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Abu Hureyra: Agriculture and Domestication

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Introduction

The prehistoric settlement of Abu Hureyra (35° 52′ N, 38° 24′ E) was located on the edge of the valley of the Euphrates River in northern Syria. It was a very large (11.5 ha) mound composed of two superimposed villages, Abu Hureyra 1 (c. 13,400–11,500 CalB.P.) and Abu Hureyra 2 (c. 10,600–7,500 CalB.P.) with an Intermediate episode of occupation (c. 11,500–10,600 CalB.P.) (Moore et al. 2000: Fig. 14.1). The site was thus continuously inhabited for 6,000 years. Culturally, Abu Hureyra 1 had late Epipalaeolithic affinities while the Intermediate Period and Abu Hureyra 2 fell within the Neolithic of Western Asia.

Key Issues

The site was excavated in 1972 and 1973 as part of an international salvage campaign that preceded the completion of a dam across the Euphrates. The site was flooded in 1974. Seven trenches were dug across the site to establish the sequence of occupation. These demonstrated that the initial settlement of Abu Hureyra 1 was confined to the north-west sector of the mound. The bulk of the deposits was derived from the much more extensive settlement of Abu Hureyra 2.

All the soil was dry-sieved to ensure near-total recovery of artifacts and animal bones. Given the potential of the site to yield information about the formative stages of agriculture, the excavators systematically employed flotation to recover large samples of plant remains. The 2 t of animal bones and 500 l of plant remains retrieved by these methods provided important insights on changes in the economy and environment.

The initial settlement at Abu Hureyra in Period 1A consisted of multichambered pit dwellings dug into the subsoil that were covered with a timber framework and roofed with reeds. This settlement was occupied year-round and lasted for 500 years. The form of the settlement changed abruptly in Periods 1B and 1C. The inhabitants built their huts on the surface of the ground with a frame of wooden posts and floors of trodden earth or clay. Finds of human bones suggested that some of the deceased were buried within the settlement.

The most numerous artifacts were made of chipped stone. Microliths, especially large lunates, and also scrapers and notched pieces, were conspicuous. A few fragments of obsidian were imported from Anatolia to the north. The bone artifacts included bipoints used as arrowheads, many awls, and some pins. Many of the other tools were made of basalt, among them grinding dishes, querns, rubbing stones, pestles,

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and mortars. These were used to prepare food and to grind pigments. Notched pebbles were probably used as sinkers for fishing lines and nets.

The inhabitants of Abu Hureyra 1A were hunters and gatherers who consumed a diverse range of foods. They collected over 100 species of edible plants (Moore et al. 2000: 369), of which wild cereal grains, feather grasses, club rush, knotgrass, millets, and chenopods were staples. Persian gazelles were the main source of meat. Herds of these animals were hunted using animal traps as they migrated past the site in the spring (Legge & Rowley-Conwy 2000: 449). The other main game animals were onagers, wild cattle, sheep, and hares.

An abrupt change in economy took place in the transition from Period 1A to 1B, c. 12,900 CalB.P. The sudden onset of the Younger Dryas climatic phase caused a prolonged drop in temperature and increase in aridity that significantly altered the environment (Robinson et al. 2006: 1536). Many of the staple plant foods diminished in abundance. The villagers responded by adopting farming (Moore et al. 2000: 479; Hillman et al. 2001). Among their crops were domestic rye, einkorn, and lentils. Cultivation of crops provided increasing amounts of food thereafter, and the population of the settlement grew as a result. The inhabitants continued to hunt gazelle as before, but they modified their pattern of plant gathering.

During the Intermediate Period and Period 2, the nature of the settlement changed remarkably. The houses in this densely packed village were built of mudbrick, were rectilinear in plan, and contained several rooms. Following the development of farming, the settlement grew very large until in Period 2B its population numbered between 5,000 and 6,000. Its economy was based on an array of cultivated cereals, rye, several wheats and barley, and legumes, including lentils, peas, vetches, and chickpeas. The villagers also raised flocks of sheep and goats, while continuing to hunt gazelle. Then, in the transition from Period 2A to 2B, c. 9,300 CalBP., hunting of gazelle sharply declined because of overexploitation. The inhabitants maintained the meat supply by rapidly expanding their flocks of sheep and goats, and added domestic cattle and pigs to the mix. By this time, hunting and gathering had ceased to contribute much to the diet.

The artifacts in Period 2 were significantly different from those of Period 1. The chipped stone industry was composed of large tools on blades, notably arrowheads, burins, and endscrapers, with a few sickle blades. Many of the artifacts were used to kill and butcher game. Small but regular amounts of obsidian attested to continued long-distance contacts with central and eastern Anatolia. Bone tools, including awls, needles, and spatulae, were used in basketry, leather working, cooking and as ornaments. There were relatively few ground stone tools in Period 2, so most agricultural and food-processing implements were presumably made of wood and other perishable materials.

Conspicuous among the remains from Period 2 were burials of humans. These were usually single inhumations or, occasionally, group burials in shallow graves under the floors of houses (Moore & Molleson 2000: 278). More women than men were buried in these locations, indicating a strong link between women and the home. Skulls were often buried separately from the rest of the corpse. The burials were the final stage in a lengthy series of rituals involving sequestering of the body while the flesh decayed. These elaborate burial rites reveal a rich ideology with reverence for ancestors and belief in an afterlife.

Many of the skeletons were sufficiently well preserved to yield vivid evidence of the lives these people had led. Most exhibited traits that indicated that they had worked extremely hard. The females, in particular, had developed a series of injuries caused by spending many hours of the day grinding grain on a saddle quern for food (Molleson 2000: Fig. 11.8).

Abu Hureyra is significant because it documents the transition from hunting and gathering through a continuous sequence of occupation at

a single site. Year-round sedentary life based on specialized hunting and gathering preceded the transition to farming. The transition itself was precipitated by an abrupt climatic change, the onset of the Younger Dryas. The subsequent development of agriculture was a lengthy step-by-step process that culminated 5,000 years later in a mature mixed farming system. The inception of farming had extraordinary consequences at Abu Hureyra, from the massive growth in the population of the village to its impact on the people themselves.

Cross-References

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- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Lentil: Origins and Development
- ▶ Plant Processing Technologies in Archaeology
- ▶ Wheats: Origins and Development

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Abungu, George H.O.

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Basic Biographical Information

George H. O. Abungu, a Kenyan, is among some of the well-known African archaeologists. He has had a tremendous academic career, establishing himself as one of the leading heritage professionals who have played a pivotal role in the management of Africa's rich past. His illustrious career should be an inspiration to the younger generation of African scholars who take up an interest in the discipline of archaeology and heritage management.

George trained as an archaeologist at the University of Nairobi Kenya between 1980 and 1984 with an Honors degree in archaeology and was subsequently employed as a Research Trainee with the National Museums of Kenya (NMK). A year later, in 1985, he got a scholarship to study at Cambridge University in England, United Kingdom, where he received an M.Phil. (1986) and a Ph.D. (1989) in archaeology. His Ph.D. research was titled *Communities on the River Tana: An Archaeological Study of Relations Between the Delta and River Basin, AD 700–1890*.

Dr. George Abungu went back to Kenya and continued working for the NMK as a Coastal Archaeologist. Between 1984 and 2002, he served in a number of positions beginning as a Research Trainee in 1984; a Senior Research Scientist 1987–1990; Head, Department of Coastal Archaeology 1990–1995; Head, Coastal Museums Programme 1992–1995; Deputy Director, NMK 1996–1997; and a Director, Regional Museums, Sites, and Monuments 1997–1999 and the Director General of the NMK, 1999–2002 when he left NMK.

Besides working for the NMK for almost two decades, Dr. Abungu has had many other professional responsibilities over the years, among them, Founding Chairman of Africa 2009 Program, and Founding Chairman for the Centre for Heritage Development in Africa (CHDA). He was a Research Associate (2001–2009) with the Field Museum of Natural History in Chicago, a Committee Member and African Representative on the ICOMOS International Committee on Underwater Cultural Heritage, and a Kenyan Representative on the UNESCO World Heritage Committee (2005–2009). Other positions of responsibilities he has held include World Archaeological Congress (WAC) Council Member from 1997, Chairman of the International Standing Committee on the Traffic of Illicit Antiquities (since 1999), Global Heritage Fund Advisory Board Member (from 2002), Member of the Executive International Council of Museums 2004–2010, and Vice-President of International Council of Museums (ICOM) from 2010.

In well over two decades, Dr. George Abungu has actively worked to ensure that the preservation of the rich African heritage and training of heritage professionals including heritage managers is not only enhanced but well established. His knowledge has been sought after, and he is often a key note speaker to many international conferences as well as guest lecturer to a number of universities, in Africa and beyond. Dr. Abungu's efforts have not gone unnoticed and most recently became the recipient of the *2012 Association for Research into Crimes Against Art (ARCA) Award for Lifetime Achievement in Defense of Art 2012* as well as the recipient of *Knight in the Order of Arts and Letters of the French Republic*. He is also a recipient of the *Life Prize in Museology* (2007), as well as *Passeur du Patrimone*, of Ecole du Patrimone Africa (2009).

The Kenyan authorities have also honored this high achiever as he is one of the three professionals whose contributions were celebrated by the NMK during its centenary celebration in 2011. In particular, Dr. Abungu was honored for the contribution he made to research and the development of Coastal Archaeology in Kenya.

Besides being a museum professional and training many aspiring heritage professionals, Dr. Abungu has been a scholar of note. He has published extensively and his publications have covered a wide range of subjects, from archaeology, heritage management, heritage legislation, to museology. He is currently undertaking research on one of the most significant challenges in this century, that of the relationship between heritage conservation and development. In the case of an African continent that lags behind in service delivery to its citizens, the conflict between managing Africa's rich past and encouraging development has become a big challenge. Additionally, Dr. Abungu is an Editorial Member for among other publications, *Public Archaeology* and *African Archaeological Review*.

He is a Founding Director of the Okello Abungu Heritage Consultants, a company, through which he offers specialized expertise to a number of heritage institutions in Africa and beyond, particularly in the areas of heritage management and planning, training, and policies relating to the management of World Heritage sites and heritage training programs in the field of world heritage in and out of Africa.

Major Accomplishments

As a trainer, mentor, and advisor, Dr. Abungu has been instrumental in efforts to improve the management of World Heritage and other sites in Africa. He is among the scholars who have pushed the African position at the World Heritage Committee (WHC) and other international forums to ensure that the rich heritage of the continent is adequately represented on the World Heritage List and supported. Among some of his accomplishments in this area has been the writing of Management Plans for Lalibela WHS (Ethiopia), Kilwa Kisiwani and Sogo Mnara WHS (Tanzania), Robben Island (SA), and nomination dossiers for Mijikenda Kaya (Kenya), the Kenya Rift Valley Lakes System (Kenya), and Le Mourne (Mauritius) among others. He is also the Founding Coordinator for the World Heritage Nomination Course in

Africa 2008–2012 and the African Regional Coordinator for the UNESCO African Periodic Reporting 2010–2011. Both of these exercises have not only led to the increase of the number of African heritage sites on the UNESCO World Heritage List but also to the improvement in the conservation of the heritage in Africa.

An advocate against the illicit trade in African heritage, Dr. Abungu was recently recognized for his commitment to this through the 2012 ARCA award. He was instrumental in the return to Kenya of the looted vigango, which are the traditional grave markers. Many of these traditional grave markers were stolen from the Mijikenda Kayas, which are now on the World Heritage List. Their return followed a process of repatriation Dr. Abungu began with his American colleagues many years ago when he worked on Kenya's Coastal Archaeology and as the Director General of the National Museums of Kenya.

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Académie Internationale de la Pipe

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Basic Information

The *Académie Internationale de la Pipe* (Academy for the Study of Tobacco and Tobacco Pipes) is a learned society which, according to its statutes, was established "to advance the education of the public in the economic and social history of tobacco and pipe smoking worldwide." Specifically, it attempts to promote a better awareness of the tobacco pipe as a cultural, artistic, and social phenomenon and to highlight the particular place the pipe holds in the history of peoples and civilizations. It supports and encourages the collecting of both artifacts and documentary information about pipe smoking and encourages serious research on pipes and related subjects.

The Academy came into being in 1984 on the initiative of a Frenchman, André-Paul Bastien. Initially based in Italy, it moved to France in 1992. Membership of the Academy consists of three distinct constituencies: serious collectors of pipes and tobacco related artifacts, curators of national museum and specialist museum collections, and academics involved in the study of the

archaeology and socioeconomic history of tobacco and smoking. Originally, the Academy might be described as elitist in that only two academicians were permitted from any one country and applications were intensively vetted. There was a secondary layer of "corresponding" members as well as institutional and sponsor involvement.

In 2008, the Academy moved its head office to Liverpool where it is housed within the School of Archaeology, Classics and Egyptology at the University, under new charitable articles of association (UK Registered Charity Number 1126166). Its address is: Room B3, 12 Abercromby Square, University of Liverpool, L69 7WZ. Its website can be found at: www.pipeacademy.org. Under its new articles, there is a single category of individual membership which is now open to any *bona fide* researcher and can include any number of people from the same country, including women.

Major Impact

The Academy has always tried to promote knowledge and research about tobacco pipes and their use in every era, in all parts of the world and from every angle, whether cultural, artistic, scientific, sociological, or ethnographic. It does this in three main ways: by organizing conferences at different centers at which members are able to discuss major themes, by the formation and activities of working groups of members, and by a program of publication.

The most recent conferences have been held in Ruhla (Germany, 2006), Metz (France, 2007), Liverpool (UK, 2008), Budapest (Hungary, 2009), Grasse (France, 2010), Novi Sad (Serbia, 2011), and Gdansk (Poland, 2012). The conferences are usually focused on regional pipe collections and are intended to promote research and local appreciation of them. For example, the Budapest conference resulted in a series of papers on the archaeology of the clay pipe in Hungary and eastern Europe which, together, have transformed understanding of the industry in that region (Ridovics & Davey 2010). At Grasse, the meeting focused on the outstanding pipe collection assembled by Baroness Rothschild in the second half of the nineteenth century. On this occasion, members of the Academy were able to advise the local library service not only about the academic significance of items within the collection, but also of the means of improving its conservation and public access. In preparation for the 2011 conference, Novi Sad Museum organized an exhibition of pipe collections from museums throughout Serbia and published a definitive catalog which has advanced knowledge of pipe production and consumption in that country to a considerable degree (Gačič 2011).

Two of the Academy's working groups have recently published wide-ranging papers as a result of their deliberations. The clay pipe group has produced summaries of the state of research in 19 countries which include historical overviews, accounts of the products, bibliographies, and proposals for future research (Davey 2009). The Meerschaum pipe group has published a symposium on iconography that was presented at the Grasse conference (Burla et al. 2011).

Between 1996 and 2008, the Academy regularly published the *Livre de la Pipe* in French, English, and German. It also produced 19 issues of an annual newsletter the *Annales* from 1987 until 2006 and a number of occasional publications such as an account of the first English pipe-smoking merchant to be based in Japan during the first years of the seventeenth century. Since the move to Liverpool in 2008, the Academy has launched a new A4, full-color, peer-reviewed journal – *Journal of the Académie Internationale de la Pipe* – that is now the main public platform for pipe research worldwide.

Cross-References

- ▶ Clay Pipes in Historical Archaeology
- ▶ Consumption, Archaeology of
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Acheulean Industrial Complex

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Introduction

For almost a million years in Africa during the first phase of human cultural development known as the Oldowan industrial complex, there appears to have been little directional change in tool technology. As sophisticated and variable as that technology had been, many archaeologists justifiably consider it a time of relative technological stasis, with differences across assemblages being relatively minor. Although the success of the simple core and flake adaptation was evident in its long endurance, by 1.7 Ma innovations began with the appearance of the Acheulean. An adaptive and technological threshold was crossed with the knapping of large flakes (>10 cm in size) and the shaping of heavy-duty tools (handaxes, cleavers, and picks) for specific tasks. The Acheulean industrial complex, together with the Oldowan, is referred to as the Earlier Stone Age (ESA) and persisted until c. 0.3/0.25 Ma in Africa. Mary Leakey (1971) published the first detailed description of the Early Acheulean, using the EF-HR assemblage from Olduvai Gorge as her descriptive type series. Over the years, research has fleshed out a deeper understanding of the Acheulean complex across the African continent.

