description of the cities on the eastern coast (Freeman-Grenville 1962: 27-32). Ibn Battûta noted that Mombasa was large, with wooden mosques. Kilwa was supposedly one of the most beautiful towns in the world with stone houses covered with palm-leaf roofs or *makuti*; only certain mosques and the palace had hard flat roofs. From the fourteenth to fifteenth century, Kilwa continued to hold the monopoly for gold,

trading gold from Yufi, situated a one-month walk from the coast. Sofala, a vassal of Kilwa city, maintained commercial relations with the Shona kingdom of Great Zimbabwe; the rise of Great Zimbabwe was intimately linked to the trading of gold with Islamized peoples.

Vasco da Gama discovered the route to India and the East African coast in 1498. The European objective was to control eastern trade markets. They possessed two important technological advantages that ensured their domination of the Indian Ocean: the use of firearms and large, fast boats, caravels. The Portuguese built some fifty forts around the Indian Ocean, from Mozambique to Malacca, occupying the coasts of Kenya and Tanzania during the sixteenth and seventeenth century. Despite founding some trading posts, they quickly abandoned any attempt at political hegemony and were content keeping control of the sea routes. At the end of the seventeenth century, the area saw significant conflict involving Portuguese and Omani forces. After the fall of Mombasa, the Imam of Oman sent governors and garrisons to large cities such as Pate, Lamu, Mombasa, Zanzibar, and Kilwa. In 1828, an Omani garrison was installed at Fort Jesus, and the Sultanate of Zanzibar was founded.

The Sultanate of Zanzibar required a lot of slaves to maintain its clove plantations, the main export product. Large caravans were organized by the Omanis who destroyed the indigenous populations' economy and introduced firearms in exchange for slaves and ivory. These slave caravans were funded by wealthy Indian merchants, the *banian*s. But the commercial force of the Sultanate of Zanzibar was also its weakness, its plundering economy being based solely on slavery and the export of tropical products such as ivory and cloves, the limited number of these products increasing the precariousness of the economic system. The direct slave trade brought about important social changes, with Swahilis using landward populations rather than venturing beyond the coastline. For the first time in the history of East Africa, Islam took root in the interior lands of Kenya and Tanzania, right up to the Great Lakes region. In 1876, the movement of slaves toward the coast was strictly prohibited. The prohibition of the slave trade and the development of steam navigation eventually destroyed the supremacy of the Omani fleet. The opening of the Suez Canal imposed one last blow on the Sultanate causing it to lose its primary markets. The last sultan, Sa'îd Barghash, died in 1888, and Zanzibar became a British protectorate on 1 July 1890.

Definition

One Territory, One Population, One Religion

Wa-swahili, or "shore people," designates the inhabitants of the East African coastline and signifies above all a culture with a common language, Kiswahili, and the same religion, Islam. Arab-Persian geographers referred to the inhabitants of the East African coast as the Zanj. The Portuguese also noticed a difference between continental Africans and the people of the coast, who in light of their religion and customs they equated with "Moors" or "Kaffirs." It was at the beginning of the nineteenth century that the first use of the term "Swahili" appeared, with settlers trying to classify and differentiate the different populations of Africa. The Swahilis have defined themselves as such since the colonial period but differentiate between themselves according to their region, island, or town of origin. Despite some common ground, Swahili identity remains multiple, incorporating populations of diverse background, both Cushitic and Bantu.

Swahili culture extends from Mogadishu in Somalia, through Kenya, Tanzania, north Madagascar, and Comoros, to the bay of Sofala in Mozambique. As well as religion and language, these coastal populations share the same social organization and architecture. More than 450 Swahili archaeological sites have been registered spread over 3,000 km of the coastline (Pradines 2004: 18-20). The lifestyles on the east coast, Comoros, and Madagascar were homogenous due to the dissemination of new ideas and techniques by maritime travellers. Swahili culture reflects neither a specific ethnic group nor a particular nationality.

The Swahili civilization stands at the periphery of the Muslim and African worlds, resulting in the development of a unique coastal culture based on trade. In fact, its marginal position is linked to our vision of the Indian Ocean, which separates Africa, Arabia, and Asia. But the ocean also provides a connection between these very different cultures: the Swahilis are thus dynamic players, equal to Arab, Persian, and Indian traders. Swahili archaeology is at the crossroads of Islamic archaeology and African archaeology.

Historical Background

The explorers of the late nineteenth century were the precursors for current multidisciplinary research. In 1856, Charles Guillain wrote the first historical report on the east coast of Africa, while R. Brenner visited sites in the archipelago of Lamu, Mambrui, and Malindi in 1868. Richard Burton mentioned ruins in Zanzibar and Tanganyika in 1872. But it was Georges Révoil who carried out the first archaeological research, digging several trenches in Mogadishu in 1882. He published several books and articles on Somalia and northern Kenya, notably his travel accounts in *Le Tour du Monde* (1885, 1888). Révoil's contribution is not only material and textual: he produced many sketches and photographs. These iconographic documents are very important for archaeology, because they show buildings that today have disappeared or fallen into ruin. Photographs were also taken by Sir John Kirk who visited Gedi and Lamu in 1897. Captain J. Stigand published photographs of Lamu, Takwa, and Pate in 1913. F. B. Pearce initiated the first research into Zanzibar and Pemba in 1920; he was followed by W. H. Ingrams in 1931 and L. Buchannan 1 year later. The ruins of Kilwa were declared heritage-listed monuments and were restored by a German team in 1935. The prewar period was thus characterized by a rising awareness of the historical value of Swahili archaeological sites.

The first archaeological dig on a medieval Swahili site can be traced to 1948. A disciple of Mortimer Wheeler, James Kirkman, was sent to Kenya to excavate and develop the Gedi site. Wild stories had been circulating about this lost city, which was believed to be the work of Phoenicians or Egyptians stranded on the African coast. The excavations lasted 10 years, until 1958, and the results were published in 1954 and 1963. Kirkman also investigated two other major sites, the city of Ungwana in the bay of Formose and the fort of Jesus de Mombasa (Kirkman 1966, 1974). The museum of Fort Jesus opened to the public in 1960 and was managed by Kirkman until 1972. As early as 1948, Kirkman founded the Coastal Archaeology Unit of the National Museums of Kenya. This department was originally based in Lamu but was transferred to Fort Jesus. It currently occupies offices in the former courthouse of East Africa, in Mombasa. The role of this department is to record, monitor, and protect more than 120 historical and archaeological sites along the coast of Kenya, its researchers conducting rescue and research operations on endangered sites. Kirkman made numerous excavations and topographical surveys in Takwa, Kilepwa, Kioni, Mnarani of Kilifi, Jumba la Mtwana, Kinuni, and even at Ras Mkumbuu on the island of Pemba. The 1950s were also marked by archaeological surveys conducted by Mortimer Wheeler and Gervase Mathew at Kilwa and at Songo Mnara. In 1964, James Kirkman published *Men and Monuments on the East African Coast*. Significantly, he refused to attribute the invention and use of coral limestone architecture to the people of Africa, preferring to see it as the result of Arab or Persian colonies. Only foreigners could be the cause of urbanization, according to Kirkman; towns were established as Arab trading posts, not as African cities.

A second important figure in Swahili archaeology, Neville Chittick, became the director of the *British Institute in Eastern Africa* in 1962. This institute, founded in 1960, had as its principal goal the promotion of archaeological research in East Africa. Chittick was particularly interested in the medieval cities on the Kenyan and Tanzanian coasts. During the 1960s and

1970s, he undertook two major excavations: one in Kilwa in south Tanzania and the other in Manda in North Kenya (Chittick 1974, 1984). Chittick also initiated excavations in Songo Mnara, in Kisimani on the island of Mafia, in Pate in the Lamu archipelago, explorations in Somalia, and surveys in Mogadishu. Problems with Neville Chittick's work comprise his lack of interest in the successive ancient occupations of Kilwa and the classification of African pottery as a homogeneous group called "cooking pots." This attitude sprang from previous research; even today, the cities of the African coast are studied primarily through their imported material and monumental architecture, with African contributions being minimized or ignored.

In 1966, the work of Peter Garlake, *The Early Islamic Architecture of the East African Coast*, was published and is considered a milestone in the study of Swahili architecture. Garlake created a systematic inventory of all the ruins on the Tanzanian, Kenyan, and Somali coasts. He analyzed the evolution of local Swahili architecture and integrated it into the wider Islamic world. In the 1970s, Thomas Wilson identified 450 to 500 stone establishments extending from Warsheikh to the north of Mogadishu, to the bay of Sofala in Mozambique. Wilson's work arguably initiated reflection on the articulation of Swahili territories (1978, 1980).

In a 1962 publication, Freeman-Greville conceded that Swahili towns could be of African origin. In 1974, James de Vere Allen affirmed the African origin of the Swahili town in his presentation, "Town and Country in Swahili Culture," during the Leo Frobenius symposium in Cologne. In a 1981 article, he argued that Swahili urbanization and culture were the exclusive preserve of Africans. Unfortunately, this research on "africanity" resulted in aberrations during the 1980s. The posthumous work of James de Vere Allen mentions the presence of an African state in the ninth century, the great Shungwaya. Allen argued that this state, located in what is now southern Somalia, consisted of Cushitic-speaking peoples who later dispersed in order to found the Swahili towns. This afrocentrist vision was pure fantasy, not based on any archaeological or historical evidence. More moderate views were presented in the *General History of Africa* published by UNESCO; for example, Henri Mutoro declared: "The material forms assumed by Swahili culture present no analogy with Arab or Persian civilizations. There is no exact correlation between Swahili stone constructions and Middle Eastern, Arabic and Persian architecture, which leads one to suppose that it drew its inspiration from the latter" (Masao & Mutoro 1990: 645).

After the colonialist vision of Arab-Persian trading posts, Europeans and Africans both became engaged in the elaboration of a new ideological construct, the Africanization of Swahili cities, a theory supported by the myth of Shungwaya. Current thinking is that there is no Arab or African culture, but rather a Swahili culture, which is truly hybrid; scholars thus moved away from nationalist or propagationistic debates. In the 1970s, Pierre Vérin initiated archaeological research in the north of Madagascar (1975). His team, engaged too with the study of the Comoros, included Claude Allibert who continued the research started by Henry Wright in the 1980s (Wright 1984).

In 1980, Mark Horton undertook excavations in Shanga, in the Lamu archipelago (1996). Six field excavations, held between 1980 and 1988, clarified the Islamization of this coastal area. Horton was the first archaeologist to focus on the early phases of coastal sites, in keeping with Africanist views and bearing in mind the historical continuity linking the Islamized populations to the cities of the first millennium CE. In 1986, Paul Sinclair launched a project looking at the urbanization of East Africa and in particular of Mozambique. This project united institutions in Botswana, the Comoros, Kenya, Madagascar, Mozambique, Namibia, Somalia, Zimbabwe, Tanzania, and Zanzibar, strengthening archaeological research in these developing countries and collecting and publishing the results of excavations carried out by local researchers (Sinclair et al. 1993). Major African archaeologists emerged in the early 1990s, including George Abungu in Kenya, Félix Chami in Tanzania, Ricardo Duarte in

Swahili Archaeology, Fig. 2 Excavations of the great mosque of Gedi (Malindi, Kenya)

Mozambique, and Ahmed Jama in Somalia, who work on coastal sites in East Africa with complete scientific autonomy (Duarte 1993; Jama 1996).

Key Issues/Current Debates

The Swahili Mosque: Architecture and Islamic Expression in Sub-Saharan Africa

The origins of Islam and the first Swahili mosques in East Africa are evidenced by the results of Mark Horton's excavations in Shanga (Lamu, Kenya) and the author's own research in Gedi (Kenya), in Songo Mnara, and Sanjé ya Kati (Kilwa, Tanzania) (Horton 1996; Pradines 2009) (Figs. 2 and 3). Swahili mosques have a rectangular prayer hall flanked by narrow lateral wings usually comprising one-third of the width of the central hall. These mosques do not have a minaret and are bordered by a small courtyard where ablutions are practiced. Some mosques comprise a central row of pillars, facing the *mihrab*. The niche of the *mihrab* is in the form of a square, not integrated into the wall but jutting outside the mosque. The plans of Swahili mosques have a number of similarities with their counterparts in South Arabia, notably on the shores of the Hadramaut and Oman. Thus, in the fifteenth century, the *mihrab* of the Great Mosque of Gedi was decorated with 13 blue and white porcelain vessels inserted into the tympanum and the lower side of the apse. This use of ceramics as a decorative element of the *qibla* or the *mihrab* is also evident in Oman in the Shawâdhnâ of Nizwa mosque, dated 1530 and decorated with an inlay of cut blue and white porcelain.

According to oral traditions in many Swahili cities, the first stone mosques were associated with the Shirazis. The so-called Shirazi mosques, of eleventh- to twelfth-century date, seem to have had consistent proportions; thus in Gedi, the first mosque was c. 10 by 7 m. In Tanzania, the great mosque of Kilwa was erected between 1131 and 1170 (Freeman-Grenville 1962: 34-38). Its initial rectangular plan does not differ from the model previously described, measuring 11.8 by 7.8 m. Also in the Bay of Kilwa, the Island of Sanjé ya Kati houses a large mosque founded in the second half of the eleventh century; with its lateral wings, the mosque measures 10.21 by 9.46 m. The Shanga mosque, the final construction phase of which dated from the fourteenth century, may have been founded earlier. What is certain is that a mosque was constructed in Shanga between 1015 and 1035, decorated with blocks of sea coral. The eleventh-century building forms a rectangle measuring 11.22 by 7.21 m. During archaeological excavations at Tumbatu (Island of

Swahili Archaeology, Fig. 3 Excavations in front of the *mihrab* of the mosque of Songo Mnara (Kilwa Islands, Tanzania)

Zanzibar), Catherine Clark and Mark Horton unearthed the foundations of a Friday mosque from the twelfth century.

It was during the eleventh century that Swahili builders adopted coral to construct their mosques. This material was used for walls until the twelfth century. Its extraction was not easy, and it was thus used for fine sculptures around the *mihrab*. The sea coral was replaced by limestone coral from the thirteenth century. This fossil rock forms the geological substratum of the entire eastern coast. The blocks were taken from open-air quarries, not far from the construction site. The first buildings were assembled using coral stones cut in rectangular blocks and set in lime mortar. At the end of the fourteenth century, stone mosques became widespread and eventually reached large dimensions, such as that in Gedi, 26 m long. From this period, the walls of the buildings were erected using a formwork of irregular stones embedded in lime mortar.

The Islamization of the African coasts was connected with Shi'ite communities from the Persian Gulf, and the oldest-known Swahili *mihrab* is indicative of these transoceanic influences. The *mihrab* of Kizimkazi on the island of Zanzibar is decorated with a passage from the Qur'an and bears the date 1107 (Flury 1922). The niche is decorated with floral kufic inscriptions along the capitals and within the apse. The islands of Bahrain and Zanzibar share this particular type of *mihrab* (Kervran 1990: 31, 48). In Bahrain, the Suq al-Khamis Mosque has a floral kufic inscription with a shi'a inscription mentioning the Twelver imams.

International Perspectives

Ports and Maritime Trade

Archaeological research on the Swahili is linked to navigation and trade in the Indian Ocean. Mogadishu, in Somalia, formed the northern boundary of the Swahili cultural area. The stretch of coast between this city and the Lamu archipelago is nicknamed the *benadir*, an Arabic-Persian word meaning "the coast of ports." The southern boundary of Swahili culture is the Bay of Sofala in today's Mozambique. It is within this area that Muslim traders came to search for gold. In the medieval era, Arab geographers divided the African coast into four regions: sailors first reached the land of the barbarians or *Bilâd al-Barbar*; next, they arrived at the land of Zanj or *Bilâd al-Zanj*, situated between the Somali river Shebele and the island of Zanzibar; then, they

arrived at the land of Sofala, *Bilâd al-Sufâla*, a zone between the mouths of the Zambezi and Limpopo rivers, also called Sofala the Golden or *Sufâla al-dhahab*; and finally a number of sailors went all the way to the mysterious land of *Wâk-wâk*, the large island of Madagascar. Long-distance trade is thus at the center of Swahili culture. Coastal cities formed an interface between the African highlands and the merchants of the Indian Ocean.

East Africa exported mostly raw materials; these commercial products are mostly invisible to archaeologists, comprising organic materials such as ivory, skins, cloth, or wood. One of the most prized products was ivory. Tusks were generally sold raw throughout the cities of Vumba, Mombasa, Malindi, Lamu, and Pate. The polishing of ivory occurred in the importing countries, for example, in Fatimid Cairo. In addition to income earned from trade and fishing, Swahili urban elites owned plantations enabling them to meet their needs. Populations from the coastal hinterland provided other agricultural products, from hunting or gathering. Various Swahili agricultural products were exported, such as coconut and rice. Archives from the customs of Aden, dating from the fifteenth century, mention imported rice from Kilwa, but Neville Chittick argued that rice was only transited via Kilwa and actually came from Madagascar. Cloves were introduced in Zanzibar in 1818 by Sultan Sa'îd and became the principal export of Pemba and Zanzibar. Mangrove timber was exported in large quantities to countries in the Persian Gulf, under the Arabic name of *saj* or *mwangati* in Kiswahili. The Swahilis also traded woodwork, such as doors or sculptured pediments, to Oman and Kuwait.

Al-Idrîsî speaks of several large iron-mining centers located between Malindi and Mombasa. Iron might have been the primary source of income for this region, and India may have imported large quantities of the metal to make steel weapons (Freeman-Grenville 1962: 19-20). The author's research in Gedi confirmed that iron production was very important in levels dating from the twelfth to thirteenth century. According to Muktahar ibn Tâhir al-Maqdisî, the Zanj country provided the Arabs with a lot of gold in the tenth century. The profits from trade played a significant role in the prosperity of the kingdom of Great Zimbabwe which operated many mines. The mined gold was sent to Sofala, a vassal locality in Kilwa Kisiwani from the twelfth century. The gold was redistributed by Kilwa, which thus held a monopoly until the fifteenth century. In 1501, Cabral boarded and searched two boats in Kilwa filled with gold (Freeman-Grenville 1962: 59-60). The "yellow metal" became the main African product of interest to the Portugese who later settled in Mozambique in the hinterland of Sofala (Horton 1996: 383). African gold, but also rock crystal, were raw materials that were in high demand under the Fatimids. Elements of rock crystal were found at several sites on the Swahili coast, in Gomani on the island of Tumbatu, in Gedi, Manda, and Shanga. This mineral is foreign to coastal areas and came from the Kerio Valley and the Rift Valley.

The trade in humans was another aspect prized in Arab countries. Before the fifteenth century, most slaves came from Kenya and from the Horn of Africa, where the ports of Zeyla and Berbera were reputed for this merchandise. Few Portuguese texts concern the sale and export of slaves between the sixteenth and seventeenth century. Yet Ibn Battûta recounts that the holy war against Kilwa infidels was undertaken primarily to find slaves, more likely to represent trading on a commercial than a domestic level. The quantity of slaves exported to the Persian Gulf must have been considerable because a reported 500,000 outraged Zanj attacked al-Basra in 869 and retreated to al-Mukhtâra in lower Iraq, where they were defeated in 883. The quest for slaves had begun under the Sassanids in the fifth century and became industrial in scale in the nineteenth century under the Sultanate of Zanzibar. Slave traders collected slaves in the ports of Masselage in western Madagascar, in the archipelago of Kerimba in Mozambique, Kilwa Kisiwani, or in Zanzibar. The *dhow*s then returned through Pate all the way to Jeddah and Mocha in the Red Sea. Some slaves were shipped back to Turkey, Muscat, Sur, and to the Sindh. The French islands of Bourbon and Mascarene (Mauritius and

Swahili Archaeology, Fig. 4 Pillar tomb of Kunduchi with Chinese porcelains, Tanzania

Réunion) exchanged many slaves for firearms especially between 1775 and 1804. Following the British ban on this trade, the Omani slave ships took refuge under the French flag from 1873 to 1891.

Swahili communities imported a lot of goods from the Persian Gulf. In the middle of the ninth century, the port of Siraf became a major trading center with East Africa. Al-Masûdî notes that vessels from Siraf left for Sofala and Waq-Waq (Madagascar). From the thirteenth to the fifteenth century, Africa was connected to other centers, in Yemen with Aden and in India with the Gujarat and the Deccan. This trade continued after the Portuguese intrusion. Finally during the nineteenth century, trade was largely controlled by Oman. The Swahili imported a lot of manufactured products, including Islamic and Chinese ceramics, glass, metalwork, and even carved stones for their mosques and cemeteries (Pradines 2010: 221-237) (Fig. 4). The study of these imports, in particular the ceramics, allows us to draw a new history of the Swahili coast and its contacts with other cultures of the Indian Ocean world.

Future Directions

Urbanization and the Genesis of the Swahili House

The majority of Swahili towns were allegedly founded between the tenth and twelfth centuries. The first stone buildings date to the tenth century in Shanga and to the end of the eleventh century in Kilwa and Gedi (Horton 1996; Pradines 2010: 27). The growth of the population in the fourteenth century created demographic pressure, which led to the abandonment of some sites and the creation of new towns. From the fifteenth century onward, Swahili towns were surrounded by stone walls, as notably at the Kenyan sites of Pate, Ungwana, and Gedi (Pradines 2004: 328-334).

Swahili Archaeology, Fig. 5 Survey of the stones houses of Gedi (Malindi, Kenya)

These urban fortifications gave the developing political power some security and reinforced the distinction between town and country. The emergence of domestic architecture in stone differentiated from traditional African houses symbolized hierarchy among the Swahili community. Only rich merchants and individuals from powerful lineages could live in stone houses. This change in habitation is confirmed by observations at Gedi where architecture profoundly altered at the beginning of the fifteenth century.

The restructuring of the cities on the east coast is related to the apex of Swahili trade. This widespread phenomenon has been observed from the Lamu archipelago, to northern Kenya and all the way to Kilwa in southern Tanzania. In the sixteenth century, many Swahili ports were abandoned by commercial traffic because of the Portuguese intrusion in the Indian Ocean. The towns were then protected by forts, such as the Portuguese fort of Mombasa or the Omani fort of Kilwa. From the eighteenth century, the Omani presence led to a renaissance in Swahili architecture and urbanism. The towns gained height with multistorey buildings.