Although Leakey preferred the term *biface* to the functionally defined types of cleaver and handaxe, the best generic term today for these diagnostic types is the large cutting tool (LCT). This term is preferable because handaxes are not always bifacial and also because picks (which are sometimes trihedral) were not usually discussed as bifaces. Many LCTs are made on large flakes because such blanks are relatively thinner, with accessible edges, making it easier to shape the piece, but cobbles were also used for handaxes in some assemblages and very occasionally for cleavers. At some sites, there are preferences of particular raw materials for LCTs, such as large lava or quartzite cobbles and boulders, because they yielded large flakes of better size and quality. Overall, the technology of many of the earliest Acheulean assemblages is relatively similar to the classic Oldowan or only slightly more advanced in core working strategies, with large flakes and LCTs largely an added component. However, there are some clear behavioral changes apparent in the size and distribution of sites from 1.7 Ma. A trend toward larger sites and greater densities of stone tools within a site reflect a more habitual dependence on lithics for daily subsistence, and there is a more sustained use of some venues as strategic locations or for seasonal resources. Sites now also occur in a greater variety of environments, including the more consistent use of open habitats. Occasionally, some raw materials are transported further distances than in the preceding Oldowan, reflecting the broader use of landscapes.

The controlled use of fire almost certainly was a further innovation in the Early Acheulean, especially as it provided a means of defense against carnivores in open habitats where hominids competed for game. However, the interpretation of early campfires is controversial due to poor preservation in open-air sites. A few East African sites c. 1.5 Ma contain burnt sediments accepted by many researchers as plausible evidence of campfires, as heat of a certain temperature must be sustained long enough to alter the ground. There is also patterning at some sites in the spatial distribution of lithics and bone around these burnt features, which strengthens the argument for the controlled use of fire in the Early Acheulean. By 1 Ma, there is evidence for bones burnt in campfires and washed into an underground cave deposit at Swartkrans. Also c. 1 Ma, Wonderwerk Cave is argued to show in situ burning of vegetation in an Acheulean layer. While wood charcoal is absent, it may not have survived if burnt to ash (M. Bamford, *pers. comm.*). By 0.8–0.7 Ma, however, the open-air site of Gesher Benot Ya'aqov in Israel has burnt artifacts and charred botanical remains with a patterned distribution that suggests activities associated with hearths.

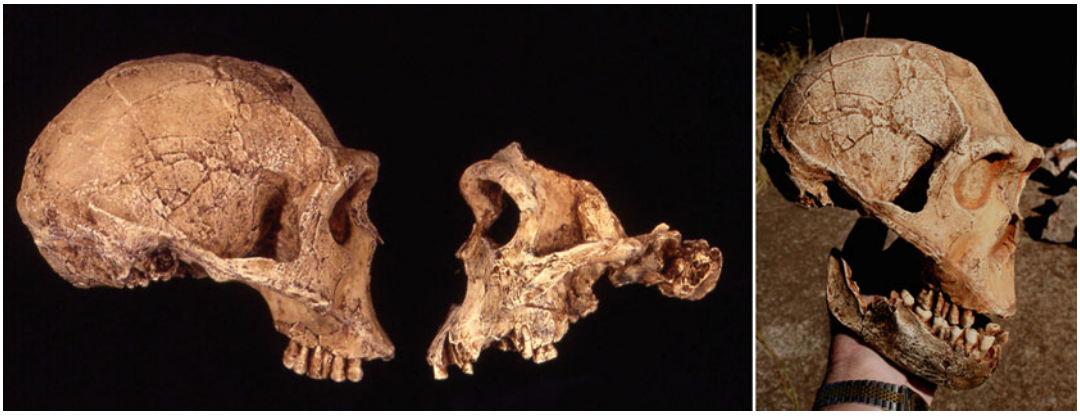
Key Issues/Current Debates

The Earliest Acheulean

The appearance of a new African hominid, *Homo ergaster* (Fig. 1), is the most plausible explanation for the behavioral and technological changes that appear with the Acheulean. This species has more sapient-like traits than *Homo habilis*, including modern human body proportions which provided an advantage in open habitats. Many researchers group *H. ergaster* with *Homo erectus* or refer to it as African *Homo erectus*, while others restrict the *erectus* species to Asia, which is the classification followed here. The earliest appearance of *H. ergaster* is dated to 1.78 Ma in Kenya (Lepre & Kent 2010) and to >1.7 Ma at Swartkrans in South Africa (Pickering et al. 2012). At Sterkfontein, it is found in direct association with Early Acheulean artifacts (Kuman & Clarke 2000). The species persists until at least 1.4 Ma, and thus there is a good match with Early Acheulean chronology.

Many of the historically important debates concerning the Early Acheulean are today increasingly less relevant. For example, Leakey's 1971 classification system regarded many core-based forms as tools rather than cores, considering the sharp edges created by platform intersections to be working edges. She then used a quantitative analysis of these types (which included the "bifaces") to arrive at her formal definition for the Acheulean industry: an assemblage in which 40 % or more of the "tools" consist of bifaces. Assemblages which did not meet this criterion were designated as Developed Oldowan. However, few researchers today use this term as the technical differences once considered important have other, better explanations. Today the range of variability in the Early Acheulean is clearer, and technological and behavioral traits that reflect the increasing complexity of the adaptation allow researchers to recognize such assemblages even when LCTs are absent due to activity differences or small sample sizes.

Kokiselei (West Lake Turkana, Kenya) is the earliest dated Acheulean site at 1.76 Ma (Lepre et al. 2011). Other dates for East African sites are as follows: 1.7 Ma at Konso, Ethiopia; 1.6–1.4 Ma at Olduvai in Middle and Upper Bed II; and c. 1.5–1.4 Ma at East Lake Turkana, Kenya (see Lepre et al. (2011) and Gibbon et al. (2009) for references). Additional Early Acheulean sites at Gona, Ethiopia, have been announced by Sileshi Semaw but are still unpublished, as are new finds in Algeria presented by Mohamed Sahnouni. In South Africa, equally early Acheulean assemblages are well established in the karst hominid sites of Sterkfontein and Swartkrans (Kuman 2007). Faunal ages for cave breccias with Early Acheulean are c. 1.5 Ma and 1 Ma at Swartkrans and c. 1.6 Ma at Sterkfontein. While there have recently been claims for younger ages at Sterkfontein in a number of deposits, the absolute methods employed have their own problems at

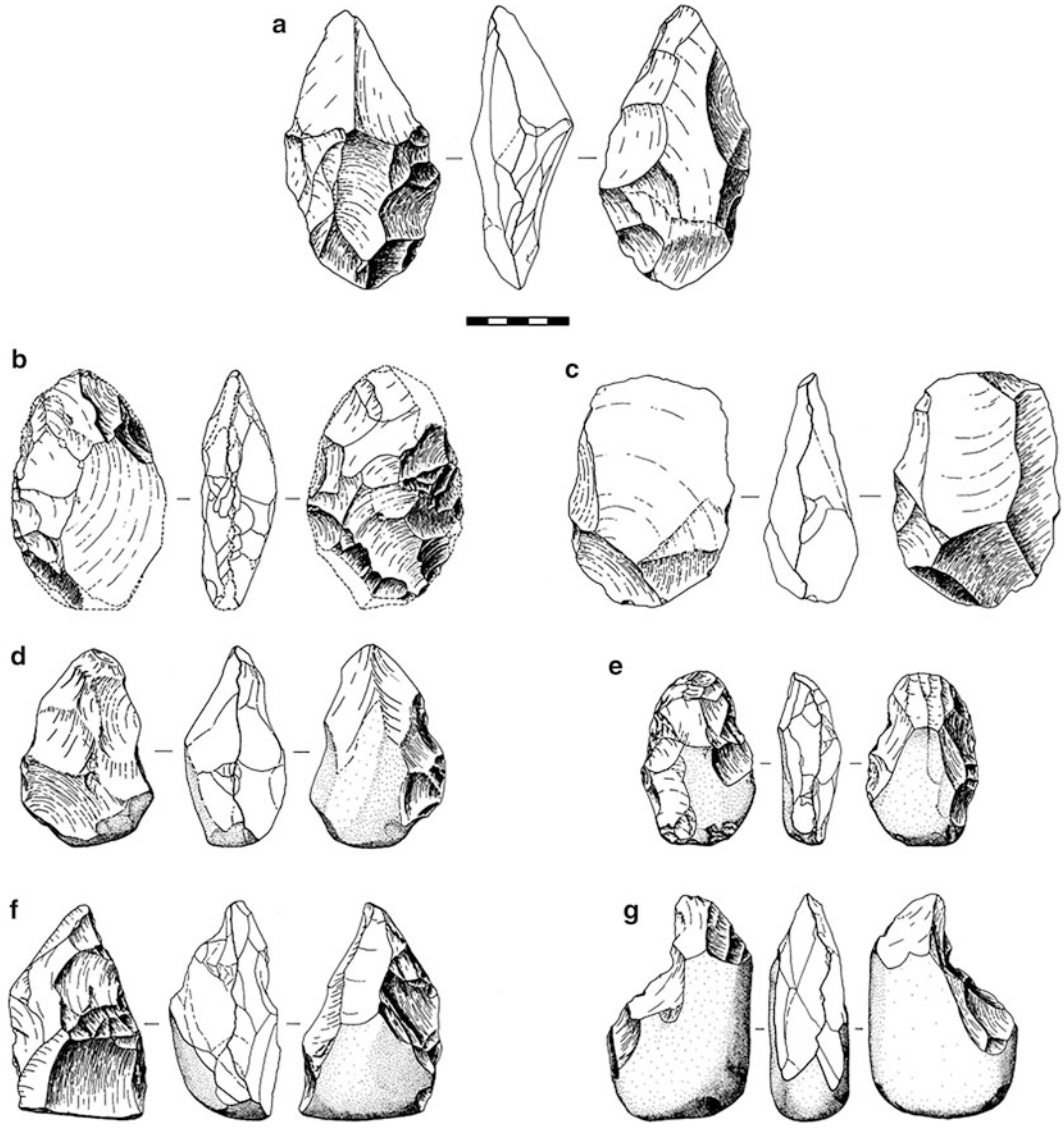


Acheulean Industrial Complex, Fig. 1 The earliest Acheulean is contemporary with a new hominid species, *Homo ergaster*, considered to be responsible for cultural innovations. KNM-ER 3733 from Kenya (*left*) is the most complete cranial specimen and is shown facing SK 847 (*center*) from Swartkrans, which was the first discovery of this species. At right is the type specimen, the KNM-ER 992 mandible from Kenya, shown together with 3733. They are not the same individual (All photos are of casts, courtesy of R. J. Clarke.)

these karst sites. Palaeomagnetic and U-Pb dates for Sterkfontein have been argued based on speleothems, but these have formed postdepositionally after the collapse and settling of breccias created voids that later filled with flowstone. Also problematic are younger electronic spin resonance dates proposed for the Sterkfontein Acheulean. Typologically and technologically, the LCTs are comparable to Early Acheulean examples from East Africa, and at this stage, the relative faunal age is more reliable. Karst cave breccias are particularly prone to the migration of groundwater through deposits, which compromises the closed system needed for ESR dating.

In interior South Africa, Early Acheulean is also now well documented in alluvial deposits of the Vaal River basin (Fig. 2), where cosmogenic nuclide burial dating documents artifact-bearing deposits ranging from 1.9 to 1.3 Ma (Gibbon et al. 2009). Although the error margins of the dates are large, their great age means that the sites still fall within the Early Acheulean. Subtracting the error from the oldest dated deposit results in an age of 1.7 Ma, which is as early as two of the East African sites (Konso at 1.7 Ma and Kokiselei at 1.76 Ma). Due to the limitations of geological preservation and dating, the Early Acheulean industries of East and South Africa currently provide our best evidence for the widespread distribution of this complex by 1.7 Ma. Undated but typologically equivalent artifacts are reported in Mozambique, and evidence will be published for Algeria, but other parts of Africa currently lack exploration or datable sites.

Descriptions of Early Acheulean technology and tool types have largely focused on the shaping of LCTs (Fig. 3), as more effort tends to be invested in such tools. Although published details are not yet available, LCTs from Konso and Kokiselei have been described as large pick-like pieces or "pick-like handaxes." The heavy-duty function of these tools may have been for digging underground foods such as bulbs, roots, and tubers. However, such types do not dominate in all the early assemblages. Handaxes from EF-HR at Olduvai and Peninj in Tanzania have been described as largely unifacial pieces – like massive scrapers with robust convergent tips (De la Torre et al. 2008). The notched edges on some examples from Peninj, EF-HR, and Sterkfontein suggest woodworking was another important function. In some assemblages, pick-like handaxes and unifacial handaxes with robust tips and scraper edges are only a minor component of the LCTs, but early handaxes generally all possess strong distals converging to a more or less flat tip for some hacking or cutting function. The degree of trimming to



Acheulean Industrial Complex, Fig. 2 Early Acheulean LCTs from Rietputs 15, South Africa, from a trench c. 1.7 Ma. Handaxes (**a**, **b**) and a cleaver (**c**) on flakes; handaxes (**d**, **e**) and picks (**f**, **g**) on cobbles (From Gibbon et al. 2009)

shape a handaxe also ranges from largely unifacial to partly bifacial to fully bifacial. However, many assemblages tend to be dominated by one type of shaping within this range, which is often determined by the degree of re-sharpening. For example, the BK assemblage from Olduvai (Fig. 4) includes some classic bifacial handaxes, along with likely evidence for re-sharpening in the form of distals broken through end-shock during knapping, as well as some very small-sized bifaces. Although some early assemblages are said to be dominated by pick-like handaxes, many researchers are able to distinguish picks as a separate type: an LCT in which the shaping is focused mostly on the distal end, with limited attention given to the body of the piece. Following the Early Acheulean, however, picks and handaxes are easier to separate as discrete types.

Acheulean Industrial Complex, Fig. 3 Early Acheulean LCTs of East and South Africa are comparable. *Right* are from Mary Leakey's type series from EF-HR, Olduvai Gorge; *left* are from Member 5, Sterkfontein

Acheulean Industrial Complex, Fig. 4 Broken handaxes and handaxe tips from BK, Olduvai, most probably resulting from flaking to re-sharpen the pieces

Another very characteristic type in the African Early Acheulean is the cleaver – an LCT made usually on a large flake, with a broad cutting edge at the distal end and/or along one lateral. The cutting edge is referred to as the "bit." It is usually formed by the naturally sharp portion of the large flake blank, but rare examples of bits with large removals do occur in the early assemblages, presumably to regularize the shape of the cutting edge. The making of a cleaver requires some planning for the large flake to be detached in order to produce a sizeable bit. The most classic cleaver type for both the early and younger Acheulean industries is one made on a large side-struck flake – a flake that is wider than it is long, with the bulb at the side of the flake's long axis. The thick platform area is then trimmed with some large removals, and the opposite lateral may also be trimmed (particularly in younger Acheulean assemblages). However, examples of cleavers on corner-struck and end-struck flakes also commonly occur. The sharp cleaver bit implies that the tool was used for a cutting or hacking function requiring a sizeable sharp edge and a tool with weight. Experiments suggest that cleavers make good dismembering tools in butchery, but handaxes and plain flakes can also perform this function. A small number of pieces studied for use-wear traces, micropolish, or phytoliths also suggest that some cleavers may have been used for chopping and scraping wood.

The raw material and the blank's form have a strong influence on the regularity of shape for LCTs, and the Early Acheulean is characterized by both crude and relatively finer examples when made in better raw materials. However, it is essential to remember that LCTs were functional pieces and there was no need for early *Homo* to produce standardized forms, symmetrical handaxes, or elegant shapes. The iconic concept of the classic, symmetrically shaped handaxe or elegant cleaver, when it occurs, is most often found in Later Acheulean assemblages after 0.6 Ma (discussed below). However, it is during the earlier Acheulean that the first handaxe industries appeared beyond the African continent. Ubeidiya in Israel has a sequence of Early Acheulean deposits from 1.4 Ma. Recently, the Early Acheulean has also been recognized in India c. 1.5 Ma with cosmogenic burial dating. The earliest handaxes in China appear by at least 0.8 Ma (at Yunxian in central China and Bose in southwestern China). In Europe, the earliest Acheulean may be as old as 0.9 Ma in Spain, but it only becomes widespread after 0.5 Ma.

From 1–0.6 Ma: Developments Following the Early Acheulean

While sites dated between 1.7 and 1.4 Ma are consistently referred to as Early Acheulean in the literature, there is no consensus on terminology for the following phases of ESA development. This is certainly a result of the limited number of sites and especially dates for the period between 1.3 and 0.78 Ma. Terms such as Early, Middle, and Later Acheulean are also historical labels created at a time when few absolute dates were available. Consequently, some researchers prefer to lump Acheulean sites into only two phases: Lower and Upper Acheulean or Early and Later Acheulean. However, with today's better understanding of Acheulean developments c. 1 Ma, there is perhaps some justification to recognize a Middle Acheulean phase from approximately 1.0–0.6 Ma. East African sites at this time demonstrate improvements in LCT production, as outlined below, and some sites show increased numbers of handaxes. Changes in handaxe flaking are probably the result of more attention paid to creating sharp cutting edges, and picks are now easier to separate into a class of their own.

At Olduvai, the sequence following the Early Acheulean in middle and upper Bed II has been published in some detail (Leakey & Roe 1994). Although the preservation of these younger assemblages is poor relative to the Early Acheulean and dating of these beds is not so precise, Roe was able to characterize changes in technology following the Early Acheulean: the Bed IV handaxes (c. 0.78–0.95 Ma – Peters et al. 2008) show more regularity of shapes and thinner profiles over the Early Acheulean, and cleavers become more frequent and often more elegantly made. These improvements could be considered a Middle Acheulean technology. Following Bed IV are the Masek Beds (c. 0.5–0.78 Ma – Peters et al. 2008), in which handaxe manufacture shows even greater standardization of preferred shapes and a high degree of technological competence. In Kenya, Olorgesailie also has a lengthy sequence dating back to 0.99 Ma. Isaac (1977: 213) classified the site as Upper Acheulean because "reliable chronological distinctions. . . are not possible." However, he commented that the assemblages are not the most refined and that one might be tempted to designate them as Middle Acheulean. Similar improvements over time are also recorded for the long sequence of Acheulean sites in the Middle Awash of Ethiopia (de Heinzelin et al. 2000). Soft-hammer flaking made its first appearance in the Middle Acheulean, with the earliest date for this technique reported from Gesher Benot Ya'aqov, Israel, at c. 0.78 Ma (Sharon & Goren-Inbar 1999). Potential percussors could have been a softer stone (like sandstone), a hardwood billet, or in Eurasia deer antler. The method is useful for detaching thinner flakes that extend further across the surface of an LCT and for finer retouching along the edges. However, the technique is more typically seen used for LCTs in the Later Acheulean.

A handful of hominid fossils is found with industries that could be termed Middle Acheulean. Several specimens from Daka, Ethiopia, are dated to 1 Ma, including a remarkable cranium

described as an evolving form of *Homo ergaster* (deHeinzelin et al. 2000). The illustrated LCTs show better technique and are more regular in form than Early Acheulean examples, but overall they are described as having bold flake scars and are larger and more irregular in plan view and profile than Later Acheulean examples. Also dating to 1 Ma is Buia in Eritrea which yielded a hominid cranium that, like Daka, possesses some progressive features. LCTs show variability across the Buia sites but are comparable in many respects to those of Daka, with bold scars and limited trimming that does not significantly modify the original blank's morphology (Abbate et al. 2004). Olorgesailie in Kenya has also yielded fragments of a hominid cranium at least 0.9 Ma, contemporary with Middle Acheulean elsewhere at the site. For South Africa, little detail is currently available for hominids in this time range as few dates are available for potential sites. An exception is Uitzhoek-Cornelia, but so far this site has only yielded one hominid tooth (Brink et al. 2012).

Most research on Acheulean sites today is focused on documenting the cultural and stratigraphic record of the relevant sites and obtaining reliable dates and palaeoenvironmental information. From a theoretical perspective, however, the "variability selection hypothesis" for hominid and cultural evolution has received widespread acceptance (Potts 1998). It argues that the driving force behind human evolution in the Pleistocene has been climatic change and the periodic fluctuations between moister and wetter environments over hundreds of thousands of years. *Homo* rose to this challenge of variability in climate and subsistence resources and adapted both physically and culturally. Fauna has long been the primary means of reconstructing palaeoenvironments when it is preserved. Isotopic studies (particularly on faunal teeth) are now a major means of analyzing diets, and hence the habitats of hominids and fauna, supplementing data that was previously limited to lists of taxa and their correlation with modern habitats. As the diets of some modern species differed somewhat relative to their past counterparts, isotopic analysis has become a valuable tool to discover those differences. Some researchers also focus on "taxon-free" analysis, studying the details of weight-bearing postcranial bones in relation to habitat substrates, particularly in bovids. And dental microwear analysis has shed further light on subsistence patterns of both fauna and hominids and hence habitat adaptations. Analysis of plant phytoliths and pollen, when preserved, along with stable carbon isotopes from sediments and geomorphological reconstruction, is another means of studying past environments. The varied regional habitats that existed across Africa during the Pleistocene add strength to the Potts hypothesis of fluctuating climates as a driving force in hominid evolution.

Another area of focus in Middle Pleistocene research is the origins of prepared core technology within the Acheulean. The earliest published date for this development is in Israel c. 0.7–0.8 Ma (Goren-Inbar et al. 2011), where there is one prepared core. However, a cosmogenic burial date for the Victoria West industry from Canteen Kopje (South Africa) is older and although the prepared cores are not the most common, they are substantial in number. These two unrelated examples suggest that the ancestor of *Homo sapiens* had relatively sophisticated cognitive abilities which were, so to speak, "hardwired" in the brain. Many researchers believe that the shaping of handaxes gave rise to the concept of core preparation, and the Victoria West industry demonstrates this well (Figs. 5, 6). These almond-shaped cores are flaked initially like a very large handaxe with bold scars. However, the profile is more asymmetrical, with a shallower upper surface and a deeper lower surface. A single large "preferential" flake is struck from the upper surface, perpendicular to the long axis of the core. Such side-struck flakes were particularly suitable blanks for handaxe manufacture. Cleavers may not have been made regularly on these blanks, as the preferential flake scars tend not to have the right shape for a *bit*. Although the Victoria West core is a small component of the overall cores in excavated samples, it clearly shows the conceptual link with handaxe manufacture. "Giant cores" are also present at Gesher Benot Ya'aqov

Acheulean Industrial Complex, Fig. 5 Handaxes from Canteen Kopje's Victoria West prepared core industry, South Africa

(Goren-Inbar et al. 2011). These appear to have been specially targeted for the making of LCT blanks. Hominid size and strength at this time must have enhanced human survival considerably, and this is reflected in the giant cores and the heavy-duty tools.

From 0.6 Ma to 0.3–2 Ma: The Later Acheulean and Final ESA

From 0.6–0.5 Ma, the number of archaeological sites in Africa increases (Clark 2001a), not merely because younger sites are more likely to be preserved but because of the successful adaptation of evolving *Homo sapiens*. A very important influence on this success was undoubtedly the slower rate of maturation of *H. sapiens*, which the increase in site numbers suggests was developing at this time. In contrast, even *Homo ergaster* matured relatively quickly. The specific age of an early *Homo* fossil may be difficult to know for certain, but it is today well documented that the rate at which an early *Homo ergaster* juvenile reached maturity was faster than in modern humans. This fact undoubtedly influenced the character of earlier Acheulean industries. Hominids learned to make tools by observing and learning their group's tradition, but a shorter adolescence would have limited the time for individuals to experiment and innovate. Studies of nonhuman primates show that it is mainly the younger individuals who invent new cultural practices or adopt innovations from others in the group through observation.

While most variability in the Later Acheulean from c. 0.6 to 0.3 Ma can be explained by differences in raw materials and environment (Clark 2001a), there is nevertheless greater skill evident in the flaking of cores, in the acquisition of some better raw materials from distant sources, and in the shaping of the best LCT examples. The most logical explanation for these changes is not the appearance of a dramatically different, more advanced hominid but the increase of more sapient traits and cognitive abilities in the descendants of *H. ergaster*. Some researchers lump the hominids of this phase together as *Homo heidelbergensis*, but most specialists prefer to restrict this species to Europe and refer the fossils to archaic *Homo sapiens*. The relevant fossils are all associated with Later Acheulean and include the Bodo cranium from Ethiopia c. 0.6 Ma, the Elandsfontein skullcap from South Africa c. 0.5 Ma, and the Ndutu cranium from Tanzania c. 0.4 Ma. The Kabwe cranium was retrieved by miners at Broken Hill, Zambia, and is probably at least 0.4 Ma. Middle Stone Age artifacts were also found in the cave deposits but in unknown relationship, while Acheulean and Sangoan assemblages (discussed later) were excavated in situ from open-air deposits not far from the cave.

The earliest cave occupations occur in the Later Acheulean, such as the Cave of Hearths (c. 0.45 Ma), Montagu Cave, and Wonderwerk Cave in South Africa. There are earlier Acheulean levels at Wonderwerk >0.78 Ma, and if the artifacts are in situ, then Wonderwerk

Acheulean Industrial Complex, Fig. 6 Victoria West prepared cores. *Top right* is the prepared upper surface and *bottom right* the deeper undersurface. *Top left* shows a core in profile with an LCT made on a large side-struck flake from such a prepared surface. *Bottom left* are profile views of two cores showing the asymmetry of the two surfaces

would be the earliest cave occupation to date, as the karst cave infills in South Africa are in redeposited contexts that do not represent occupations. The assemblages from these earlier levels at Wonderwerk are small and not well published. It is possible that hominids may have sheltered or slept in the cave rather than lived in it, as some rare baboon and chimpanzee troops have been recorded to do, and this could explain the small tool assemblages.

Open-air sites of the Later Acheulean in Africa are much more numerous, although many remain poorly dated. Exceptions are Kathu Pan in South Africa and Kapthurin in Kenya, both c. 0.5 Ma. Some of the most detailed descriptions of Later Acheulean industries are published for Olduvai, Tanzania (Leakey & Roe 1994), and the Middle Awash Valley of Ethiopia (de Heinzelin et al. 2000). All Later Acheulean assemblages show considerable improvement in skill over earlier phases, even though there is very often a "least effort" approach, with just enough flaking to get the desired edge. The sequence at Kalambo Falls deserves special comment, as it is well described (Clark 2001b) and includes both Later Acheulean and an overlying final ESA industry known as Sangoan. Experienced knappers have commented that the Kalambo LCTs show some of the finest proficiency in the African Acheulean, with refined technique evident in sharp cutting edges around all or most of the perimeter, absence of step fractures, intensive flaking, symmetrical plan forms and cross sections, careful removal of small flakes as a last series of removals to regularize edges, and use of soft-hammer flaking for the finer work. Not all Later Acheulean LCTs are beautifully made, but when effort is invested in a good raw material or the maker is highly experienced, there is great skill evident, demonstrating what Glynn Isaac referred to as the "upper limits" of the abilities manifested in an industry (Fig. 7).

The significance of blades in the Later Acheulean is often noted, as blades require

Acheulean Industrial Complex, Fig. 7 Some of the more finely worked handaxes from the Later Acheulean at Cave of Hearths, South Africa, showing extensive flaking

a purposeful flaking strategy to be made with any consistency. Three of the oldest regional industries with blades date back to 0.5–0.4 Ma (see Wilkins & Chazan 2012 for references). Along with blades, the Fauresmith at Kathu Pan, South Africa (c. 0.5–0.29 Ma), includes some LCTs, points, and prepared cores. Similarly, the Kapthurin industry in Kenya has core preparation and blades from c. 0.55 to 0.285 Ma. In Israel, a third blade technology is the Amudian, c. 0.42–0.32 Ma. These three technologies are unrelated as the techniques differ. In Africa, Acheulean blade tools tend to be associated with more open habitats (Clark 2001a). Another trait noted occasionally in some late assemblages is small-sized LCTs, some of which overlap in length with the larger early Middle Stone Age (MSA) points and unifaces. The most variable and skilled assemblages of the Later Acheulean occur in the late or final phase of the Acheulean, with retouched tools and technology presaging MSA features in some industries (Clark 2001a). Due to such similarities, many researchers recognize regional transitions from ESA to MSA but will label an assemblage Acheulean if it contains LCTs. The Kapthurin and Fauresmith both suggest a slow transition toward Middle Stone Age technology in different parts of Africa.

Clark (2001a) always maintained that the late ESA was the first time that hominids coped with the challenges of more forested environments. The Sangoan was named as a central African industry found in regions that today are tropical. While the original collections were retrieved from disturbed geological contexts, subsequent research has documented it in context, where it always follows the Acheulean in time when both phases are present. The industry is found mainly in central and south central Africa and western Kenya where woodlands were prominent at times. At Kalambo Falls, climates alternated between warmer/moister and colder/drier episodes, indicating that the Sangoan was not specifically a tropical or closed habitat adaptation. Rather it occurred in regions where woodland resources were an important component. Typical tools include small scrapers, picks, and core axes, a type which seems to have functioned as a form of adze for woodworking and cutting toe holds for climbing in trees (Clark 2001b). Acheulean-style handaxes continue to occur in small numbers, and thus some researchers see the Sangoan industry as a variant of the Later Acheulean with the addition of some new types related to the prominence of woodland resources. In Zambia and western Kenya, there are some shared features between Sangoan and early MSA industries, such as the core axes at Kalambo Falls which continue in the early MSA but become increasingly adze-like. In western Kenya, the Sangoan and the Lupemban (an early MSA industry) share so many traits that at least one research combines the terms as the Sangoan-Lupemban Complex. Precise dates are not available for Sangoan industries, but they are at least 0.1–0.2 Ma, and some may be considerably older.

International Perspectives

The most interesting theoretical aspect of Acheulean research is perhaps the "variable sameness" of the industries across time and space in Africa and Eurasia until the Later Acheulean. Even then,

most variability is attributed to raw material differences, and one is still left with an impression that the toolmakers were very clever people indeed, but still relatively archaic in mind and matter when compared to modern humans that appeared by 0.2 Ma with the early MSA. Industries then become considerably more variable, with many regional adaptations that include some stylistic differences, and the pace of change picks up even more during the course of the MSA. Various researchers have debated the meaning of Acheulean variability and the methods used to analyze it both regionally and globally. However, the most informative approach remains a thorough understanding of Acheulean assemblages in the context of experimental flaking with the specific raw materials that influenced their characters. Such hands-on experience always provides valuable insights, often more valuable than detailed morphometric and statistical studies that are popular today, as they help to interpret those factors contributing to the variability. The Acheulean was undoubtedly a highly successful adaptation from 1.7 to 0.3–0.2 Ma ago, with an emphasis on open woodland and grassland subsistence until the appearance of the Sangoan variant. The final ESA, however, is unique, witnessing the transition from more archaic to modern humans by 0.2 Ma. The success of the Early Acheulean and *Homo ergaster* as a species clearly set the stage for these milestones in human development.

Cross-References

- ▶ African Stone Age
- ▶ *Homo ergaster*
- ▶ Human Evolution: Use of Fire
- ▶ Olduvai Gorge Archaeological Site
- ▶ Lithic Technology, Paleolithic

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Basic Biographical Information

Lisa Ackerman is Executive Vice-President and Chief Operating Officer of World Monuments Fund and serves on the boards of Historic House Trust of New York City, New York Preservation Archive Project, and US/ICOMOS. She has previously served as Executive Vice-President of the Samuel H. Kress Foundation.