The genesis of the Swahili house is still subject to discussion, between supporters of a local evolution, including Mark Horton and John Middleton (Horton & Middleton 2000: 119), and those favoring exogenous influences, including Linda Donley-Reid, Abdul Sheriff, and the current author (Donley-Reid 1990: 114-126; Sheriff 2002: 76; Pradines 2004: 111-112). This new technology was first reserved for mosques and palaces, before becoming more widespread, being used for a group of large private houses in the fourteenth century. Stone buildings became emblematic of the power of the *wa-ungwana* patricians/nobility and represented the very notion of the Swahili city (Fig. 5).

Mark Horton has argued for continuity in the evolution of Swahili houses, from traditional earth-built dwellings to large houses in stone, in terms of consistent traits in the plans of the buildings and in the use of space. Unfortunately, examples prior to the fourteenth century are virtually nonexistent. A further problem is the existence of very similar architecture in Yemen, the occupation of which by Indian merchants is confirmed by historical sources. Horton also asserts that stone architecture is a local invention reinforced by Fatimid technologies from the Red Sea. He cites multiple examples of architecture in coral limestone in the Dahlak Islands, Er Rih, Aydhab, and Suakin. However, this technology was not only found on Egyptian and Sudanese shores, with examples existing on the coast of the Hadramaut and in the Persian Gulf, in Bahrain,

and in Qatar where coral blocks are called *hagar al-bahr*, or "stones of the sea."

It is more likely that domestic Swahili architecture from the fifteenth century was strongly influenced by Indo-Persian cultures between the thirteenth and fourteenth centuries. Two elements reflect the role of India in the genesis of Swahili habitations: the division of space into narrow, parallel rooms and the use of niches for wall ornamentation. Linda Donley-Reid has identified three types of Indian house, which are very similar to Swahili habitations. The southern region of Gujarat, from Mumbai to Broach, exhibits houses with two or three parallel rooms and a lateral circulation zone. Women live at the back of the building, which has an exit separate from the main entry situated in the façade. Houses to the north of Gujarat, from Broach to Cambay, have three parallel rooms with a central passage. There is no door at the back, and the walls are decorated with niches in a style very close to that found in Lamu.

In Gedi, the plans of the houses in the northeastern area are very significant: they present narrow, elongated rooms, all parallel except for one forming a side corridor. Some rooms have symmetrically arranged niches in the walls. As just noted, the room layout and the wall decorations are characteristic of Gujurati homes. Domestic units in Shanga had niches during the fourteenth century (Horton & Middleton 2000: 118). These cavities were organized in a symmetrical fashion, with a balancing of space still found in Swahili houses today. From this, we infer that the organization of central secluded rooms (*ndani*) and of niches in modern, traditional Swahili homes dates back to the fourteenth century. The origin of this form of niche comes from Gujurat and not from the African coast, as ornamentation with niches is found in Zabid and Mocha in Yemen, towns strongly influenced by Indian architecture from Surat. Niches found inside homes in Gujurat and Kutch obey a certain harmony, a regularity of space. This balance is based on symmetry of architectural elements. The plaster niches in Indian Bohras' houses are like miniature *mihrab*s; the alcoves, called *gokala*, are often associated with magical squares containing the name of Allah.

In conclusion, it must be said that archaeological research on Swahili settlements is still in its infancy. To progress further, what is needed is collaboration between specialists working in Africa, Arabia, Persia, India, and even China.

Cross-References

- ▶ Abungu, George H.O.
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Chami, Felix Arkard
- ▶ Chinese Porcelain: Late Ming (1366–1644) and Qing (1644–1911) Dynasties
- ▶ Fortifications, Archaeology of
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Iran: Islamic Archaeology
- ▶ Iraq: Archaeological Heritage
- ▶ Islamic Archaeology and Art History
- ▶ Maritime History
- ▶ Medieval Archaeology
- ▶ Medieval Urbanism
- ▶ Nationalism and Archaeology
- ▶ Urban Archaeology

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Sweden: Cultural Heritage Management

Johan Hegardt
Department of Cultural History and Collections, National Historical Museum, Stockholm, Sweden

Introduction

Heritage management in Sweden has a long history dating back to at least. This history can be viewed from two perspectives – continuity or discontinuity. The first perspective is the official view, but not without problems. When viewed as a continuing enterprise, heritage management becomes a heritage in itself. This keeps the power over heritage linked to authorities claiming long historical continuity, which conserves the management of Swedish heritage. I will therefore approach Swedish heritage management from the second perspective, namely, discontinuity. Viewed from this point, heritage management can be seen as contextual and dynamic and closely linked to an active society that has a need and desire for heritage because of political and social reasons. Heritage management in Sweden is the history of its legislation, of those institutions that have been and are responsible, and the country's position in a broader context, at first in a European context and later in a global context. Legislation is always related to moral and norms, to identity and being, to power and majority (Derrida 2005). Behind the explicit civic structures of heritage legislation discussed here, a complicated and often hidden

Sweden: Cultural Heritage Management, Fig. 1 The Museum of National Antiquities, 1967. Social Democratic minister of Culture Olof Palme with scull of Stone Age "ancestor" in his hand. Palme later became Prime Minister and in 1986 he was assassinated on the streets of Stockholm (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

idea of ethnic continuity and identity can be found – the idea of a pure Swedish race and a united nation (Hegardt 2011a, b; Hegardt & Källén 2011; Svanberg in press) (Fig. 1).

Definition

Swedish heritage management can be classified into three historical contexts, Heritage as myth, Heritage as genealogy, Heritage as science and nation-narration, and a fourth – Heritage in a cosmopolitan world. Heritage is represented differently in each of these categories. Even the idea of Swedishness and a united nation is expressed differently, because of social, religious, and political needs and desires. Throughout history, many different institutions, academic subjects, museums, and authorities have been engaged in the management of Swedish heritage. The leading actor today is the National Heritage Board founded in the 1930s, but present legislation and centralized power is questioned and debated.

In 2005, I conducted a study with the department Sociology of Education and Culture at Uppsala University to find out who studies cultural historical subjects and heritage management related subjects at the different universities in Sweden (Hegardt 2005; Hegardt & Källén 2011). It turned out that the majority of the students came from native Swedish middle-class families with a desire for cultural capital. Finding a job in the heritage management system was the first wish for these students. This means, in short, that these individuals will reproduce and guard the narratives of Swedish heritage and history, because it is through these narratives that they gain their cultural capital and because they will do this inside a system organized by the State and civil society. The narratives thus become State governed and managed by people employed by the different authorities.

Swedish heritage spans over several millennia, starting with Stone Age remains dating back to at least 14,000 BP and ending in present-day industrial structures, for example. However, cultural heritage cannot be separated from nature and intangible and material cultural heritage exists within environmental contexts. Heritage thus becomes a metaphysical concept inscribed into structures, things, expressions, memories, and nature and has, because of this, been used and is used as a barrier against the outside world. Today, it, in a very problematic way, defines and encloses the Swedish and becomes a safe harbor in a dynamic world (Fig. 2).

Sweden: Cultural Heritage Management, Fig. 2 The Museum of National Antiquities, 1967. "Stone Age Swedes" (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

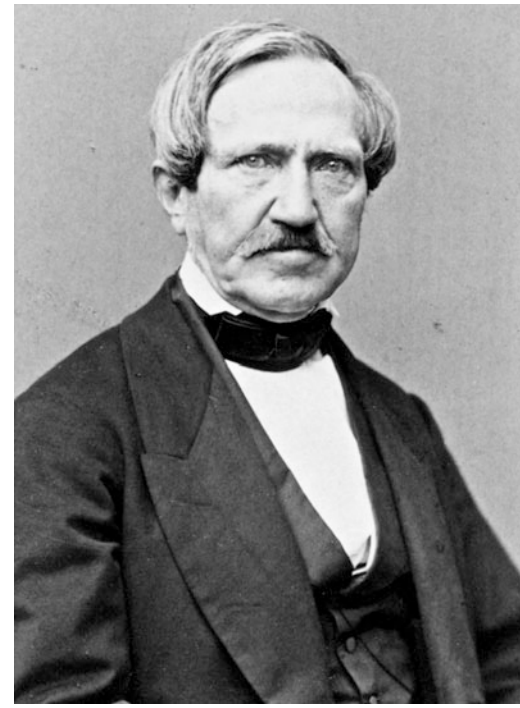
Historical Background

Heritage as Myth: Seventeenth Century

Swedish heritage management has an ambiguous origin in the laws of the provinces from the fourteenth and fifteenth centuries (Swedish: landskapslagarna). Some of these laws settled what should be done with ancient objects found on someone's property (Jensen 2002). However, there existed no clear historical narrative connected to the laws or to the ancient objects and monuments. The point with these medieval laws was nevertheless to secure the present rather than to guard the past. In the mid-sixteenth century, Archbishop Olaus Magnus (1490–1557) stressed that ancient monuments should be preserved since they were constructed with the aim of commemorating the deceased or an important event (Jensen 2010: 153). In 1523, Sweden became an independent Protestant State after 500 years of Catholic governance, Danish oppression, and the Hanseatic League's control over the economy, according to established historical narratives. Being Catholic, Magnus was in a difficult situation. He had to connect himself to the new society with the help of ancient monuments and historical myths. (It did not help. He died in Rome.) For Magnus and others, heritage signified a mythological and heroic past, present in the landscape as symbols. The present past became useful in the political, religious, and social context of the time. In 1630, Johannes Bureus (1568–1652) was appointed Riksantikvarie (Custodian of Heritage). Being the first, he has had 29 successors up to present date, out of which two have been women. The first explicit heritage legislation was published in 1666. Sweden was a major imperial power in the Baltic region at that time, and myths of Swedish history are presented in thick volumes emphasizing patriotic perspectives and heroic narratives. The most bizarre of these was published in 1675 by Olof Rudbeck (1630–1702), claiming that Sweden was the lost Atlantis.

Heritage as Genealogy: Eighteenth Century

In 1753, Queen Lovisa Ulrika (1720–1782) founded The Royal Swedish Academy of Belles-Lettres with the purpose to encourage historical research, rhetoric, poetry, and the Swedish language. A few decades later, in 1786, King Gustav III (1746–1792) restructured his mother's Academy and moved Swedish language and literature to The Swedish Academy (later becoming responsible for the Nobel Prize in literature) (Jonsson 2003). The Riksantikvarie was linked to the new Academy, named The Royal Swedish Academy of Letters, History and Antiquities. A utilitarian approach, reason, and specialized historical research opened a new approach to heritage and history – genealogy and chronology. Historians such as Olof von Dalin (1708–1763) and Sven Lagerbring (1707–1787) questioned, together with a new generation antiquarians, earlier historians for not being scientific enough. The chronology of the nation and the genealogy of the King and the nobility became important. The legislation from 1666 was still at work and heritage was viewed as genealogical facts rather than symbols for a mythological and patriotic past.