Major Accomplishments

In 2007 Lisa Ackerman received the Historic District Council's Landmarks Lion Award. In 2008 she was named the first recipient of the US/ICOMOS Ann Webster Smith Award for International Heritage Achievement.

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Activism and Archaeology

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Introduction

For most people, including many archaeologists, archaeology is about the more distant past. Archaeology is more interesting and esoteric than actually being useful. After all, the "archaeo" part of the word means "ancient"! Thus, the past is over and done with, and while it may be intrinsically interesting or provide us with perspective on our lives and cultural changes through time, the past does not seem to be of much use in dealing with contemporary issues. Other archaeologists, however, have called on archaeology to become more action oriented

and for archaeologists to explore more ways to use archaeology to address contemporary problems (Kleindienst & Watson 1956). They want archaeology to matter (Sabloff 2008) arguing that archaeologists "...have responsibilities towards the communities, individuals, and institutions directly implicated by archaeological work into the recent past in helping them come to terms with the obscured and often painful circumstances of contemporary life" (Buchli 2007: 14). To do this, archaeologists must first acknowledge that the past actually includes anything from the briefest moment ago into the depths of time (Patel 2007: 51).

Archaeology is really more about the study of material culture than about the past and can be applied to *any* period of time. Expressed simply, artifacts do not "lie"; they are present or they are not, which in either case may require explanation. Although archaeologists may err in their interpretations, their goal is to recover material remnants of past behaviors and their contexts in order to provide a narrative – a story – about the history of a people, their lifeways, their adaptations to changes in natural and social environment, and what things mean to them. This can be a powerful way of seeing the past, which makes archaeology potentially useful in understanding contemporary concerns. Archaeology's applicability to the present stems from three key elements: studying material culture, building accurate narratives about the past based on what is found, and using the narratives to suggest changes relating to social concerns. To realize this potential, however, requires activism.

Definition

Activism generally is the use of some kind of direct action either in support of or in opposition to a cause or issue. When linked to archaeology, this means that the tools of archaeology are applied in some way to support or oppose an issue in an effort to promote change. Activism requires that archaeologists make choices and then take some sort of political position, usually in collaboration with stakeholders to that issue, in an effort to effect the desired change.

Activism depends heavily on collaboration with non-archaeologists. Projects are sometimes low key exercises in public education about what archaeology does or uses archaeology to address relatively uncomplicated concerns. Several projects, for example, employ archaeology to demonstrate the historical basis and impacts of race in a community, and others use particular archaeological techniques to assist with mass disasters. On the other end of the continuum are projects in which archaeology is only one aspect of studying very complex social problems such as homelessness or global warming. Little and Zimmerman (2010) and Stottman (2010) provide numerous examples spanning the spectrum of activist archaeology projects.

Key Issues/Current Debates/Future Directions/Examples

Two key issues impede activism. The first is that activism requires archaeologists to be political, which many have been loath to do. The second is that even if they are willing to be activists, few archaeologists know how to translate the results of their work in ways useful to the formulation of public policy.

The former stems from archaeology's long struggle to become scientific, and as such, many archaeologists believe that archaeologists and their interpretations must be objective and unbiased. Some altogether reject studies of the contemporary past as even being archaeology, suggesting that they epistemologically reflect postmodernism. As a few activist archaeologists have heard from colleagues, "you do politics, not archaeology!" In spite of the fact that there is disagreement with his assessments, McGuire (2008) has contended, however, that archaeology always has been and still is clearly political.

Accepting archaeology as inherently political, a growing number of archaeologists have moved toward making their research "translational". This means that they "generate

knowledge and utilize evidence to develop meaningful practices that address problems or issues in everyday life and collaborate or form partnerships to successfully translate evidence into meaningful practices" in order to make a difference in people's lives (Zimmerman et al. 2010: 444-45). In other words, by working with others, they find ways to put archaeology to use. Doing so is not always easy and carries risks of alienating collaborators or other powerful stakeholders. Given the limited experience of most archaeologists with activism, most are relying on a case-by-case approach to projects and use a lot of experimentation. To say that the discipline has yet to develop an encompassing epistemology for activism and is nowhere close to a set of "best practices" would be a profound understatement.

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Critical Historical Archaeology
- ▶ Cultural Heritage and Communities
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Stakeholders and Community Participation

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Adandé, Alexis B. A.

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Basic Biographical Information

Dr. Alexis Bertrand Agunmaro Adandé is an archaeologist from the Republic of Benin, born April 7, 1949 in Dakar, Senegal. He completed his primary and secondary studies in Dakar (Senegal), and Porto-Novo (Republic of Benin), between 1954 and 1968. After obtaining his Baccalaureat in 1968, he entered the Institute of Higher Education of Benin in Lomé, Togo; in 1970, he left to continue his studies at the University of PARIS I – Panthéon – Sorbonne in France. There, he obtained a license of history in 1971 and a Master of Arts in 1972. He returned to Benin, where he taught history and geography in secondary schools (1972–1979), before returning to France in 1979 for his doctoral studies. At the University of PARIS I – Panthéon – Sorbonne, he successfully defended a Diploma of Advanced Studies in Archaeology in 1980, and a Ph.D. in 1984. Upon his return, he was sent to the National University of Benin, where he was already a lecturer in archaeology at the Department of History and Archaeology (1978–1986). He taught archaeology as Assistant Professor of Archaeology from 1986 to 1993. Since 1993, he has been a senior lecturer in archaeology. He was Deputy

Adandé, Alexis B. A., Fig. 1 During fieldwork

Head of the Department of History and Archaeology of the University of Benin from 1989 to 1995, and Head of the Archaeological Research Team of Benin (ERAB) from 2003 to 2007 (Fig. 1).

During his career, Dr. Adandé participated in several training courses at archaeological sites in Tunisia and France; in particular at the Pincevent school site, under the direction of Professor André Leroi-Gourhan, College of France (16 June–6 July, 1980) and the training school site of Ras ed Drak-Kerkouane (Tunisia) under the auspices of the Institute of Art and Archaeology and under the joint direction of Professors A. Fantar and J. Leglay (September 1983).

He has directed several archaeological excavations in Benin. He was, among other things:

responsible for research and excavations in the region of Allada (1981–1982);

Co-leader of the Mixed team for the Benin–Togo Archaeological Rescue Project of Mono Valley (1990–1993);

Co-director of the Archaeological Project in Ouidah (July–August 1991);

Project Manager of Ouessè Archaeological Research (1992);

Co-leader of Project Beninese—Danish archaeology (BDArch, 2002–2004).

Dr. Adandé is also interested in museums, where he led several exhibitions within the framework of the development of the archaeological results. This includes the first archaeological exhibition in the Republic of Benin during the commemoration of "Ten years of archaeological research in Benin" (campus of Abomey – Calavi and Honmè Museum – Royal Palace Porto Novo, 1988); and the installation of the exhibition "The Earth is also Our History Book," Alexandre Sènou Adande ethnographic museum, Porto-Novo (1994–1995). He was Executive Director of West African Museums Program (WAMP) from 1995 to 2001. Dr. Adandé has also participated in several seminars and scientific conferences and educational workshops on the national and international level (Fig. 2).

Major Accomplishments

Dr. Alexis Bertrand Agumaro Adandé was the first to have defended a doctoral thesis in archaeology in the Republic of Benin. He was the first archaeologist who conducted well-documented archaeological excavations at the site of Togoudo Awutè Allada, southern Republic of Benin (Adandé 1984). His work has contributed to the knowledge

Adandé, Alexis B. A., Fig. 2 Dr Alexis Adandé during an exhibition

of the rich archaeological heritage of Benin and its protection. He has contributed to the creation of the Archaeological Research Team of Benin in 1978 under Father François de Medeiros, then Head of Department. This team developed the first national program of archaeological research, covering the territory of Benin and has enabled a precise inventory of archaeological sites in Benin.

Dr. Adandé has contributed to the opening of a regional perspective in archaeological research through the West African Archaeological Association. For him, the archaeological approach, to be meaningful, has to be global; that is to say, the work cannot be achieved without taking into account research sites located in neighboring countries (Adandé 1993). This methodological perspective of integrating the historiography of various countries within the sub-regional West Africa is fruitful, because it helps build hypotheses that are better reasoned and less narrow.

Dr. Adandé also contributed to the training of several generations of archaeologists in Benin and in the sub-region of West Africa. He has significantly contributed to the development of archaeology in Benin and West Africa.

Cross-References

- ▶ Cultural Heritage Management: International Practice and Regional Applications
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Heritage and Archaeology
- ▶ Heritage Museums and the Public
- ▶ Heritage Values and Education
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ West Africa: Museums
- ▶ World Archaeological Congress (WAC)
- ▶ World Heritage List: Criteria, Inscription, and Representation

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Adaptation in Archaeology

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Introduction

The theory of evolution is inherently attractive for archaeologists, who are concerned with the long-term history of humankind (Dunnell 1980). Changes through time during the long process of hominization are, by definition, adaptive. Adaptation is clearly one basic constituent of evolution. For that reason, the concept of adaptation – including the capacity for a cultural system to adjust to changes – is important in many approaches, particularly in ecologically oriented archaeology and, more recently, in evolutionary archaeology.

Definition

This variety of approaches using the concept of adaptation naturally leads to the existence of slightly different definitions (O'Brien & Holland 1992; Van Pool 2002).

Basically, adaptation refers to "the idea that organisms are fitted for the particular environments in which they live" (Alexander 1962: 826), or more directly to the "conformity between the organism and its environment" (Pianka 1983: 85).

It is accepted that an adaptation refers to both the state of being adapted and the process that produces the adaptation. However, even biologists have found it difficult to recognize adaptations, and the acceptance that natural selection is not the only mechanism behind evolutionary processes was one result of this difficulty (Vrba & Eldredge 1984).

Historical Background

The concept of adaptation used by many archaeologists was based on the work of classic evolutionary anthropologists like Leslie White (1949) and Julian Steward (1955). In these approaches, tools are seen basically as extrasomatic means of adaptation. The assignation of functions to archaeological tools and features is the key concept to understand and discuss adaptations, an activity that falls within the approach known as Cultural Evolution, which is extremely popular. Circularity is the main interpretative problem of this approach. Effectively, the role of adaptation as an ex post facto argument invoked as the cause of both the appearance and the persistence of archaeological traits was and is an impediment in most applications (O'Brien & Holland 1992).

On a slightly different vein, Patrick Kirch wrote about "the continuous modification of . . . behavioral patterns in response to changing environments, by means of selective retention of behavior" (Kirch 1980: 110). He explained that it is this selective retention which serves the adaptation of individuals. In a sense, in this approach, artifacts are the result of adaptations. One famous example provided by Kirch refers to the different types of fishhooks recovered at the different Pacific Islands (Kirch 1980). Using this approach to define tactics and strategies which involve tools and features, it is possible to discuss how large parts of past societies functioned in the past, and Kirch used it – in conjunction with historical linguistics – to explain the process of human colonization of the Pacific Islands (Kirch 2010).

One observation is that many times these approaches assumed that cultural systems were in equilibrium, and adaptations were simply seen as including those behaviors "that seemed a reasonable way to maintain the status quo" (Kelly 1995: 47). In the end, it is true that the concept of adaptation is trapped in circular thinking.

Since the 1980s, adaptation is also a core concept of Darwinian or selectionist archaeology. In this approach, tools are seen as the hard parts of the human phenotype, and they are treated as adaptations resulting from the action of natural selection (O'Brien & Holland 1992). The problem is that showing that any given trait was under natural selection is a difficult task at best. Most published

applications are restricted to highly specific aspects of past societies, like changes in the shape of projectile points or in the wall thickness of pottery (Neff 1992; O'Brien & Holland 1992). These are attractive and useful examples, but wider applications are still difficult to achieve.

Key Issues/Current Debates

In the twenty-first century, different approaches with a focus on the concept of adaptation are disputing their capacity to deal with the archaeological record. Among these approaches, human behavioral ecology (Bird & O'Connell 2006), selectionism (Dunnell 1980), and cultural macroevolution (Prentiss et al. 2009) are among the best known. Behavioral ecology is "the subset of evolutionary ecology that studies the fitness-related behavioral trade-offs that organisms face in particular environments" (Bird & O'Connell 2006: 144) and includes widely used subfields like costly signaling theory. Basic to these approaches is that natural selection provides the flexibility to adapt to a variety of situations. Extensive ethnoarchaeological and experimental research was done in order to understand the costs and benefits of different tools and strategies. These results are in turn used to discuss diverse aspects of the archaeological record that are not focused in adaptations, but result from the process of decision-making allowed by natural selection. Ethnographic data is used not only to develop methodological tools but also to test some of the basic assumptions of behavioral ecology.

Selectionism, on the other hand, tries to explain the archaeological record in terms of the direct action of natural selection (Dunnell 1980; Neff 1992). Adherents to this approach believe that ethnoarchaeology is not useful, since recent societies should be the result of evolutionary forces. For that reason, they should not be adequate to provide good analogs for the past. However, there is a role for experiments, especially those designed to develop engineering principles that can be used to understand the performance of archaeological tools. Many of the most attractive discussions about adaptation produced by selectionists derive from this kind of studies.

Researchers working under the cultural macroevolution brand are concentrating in the study of higher level cultural entities. This is their basis for the construction of an inclusive macroevolutionary approach to archaeology, which is used to study the evolution of whole cultural systems (Prentiss et al. 2009).

Examples of the identification of archaeological and ethnographic adaptations exist, but there are critiques, importantly that most of the so-called adaptations recorded by ethnographic research cannot be the result of natural selection, because they occurred within one human generation. The main example is the use of snowcats by the Cree that replaced snowshoes in a few years (Boone & Smith 1998). It is indeed difficult to implicate natural selection – a benefit in differential survival – to explain a process that occurred in less than one generation. As a result of all these disagreements, nothing close to an operative application of the concept of adaptation for archaeology emerged. Scheinsohn (2011) maintains that the published examples presented as adaptations are many times in fact either aptations or exaptations, that is, "features coopted for a current utility following an origin for a different function (or for no function at all)" (Gould 2002: 1246). In the end, it appears that it is not reproductive, but replicative success that is useful in archaeological studies (Leonard & Jones 1987). Tools can be counted through space and time, and the results can be compared. The assumption is that replicative success derives from the better performance properties of tools, and this is something that we can study in a number of ways. Studies of the resistance of materials, that is, the resistance of ceramics to thermal shock, or the shape of tools, that is, the distribution of cutting edges in lithic tools, can be used to understand the performance potential of different materials. Given the fact that the selective environment is constantly changing, when replication is successful, a number of exaptations are to be expected (Van Pool 2002). For example, most of the morphological

transformations of lithic tools are expected to be exaptive. For that reason, it can be suggested that many lithic tools follow an inexorable trend of exaptive transformation. Functional studies, or residue analysis, are adequate ways to study and understand the scope of these variations.

Also, in order to study replicative success per se, engineering studies are useful. These studies are basic components within both the Darwinian or selectionist and behavioral approaches to archaeology. Behavioral archaeology is an approach based on human-artifact interactions that seek to understand cultural change in the long term. In part, this similarity and the idea that "nothing in Darwinian theory per se nor in modern evolutionary biology precludes framing theory and models in behavioral terms" (Schiffer 1996: 96) led Michael Schiffer to propose the existence of important overlaps between both research programs. The answer from the selectionist camp was that differences were still important, including the nomothetic interest which is manifested in the behavioral approach and the corresponding place for historical contingency in the selectionist approach (O'Brien et al. 1998). Beyond these discrepancies, it can be sustained that an understanding of the forces and tensions to which pottery, lithics, or bones are subjected surely helps in the construction of credible adaptive scenarios. These scenarios, in turn, should be able to capture the whole complexity of the cultural systems that produced them.

The study of human bones should be a basic component of any approach that is trying to tackle adaptations in the archaeological record. However, bioanthropology usually appears only through applications of the results of population genetics and molecular biology. This is particularly true in highly speculative scenarios of human colonization of the different regions of the planet. But human bones rarely appear in archaeological discussions of adaptation (but see O'Brien 1987). This is odd, since humans are the carriers of the supposedly adaptive tools and behaviors that we are studying.

Future Directions

One important conclusion is that tools are just means purposefully designed to perform functions. However, intentions can be considered proximate causes at best, and their main role is to generate variation (O'Brien & Holland 1992). Some of the tools recovered in the archaeological record can be seen as exaptations, cases in which the design is not necessarily related with the function but, instead, in the nomenclature of Gould (2002), with its effects. In other words, tools can be used in many unplanned contexts. In one way or the other, it may be true that exaptations can be seen as basic to the understanding of long-term human processes. More specifically, the explicit search for exaptive examples appears today as an archaeologically relevant task, since functions and effects can be understood and temporal changes can be evaluated (Scheinsohn 2011). In a more sophisticated level, exaptations can be invoked even to explain issues like the origins of social inequality or socioeconomic change (Prentiss et al. 2009).

Finally, it is only with the intensive use of bioanthropological information that archaeological discussions of adaptation will find the much desired depth. There is promise in a study that starts with the study of adaptations of the human individual – functional pathologies, stress indicators, stable isotope information, etc. – and then searches for related changes in the frequency of tools or designs. In doing this, we are dealing with conscious or unconscious modifications of behavior (Van Pool 2002: 16) that respond to changes in the social and natural environment. In other words, behaviors, technologies, and phenotypes can be related in complex and difficult to understand loops. Then, an exploration of exaptations, which may be related or not with previous adaptations, appears to be an attractive and promising way to understand the dynamics of past societies.

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▶ Darwin, Charles R.

► Evolutionary Anthropology: Issues, News, and Reviews
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Advertising and the Appropriation of Culture

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Introduction

The growth of cultural tourism and the spread of global information have both contributed to an increase in the commercialization of the past. Ancient cultures are used for marketing everything from vacation destinations to a wide range of products that draw upon stereotypes of the past as mysterious or idyllic. The pervasive use of ancient sites and artifacts by advertisers may simultaneously increase awareness of the past as well as put sites in danger as a result of overvisitation or mismanagement.

Definition

Certain sites such as Stonehenge and Chichen Itza have both iconic status within modern Western marketing and clear brand name recognition. Unfortunately, the field of advertising is largely unaware of the impact upon archaeological sites and descendant communities of a campaign designed around stereotypes of the past.

Key Issues/Current Debates/Future Directions/Examples

Advertising is ubiquitous in our world today. Given the seemingly endless opportunities to

purchase goods and services in modern Western society, it is no wonder that archaeological cultures and sites are frequently used to attract consumer attention. Well-known archaeological sites achieve an iconic status within many cultures and become easy shorthand for specific values advertisers wish to associate with their products. The advertising industry is voracious and constantly on the lookout for new ideas and ways to market products. Archaeologists must be aware of the impact such media campaigns have on popular conceptualizations of cultural heritage and guard against a trivialization of archaeological resources due to overexposure or distortion in the media.

One of the risks of archaeological resources being utilized in advertising campaigns derives from the nature of this particular enterprise. "Advertizing is a rhetoric of persuasion, not a narrative of instruction," and while it is obvious that we do not turn to advertisements for educational purposes, nonetheless the messages conveyed about ancient cultures and archaeological sites via the medium of advertising influence our shared understanding of the past (Talalay 2004: 208). In many cases, an entire civilization is reduced to a single image and concept – when Stonehenge is used to convey a sense of a premodern, nonindustrial, and tribal identity missing from today's hectic world or when a jungle-covered Maya pyramid is used to convey an exotic and dangerous escape from modern routines, advertisers have selectively imagined the past in a way that essentializes the diversity and complexity of ancient cultures in order to connect quickly and easily with the consumer (McCarthy 2002). This reductive process in turn fosters the stereotypes that most Westerners have about the ancient past – that it was a simpler, easier time – and may even constrain how heritage resources are managed. The use of a single icon from ancient Egypt, such as the Sphinx, reinforces the stereotype that ancient Egypt was dominated by isolated monumental constructions that exist in a peopleless and pristine setting (MacDonald & Rice 2003). When such extraordinary and unusual artifacts come to define an ancient culture, we lose the richness of a landscape filled with ancient people performing an enormous range of activities in order to keep desert settlements functioning, and in turn we hamper our ability to preserve the less visible sites where the vast majority of the population lived, worked, and conducted the business of social reproduction.

Popular advertising that utilizes archaeological themes often overemphasizes the artificial boundary erected today between past and present (Talalay 2004). The idea of a "past" that is not in some way tied to our modern lives is a falsehood encouraged by depictions of archaeological cultures as exotic, unchanging, or bizarre. Advertisements for adventure tourism or all-terrain vehicles often utilize this trope by situating the modern consumer within an alien landscape of ruined structures in a harsh environment. The message conveyed is that the past is stuck in the past and we may enter it for entertainment or diversion if we are brave enough. Advertisements for cosmetics and jewelry that draw selectively upon artifacts and iconography of the ancient Mediterranean, for example, are based in a different trope that argues the boundary between past and present is permeable – certain goods have always been valued by elites, and the purchase of a pearl necklace or timepiece will connect the consumer to a privileged set who unabashedly displayed their elite status when such behaviors were better tolerated (Duke 2007). The consumer is invited to share an essential understanding of the unchanging and timeless value of certain important luxuries. In both cases, whether the past is depicted as alien and threatening or as a source of legitimization, the past has an uncontested authority that advertisers use to promote their product. This inherent authority is set in opposition to our ever-changing present, full of diverse choices and ambiguity.

Archaeological tourism is one venue in which advertisers take full advantage of ancient cultures to sell a product. As cultural and heritage tourism have grown over the last 20 years, national tourism agencies have created marketing campaigns centered on the iconic image of archaeology as healthy escapism. Many of the most important archaeological sites around the world are state

owned and state managed, with governmental control over how they are marketed. This arrangement has serious implications for the interpretation of archaeological cultures, as governmental control has often meant a small minority of power holders construct a past that is acceptable, marketable, and profitable. Descendant communities, especially indigenous populations, are very often excluded from this interpretive process and from decisions about how their heritage will be marketed or appropriated for national tourism campaigns (Ardren 2004). This is despite overwhelming evidence of the strong ties many modern indigenous people have to ancient sites or to an identity that rests in part within a historically charged landscape of places and events. In January 2006, indigenous people from all over the world met at the ancient center of Tiwanaku, Bolivia, to witness purification and blessing ceremonies of incoming President Evo Morales. President Morales is the first Bolivian president of indigenous heritage, and he chose Tiwanaku as his inauguration setting deliberately. His comments on that occasion referenced the archaeological site as evidence for the survival of indigenous culture and its successful resistance to colonial empires. Morales reclaimed the site as a reservoir of native art and culture as well as a source of tourism revenue. The distinctive art and architecture of Tiwanaku are frequently used in advertisements, and President Morales argued that the indigenous people of Ecuador should have a role in deciding how such images are commercialized and manipulated. Tiwanaku is by no means a unique example: the three most heavily visited UNESCO World Heritage sites in the New World – Chaco Canyon in New Mexico, Chichen Itza in Mexico, and Machu Picchu in Peru – have no formalized mechanisms for the involvement of the large descendant communities that surround them in decisions about how images from the sites will be commercialized and popularized.

The way archaeological resources are portrayed in the media also affects the public understanding of archaeology as a natural and cultural resource and, thus, site management strategies. If archaeological sites are trivialized, through their depiction as either the settings for escapism or entertainment activities only, the argument for sufficient resources for protection and maintenance becomes much harder for archaeologists and others committed to heritage preservation to make. Likewise, when archaeological sites are depicted as exotic locations full of unusual or mysterious objects, a message is conveyed that archaeological resources are only located in distant places and we are unlikely to encounter them at home. When archaeological cultures are used as a passive backdrop for commercialized advertising, a dangerous impression is given that archaeological resources are unlimited and eternal and that they exist without the need for careful preservation and management (McCarthy 2002).

In sum, the archaeological past is generally appropriated by advertising in a way that furthers common stereotypes and does not encourage responsible use. Improvements are simple and would involve avoidance of these stereotypes, efforts to "people" the past, and consultation with descendent communities when images are being used. The common use of ancient cultures in modern advertising can have a very positive effect upon the public awareness of archaeology and archaeological resources. But there is tremendous room for improvement in how such images are utilized and in trying to understand the effect they have on all of us who consume them.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Cultural Heritage Management: Building Bridges
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Gender
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage Research and Visitor Planning

▶ Heritage Tourism and the Marketplace
▶ Heritage: History and Context
▶ Indigenous Archaeologies
▶ Intangible Cultural Heritage
▶ Marketing Heritage

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Aerial and Satellite Remote Sensing in Archaeology

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Introduction

Aerial and satellite remote sensing technologies offer a noninvasive and nondestructive tool that can be used in many ways for the preservation and conservation of archaeological sites and landscapes. A synoptic, landscape perspective is inherent in the use of these technologies, which enriches the context that is essential to understanding the value of archaeological discoveries. The extent and nature of environmental changes that threaten sites can often be more quickly observed, characterized, and measured by observing the landscape from above, rather than exploring it on the ground. With training, archaeologists can use them to (1) directly detect archaeological sites, (2) model likely site locations, (3) assess the importance of sites based upon spatial relationships among sites themselves as well as relationships among sites and environmental features, (4) detect threats to sites and landscapes arising from natural processes or from development, and (5) monitor such threats as they emerge, increase, or abate.

Recent years have seen enormous advances in sensor technologies and much greater access to a variety of aerial and satellite platforms that carry these sensors. During the same period, computing power measured in numerous ways has roughly doubled every two years ("Moore's Law"), data storage capacity has grown at the same pace and become much less expensive, and software for enhancement, analysis, and integration of images into geographical information systems has become more user friendly. Some of this software is open source or available at a reasonable price. The cost of using open source software is therefore only in acquiring the training necessary to use it. The result of these technological improvements means that little stands in the way of their use by archaeologists and conservationists.

Definition

Remote sensing includes a wide array of technologies that have in common the acquisition of data from platforms that are at a distance from objects, materials, and other phenomena of interest. These technologies use and analyze electromagnetic radiation or, in a few cases, sound waves or gravitational fields. Types of radiation frequently used include many bands of the electromagnetic spectrum, from ultraviolet through visible light to longer electromagnetic waves, such as near infrared, infrared, and radar. Sensors that collect data generated by the use of visible through infrared

bands are termed *multispectral* if they utilize only a few, narrow, discreet bands or *hyperspectral* if they sense bands over a continuous range. Some electromagnetic bands can be transmitted and received in ways that greatly enhance the ability to collect data of particular interest. Light waves, for example, can be made highly coherent and focused. Transmitting and receiving a pinpoint of light created in this way can be used to precisely locate what reflected the light. Using many points of light, a surface can be extrapolated from multiple locations. Radar transmitted from a rapidly moving platform (aircraft or satellite) creates a synthetically large antenna; since resolution of images sensed by radar depends upon the size of the antenna, the faster the platform carrying radar moves, the greater the resolution of resulting images.

Synthetic aperture radar (SAR) waves can also be polarized vertically or horizontally at transmission and reception, providing data that can be used to discern shape and orientation and can be analyzed interferometrically to develop a surface model. Analysis of remotely sensed data is done with use of many different types of software that create and enhance images, and provide built-in algorithms for the analysis of images and a degree of capacity to develop custom algorithms. Images, which are enhanced, analyzed, or otherwise modified, are often further interpreted as a layer in a geographical information system project. Data obtained from sensors and images can also be analyzed with mathematical, statistical, and engineering software.

Key Issues/Current Debates/Future Directions/Examples

An important application of this technology is the detection of archaeological sites. Archaeologists have used aerial photos obtained from aircrafts and before that balloons and kites for more than 100 years (see, for example, Poidebard 1934). Photos obtained from small, private aircrafts are still being used in this way, especially in Europe and the Middle East. From 1960 to 1972, the United States operated the Cold War-era CORONA intelligence satellite program. In 1972, Corona images were declassified and now can be easily obtained by the public (http://earthexplorer.usgs.gov), as can those acquired by a companion satellite, GAMBIT. These black and white photos are of relatively high resolution, but were not georeferenced and contained the normal distortion associated with perspective. They require georeferencing or preferably orthorectification to be transformed into an image with a scale that is constant throughout. They have been of especially great utility in planning archaeological surveys in remote areas and in determining the locations of sites that have been obscured or obliterated by development. Min (2013) has used CORONA photographs in this way to map features on the ancient landscape that have been removed by the recent rapid development in China.

New analytical techniques can render the analysis of images produced with older, strictly optical, technologies more useful. Jesse Casana and Jackson Cothren (2013) of CAST at the University of Arkansas have developed a means to streamline orthorectification of CORONA imagery. They have made more than 1,000 CORONA tiles of the Middle East available for download (http://corona.cast.uark.edu/index) and have described their technique for replication by others. Ur (2012) provides an overview of how CORONA and GAMBIT have been used in the Middle East, describing how tells, roads and tracks, irrigation canals, and fields have been discerned with the eye by attention to shadow, lightness, and darkness. Ur and Menze have refined this approach by developing signatures for soils generated by human occupation (anthrosols) using bands from among the 14 collected by ASTER satellites (Menze & Ur 2013).

Newer sensing technologies expand possibilities for site detection. If archaeological remains are above ground, and exhibit a level of structural integrity, LiDAR can generate remarkably clear images of them. If dense clusters of LiDAR beams are used, the full array of archaeological features on a landscape can be imaged even when covered by forests, shrubs, or grassland. SAR can penetrate materials to a depth determined by

wavelength and moisture content of materials encountered. Maximum penetration is of sand in hyperarid environments. SAR images are less easy to interpret with the naked eye than are images produced by LiDAR, because data to produce them are obtained from oblique angles, and so distortion can be more difficult to correct. SAR images are therefore generally more informative when data contained in them are analyzed by the use of statistical protocols that have been identified or developed for this purpose (Comer & Blom 2007; Chen et al. 2013). Similar statistical protocols can also detect sites using multispectral and hyperspectral imagery under certain conditions with greater or lesser success given the nature of sites to be detected and the environment in which they are located. Statistically based site detection, by definition, admits some degree of uncertainly until site locations are confirmed on the ground. Nonetheless, an inventory based upon statistically valid measures of productivity and reliability provides a valuable starting point for site protection, one that can also be used to more wisely allocate on-ground survey efforts. An alternate approach is the use of archaeological predictive modeling (APM), which identifies areas more or less likely to contain sites. While direct detection of archaeological sites can therefore be termed probabilistic, APMs are *possibilistic*, as discussed by Van Leusen and Kamermans (2005: 30).

Site evaluation is an essential step in the protection of archaeological heritage. Not all sites and landscapes are of equal importance. Given the dearth of resources available for site preservation, setting priorities is essential. The analysis of multispectral and hyperspectral imagery is particularly useful in characterizing the environments in which sites occur. It can therefore illuminate relationships among sites themselves and the environment in which they are found. These relationships have a tremendous bearing on the importance of each individual site. Environments can often be characterized sufficiently using data contained in inexpensive NASA satellite imagery. Landsat satellite images are now available at no cost, and the cost of ASTER imagery is minimal. Comer (2013), for example, has used Landsat imagery to explore the association between the distribution of sites on arable soils and the emergences of settled way of life among the Nabataeans.

NASA satellites also provide information not available from imagery collected by more recently developed, higher-resolution satellites operated by the private sector: they provide a record of environmental change over the past 30 years, since the first Landsat was launched. This records degradation that affects the value of sites, which can be halted or reversed if detected in time. For example, Barlindhaug et al. (2007) has analyzed Landsat imagery to monitor regrowth at archaeological sites allocated in abandoned farms in Norway, which damages or destroys them.