Sweden: Cultural Heritage Management, Fig. 3 B. E. Hildebrand, the grand old man of Swedish heritage management (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

Heritage as Science and Nation-Narration: Nineteenth Century and Early Twentieth Century

Sweden lost Finland to Russia in 1807, which was a traumatic blow to Swedish's self-confidence. The country was also in need of a new king. In 1814, Sweden gained Norway from Denmark, a great triumph. (Norway became an independent state 1905 and took with it an enormous amount of oil). During the nineteenth century, the Parliament obtained more power. The capacity to control and organize the society through civil servants had, however, been significant for Sweden since the mid-seventeenth century. Nevertheless, during early nineteenth century, new sciences such as archaeology, ideas of progression launched by German Enlightenment philosophers, such as Hegel and Kant, positivism and natural science, the idea that the nation is an ethnic and linguistic entity proposed by, for example, Fichte and Herder, contributed to chronological studies of Swedish heritage. An important boost was given to this process by the Dane Christian Jürgensen Thomsen's (1788–1865) publication of his Three Age System, featuring the Stone Age, the Bronze Age, and the Iron Age (Thomsen 1836). In the late nineteenth century, heritage management became centralized and related to bureaucratic institutions and museums in Stockholm, a process criticized by private actors in the provinces. The heritage legislation from the late sixteenth century was rewritten and will again be rewritten several times during the twentieth century to adjust to a changing society and centralized bureaucracy (Fig. 3).

Bror Emil Hildebrand (1806–1884) was impressed by Thomsen's museum and reorganized the Historical Museum in the university city of Lund after Thomsen's Three Age System. In the early 1830s, Hildebrand was called to Stockholm to help Riksantikvarie Johan Gustaf Liljegren (1791–1837) at the

Sweden: Cultural Heritage Management, Fig. 4 The Museum of National Antiquities, 1943. A place for consensus and compromise (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

Museum of Antiquities, a small museum in the Royal Palace. In 1837, Hildebrand was appointed Riksantikvarie and began to rework the museum following the same principles he used in Lund. In 1845, the Parliament decided to build a new National Museum and Hildebrand responded immediately with a memorandum (Hildebrand 1845) to the Academy explaining how the new museum should be organized. The National Museum stood finished in 1866 and the Museum of National Antiquities was placed on the ground floor. It followed Thomsen's ideas in detail, with the Three Age System as the main chronological principle. The galleries illustrated, like pictures in a book and in a proper chronological order, the progression of the nation. Narration was crucial when explaining how the nation has come into being through its heritage and Hildebrand and later Oscar Montelius (1843–1921) and Hildebrand's son Hans Hildebrand (1842–1913) never ceased to emphasize social and cultural progression. It was important to show a united people – one race – through prehistory and history. The museum would become the center for heritage management and archaeological research until the late 1930s.

However, already in the 1920s, the Museum of National Antiquities was bursting at the seams, being overfilled with objects. The bits and pieces of the nation coming into being, once glued together, were now slowly falling apart. At the same time, the Swedish society went through political and economical crises. According to Nina Witoszek (2002), these crises became a proof of temporariness, eliminating the idea of a secure and infinite historical process. To meet these crises, a welfare society – the folkhome – was introduced. Europe was viewed with skepticism as neofeudal, patriarchal, and unequal. Conflicts and tensions were to be avoided by the "imperative of harmony" and the society was to be built on rationalism, compromises, and consensus. According to Witoszek, Sweden from that time defined itself as the nation of goodness. Heritage management and the museums followed (Fig. 4).

Per Albin Hanson (1885–1946), the leader of the Social Democratic Party, introduced the welfare society and the "folkhem" (folkhome), and in the mid-1920s, Sigurd Curman (1879–1966) took over the Museum of National Antiquities, launching new museum policies and heritage politics based on the "folkhem." It was also decided that a new museum must be built, standing at the end of the 1930s. It was time to glue the bits and pieces of history back together again, this time on

Sweden: Cultural Heritage Management, Fig. 5 Sigurd Curman in his office 1926. The painting behind Curman shows Gutav II Adolf, a seventeenth century hero King (Courtesy of Riskantikvarieämbetet. Image © Riksantikvarieämbetet)

the principles of the folkhome, which was consensus, compromise, rationalism, and the society of goodness. To make this happen, heritage management and museums had to be reorganized. Until that time, the Riksantikvarie had been associated with the museum, but Curman introduced a new authority, the National Heritage Board (Riksantikvarieämbetet). The Board and the Riksantikvarie became responsible for the Nation's heritage, and the museum was made responsible for the collections of antiquities. The Academy was a third important actor (Fig. 5).

The Museum of National Antiquities worked with an advanced chronological perspective illustrating the united Swedes and how their special race came into being (see also Svanberg in press). In the 1920s and 1930s, these perspectives were emphasized and moved into heritage management under the authority of the Heritage Board. National consensus based on rationalistic epistemology became important, and heritage legislation and organization was founded on civic organization rather than on an explicit ethnic or linguistic principle. Nevertheless, the capacity of civic society to organize heritage is related to the ethnic and linguistic idea of a united Swedish race. Swedishness has been inscribed and narrated as heritage with the aim of guaranteeing stability and the homogenous nation, first disturbed when faced with cosmopolitan diversity and global economies in later decades of the twentieth century. Color consciousness (Appiah & Gutmann 1996) in Sweden is based on the idea that Swedes are a stable historical race of blond and blue-eyed people with a common heritage. Implicit racism is the outcome of such perspectives, becoming a practical reality (if the Sami are not included) in the late twentieth century due to increasing immigration to Sweden. Through heritage and the "good" society, Swedes have viewed themselves as superior without

having to face the people classified as inferior from a standpoint of a racialized discourse. When these "inferior" people suddenly turned up in Sweden as immigrants, Sweden has had to face itself, its history, and its idea of heritage. Swedish public-service authorities have rightly been accused of having profound problems with structural racism (de los Reyes & Kamali 2005; Pred 2000; Hegardt & Källén 2011).

Key Issues/Current Debates

The key issue for heritage management in Sweden since the early seventeenth century has been the definition of heritage as a state-controlled signifier of Swedishness, but without explicit narratives, heritage is rather pointless. Narratives produced by scholars in state-governed universities, academies, and museums have – through history – shaped the idea of a united nation, one people, and one race. The latest debate on archaeology and heritage management in Sweden has been published in Current Swedish Archaeology (Hansson & Källén 2010, 2011). Commercialization of contract archaeology and the relationship between heritage and a right-wing party that has come into parliament has been discussed. In both cases, it is the relationship between heritage and Swedishness, the historical continuity and authority of heritage management, the society as a stable united nation of one people and one race that is the crucial problem. The critical point made is that heritage management and archaeology can no longer build its existence on the idea of national continuity. The question is what to do. Heritage authorities, with their idea of a long historical continuity, the political parties, and the parliament, have few answers to the problem. Yet, heritage as a national and ethnical signifier has shown to be both obsolete and dangerous (Hegardt 2011c).

International Perspectives

As mentioned, Swedish heritage management, archaeology, and the legislation is under pressure in a changing world. Immigrants and cosmopolitan movements play their parts, but a more open Swedish society, the market economy, and political and economical crises have been influential as well. Continuity and Swedishness does not work in a society marching into a global world with cosmopolitan responsibilities. The uncertainty that has followed has opened for right-wing parties, but also for other political groups, local organizations, museums and authorities, and the public to appropriate heritage in line with the old idea of historical continuity, a united nation and Swedishness, and building their arguments on traditional heritage narratives, for example, by replacing the word race with the word culture and striving to enclose Sweden, regions or local areas through its heritage.

Future Directions

Heritage management in Sweden must find a new definition of what it means to be Swedish. From my point of departure, the word "cosmopolitan" (Appiah 2007) describes the situation best. If one looks closer into what is called Swedish heritage, one finds that only a small part of it can be defined as Swedish in accordance with the national definition of the word. Material heritage has been brought to Sweden from all parts of the world by people from all parts of the world. Historical buildings and other structures have been built by workers and paid for by wealthy people who have come from all parts of the world. Intangible heritage is a consequence of people meeting with people from many parts of the world. Every museum in Sweden is filled with objects that strengthen this perspective. What is needed is a definition of being Swedish that expands the boarders of the nation-state, perhaps in line with Bhabha's (2004) ideas of hybridity. Nonetheless, true and authentic Swedishness and heritage only exists inside a very narrow and imagined construction, and as Appiah (2007) has stated it: Cosmopolitanism is not hard work, repudiating it is.

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- ▶ Poland: Cultural Heritage Management
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Swedish Institute of Classical Studies at Rome

Barbro Santillo Frizell[1] and Simon Malmberg[2]
[1]Svenska Institutet i Rom, Rome, Italy
[2]Department of Archaeology, History, Cultural Studies and Religion, University of Bergen, Bergen, Norway

Basic Information

The Swedish Institute of Classical Studies at Rome (Via Omero, 14, 00197 Rome, Italy, http://www.isvroma.it) is a research institute devoted to classical studies with a special emphasis on archaeology. It is the base for Swedish archaeological excavations and academic activities in Italy. In collaboration with Swedish universities, the Institute gives annual courses in classics, art history, and related subjects. The Institute is located in central Rome and has a research library with c. 60,000 volumes. Twenty guest rooms and apartments are at the disposal of visiting researchers and holders of scholarships. The Institute is a state-financed foundation, with its board and secretariat situated in Stockholm, Sweden. The Institute's activities in Rome are supervised by a director educated in classics and a vice director trained in art history.

Major Impact

History, Facilities, and Activities of the Institute

The Institute was founded in 1925 on the initiative of Swedish Crown Prince Gustav Adolf (1882–1973), who was a professional archaeologist with a special interest in classical studies. As King Gustav VI Adolf, he maintained his interest in the Institute's activities, not least the archaeological excavation projects, and his lifelong commitment has been of the utmost importance to the institute.

The original aim behind the foundation of the Institute was to enable Swedish university students, and teachers in classical languages, to study the ancient topography of Rome and Italy, as well as the art and monuments of the same. A main objective of the Institute has always been its educational activities, as manifested in annual courses given to students from Swedish universities. These include courses in archaeology (offered since 1926) and in art history (offered since 1959), as well as other, more temporary, courses.

The Institute awards annual scholarships to support major research in Rome during the academic year in the subjects of architecture, art history, archaeology, philology, and conservation and heritage research. Thanks to a donation from Fondazione Famiglia Rausing, the Institute has broadened its research in other humanities as well, such as the Italian language, comparative literature, social anthropology, history, and the aesthetic disciplines.

The library is primarily devoted to archaeology, classical studies, and art history. The publication series Acta Instituti Romani Regni Sueciae was founded in 1932, and in 1992 the series Suecoromana, specializing in art history, saw the light. Since 2004 the Institute also possesses an on-line publication series, called Projects and Seminars. In collaboration with the Swedish Institute in Athens, the Institute publishes an annual journal called Opuscula.

Since 1940 the Institute has been located on Via Omero 14 in the Villa Borghese Park in Rome, in an area nearby several other international institutes. The Italian government placed the site at the disposal of the Institute for free, on condition that Sweden make the grounds available for the Italian Cultural Institute in Stockholm. The Institute building was designed by the famous Swedish architect Ivar

Tengbom (1878–1968), while several distinguished Swedish designers and artists were responsible for the furniture, textiles, and works of art that furnish the Institute. A new guest wing was added in 1964, an auditorium in 1988, and a new library wing in 2008.

Archaeological Research

The Institute has since its foundation been devoted to the study of Italy's ancient cultures. The research undertaken may be generally divided into following areas: Italic prehistory, Etruscan culture, the topography of the city of Rome, Pompeii, landscape studies, and the cultural heritage of Mediterranean antiquity.

The study of central Italy's prehistoric cultures, primarily the Etruscan and Latin cultures, has long been at the center of the activities of the Institute. The first Swedish excavation in Italy took place in the Latin town of Ardea south of Rome in the 1930s. The period after World War II saw a dramatic increase in the archaeological activity of the Institute, with important excavations in the Etruscan towns of San Giovenale and Acquarossa and the prehistoric site of Luni sul Mignone, in the years 1956–1978, with the aim to explore settlement patterns in Etruria. Moreover, in the 1970s, a joint Nordic excavation was carried out at Ficana south of Rome. Since then, more limited fieldwork has been undertaken, primarily in the form of surface survey and aerial photography.

The Institute also has pursued research on the ancient city of Rome and its hinterland. An important study of the Republican city wall of Rome was followed in 1939–1954 by excavation of the earliest phases of the Forum Romanum and, in the 1980s, by a joint Nordic exploration of the Temple of Castor and Pollux in the Forum Romanum. Other archaeological projects have focused on documentation and survey by nondestructive methods, complemented in some cases with limited excavation. Fieldwork of this character has been done at San Lorenzo in Lucina and the Lateran Baptistery in central Rome and at the imperial villa at Prima Porta on the outskirts of Rome. In the city's hinterland, joint Nordic excavations were undertaken at the imperial villa at Lake Nemi. The recently concluded research project Via Tiburtina studied the road with this name between Rome and Tivoli. It was an interdisciplinary project involving architecture, urban planning, archaeology, history, art history, and conservation and cultural heritage which contributed new perspectives on communication, cultural history, as well as urban and suburban development from the Bronze Age until modern times.

Since 2000 the Institute has pursued an archaeological project at Pompeii, aiming to analyze and comprehensively document a residential block, Insula V 1. Previously excavated and non-published areas are being documented and systematized to make this information available in a new publication and on-line (www.pompejiprojektet.se).

In recent years, the Institute has been focusing more on questions concerning cultural heritage and classical reception. Within this area, research has been undertaken on the preservation, dissemination, and understanding of ancient remains and cultures in modern society.

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Sweet Potato: Origins and Development

Adelia C. Bovell-Benjamin
Department of Food and Nutritional Sciences, Tuskegee University, Tuskegee, AL, USA

Basic Species Information

The botanical name for the sweet potato is *Ipomoea batatas* [L.] (Lam). The most common indigenous names for the sweet potato tuber in Central and South America include *batata*, *boniato*, *camote*, *batata doce*, and *apichu*. From Peru, Hawaii, and Samoa to the Philippines, sweet potato is known by a broad range of cognates: *kumar*, *uala*, *umala*, and *kamote*, respectively. The sweet potato is called *kumara* in New Zealand. Eastern Africans know the sweet potato as *cileraabana*, "protector of the children," and it is called *ubhatata* in South Africa. It is known as *kara-imo*, "Chinese potato" in southern Kyushu, and in most other parts of Japan, it is known as *satsuma-imo*, "Japanese potato."

Timing and Tracking Domestication

The sweet potato is considered to originate in the New World, although its precise origin is not well defined. Archaeological remains of the storage roots, or tubers, of sweet potato show it was long used as a food source by the inhabitants of Peru. Preserved remains and samples from ancient tombs and burial sites have yielded cloth tapestries and ceramic vessels that occasionally bear woven images and artistic representation, respectively, of the sweet potato (Sauer 1951). Steinhold (2008) states that Peruvian sweet potato remains date back to 10,000 years ago in South America. Towle (1961) reports that dried sweet potato roots have also been found in more recent grave sites at Ocucaje dating to CE 1–600. Alternatively, Austin (1988) proposed a more eastward origin for the sweet potato between the Yucatán Peninsula of Mexico and the Orinoco River in Venezuela.

The sweet potato was domesticated roughly 10,000 years ago in a period when environmental and climatic conditions were completely different to today. During the early postglacial period, several factors, including increasingly arid climate and decreased natural resources, influenced the change from hunting and fishing to the planting of food crops. This intervention led to the domestication of the wild species of sweet potato by humans.

Commercial cultivation of sweet potato began in Hawaii in 1849. However, Asia is now the largest sweet potato-producing region in the world, with an annual production of 125 million tons. China produces roughly 80 % of the world's sweet potato (117 million tons annually), making it the leading supplier of sweet potatoes in the world. Latin America and North America produce about 1.9 million and 600,000 t annually, respectively.

Today, the sweet potato is a staple food source for many indigenous populations in Central and

South America, Ryukyu Island, Africa, the Caribbean, the Maori people, Hawaiians, and Papua New Guineans. The sweet potato contains many nutrients including protein, carbohydrates, minerals (calcium, iron, and potassium), carotenoids, dietary fiber, and vitamins (especially C, folate, and B_6); it contains very little fat and sodium. The chemical composition of the sweet potato varies greatly according to genetic and environmental factors. Protein contents of sweet potato leaves and roots range from 4.0 % to 27.0 % and 1.0 to 9.0 %, respectively. The root has high concentrations of anthocyanin and β-carotene.

Botanical Classification

The sweet potato is a creeping dicotyledonous plant with the following systematic classification (Huamán 1999):
Kingdom: Plantae
Division: Magnoliophyta
Class: Magnoliopsida
Order: Solanales
Family: Convolvulaceae
Tribe: Ipomoeae
Genus: Ipomoea
Subgenus: Eriospermum
Section: Eriospermum
Series: Batatas
Species: *Ipomoea batatas* (L.) Lam.

Within the Series Batatas, there are 13 wild species, which are considered to be related to the sweet potato (Austin & Huamán 1996). The number of chromosomes in the sweet potato plant is 2n = 6x = 90, indicating it as a hexaploid plant with a basic chromosome number x = 15. Although the Series *Batatas* constantly undergoes revision, it contains roughly 12 other species, which are predominantly diploid (2n = 2x = 30) and a few tetraploids (4x = 60), which are wild.

Polyploid species are *I. cordatotriloba* with 2x and 4x and *I. trifida* with 2x, 3x, 4x, and 6x (Huamán & Zhang 1997).

There are diverse theories regarding the evolution of *I. batatas*. For example, Japanese researchers have considered it an autopolyploid derivative of *I. trifida*. On the other hand, American researchers posit an allopolyploid origin involving *I. trifida* and an unidentified tetraploid parent (Collins 1995). Zhang et al. (1998) suggests northern Peru and southern Ecuador as a secondary center of sweet potato diversity for *I. batatas*. Other important centers of diversity exist in sub-Saharan Africa, Papua New Guinea, and Indonesia. The geographic distribution of the wild species of Series Batatas is within the Americas, with the exception of *I. littoralis*, which is found in Australia and Asia. The cultivated species *I. batatas* includes plants that are very variable in their morphology.

Currently, thousands of cultivars are grown throughout the world and are unique to countries or to smaller regions within countries. All cultivars are more or less sweet flavored. Sweet potato cultivars exist in many colors of skin and flesh, ranging from almost pure white through cream, yellow, orange, or pink, to a very deep purple. For example, white- to cream-colored flesh sweet potatoes are common in the South Pacific, Africa, the Caribbean, and most other developing countries. In contrast, sweet potatoes commonly consumed in the developed countries, normally have yellow to orange flesh. The commercial sweet potato varieties in Hawaii have white, cream, purple, and yellow to orange color flesh.

The sweet potato is among the world's most important root crops today, especially in the developing world. Information on its archaeology, distribution, and genetic variations in ancient times has given scientists a better understanding of how this crop evolved under the selective and protective influences of human.

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- ▶ Domestication Syndrome in Plants
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Switzerland: Upper Paleolithic Living Floor Investigations

Denise Leesch
University of Neuchâtel, Neuchâtel, Switzerland

Introduction

Upper Paleolithic living floors represent moments in the life of hunter-gatherers in the form of scattered finds and ephemeral features. Such sites are naturally vulnerable to later activities and well-preserved examples are rare.

Key Issues/Current Debates/Future Directions/Examples

Investigating how such a site was composed is primarily achieved by fine stratigraphic observation and later by refitting of the recovered flint artifacts, bone fragments, and fire-cracked rocks. The network of lines created by conjoined pieces whose location is recorded three dimensionally allows us to visualize intra-site dynamics and to establish the relative chronology of a site's use. Further crucial information on the time depth of an archaeological horizon is obtained by studying the period(s) of the year during which a site was occupied. Special attention is therefore paid to screening the excavated sediments in order to recover all fragile organic elements that may be used for season determination, notably the teeth from very young animals, less than one year old, and the remains from small hibernating mammals such as ground squirrel and marmot. Another major concern is to differentiate anthropogenic structures (e.g., pits and post holes) from natural features dug by burrowing animals (e. g., collared lemmings or narrow-headed voles). Similarly, it is important to correctly identify naturally accumulated stones or other geological phenomena that may evoke human-made structures. For that reason, the horizontal view of a living floor, however impressive it may be, needs to be completed

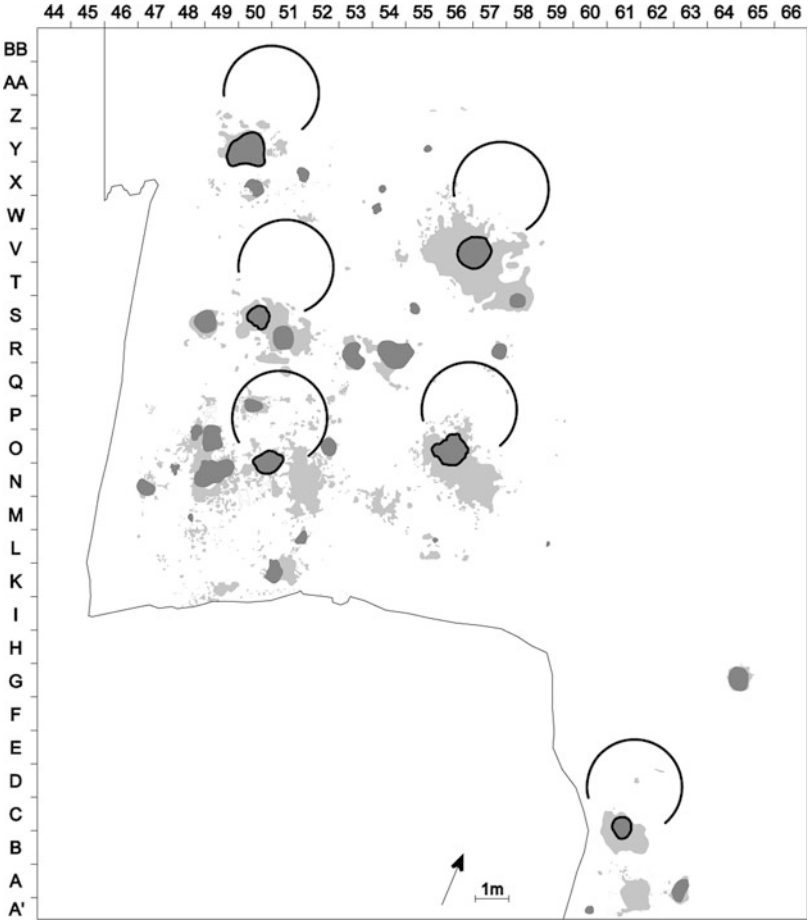
Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 1 The Magdalenian open-air site Monruz (Neuchâtel, Switzerland). The living floor yielded more than 40 well-preserved hearths and remains from at least 56 horses. The layer, though only c. 2–3-cm thick, has proved to be the result of repeated occupation episodes after successful horse hunts (© photo Y. André, Office et Musée d'archéologie Neuchâtel)

by detailed stratigraphic documentation of all structures and features observed on the surface.