Precise surface models (DSMs, DTMs, and DEMs) can be the key to an even deeper understanding of intra-site and environmental relationships. These are developed from dense point clouds, often obtained using LiDAR and SAR data collected from satellites and many common types of aircraft. As noted previously, data collected by LiDAR, if this is done in certain ways, can model the surface of the earth as it would appear if it were devoid of vegetation (usually termed a digital terrain model or DTM). Standard or custom algorithms can generate least-cost paths from DTMs. These provide the basis for developing and testing hypotheses about polity size, procurement zones, and social and political interactions. White and Surface-Evans (2012) offer many examples of how this has been done; surface models can also provide viewshed analyses, which are pertinent to suggesting similar social parameters (Fisher & Farrelly 1997; Bongers et al. 2011). Harrower (2010, 2011) has generated hydrological models from digital surface models that clarify the development of agriculture and the role of pastoralism in Yemen.

Surface models can also identify areas that would visually intrude upon ancient landscapes were they developed. They can also be used to model hydrological changes that threaten

archaeological sites (Akasheh 2012). Point clouds can be generated by photogrammetric analysis of "stereo pairs" acquired from model airplanes and even kites. This can be done very inexpensively, but will not provide a DTM.

As the cost of such technologies continues to lessen, archaeologists, conservationists, and cultural management officials will increasingly use them to track and maintain cultural heritage throughout the world.

Cross-References

- ▶ Aerial Archaeology
- ▶ Immovable Heritage: Appropriate Approaches to Archaeological Sites and Landscapes
- ▶ Landscape Archaeology
- ▶ Nondestructive Subsurface Mapping in Field Archaeology

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Aerial Archaeology

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Introduction and Definition

Aerial archaeology (AA) uses photographs, and other kinds of image acquisition, in archaeological field research. It involves taking photographs of the land from above, examining them for pertinent information, interpreting the images seen there and making the resulting data available in a variety of forms to develop archaeological knowledge about past people and the conservation of archaeological sites and landscapes (Bewley & Rączkowski 2002).

Key Issues/Current Debates/Future Directions/Examples

Why Can We See a Variety of Types of Sites?

Since people first learnt to fly, it has been appreciated that traces of early human activity can be observed from the air, recognized from their curved or linear shapes. Humans have always exploited and adapted the environment to their own needs. The surface of the ground has been disturbed and altered by generations of previous occupants, who have dug into it to create foundations, ditches, and pits, and raised structures upon it, in the form of stone buildings or earth ramparts. All this activity has caused "injury" to the land. Much of it has been subsequently covered over or leveled by later exploitation, particularly agriculture. Today, in the majority of such places, there is little sign of this past human activity on the surface, but the "scars" remain beneath and these may show up from the air (Wilson 1982).

Some ancient earth, stone, and timber structures are still just visible above ground level as *earthworks*. Most frequently encountered are the remains of barrows, ramparts, walls, banks, and ditches. These can be photographed by exploiting the contrast of the shadows by a sun low on the horizon. The way snow settles and melts may also reveal the presence of archaeological features, as can widespread flooding (mainly on low-lying ground) for it exposes all the topographic elements which are above water level (Fig. 1). The new technique of LiDAR (see below) now records low-lying earthworks by measuring their topography directly.

The remains of human activity beneath the topsoil determine growth conditions and cause

Aerial Archaeology, Fig. 1 Bonikowo, Wielkopolska Region, Poland. Early Medieval stronghold clearly visible due to flooded bottom of valley (Photo: W. Rączkowski, March 1999)

Aerial Archaeology, Fig. 2 Mutowo, Wielkopolska Region, Poland. Cropmarks show up archaeological remains of a medieval town (thirteenth century) of Szamotuły (Photo: W. Rączkowski, July 2011)

difference in growth, causing *cropmarks* (Fig. 2). Subsurface hollows, foundation trenches, ditches, and pits retain water and nourishment, prompting the plants that grow immediately above them to be taller or greener for longer than others in the immediate vicinity (*positive cropmarks*). Plants growing over stones, bricks, or roads are deprived of moisture, so may be more stunted in growth and more pallid in color (*negative cropmarks*). Cropmarks can also be photographed, thanks to the shadows thrown by taller plants, disclosing the archaeological features beneath. Not all plants are equally "sensitive" to variable soil conditions – some "display" what is beneath the topsoil while others do not react to local conditions. Wheat and barley best show the presence of archaeological remains well, especially late in the growing season, while potatoes, cabbage, or corn are less demonstrative of what lies beneath.

Plowing may disturb the uppermost layer of an archaeological feature and bring it to the surface as a *soilmark*, recognizable by its different color to the topsoil. Soilmarks can be most readily

Aerial Archaeology, Fig. 3 Rębowo, Wielkopolska Region, Poland. Color of soil differentiation shows up the remains of a plowed rampart of an early medieval stronghold (Photo: W. Rączkowski, March 1999)

observed when there is no vegetation growing – from late autumn through to early spring (Fig. 3).

Development of Techniques: History

The first known aerial photographs in archaeology used hot air balloons to take aerial photographs of archaeological sites between 1899 and 1911 (Forum Romanum, Tiber delta, Pompei, Ostia) and in 1906 (Stonehenge). The First World War advanced the development of both aeroplanes and cameras. The number of pioneers using aerial photographs to search, identify, and document archaeological sites increased (T. Wiegand, L. Rey, G. Beazeley, A. Poidebard, C. Schuchhardt). O.G.S. Crawford (1923) made a significant contribution to the methodology and its application in research. In the 1920s and 1930s, photographs were taken of archaeological sites (e.g., hillforts) across Europe, excavation work in progress was documented from aircraft (e.g., Biskupin in Poland), and aerial surveys led to the discovery of new sites (e.g., Woodhenge – UK, Ipf near Bopfingen – Germany). Similar surveys were also successful in the USA (C. A. Lindbergh, N. Judd), Mexico (A. V. Kidder, P. C. Madeira Jr.), and Peru (G. Johnson).

Developments in both technology and the interpretation of aerial photographs (e.g., the Allied Central Interpretation Unit) during the Second World War enhanced the technique and established it after the war as a primary research tool in archaeology. Although political regimes in some European countries severely restricted overflying, it developed without major interference in the UK (J.K. St Joseph, A. Baker, J. Pickering, D. Riley, D. Wilson), France (J. Baradez, R. Agache), West Germany (I. Scollar, R. Christlein, P. Filtzinger, O. Braasch, K. Leidorf), Belgium (C. Leva, J. Semey), and Denmark (H. Stiesdal). The 1994 Klienmachnow conference (in Germany) was a key moment in raising awareness of AA among archaeologists from Central, Eastern, and Southern Europe.

Stereoscopy was a successful technology especially applied during WWII. Nowadays, it is frequently used in AA when working with vertical photographs to give an illusion of depth. A 3D effect can be achieved using two photographs offset by 60 %. The stereoscope shows the left eye one photograph and the right eye the second, the brain then creates a 3D image of the area.

Since the late 1960s, AA has seen dramatic technical advances. In addition to the traditional platforms (e.g., kites, model planes, balloons, aircraft, helicopters), remote sensing now makes use of multispectral imagery captured by

satellites to explore past landscapes and features at a wide range of scales. Satellites (since 1960s) orbiting at 600–1,200 km from the Earth's surface have recorded a wealth of information.

The declassification by the USA in 1995 of an archive of images acquired by the first generation of US photo reconnaissance satellites (CORONA – 1960 and 1972) and the KH-7 GAMBIT and KH-9 mapping camera programs in 2002 was a milestone for archaeologists who quickly recognized the potential of these archives for extensive survey coverage of the Earth, including territories currently lying in no-fly zones (e.g., Turkey, Syria, Armenia) (Ur 2003). The ERTS satellite (later renamed LANDSAT) was launched in 1972 to continually photograph the Earth's surface. Many countries and organizations have sent satellites equipped with cameras and sensors into orbit to acquire information on surface events by using electromagnetic radiation across the spectrum (Parcak 2009).

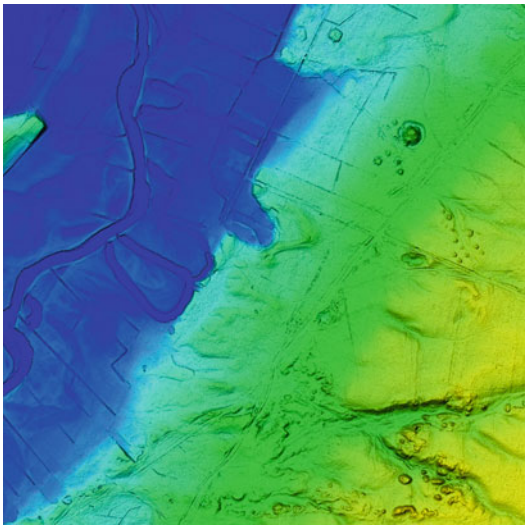
Use of the wider spectrum of different bands of wavelengths of electromagnetic radiation (daylight, infrared, ultraviolet, thermal radiation) means that AA can be classed as a method of *remote sensing*. Radiation of different wavelengths detects different physical features. The majority of satellite survey work in archaeology has focused on the band of *visible light* to detect archaeological features and past landscapes. However, visual data is only a small proportion of what cameras and other sensors can detect. A multispectral scanner registers a small number of bandwidths. By comparison, a hyperspectral scanner registers 100 or more bandwidths – including those which are beyond the visible spectrum, e.g., radar, ultraviolet, thermal radiation, etc.

For assessing what can be detected, two parameters are especially important – spectral resolution and spatial resolution. *Spectral resolution* denotes the detection that is possibly owed to the chosen wavelength. The range of visible light is from 0.380 to 0.780 μm (panchromatic image). If a sensor registers visible light, then it covers four channels (spectrum bands) – blue (0.45–0.52 μm), green (0.52–0.60 μm), red (0.63–0.69 μm), and infrared (0.76–0.90 μm). The spectral response pattern of soil is generally governed by the properties of the soils: color, texture, structure, mineralogy, organic matter, free carbonates, salinity, moisture, and the oxides/hydroxides of iron and manganese. Thus, analysis of results from parts of the spectrum provides information about the physical-chemical characteristics of any detected features. For example, analysis of green and red bands may give information on the contents of iron (Fe) in soil. *Normalized Difference Vegetation Index* (red and infrared bands) is a method for measuring vegetation vigor which may indirectly infer the presence of archaeological features.

Ground (spatial) resolution measures the minimum size of a feature detectable on the ground. A feature larger than the spatial resolution will be visible on the image, while a feature appearing smaller than a pixel on the image will not be seen. High ground resolution therefore is extremely important. Images of 80 m resolution (Landsat series MSS 1, 2 and 3) or 30 m (Landsat TM 4 and 5) are sufficient to determine geological or geographical aspects but not to detect archaeological features. Current resolutions can be achieved down to 1 m, which enables individual features such as storage pits, barrows, or sunken houses to be identified. The IKONOS satellite's panchromatic imaging (the whole visible spectrum, which means more energy reaches the sensor) provides a surface resolution of 1 m, although multispectral imaging resolution falls to 4 m.

Satellite images are currently used in prospection of archaeological features, study of their environmental contexts, spatial analysis, past landscape studies, 3D modeling, preservation assessments, and protection and management of archaeological heritage.

Airborne Laser Scanning (ALS), developed in the 1990s, uses the LiDAR (**Li**ght Detection **a**nd Ranging) system for rapid, high precision survey of the surface of the ground (including forested areas) (Crutchley & Crow 2009). In this method, laser range-finding beams are fired at the ground from an aircraft with exact position measured by GPS, creating clouds of points (with x, y, z coordinates), which are used to



Aerial Archaeology, Fig. 4 Września, Pomerania Region, Poland. DTM derived from LiDAR of the forested area presenting detailed topography and showing up the presence of geomorphologic structures as well as clusters of early medieval burial mounds (By Ł. Banaszek & MGGP Areo, 2012)

compute a digital terrain model (DTM) and digital elevation model (DEM) (Bewley et al. 2005). Digital graphic processing generates views of the surface in micro-relief. The most spectacular discoveries made using this technique include medieval field systems, road courses, barrows, queries, etc., especially those hidden in forests (Devereux et al. 2005; Doneus & Briese 2011) (Fig. 4).

LiDAR data also provides additional information on the intensity of the reflected light, as the emitted signal is usually in the near-infrared (NIR) spectrum. It is therefore possible to use it to analyze moisture, chlorophyll content, and other factors that characterize cropmarks.

Theoretical Context

AA has been a key branch of *field archaeology* for more than a century. Its initial success was applied to generating *culture history*, featuring interpretations based on *evolution* and *diffusion*. This took the premise that a photograph is neutral and objective in its representation of the world. As image registration is "mechanical" in nature, photographs were seen as recording real anomalies devoid of a subjective human factor. These anomalies added to the world's stock of sites and monuments, from which the narratives of prehistory and history can be written. By the same token, repeat visits to certain landscapes led to the realization that the sites were disappearing. *A Matter of Time* (published in 1960 by the Royal Commission on Historical Monuments of England) established a role for AA in conservation practice in the UK, leading to *The National Mapping Programme* and the development of set standards.

Processual archaeology was a major factor in the technological "revolution" in AA. It emphasized the objectivity of the research process and the consequent importance of the precise measuring of cultural and natural features. This mission was aided by new analytical technologies, particularly computerized *data bases* (including mapping) and *Geographic Information Systems* (GIS). Gaps in the record raised questions about the visibility of sites, and prompted research into *formation processes* as applied to cropmarks and soilmarks. Results obtained from remote sensing influenced the classification and construction of models describing the relation between cultural systems and the natural environment, and the application of technological innovation.

Postprocessual archaeology questioned the "realism" of aerial photographs, and emphasized the role of perception and interpretation in the creation of the record. Interpretation issues are now the subject of intense discussion on the way the cultural context affects aerial survey, the photoreading process, and their role in forming how we imagine the past (Brophy & Cowley 2005).

Interpretation

Understanding that there is an interpretative process by which the information from aerial photograph becomes an archaeological record is crucial. The interpretation of archaeological features and landscapes is a skill built on experience and knowledge, where intuition and subjective judgment are acknowledged as major factors.

The ability of the archaeologist to interpret and depict is as important as the technical processes of rectification and georeferencing.

As archaeological use of digitally recorded data has developed, it has become increasingly clear that it is not an "objective" dataset. Methods of primary data collection and processing parameters have a significant impact on output; the ability to "see" is heavily dependent on software for manipulation and visualization. These factors are a complex mix of objective parameters (e.g., point density) and subjective judgments that are inextricable from the pervasive issue of archaeological interpretation.

Archaeologists decide which platform to use (aerial, satellite, ALS) and which electromagnetic emission to record. Similarly, data-processing, the selection of suitable algorithms, and their mode of visualization are matters decided by researchers. The final image undergoes visual editing and interpretation according to knowledge and interpretation experience and is accepted when a result is deemed to be satisfactory. Thus, like all other forms of archaeological data, the corpus of aerial photographs is the result of reconciling observation and imagination, of matching what we want to know, what has survived, what we currently recognize, and the methods available for their detection and recording. These methods are improving all the time as fresh interpretations raise our expectations and ambitions further.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Archaeological Theory: Paradigm Shift
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Cultural Landscapes: Conservation and Preservation
- ▶ Landscape Archaeology
- ▶ Post-Processual Archaeology
- ▶ Processualism in Archaeological Theory
- ▶ Prospection Methods in Archaeology
- ▶ Site Formation Processes

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Aesthetics in Archaeology

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Introduction and Definition

The term "aesthetics" was coined in the eighteenth century by Alexander Baumgarten, who thought of it as "the science of sensible cognition" (1961[1750-1758]: §1, p. 107). As such, it concerns the study of how to think the sensible appearance (the look/sound/feel) of things when the focus is on their perceptual qualities as such. Immanuel Kant further added

to this conception by proposing that aesthetic judgment involves a claim *not* based on an (objective) *coming to know* of the world but on a particular (subjective) *feeling* produced in the encounter with objects of perception. The feeling in question is produced when the faculties of imagination and understanding are in "free play" while provoked by various objects of perception (Kant 1790 trans. 1987: Pt. 1, Book 1, Section 9).

Accordingly, aesthetics is concerned with the claim that the *particular way* in which things are present in our awareness may lead to a certain kind of object-related but subjective feeling. Concretely, the feeling in question responds to *the particular disposition* of things, be it the composed *ordering* of sounds; the *layout* of material things in space; the choreographed *pattern* of movement of bodies through three-dimensional space; the *design* of two-dimensional surfaces; the meaningful *arrangement* of words; the determinate *sequencing* of the contents of the imagination based on some written, heard, or visual narration; or some other perceivable *structuring* of our perceptual world, including, for example, diverse forms of "skilled and knowledgeable forms of action" (Pollard 2001: 318).

While Baumgarten and Kant intended aesthetics to address itself to a *very wide* range of objects, later theoreticians tended to focus on *artistic* manifestations, as found in the Western world. This orientation has caused concern among archaeologists and anthropologists about the application of the aesthetic gaze to their objects of study, insofar as it would bring about ethnocentric and anachronistic conclusions, especially since many cultures seem not to distinguish between art and other spheres of life. The worry is that by using the categories of Western aesthetics and art in the study of the archaeological record, epistemological, methodological, as well as ethical problems, seem to arise.

Key Issues/Current Debates/Future Directions/Examples

The situation would seem to pose an epistemological problem since due to limited access in archaeological research to the context of the objects studied, it may be questioned whether we can know that the people, who made and used these objects, in fact had the intention of making objects with particular aesthetic qualities such as we recognise in standard Western artworks of the modern period (Soffer & Conkey 1997). Furthermore, there is the problem of how the disposition or structuring of things may have been appreciated by their makers and users if we have reason to believe that their perceived world differed radically from ours. In other words, their different "sensorium" would suggest that their aesthetic appreciation would have been significantly different from ours, and hence, it may be difficult to know what counted as aesthetically valuable and what not.

Methodologically, there is the problem that the focus on aesthetics and art seems to lead down the wrong path because *universal validity* is claimed for aesthetic and art-oriented categories, which actually import perspectives and values of *merely regional and historical validity*, as developed in the artworld of European peoples between the eighteenth and twenty-first centuries (Tomásková 1997; White 2003; Moro Abadía & González-Morales 2008). Ethically, the utilization of these categories entails the problem that insofar as they are value-laden, their application to objects from other cultures may lead to inappropriate value judgments (often expressing ethnocentrism) about other peoples' cultural goods (Heyd 2003, 2007; Heyd & Clegg 2005).

Notably, these epistemological, methodological, and ethical concerns tend to arise through the narrowing down of the object of aesthetics to a very limited, geographically local and historically conditioned, notion of "art." Aesthetic judgments, however, are also issued in a great variety of *nonartistic* contexts, such as regarding human beings, natural landscapes, or even concerning thought constructs such as mathematical formulae. *Anything* may become an object of aesthetic attention when it is considered as the trigger for a certain feeling based on the reflexive appreciation of one's perceptual contents (Ziff 1997). Human beings everywhere

Aesthetics in Archaeology, Fig. 1 *Gwion Gwion*, Kimberleys, Northern Australia (taken by Heyd in 2000)

sing, produce poetry, tell and enact stories, and draw or fashion three-dimensional objects to delight their fellows and children. As such, aesthetic judgments are ubiquitous and, as evolutionary aesthetics argues, probably can be projected back to our species' deep past (Davies 2006: 1-25). This situation, in turn, invites closer consideration of aesthetic values in the archaeological record as a topic of research.

While anthropology may be said to have discussed aesthetics as a research tool at least since the 1990s (Coote & Shelton 1992; Gell 1992, 1998), interest in theorizing its application in archaeology is more recent. Starting from the perspective that the aesthetic values perceived in things have socially relevant effects, it is argued, for example, that tracking the ways in which such effects are produced may open up an understanding of important aspects of the cultural systems under study (Gosden 2001). Here, the plethora of possibilities for structuring particular objects two- and three-dimensionally, and even their arrangement in space, may constitute valuable resources of insight (as demonstrated by Pollard 2001, in his study of depositional practice).

One very general argument for the consideration of the aesthetic perspective is that many cultural goods, even if utilitarian, be they material (such as pots, knives, or shoeing) or more notional (such as accounts of religious ideals or of stratification in society), often seem to exhibit *more structuring than necessary* to realize a specific function or to get a particular message across (Dobres 2001). This information may be "tapped into" by archaeologists by paying close attention to the perceptually accessible structuring of the carriers of information. As an illustration, we may consider humanly made marks on rock, commonly referred to as "rock art" (e.g., see Fig. 1).

Aesthetically relevant choices are evident throughout in what concerns the making of these manifestations. Generally, it is true that particular sites are chosen among many available, only certain surfaces are selected even if others could be used, selected modes of image making (e.g., painting, engraving, stencils or wax application) are utilized when other modes are possible, and motifs perceived may be represented in more or less dynamic, restrained, interactive, or striking ways. The multiple, perceptually significant choices realized in each site suggest empirically testable hypotheses with regard to their significance for their makers and users. For example, large images may be understood as directed toward people at a distance, suggesting that they may have group representational functions, while small images only accessible by, or visible to, single individuals may be meant for more private, potentially spiritual, functions. Dazzling figures may be meant to impress friend, foe, or commercial exchange partner (Gell 1992, on the decoration of Trobriand canoe prows, and Morphy 1992, 2005, on Yolngu *bir'yun* brilliance), while hand stencils may be intended as referential to personal identities (Forge 1991: 40).

Throughout, it is notable that insofar as the making of images requires attention to how the marks created *appear* to onlookers, aesthetic judgments and the application of skill and knowledge would have been *required* on the part of their makers. Moreover, insofar as different aesthetic values are generated through the choice of particular formal qualities, the ability among viewers to "read" aesthetically relevant differences would have to be presupposed. Hence, *not* attending to the aesthetics of such images would be to overlook a potentially important aspect of the forms of life of the human groups studied (also see Heyd 2012).

While concern regarding the importation of values and categories from the cultural context of the researcher into her or his objects of research certainly is relevant and legitimate, this danger is nothing new within the wider anthropological and archaeological context. Appropriate methodology in this respect would argue for the need to recognize cultural biases and the application of empirical techniques that allow specific cultural differences to *emerge* from the archaeological text, instead of forcing the given into the procrustean bed of Western aesthetic categories.

Certainly, recovering a sense of the aesthetic impact of any structuring of items found in the archaeological record on their makers and users will have to remain at the level of an educated guess. As Gosden (2001: 166) suggests, this requires "an unlearning" of our own sensorium to facilitate the appreciation of the sensory environment that may have existed for those who left material traces in former times. In sum, we may conclude that though aesthetic perspectives in archaeology undoubtedly have played a part throughout archaeological research in the past, its theoretical grounding and systematic exploration is still in development and likely will produce significant payoff in future research endeavors.

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► Rock Art, Forms of

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African Diaspora Archaeology

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Introduction and Definition

Archaeological investigations of African diasporas have expanded dramatically in number, diversity of research designs, and geographic scales over the last several decades. The term "diaspora" is typically used to address the dispersion of people to new locations as a result of hostile circumstances in the areas from which they departed or were abducted. Analysts have pursued a diverse array of perspectives in this period of growth for African diaspora archaeology. Projects have explored questions in spatial scales spanning the household, local, regional, interregional, and global.

Historical Background

Researchers undertaking interdisciplinary studies of African diaspora sites and communities will benefit by familiarity with the analyses of scholars in Black studies, such as Frederick Douglass, St. Claire Drake, W. E. B. Du Bois, bell hooks, Zora Neale Hurston, Arturo Schomburg, Booker T. Washington, George Williams, Carter Woodson, and Malcolm X (e.g., Mullins 2008). The work of investigators of African diaspora communities is also aided by digital and internet-based databases. These include *The Trans-Atlantic Slave Trade: A Database on CD-ROM* (Eltis et al. 2000) and the expanded *Trans-Atlantic Slave Voyages* database available online, which provides information on 34,850 slave vessel voyages and the people captured in those operations of bondage (e.g., Eltis & Richardson 2008). The *Digital Archaeological Archive of Comparative Slavery*, funded and maintained by the Thomas Jefferson Foundation (n.d.), presents archaeological data from numerous sites in North America and the Caribbean. Jerome Handler, Michael Tuite, Jr. (2011), and their colleagues maintain a substantial online database of historical images depicting details of the operations of the trans-Atlantic slave trade and its impact on past lives. The African Diaspora Archaeology Network (n.d.) consists of numerous collaborating researchers and publishes a quarterly, online newsletter with articles, announcements, and reviews on new projects and research designs.

Key Issues/Current Debates

A remarkable variety of research questions have been addressed over the past several decades, often engaging with theoretical debates on subjects such as social group identity, agency, racism, power, class structures, ethnicity, and self-determination (Ogundiran 2008 and Fennell 2011 provide overviews). In North America, the vast majority of archaeology projects related to African diaspora sites are conducted by archaeologists working in cultural resource management (CRM) settings. This tendency reflects the higher frequency with which sites of African diaspora heritage are impacted by disturbance due to new construction projects and resultant analysis through CRM procedures (e.g., Joseph 2004). These CRM archaeology projects contributed significantly to the development of African diaspora archaeology in the United States (e.g., Wheaton et al. 1983).

Some researchers advocate the compilation of detailed, contextual studies addressing dynamics at local and regional scales (e.g., Mullins 2006). Researchers also frequently implement investigative plans shaped in part by the interests of descendant communities (e.g., Agbe-Davies 2007 in Ogundiran & Falola 2007). Other analysts recommend a focus on the facets of racial ideologies and capitalist economies on a worldwide scale (e.g., Orser 1994; Mullins 2008).

This variety of research designs includes a focus on the operations of racial ideologies underlying economic structures (e.g., Orser 2007) and African descendants living and working in industrial settings (e.g., Shackel & Larsen 2000 in Delle et al. 2000). Researchers have also explored the ways in which facets of particular African cultures (such as the Asante, BaKongo, Igbo, and Yoruba) were related to continuing developments of cultural beliefs and practices at diaspora sites (e.g., Ferguson 1992). Many sites have yielded evidence of the material expressions of spirituality by African descendant peoples (e.g., Fennell 2003). The contours of ethnic group identities and new social networks (e.g., Wilkie 2000a; Ogundiran & Falola 2007 in Ogundiran & Falola 2007) as well as processes of ethnogenesis, syncretism, and creolization (e.g., Fennell 2007) have been examined in extensive studies.

Our knowledge of African diaspora histories has also been greatly enhanced by studies of mortuary traditions (e.g., McCarthy 2006 in Haviser & MacDonald 2006) and health-care practices (e.g., Cabak et al. 1995). Bioarchaeological investigations similarly provide detailed evidence of past lifeways, individual health conditions, and the impacts of enslavement on the physiologies of Africans and African descendants trapped in bondage (e.g., Mack & Blakey 2004). Diverse studies of diets, culinary practices, and consumer choices provide evidence on multiple time periods and spatial scales (e.g., Wilkie 2000b). Investigators have explored the subject of gender dynamics within African diaspora communities and seek to implement feminist critiques of research designs (e.g., Battle-Baptiste 2011). Extensive studies have examined the degree of impacts of particular African pottery-making and ornament traditions on ceramic production at diaspora sites (e.g., Ferguson 1992; Deetz 1993; Singleton & Bograd 2000 in Delle et al. 2000; Hauser 2007 in Ogundiran & Falola 2007).

Other investigations have concentrated on instances of self-determination, resistance against subjugation, and the creation of "maroon" communities (e.g., Weik 2004; Agorsah 2006 in Haviser & MacDonald 2006). Archaeological studies have focused on such dynamics of communities founded by escaped bonds people called "palenques" in Cuba and "quilombos" in Brazil (e.g., Orser & Funari 2001; La Rosa Corzo 2003). The operations of escape networks combating slavery in North America, often referred to as facets of an "underground railroad," have received increasing attention by archaeologists and landscape analysts as well (e.g., Ginsburg 2007; Delle & Shellenhamer 2008). Studies of spatial distributions and the ways people shaped and perceived the surrounding landscape have traversed scales from the household and yard, to neighboring plantations, to community and region (e.g., Handler & Lange 1978; Delle 1998; Battle-Baptiste 2007 in Ogundiran & Falola 2007; Chan 2007 in Ogundiran & Falola 2007).

International Perspectives

Much of the work in African diaspora archaeology has focused on sites in the Americas and Caribbean. A growing body of work addresses diasporas throughout the Indian Ocean region, Middle East, and portions of Asia (Walz & Brandt 2006 in Haviser & MacDonald 2006; de Jayasuriya Silva & Angenot 2008). In addition, an increasing collection of historical archaeology studies of locations in Africa impacted by the trans-Atlantic slave trade presents excellent potentials for comparative analyses in the future (e.g., Hall 2000; Kelly 2004 in Reid & Lane 2004; Reid & Lane 2004; Schmidt 2006; Ogundiran & Falola 2007).

Future Directions

This brief survey of research questions and methods in African diaspora archaeology illustrates the remarkable breadth and diversity of the field. Future work provides great promise for comparative and synthetic analyses of sites spanning the Americas, Africa, Europe, and Asia. Rapid advances in bioarchaeological methods, DNA studies, and stable isotope analyses have the potential to provide increasing data on direct connections between populations across space and time. Ongoing developments in spatial modeling, remote sensing, accessibility of aerial and satellite data, and complex mapping programs will also enhance landscape and spatial studies. Researchers in African diaspora archaeology pursue these state-of-the-art advances while also maintaining close ties with the interests and questions advanced by members of African descendant communities.

Cross-References

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- ▶ Atlantic World: Historical Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Ceramics: Colonoware
- ▶ Deetz, James (Historical Archaeology)
- ▶ East Africa: Historical Archaeology
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- ▶ Hispanic South America: Historical Archaeology
- ▶ Historic St. Mary's City
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- ▶ Modern World: Historical Archaeology
- ▶ North Africa: Historical Archaeology
- ▶ Orser, Jr., Charles E.
- ▶ Plantation Archaeology
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- ▶ Southern Africa: Historical Archaeology
- ▶ Trade Beads in Historical Archaeology
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African Diaspora Archaeology Network (ADAN)

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Basic Information

The African Diaspora Archaeology Network (ADAN) consists of collaborating scholars, researchers, and interested parties with expertise in African diaspora studies, archaeology, material culture analysis, African histories, and studies of the many developments and changes over time in African diaspora communities. The term "diaspora" typically addresses the dispersion of people to new locations as a result of adverse and hostile circumstances in the areas

from which they were abducted or departed. The ADAN (n.d.) describes its mission as connecting "an intellectual community that considers the historical processes of culture, economics, gender, power, and racialization operating within and upon African descendant" populations.

Major Impact

The ADAN publishes a quarterly, open-access newsletter through Internet distribution to thousands of readers worldwide. The network also presents extensive resources for community members and researchers through its Internet site (ADAN n.d.) and convenes an annual forum at the conference of the Society for Historical Archaeology (SHA).

The ADAN and its quarterly newsletter are successors to the African-American Archaeology Network (AAAN) and newsletter. The AAAN was organized by Theresa Singleton in 1990, and its newsletter was edited and produced in succession by Singleton, Thomas Wheaton, and John McCarthy up through 2000. The ADAN was organized in 2005 by Christopher Fennell, McCarthy, Jamie Brandon, and a group of collaborating scholars and adopted a new name to focus on the broader geographic scale of African diaspora communities worldwide.

The field of African diaspora archaeology has witnessed a remarkable expansion in the number of projects, scope of investigations, and variety of research questions pursued over the past several decades. This growth was illustrated in discussions at an ADAN forum entitled "Research Designs for Atlantic Africa and African Diaspora Archaeologies," convened in 2007 at the annual meeting of the SHA. Those forum discussions focused on interpretative frameworks and theoretical constructs utilized in African diaspora archaeology projects. Debates also addressed comparative historical archaeology investigations of sites in Africa impacted by the trans-Atlantic slave trade. The resulting assessments of the state of the field demonstrated that researchers are pursuing a breathtaking variety of research questions. Such analysts address relationships between people, material culture, and historical processes across spatial scales spanning local, regional, interregional, hemispheric, and global frameworks (Fennell 2011).