Hearths are of special interest because they acted as focal points around which most of the technical, domestic, and social activities took place. In the vast majority of sites, however, charcoal has been destroyed and the soil shows no traces of heat action, thus making it difficult to precisely locate the combustion areas and other hearth-related structures. The approximate position of the hearths is then endorsed by confronting the spatial distribution of all thermally altered objects, notably flints, bones, and stones. In the rare cases of hearths still containing black sediment, the residues are screened separately in the laboratory and sorted under the microscope in order to extract all discrete remains such as charcoal fragments, charred seeds, bones, and fish scales, relevant for reconstructing the use of the hearths.

An exceptionally well-preserved Magdalenian living floor excavated in Monruz, at the edge of Lake Neuchâtel (Switzerland) in advance of motorway construction, offers an example of these techniques in action. The floor belongs to an open-air living and processing site dated to c. 15,500 years ago. Due to high stratigraphic resolution, it was easy in this case to follow the micro-topography of the thin covering layer (c. 2.5-cm thick), so exposing the intact living surface at the very moment of its abandon (Fig. 1). Since the detailed distribution of finds and features is of paramount importance, it is necessary to avoid treading on the excavated surface: excavators work from platforms supported by scaffolding (Fig. 2). Dense bone and flint scatters, together with extended patches of red ochre, were associated with more than 40 hearths of various types and dimensions (bowl-shaped and flat structures). By refitting several thousands of fractured stones, it could be demonstrated that all had been originally brought onto the site to cover hearths, so conserving heat – a combustion system characteristic of the Upper Paleolithic period. At that time, fuel was scarce and included only twigs of wood species, such as dwarf willow and dwarf birch, that grow low to the ground. By placing stones on top of the brushwood, the use of the hearths slowly released the heat they had accumulated during the short combustion phase. Stones that fractured in the heat were subsequently dispersed.

Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 2 In order to not disturb the original position of the finds, excavation of Paleolithic living floors is operated from a slightly elevated platform made from planks. The sediments are filled into buckets to be wet-sieved per ¼ of square meters, a well-adapted spatial unit for interpreting even discrete find scatters (© photo Y. André, Office et Musée d'archéologie Neuchâtel)



Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 3 Model of dwelling units based on the location of the large pit-hearths and charcoal scatters (Leesch & J. Bullinger 2012, fig. 11)

Switzerland: Upper Paleolithic Living Floor Investigations, Fig. 4 Transport of a portion of a Magdalenian open-air site. This unusual operation was entirely financed by the Swiss Federal Roads Office (© photo Y. André, Office et Musée d'archéologie Neuchâtel)

Through precise mapping of the activity areas, it could also be demonstrated that most of the hearths were of multifunctional character. Maintenance of hunting weapons was systematically performed less than 50 cm from the heat source, and sewing, as shown by the fractured bone needles, less than 1 m away. Hide treatment, probably because it required more space, took place at a slightly greater distance from the hearth. With the focus on the larger hearths, it was possible to propose living units within the overall pattern of debris (Fig. 3).

The Magdalenian site of Monruz is interpreted as a site that was occupied repeatedly following successful horse hunts. During each hunting event, only one to a maximum of three horses was killed. After the hunt, the whole group moved from its former camp location to this point where the horses were butchered and consumed. According to the number of killed animals, the occupation lasted for one to a few weeks. While staying at this place, diverse smaller species such as ibex, marmot, alpine hare, and various birds and fishes were hunted in the surrounding area and brought to the camp where they were processed and eaten in the immediate vicinity of the fireplaces. No more than three large hearths functioned simultaneously. Thus, what appeared at first sight to represent a single-occupation level was shown by careful excavation to correspond to a palimpsest created by repeated short habitation episodes during spring and summer.

So perfect an Upper Paleolithic picture did the Monruz deposit provide that part of it was extracted as a single block and removed out of the path of the motorway. It was enclosed in a container made from metal sheet piles and underlain by large pipes filled with concrete (dimensions of the block: 11 × 6 m × 2.5 m; weight: 400 t). The "box" was then loaded onto the platform of a trailer and taken to a new location where it could be studied without time constraint (Fig. 4).

Cross-References

- ▶ Excavation Methods in Archaeology
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Leroi-Gourhan, André
- ▶ Site Formation Processes

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Symposion

Fiona Hobden
Archaeology, Classics & Egyptology, University of Liverpool, Liverpool, Merseyside, UK

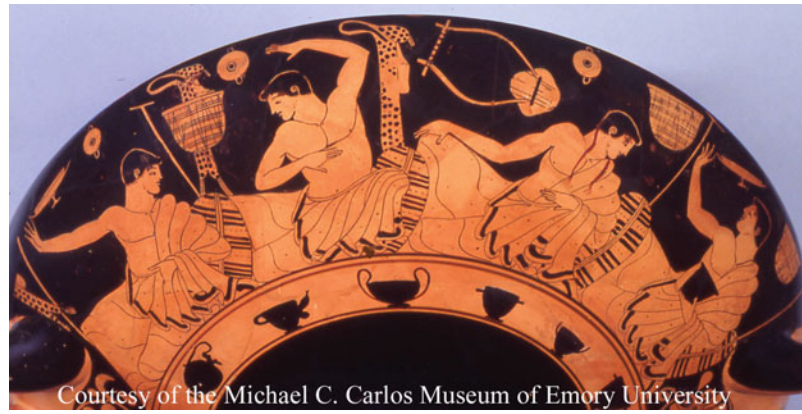
Introduction

Since the 1980s, the "symposion," or drinking party, has been studied intensively as a major socio-political phenomenon in ancient Greece. Its origins probably lie in the fusion of local drinking culture with practices learned from the Near East in areas where trade opened up not just the transfer of goods but practices and ideas. However, as part of an Archaic Greek culture it developed its own distinctive rituals, forms, and functions. To understand its sociological, political, and psychological dimensions we must look at written, archaeological and iconographic material together.

Definition

"Let us drink!" With this opening invitation, the late seventh/early sixth-century BCE poet Alcaeus from the island of Lesbos (fr. 346) encapsulates the essence of the symposion imbedded in the name: to drink (*poteô*) in company (*sun-*, "with"). As the poem continues, further features emerge. With night only a fraction away, a beloved youth is instructed to take down large painted cups. Reminded first that the god Dionysus gave care-banishing wine to mankind, the boy is urged to fill them up to the brim with one measure of water to two of wine, as one cup jostles with another. Alcaeus' commands draw attention to some specific accoutrements and processes – a serving boy, decorated wine cups, and the mixing of wine –, and aim at a carefree, eroticized, exuberant atmosphere. Here, then, is one symposion.

Step forward in time to the early fifth century and travel across the Aegean Sea to mainland Athens, and a red-figure drinking cup attributed to the Painter of the Paris Gigantomachy provides a glimpse of another party in progress. On one exterior scene (Fig. 1), many of the same attributes are visible. The presence of four young men reclining side-by-side, facing one another in pairs creates a communal dimension. Cups hang behind them on the walls, or rest in their hands, or stand silhouetted on a border below (this border perhaps stands for the table or the floor). If the appearance of stylized semi-naked, beardless youths is not enough to convey an erotic tone, then the bent elbow, outstretched arm, and raised cups of the youths to the far left and right certainly do. They are playing kottabos, a toasting game in which each player aimed the dregs of his wine cup at a target (here, two high poles) in order to claim kisses. A penis cup also stands cheekily to attention below. In addition, the scene contains signs of luxury. The symposiasts recline upon sumptuous striped cushions. They are apparently on the floor, but this may be a visual shorthand for the raised couch (*klinê*) upon which two more symposiasts lie on the interior of the cup. The potential extravagance of this furniture is hinted at by the molded legs and decorative arm of a bronze couch in Athens' National Archaeological Museum (X18922), which, although from the second century BCE, accords with representations of *klinai* from Archaic Painted pottery (discussed by Boardman 1990). Depicted on the wall behind our nubile youths, furthermore, are animal-skin cases for the pipes (*aulos*) and a lyre, symbols of musical performance. Alcaeus might focus on the drinking, but his poem constituted a musical contribution to the symposion, most probably sung to the accompaniment of the lyre.



Symposion, Fig. 1 Painter of the Paris Gigantomachy. Kylix: symposion scene. Greek, Attic. C. 480 BC. Terracotta. 1998.8. (© Michael C. Carlos Museum, Emory University. Photo by Bruce M. White, 2005)

Taken from the written and material record, these two snapshots of the symposion provide a cumulative vision of a male homosocial occasion characterized by communal drinking, (homo)eroticism, music, luxury, and game-play. Add to this the archaeological evidence of the andron – the distinctive "men's room" that appears at civic-religious then domestic sites from the sixth century onwards, which is identifiable by its dimensions, architectural details, and more elaborate decoration – and you also have an event that took place within closed walls. These walls were lined with 7 or 11 couches in a circle. Like the figures spread around the exterior of our red-figure cup (the symposion continues on the reverse), the occupants' attention was automatically turned towards one another, away from outside. This lent the symposion an inclusive and exclusive air. The communality attested in the name symposion and its shared ventures was reinforced via the dynamics of the architectural space in which it took place.

Key Issues and Current Debates

To understand the symposion it is necessary to read different types of evidence in tandem. Each has a distinct focus and purpose: monodic poetry of the type attributed to Alcaeus was sung at the symposion; figured drinking vessels circulated amongst symposiasts at Athens and beyond; and excavated sites provide access to the physical space they inhabited. Together they construct a composite form. Yet, approached individually, each can shed independent light on the phenomenon; and from the divides arise discontinuities and differences. For, as is shown by poems composed not only by Alcaeus of Lesbos but also, moving from the late seventh to fifth centuries, Archilochus of Paros, Tyrtaeus of Sparta, Theognis of Megara, Solon of Athens, Anacreon of Abdera (who sang at the court of the tyrants Polycrates of Samos and Hipparchus of Athens), Xenophanes of Colophon, Ion of Chios, Dionysius Chalcus and Critias of Athens, the symposion was a multifaceted affair. Composed on the spot, introduced by the original poet, or memorized and performed by others, their songs may survive mainly in fragments. None the less, they preserve the conversations of the event. Through poetry symposiasts might express political sentiments, outline moral positions, praise or criticize a companion's conduct, pursue erotic relationships (especially with younger males), offer hymns, and make statements about themselves. Moreover, verses could be uttered in self-promotion, challenge, or defense. The symposion could therefore be a place for consolidating political alignments, educating young members of the community, forming personal social and sexual bonds, and expressing one's identity with regards to the present group and the outside world – and also disrupting or disputing these.

Of course, pushing together all this written evidence, generated orally at different parties in

different towns and at different times, minimizes the diversity of opinions and interests between the poets and their audiences. One ongoing task, then, is to understand the particular agendas of sympotic poets, to understand their corpuses as a whole, and also how their verses (however fragmentary they are now) might have been effective at gatherings beyond their original performance occasion. Ceramic drinking vessels can be similarly interrogated. Many are not only decorated with images of drinking parties, like the red-figure cup above, but were in all likelihood used on convivial occasions. We can therefore think about the items themselves, and about the images on them. There is one problem here. Many of the cups, kraters, jugs, amphorae and hydrias that we encounter now in museums have no recorded findspot (Lewis 2002: 5 estimates 50 %), or were excavated in Etruria (Italy), where they may have been used by local elites before being deposited as grave goods. Thus, we need to put the majority of pots back into the Greek andron, but of course we have no direct evidence of who used them, where or when.

There is therefore an unavoidable risk of circularity when approaching the visual evidence: of understanding how the imagery on pots contributed to the symposion's social and psychological dynamics by bringing to bear one's preconceptions of what these might be, based in part on that imagery. For François Lissarrague, close attention to iconographical detail allowed a way through the problem, and demonstrated the role of sympotic imagery in self-exploration and identity construction by the symposiast. His seminal monograph, *The Aesthetics of the Greek Banquet* (1990), set the vessels and their images circulating around the andron in the hands and before the eyes of symposiasts. As drinkers encountered reflections of their own activities, sometimes idealized to fit a generic model, sometimes vulgarized, sometimes undertaken by raucous satyrs or hat-wearing foreigners, they were confronted through association and humor with the pleasures and difficulties of their own drinking practices (see, for example, Sutton 2000; Osborne 2007; Steiner 2007: 231-64). Wine could be a powerful and transformative potion, as reflected in the character of Dionysus, its transgressive, boundary-blurring, and boundary-pushing deity. The images on the pots thus acted as Dionysian mirrors, showing drinkers how they were and how they might be. They thereby echoed the discussion of appropriate modes of drinking and the attendant dangers expressed in sympotic poetry.

However, the imagery on Greek pots extended beyond sympotic themes, to include mythological and "everyday" scenes. In tandem with oral story-telling through poetry, for example the tales of giants and strife that the philosopher-poet Xenophanes (F1) wished to eject from the symposion, painted pots drew symposiasts towards narratives about the (heroic) past and present. Like Tyrtaeus' martial elegy, scenes of Homeric-style fighting might contribute to the creation of shared memory – linking modern-day warriors to their heroic ancestors – or reinforce a martial ethic. Or scenes of men "courting" boys could titillate as much as Anacreon's poetic expressions of his homoerotic desires. Or sexually explicit scenes of men with women might also excite, whether as fantasies or anticipating real-life action; or in the most graphic or violent scenes they may even express gender power hierarchies. (Archilochus' "iambic" poetry similarly subjected women to sexual exposure through verbal abuse). These are only a few examples; the scenes on Athenian figured pottery are multifarious. It is frustrating not to know more about the precise encounter contexts for specific images, and difficult to avoid speculation when proposing the responses of imagined drinkers – even if that is grounded in what we know about Greek society generally, and through other evidence from the symposion. However, contemplating this limited selection already indicates some potential resonances, and highlights the symposion once more as a venue for conversations about self and society.

Occasionally, however, imaginative leaps are not required. Some drinking vessels are preserved in situ in Greek settlements in androns, or close by in rubbish tips or graves. When this does

occur, the results are fascinating. By studying the shapes and images and inscriptions on pottery found in the fifth-century Athenian Agora, Steiner (2002) has demonstrated the incorporation of "élite" sympotic elements into the dining practices of democratic officials (see previously Rotroff & Oakley 1992). Also in the Agora, deposits from the well (J 2:4) of a late Archaic house have revealed more about how Athenians drank at home: the shapes used by inhabitants and the iconographic themes they enjoyed are set by Lynch (2011) within the context of wider household activities and the new democracy. And the physical and chronological dispersal of kraters across three Greek cities in Sicily – Megara Hyblaea, Himera, and Silenus – shows a shift in sympotic activity from public to private events during the sixth to fifth centuries. Rabinowitz (2009) sets this progression against the political tenor of a proportion of sympotic verse, making the symposion a venue for expressing the tensions amongst members of developing communities, between bids for equality and power (On the basis of Doric practice at Sicily, he also argues that Spartan convivial practice of the *syssition*, far from being atypical as is often thought, was an extreme version of the standard symposion). Site-specific analyses of the archaeological evidence afford new glimpses into the practicalities of Greek drinking, and the sympotic experiences of individuals and communities.

The particular focus on the symposion's civic dimension reanimates Schmitt Pantel's (1992) argument that the symposion – and its ceramic ware – belonged within the wider sphere of civic commensality. It also fits with revisionist interpretations of the poetic evidence. Earlier studies of the symposion evaluated political comments in Alcaeus and Theognis as evidence for the symposion as an aristocratic activity of separation and opposition (Murray 1983). Or they divided poetry into two types – "élite" and "middling" – according to whether its singers reveled in or rejected luxury, and correlated this to a divide in political ideology (Kurke 1992). "Élite" symposiasts rejected the dissemination of their culture and power to less wealthy and less worthy citizens; "middling" symposiasts towed a middle line in their ethics and political relationships (Morris 1996). Hammer (2004) has challenged the very basis for this distinction, attributing it to the erroneous imposition of ideological divisions, while Corner (2010) shows that the symposion could act as a microcosm of the polis, linking its socialization processes to the individual within the community as a whole. By this reading, the symposion bridges the (private) household and (public) city.

The ramifications of this new work for understanding the symposion as a socio-political phenomenon need further consideration. On the one hand, the symposion was clearly enjoyed by a wider selection of individuals on a broader range of occasions than the inward-focused, oppositional "aristocratic Männerbund" formerly postulated (Murray 1983). But the relationship between the event articulated through the poetry and pot-paintings and the potential settings for sympotic performances intimated by the archaeological record could be sharpened by closer attention to specific archaeological settings. For example, allowing that standard issues regarding preservation, excavation, and interpretation may influence the picture, the majority of andrones in the Archaic period appear to have been situated in public buildings, especially at religious sanctuaries. Symposia here automatically took place in cultic contexts, presumably amongst specific individuals on particular occasions. How can this setting help us understand individual and group experiences? Hobden (2011) reminds us of the indivisibility of religion from other areas of life in ancient Greece, and, bringing together the poetry and imagery of the symposion, suggests some ways in which a religious dimension might facilitate the communal dynamics. But it would be interesting also to explore the (related) religious-political dimension.

Together, these studies demonstrate the pervasiveness of sympotic culture. Drinking in company is not merely the preserve of disaffected aristocratic élites; it was part of "mainstream" Greek culture. Or at least, there were occasions

when non-élite citizens enjoyed communal drinking, and civic occasions when groups might come together in various guises. Given also variations in settings, membership, and activities from town to town and across time, any single event could be quite distinct. The symposion may have been a major cultural phenomenon, but it was also diverse in expression. Furthermore, the poetic and visual evidence point towards an event that was potentially disputatious, disruptive and dangerous as much as a positive affirmation of identity and facilitator of group bonding. One of the greatest pleasures of the symposion is the continuing challenge to unpack that diversity of experience.

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- ▶ Andron
- ▶ Polis
- ▶ Religion, Greek, Archaeology of

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Syrian Archaeological Heritage Management: "Dead Cities" and Living Communities

Kari A. Zobler
Department of Anthropology, University of Illinois at Urbana-Champaign, Urbana, IL, USA

Introduction

Heritage management is at the epicenter of community cohesion and identity construction in modern Syria. Founded as an independent nation-state in 1946, after a significant era of Ottoman and French colonization, the Syrian Arab Republic manages millennia of Syrian heritage, from some of the world's oldest continually occupied cities to transforming expressions of intangible culture. Modern Syria is negotiating the dialectic between tradition and innovation, utilizing the legacy of the past to meet the challenges of the future.

Syria's vast archaeological heritage is managed by the Directorate-General of Antiquities and Museums (DGAM) under the auspices of the Ministry of Culture. The DGAM was founded soon after Syrian independence and serves an integral role in managing the nation's archaeological patrimony and structuring heritage narratives. The national narrative is one of legitimization through antiquity and the assertion of national identity in the postcolonial era. National museum and archaeological site narratives emphasize majority culture over diversity, minimizing difference by highlighting elements of a perceived shared past and striving toward a common future. It is through the medium of archaeological heritage that the past is recontextualized and the process of identity formation negotiated.

Key Issues/Current Debates/Future Directions/Examples

Archaeological Site Excavation and Protection

Syria's cultural patrimony encompasses a rich tapestry of archaeological and historical sites that illustrate the region's ancient and diverse past. These sites represent human settlement and culture in the Near East from the earliest occupations in ancient Mesopotamia to Hellenization and Islam. Many of Syria's archaeological sites have been scientifically excavated through a combination of national efforts and international partnerships with foreign scholars. Excavated artifacts are curated in one of a network of Syrian national museums, where the past is recontextualized in the construction of present identities through regional and national narratives.

Archaeological sites in Syria are protected by strict national laws against looting and destruction. Local branches of the DGAM operate in each of 14 provinces, often from the offices of a national museum. Permanent site guards are required at all archaeological sites under current excavation. All sites are regularly visited by provincial officials of the DGAM to ensure that they are in stable condition, but consistent coverage is difficult with a lack of financial resources.

The rural locations of many sites offer a unique set of conservation challenges. Many of the environmental factors that motivated ancient settlement in these rural regions are equally attractive to modern occupants. Thus, villages are frequently located nearby, if not directly surmounting, ancient settlements. In the ideal scenario, the ubiquity of modern settlement near ancient sites could foster a community of local stewards to protect archaeological heritage and participate in scientific excavation. Presently, it is a continuing challenge to balance modern concerns with the preservation of cultural patrimony.

Syrian law protects archaeological sites from modern cultivation and construction. Archaeological *tells*, or settlement mounds, are the most evident type of site morphology in Syria, which frequently results in legal protection extending solely to the more visible high mound. Lower mounds or ancient outer towns are not as topographically obvious and are thus often hidden or destroyed under modern agricultural cultivation. Irrigation agriculture is most prevalent, as many regions in Syria are in either marginal

environmental zones or reside below rainfall requirements for successful dry farming. Agricultural reliance on irrigation in these regions has artificially raised the water table surrounding many archaeological sites that are not themselves under cultivation. Thus, tells may appear intact on the surface, while access to deep archaeological deposits is rendered effectively impossible by water and salinity. The popularity and economic growth of cotton cultivation, which requires considerably more water than other crops, has only accelerated this process. Numerous well-preserved sites remain, though many have not yet been scientifically excavated.

The DGAM has identified "salvage zones" in regions where archaeological sites require special protections. These salvage zones are usually regions where modern developments threaten to destroy or obfuscate ancient sites. The directorate-general issues new excavation permits to foreign expeditions only in "salvage zones," which carry the incentive of official dispensation of half the excavated material to foreign scholars at the end of the scientific mission. In 1968–1973, the Tabqa Dam Project constructed a hydroelectric dam on the Euphrates River, which created Lake Assad. Prior to completion of the impound lake, a cooperative Syrian and international effort was undertaken in concert with UNESCO to excavate sites that would be flooded (Freedman 1977). As part of this initiative, standing architecture at sites such as Qala'at Jaabr were conserved and reinforced; a brick minaret from the thirteenth-century mosque at Siffin was relocated to Meskene (Bounni 1977; Burns 1992: 204), along with the relocation of a similar minaret from Abu Hureyra (Bounni 1977). Recently, the DGAM designated a salvage zone in the Halebiye-Zalebiye region of eastern Syria in response to the planned construction of a dam and resultant flooding of nearby archaeological sites.

Many famous and historically important sites have undergone extensive conservation efforts. In 1999, the DGAM partnered with the Aga Khan Trust for Culture under the latter's Historic Cities Programme (AGHCP) to conserve and restore a selection of Syria's historic fortresses, including Qala'at Salah ad-Din and the Aleppo and Masyaf Citadels. The AGHCP provided technical assistance with the restorations, which "encompassed the refurbishment of public spaces, the provision of tourism infrastructure and a number of socio-economic programmes" (Aga Khan Development Network 2007). In 2004, the Syrian Ministry of Culture signed a similar agreement with Italy's Ministry of Foreign Affairs to renovate the Damascus Citadel and the National Museum of Damascus.

In addition to national laws protecting Syria's archaeological heritage, six sites in the Syrian Arab Republic are currently protected by UNESCO's Convention Concerning the Protection of the World Cultural and Natural Heritage (1972). These are, in order of acceptance to the World Heritage List, the Old City of Damascus (1979), Bosra (1980), Palmyra (1980), the Old City of Aleppo (1986), Krak des Chevaliers and Qala'at Salah ad-Din (2006), and the Ancient Villages of Northern Syria (2011), more commonly known as the Dead Cities. There are also a dozen other cultural heritage sites submitted to UNESCO's Tentative List for possible future inclusion. The sites that currently reside on the list are some of the most popular and heavily trafficked tourist destinations in Syria.

Syrian National Museums

Syrian national museums preserve and present the archaeological past, recontextualizing Syria's vibrant cultural heritage for a modern audience. The national museums were created as nationalist enterprises during Ottoman rule, expanded and modified for colonial purposes under the French Mandate, and finally adopted by the nascent Syrian Arab Republic as a means of contextualizing and presenting their cultural heritage in a postcolonial era. The two oldest Syrian museums, the National Museum of Damascus and the National Museum of Aleppo, were both formed from collections of independent nationalist societies (the Arab Academy and the Archaeological Society, respectively), before being subsumed under the government-operated *Service des Antiquités* around 1920.

Today, the DGAM maintains national museums in many of Syria's provinces, each of

which draws upon the same corpus of archaeological heritage. Although the network of national museums display similar artifacts exemplifying millennia of Syrian settlement, each museum presents a distinct narrative of Syrian national identity (see Zobler 2011). Several of Syria's archaeological sites, including Palmyra and Mari (modern Tell Hariri), contain small site museums showcasing some of the artifacts discovered. These museums allow visitors to examine artifacts recovered during excavation and provide a broader historical context for archaeological sites and regional histories. These site museums are far more specialized in scope in comparison with the more conglomerate national museums.

Tourism and Historic Site Management

Syria's rich archaeological heritage is presented to tourists with a particular focus on a few sites and national museums. At Syria's most famous and heavily trafficked tourist destinations, local and foreign tourists mingle to explore Syria's cultural patrimony. The drastically reduced entry fees for Syrian citizens encourage national patronage of archaeological sites and museums. In addition to extant ruins, there are also related intangible heritage events such as the Festival of le Crac des Chevaliers and the Valley for Arts and Culture, which was held in Homs in the summer of 2010.

Many of these sites have ongoing excavations and restoration projects, which contribute to the corpus of archaeological data, while opening new tourism opportunities and conserving sites for future visitors. Ongoing research at these sites affords tourists the opportunity to witness excavation and restoration programs in progress, thereby de-abstracting the work of heritage management and highlighting its importance in the responsible stewardship of archaeological resources.

Visitor Flow at Archaeological Heritage Sites

Syrian management of large sites with significant tourist traffic involves a segmented organization of multiple checkpoints at key areas of interest, usually involving separate entrance fees for high-profile monuments. These checkpoints may be used to manage the number of tourists able to enter an area at any one time for conservation purposes. In practice, only a small percentage of a large archaeological complex is visited by a significant number of tourists, usually in direct correlation with tour bus accessibility. Syrian officials have concentrated their management efforts in these popular zones, but are virtually absent in other parts of a large site. Thus, the more persistent visitor can often experience sites virtually in isolation (and without official supervision) by walking beyond the most commonly visited sectors of a site. Syrian officials combat this tourist tendency in remote zones by restricting access to unguarded structures with locked gates, making them only accessible by guided tour.

Even with large numbers of tourists arriving daily at a few select sites, there is minimal effort to direct tourist movement patterns in Syrian site management planning. The paucity of cordoned-off sections (for either safety or site preservation) or directional signs to suggest a route, by which visitors may experience the site, engenders a management strategy significantly reliant on individual responsibility. Syrian site officials frequently adopt a warden-esque approach to site protection from damage, issuing frequent verbal reminders to tourists as to which portions of the site are off-limits. From a conservation and safety standpoint, this often leads to more limited and inconsistent site coverage, particularly when spread over a large surface area, than more integrative methods utilizing barriers and signage in addition to roving guardians.

It is predominantly the responsibility of individual tour guides to ferry their visitors around sites and give them historical context in the absence of signage. Syrian tour guides require an official license to practice in Syria, thus ensuring relative standardization in the quality of information presented. Foreign tour guides are allowed in Syria, but the majority of foreign tour companies usually outsource to local agencies for Syrian guides. Within the framework of the guided tour, tour guides are comparatively

free to construct the narrative for visitors and chart their own course through a site.

Heritage Narratives: Scripting the Past

The narratives presented at Syrian archaeological and historical sites are intimately tied to tourist movement and signage. Small or isolated sites are usually connected in tourist routes by local tour companies or hotels, often constructed as day-trips from a major city. Packaged tours for multiple site visitations reveal how heritage narratives structure tourism marketing. For example, a combination of Byzantine sites outside of Hama has been dubbed the "Dead Cities" and is commonly visited in a single excursion. Sites that may draw a particular audience, such as Krak des Chevaliers and the Saint George Monastery are also frequently packaged together.

Tourists are almost completely reliant on either guided tours or their own tour books to understand the composition and history of a site, particularly at smaller attractions. Signage is often minimal, even at many of the largest and most frequently visited sites, which instead rely on optional tour guides to provide a narrative framework. Print media is relatively scarce at many historic sites and national museums (with a few notable exceptions; see Bonatz et al. 1998; Faraj al-Ush et al. 1999; al Moadin et al. 2006) and virtually absent at smaller sites. Thus, modest or remote sites form a part of Syria's heritage that is often underappreciated because there is so little structuring of the tourist experience. Additionally, the ability of foreign tourists to visit many of the smaller sites is hampered by Syrian tourist visas, which are valid for only short stays. Thus, it is usually only the extremely dedicated traveler, usually one who has visited the country multiple times, who visits these sites.

The appeal of these smaller sites for many tourists is the opportunity to encounter incredibly well-preserved ruins in virtual solitude. For many foreign visitors, this conjures the romance of exploration that was so prevalent in the nineteenth century. Syrian entrepreneurs often capitalize on the Orientalist mythos in the structuring of the tourist experience. Overtly, vendors offer camel rides (terrain permitting) and meals at "traditional" restaurants designed for tourist consumption. In more subtle manifestations, such as the display of T.E. Lawrence's unpaid bill at the Baron Hotel in Aleppo, Syrian heritage tourism is recontextualized as exotic adventure in a grand tradition.

The site of Serjilla represents an exception to the general lack of signage in Syrian site management. The Byzantine Period site includes astonishingly well-preserved ruins of houses, baths, a church, and tombs, and is perhaps the most impressive of the so-called dead cities. Signage is evenly spaced throughout the major buildings in unobtrusive locations, so as not to detract from the experience of encountering the ruined Byzantine settlement. Information is presented in concise, multilingual plaques (in Arabic, English, and French) with accompanying illustrations. The script places the site in broader historical context and offers summaries of important historical and anthropological concepts related to subsistence and environment, trade, and political organization. Text panels offer architectural reconstructions of a few of the structures to aid visitors in imaging how these buildings might have looked and functioned in antiquity. These illustrative reconstructions are an extremely effective method of disseminating the results of archaeological scholarship without physically altering the sites themselves, which is infinitely more costly and open to editorial interpretation.

Souvenirs and Popular Culture

Syria has enjoyed a long history of souvenir production based on its cultural heritage for domestic and international consumption. International souvenirs began with the postcard industry. These images of historic monuments, traditional costume, and Orientalist themes not only disseminated images of the region to a broadening interested public, but also structured expectations of travel in the Near East for future travelers and provided a framework through which existing travelers conceptualized their own experiences. More cynically, postcards also functioned as instruments of propaganda, particularly during the French Mandate. Today, souvenirs marketed

to foreign tourists reference traditional Islamic society, particularly Bedouin culture. Commonly sold souvenirs relate to traditional culture or handicrafts, including woven rugs, water pipes, Bedouin jewelry and metalworking, as well as kitschy Assad memorabilia and wards against the Evil Eye.

Souvenirs produced for a domestic audience often highlight local interests. Among these are the scale models of the water wheels of Hama, one of Syria's most popular destinations for domestic travel. The wheels are fashioned into children's toys, fountains and decorative conversation pieces at varying scales. They are sold in tourist stalls and shops as well as the main bus terminal: the epicenter of Syrian middle-class travel. Another popular icon of Syrian heritage is the so-called Mari Lady, from a fountain statue in the Palace of Zimri-Lim at Mari. Reproductions of the enigmatic, mono-browed goddess of ancient Mesopotamia adorn public squares and private home gardens alike.

Souvenirs are sold in official gift shops at popular sites and in the national museums, but the majority are produced and sold by entrepreneurial vendors. Syria's tourist market supports a thriving kitsch industry, as enterprising individuals sell independently produced handicrafts and postcards (often at a discount from the official site stores) and refreshments to ambling tourists. Traditional-style goods, such as textiles and metalworking, are most commonly sold in the tourist sectors of *souqs* (markets), though today, they are frequently mass-produced outside of Syria instead of handcrafted by traditional artisans.

Vendor entrepreneurship allows a broad community to benefit from tourist revenues. This cottage industry provides a vehicle for individuals to capitalize on their tangible heritage in a way that is nondestructive to sites. However, the majority of sellers reach their customers by motorcycle across large archaeological sites, which is problematic for effective site preservation. The relationship between independent vendors and site officials is tolerant, though site planners might work in concert with vendors to develop a strategy for effectively reaching customers, while protecting the archaeological heritage on which souvenirs are based.

The Future of Syrian Heritage Management

Syrian management of their archaeological heritage encompasses excavation and preservation initiatives, a complex system of national museums, and a burgeoning tourism industry. The DGAM governs the nation's cultural patrimony through a combination of local efforts and international partnerships. Modern communities thrive beside ancient cities, and entrepreneurial tour guides and vendors capitalize on Syria's past, while economically providing for the present.

The discourse of Syrian heritage has, until recently, been framed as a global assertion of unified national identity and as a mechanism for the communication of provincial identities internally, rather than serving as a means for heritage introspection. Perhaps future heritage narratives will address more contemporary sociopolitical conditions, as Syrian identity continues to be negotiated. The nation's archaeological heritage will surely be an important medium through which such conversations take place.

Cross-References

- ▶ Abu Hureyra: Agriculture and Domestication
- ▶ Conservation and Management of Archaeological Sites
- ▶ Conservation in Museums
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Experiencing Cultural Heritage
- ▶ Heritage and Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Middle East Archaeology: Sites, Texts, Symbols, and Politics
- ▶ Postcolonial Archaeologies
- ▶ Site Visitation and Interpretation: Management

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