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)

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African Stone Age

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Introduction

The African Stone Age spans the first 2.5 Ma of human prehistory, beginning with the world's earliest stone tool production and continuing through the historical period of European colonization. The African Stone Age includes a tremendous diversity in terms of the characteristics of its industries and the life ways engaged in by its makers. Archaeological research on African stone tool industries has had wide-ranging impacts on our understanding of processes of human evolution and the organization of past human societies.

Definition

The African Stone Age is conventionally divided into three phases, including the Early, Middle,

and Later Stone Ages (ESA, MSA, and LSA). The ESA includes the Oldowan, Developed Oldowan, and Acheulean industries. Oldowan industry is thought to have begun with the world's oldest known stone tool technology at the site of Gona, Ethiopia, dating to around 2.5 Ma (Semaw 2000). The Oldowan industry is characterized by the production of flakes using direct hard-hammer percussion, though bipolar flaking is also known (Delagnes & Roche 2005). Common core forms include choppers, discoids, and polyhedrons. Retouched tools mainly include various types of scrapers and denticulates, though flake retouching is not common in most assemblages. The Oldowan gives way to the Acheulean industry between around 1.8 and 1.5 Ma, though this transition appears to have occurred gradually. Numerous securely dated Oldowan sites are known across eastern and southern Africa, and stone tool assemblages with Oldowan characteristics have also been identified in both the eastern and western Sahara (Plummer 2004). It is reasonable to conclude that the Oldowan industry was a pervasive phenomenon across Africa during the Lower Pleistocene.

The earliest known Acheulean assemblages occur at sites dating between around 1.8 and 1.5 Ma in the Konso Formation of Ethiopia (Asfaw et al. 1992), the West Turkana region of Kenya (Roche 2003), and at Olduvai Gorge in Tanzania (Leakey 1971). Acheulean assemblages include the same core and retouched tool forms as the Oldowan but are defined by the production of large bifacial hand axes, which are also referred to as "large cutting tools" (LCTs). Acheulean sites are known from all regions of the African continent. Hand axes at early Acheulean sites were produced through a process of alternate flaking using direct hard-hammer percussion, which resulted in large tools with bifacial edges. Middle Pleistocene Acheulean assemblages show more sophisticated flaking techniques for the purposes of bifacial thinning, including the use of soft-hammer percussion and the preparation of striking platforms (Ambrose 2001). Terminal Acheulean industries, such as the Fauresmith industry of southern Africa, are characterized by the production of much smaller hand axes and the increasing prevalence of other core reduction strategies. The Acheulean industry gives way to the Middle Stone Age between around 300 and 200 ka.

The Developed Oldowan industry is contemporaneous with the early period of the Acheulean industry, ranging in age between 1.8 and 1.0 Ma. It is mainly defined by the absence or scarcity of hand axes, though Developed Oldowan assemblages often include crude bifacial core forms, such as picks (Leakey 1976). Retouched tools also occur in somewhat higher frequencies and with more diversity than in the Oldowan industry. While there is some controversy in the definition and identification of Developed Oldowan sites (Semaw et al. 2009), a number of examples have been documented in eastern and southern Africa as well as in the Sahara.

The earliest known MSA sites are located in the Kapthurin Formation of the Kenyan Rift Valley and date to around 280 ka (Tryon & McBrearty 2002). Elsewhere in eastern and southern Africa, the transition from the Acheulean to the MSA appears to have occurred somewhat later, ending by around 200 ka. The Middle Stone Age is defined by the use of the Levallois technique, in addition to other varieties of centripetal core reduction strategies and the use of striking platform preparation. These core reduction strategies had their origins earlier in the later Acheulean industry, perhaps predating 500 ka (Rolland 1995). In the MSA, however, they comprise a more prevalent element of core reduction strategies and the production of hand axes largely ceases. Thus, the transition from the Acheulean to the MSA may again be described as a relatively gradual shift in the prevalence of various core reduction strategies at the boundary between the Middle and Upper Pleistocene (Tyron et al. 2005: 201).

The MSA is also the first period in which stone points were produced in significant frequencies using both the Levallois technique and through the marginal retouching of flakes. Such points are thought to have served as the tips of hand delivered spears. In addition, the MSA is characterized by low frequencies of other retouched tools, including various types of scrapers, notches, denticulates, and trimmed flakes. The latter MSA,

after around 100 ka, is characterized by increasing regional diversity in terms of stone tool traditions. In southern Africa, the distinctive Still Bay and Howiesons Poort industries, respectively, defined by the production of thinned bifacial points and backed blades, appear between 80 and 55 ka (Henshilwood et al. 2001; McCall 2007). In eastern Africa, the Mumba industry dates between 60 and 50 ka and is also defined by the production of backed blade technologies. In northern Africa, the Aterian industry appears between 80 and 40 ka and is defined by the production of stemmed points and bifacial points (Cremaschi et al. 1998). It is also important to note that these later regional MSA industries are associated with the appearance of the earliest symbolic objects, which have important implications for the origins of modern cognitive, linguistic, and social capabilities (Henshilwood & Marean 2003).

The LSA begins in eastern and southern Africa between 50 and 40 ka and is characterized by the production of small microlithic tools (Wadley 1993; McCall & Thomas 2009). The earliest uncontroversial LSA assemblages are known from the site of Enkapune Ya Muto in Kenya, though putative LSA artifacts predating 40 ka have also been found at the South African site of Border Cave. Elsewhere in southern Africa, MSA traditions have been documented dating to 25 ka or later, demonstrating that the transition from the MSA to the LSA was both a time-transgressive and geographically mosaic phenomenon. While most LSA industries are characterized by microlithic stone tool technologies, this is not universal. For example, the South African Oakhurst industry dates between around 12 and 7 ka and is defined by the production large flakes and the frequent retouching of these into informal scrapers.

In the eastern Sahara, terminal Pleistocene and Holocene microlithic stone tool industries share most formal qualities with the LSA of sub-Saharan Africa but are generally referred to as Neolithic using the Levantine nomenclature system (Wendorf et al. 1976). Across Africa, LSA stone tool industries are associated with origins of pastoralist and eventually allied small-scale agricultural economic systems, occurring first in the Sahara around 9 ka and spreading to sub-Saharan Africa subsequently. The use of stone tools comes to an end with appearance of iron technology, which becomes increasingly prevalent between 2 and 1 ka. In southern Africa, forager and pastoralist populations continued producing stone tools in the Wilton industry of the LSA through the historical period of colonial contact. Isolated cases of stone tools production, such as the manufacture of stone scrapers by hide workers in Ethiopia, have persisted into the twenty-first century.

Historical Background

Early research on the African Stone Age was associated with the expansion of European colonial territories in Africa during the late nineteenth and early twentieth centuries. The three-age Stone Age chronological system was first proposed seriously by the South African archaeologists John Goodwin and Clarence van Riet Lowe (1929), though Goodwin was heavily influenced by his training under Miles Burkitt at Cambridge University. Following from Burkitt (1925), Goodwin and van Riet Lowe (1929) eschewed the three-age system used to classify the European Paleolithic (Lower Paleolithic, Middle Paleolithic, and Upper Paleolithic) in favor of a chronology unique to the African continent. The reason for this revolved around the widely held Eurocentric view that while the African Stone Age sequence showed some similarities with that known from Europe, its industries occurred later in time and were inferior reflections of their European origins. In short, the various stone tool industries found in Africa were thought to have originated earlier in Europe and diffused into Africa, degrading in quality over space and time.

This view was seriously challenged beginning in the late 1950s by the research of Louis and Mary Leakey, who were the first to establish the deep antiquity of Stone Age artifacts in eastern Africa using newly developed isotopic dating methods (Leakey 1971, 1976). Their research showed that Oldowan artifacts dated to at least

1.8 Ma – much older than what had been supposed and also significantly older than any known stone tool technology in Europe. Subsequent research demonstrated that virtually every early stone tool industry known in Europe had its predecessors in Africa, reframing Africa as the location of the origins of both our earliest human ancestors and their technological traditions. Furthermore, the increasingly synthetic reconstructions of African prehistory in the 1960s produced by archaeologists such as Desmond Clark and Glynn Isaac, as well as their students and colleagues, demonstrated that African Stone Age industries were as complex and sophisticated as any known from other regions of the world.

This trend continued with respect to research on the MSA and modern human origins, thanks in part to further advances in dating technology. While the MSA was once seen as static and underdeveloped relative to European Middle and Upper Paleolithic sequences, it is now known that the MSA was the source of many key behavioral changes among early modern human population. It is now widely acknowledged that many features of the so-called Upper Paleolithic Revolution in fact had their origins in African MSA (McBrearty & Brooks 2000; Henshilwood & Marean 2003). Furthermore, it is increasingly recognized that many important technological features of the Mesolithic and Neolithic microlithic industries of Eurasia originated much earlier in the Upper Pleistocene with the appearance of the LSA in Africa. Thus, the African Stone Age has become a major focus of research on a wide range of global Paleolithic phenomena in terms of the evolution of humans and their expansion across the Old and New Worlds.

Key Issues/Current Debates

The African Stone Age continues to be the subject of a wide range of active archaeological research and debate. Such debates involve issues of prehistory as well as archaeological method and theory. They primarily revolve around accurately reconstructing the life ways of past populations and the complexity of associated social structures, cognitive capabilities, and symbolic practices.

Current research on the ESA has focused on assessing the sophistication of knapping activities and putting these in the context of forms of archaeological information concerning economic and social behaviors. Making use of *chaîne opératoire* and allied methods of lithic analysis, this line of research has demonstrated that even the earliest hominin flintknappers associated with Oldowan lithic assemblages had a solid mechanical understanding of platform angles and other aspects of core geometry – something that even the most highly trained and sophisticated chimpanzee knappers lack (Toth & Schick 2009). Similarly, research on Middle Pleistocene Acheulean assemblages has shown that evident processes of bifacial thinning require a high degree of knapping skill, perhaps implying both sophisticated cognitive and social/linguistic structures for teaching (McPherron 2000). These insights stand in contrast with prior views of early hominin behavior and cognition, which have tended to see ESA archaeological assemblages as indicating much more apelike behavioral patterns.

Archaeological research on the MSA has exploded within the last two decades with profound implications for our understanding of modern human origins. New dating technologies and expanded programs of field research have radically overhauled our knowledge of MSA prehistory and the nature of early modern human cultural behavior. Such discoveries include the world's earliest symbolic objects, ground bone tools, blade-based lithic technology, as well as evidence for other complex knapping procedures and the exploitation of labor-intensive subsistence resources. These behavioral features have been used to define the European "Upper Paleolithic Revolution" and the broader concept of "behavioral modernity" (Mellars 1989; Shea 2011). In addition, research on MSA lithic technology has offered increasing clarity concerning the kinds of technologies, subsistence practices, and mobility systems employed by early humans. Combined, modern research on the MSA has

provided important insights concerning the origins of modern humans, their shifting cultural behavior, and their spread to the rest of the world.

By virtue of finer-grained chronological information and historical associations with modern forager groups in the Kalahari and East Africa, research on the LSA has sought to investigate the nature of later prehistoric foraging forms of technology, economic practices, and social systems. Research on rock art, especially in southern Africa, has offered important information concerning the nature of LSA social structures, religious practices, and cosmological constructs (Lewis-Williams 1983). Recent research has also focused on the transition from foraging to small-scale farming and pastoralist economic systems, as well as the complex forms of interaction between later LSA foragers and their agricultural neighbors. Finally, the transition from the MSA to the LSA is now receiving renewed attention in light of new excavations and improved dating techniques.

International Perspectives

The bulk of early archaeological research on the African Stone Age was conducted under the auspices of European colonial (especially British) academics and their associates in various African colonies. For example, John Goodwin, Louis Leakey, J. Desmond Clark, Glynn Isaac, and Brian Fagan all received graduate education in archaeology at Cambridge University in the early to middle twentieth century. Beginning in the 1960s, an initial generation of African professional archaeologists emerged and populated departments of archaeology at local universities, especially in South Africa. While this generation remained committed to the methodological and theoretical directions that originated in Europe, archaeological research on the African Stone Age began to take on a distinctive regional flavor.

The 1960s also saw the movement of many of the most important African Stone Age archaeologists to major research universities in the United States, such as the hiring of J. Desmond Clark and Glynn Isaac and the University of California Berkeley in 1961 and 1966, respectively. This trend had the effect of fostering the increasing involvement of American archaeologists on African Stone Age topics. Beginning in the 1970s, American archaeologists began to make important contributions on topics ranging from dynamics of lithic reduction, patterns of bone modification, site formation processes, ethnoarchaeology, and experimental archaeology. The increasing popularity of African Stone Age research topics also attracted the attention of powerful foreign scholars, such as Lewis Binford. Within the last two decades, archaeologists from other regions, such as various Western European countries and Australia, have made increasingly important contributions. For example, French Paleolithic scholars, such Anne Delagnes, Pierre-Jean Texier, and Jean-Philippe Rigaud, have offered new perspectives in terms of the application of *chaîne opératoire* approaches to lithic echnology in the ESA and MSA.

Perhaps the most important shift in terms of research on the African Stone Age has been the increasing involvement of indigenous scholars and African governments in the examination and preservation of Stone Age cultural resources. While this has been a continent-wide phenomenon associated with the gaining of independence from European colonial powers, it has been particularly salient in the Rift Valley nations of East Africa (especially Ethiopia, Kenya, and Tanzania) and South Africa. Across Africa, the record of human evolution and cultural diversity associated with the Stone Age has become increasingly recognized as a crucial element of cultural patrimony. With that said, indigenous involvement in research on African Stone Age topics remains regrettably rare (Shepard 2002).

Future Directions

Research on the African Stone Age is in the midst of a significant period of reorientation based on the development of new analytical methods and dating techniques as well as the expansion of available data sets through the proliferation of fieldwork projects.

Research on the Oldowan and Acheulean industries has recently focused on the evaluation of early hominin cognitive capabilities and the complexity of social organization. Future research is poised to make use of a wide range of evidence resulting from human and chimpanzee knapping experiments, further archaeological and ethological investigations of chimpanzee tool use and associated activity areas, and more detailed analysis of archaeological assemblages within a technological framework. In addition, various three-dimensional scanning technologies now allow for the documentation of the shape of tools such as hand axes in much greater detail. Finally, the field is once again turning its attention to the examination of early hominin technological organization, mobility patterns, and broader dynamics of ecological adaptation.

Recent research on the MSA has offered a great deal of new knowledge concerning the design and function of tools and weapons as well as implications for subsistence activities and economic organization. Likewise, having established the presence of many precocious forms archaeological remains associated with early modern humans, recent research on the MSA has sought to evaluate the nature of novel forms of social organization and their potential causes. While some current scholarship has questioned the utility of the behavioral modernity concept (Shea 2011), a great deal of work continues to be focused on the nature of MSA early modern human cognitive and cultural sophistication (Wadley 2012). Future research will no doubt continue to add detail concerning the nature of MSA life ways while improving our understanding of the relationship between various regional phenomena and shifts over time. For example, while the later MSA sequences of South Africa are known in great detail, their relationship with contemporaneous industries in adjacent regions is not. Likewise, the MSA of East Africa remains a neglected topic relative to the study of ESA technologies in the interest of addressing debates concerning early hominin evolution.

Future research on the LSA seems poised to address a range of issues. While the technological and operational characteristics of MSA tools and weapons are increasingly known in great detail, such information remains lacking for the LSA in spite of links with modern forager groups in Africa. The application of a similar research program would seem to have much to offer. In addition, the transition between the MSA and LSA remains a poorly understood process, especially considering apparent differences between various African regions. New directions in research on the LSA might also choose to focus on the continued production of tools by historical and modern societies. Understanding changes in lithic technology associated with processes of colonization and modernization could offer valuable new perspectives on these profoundly important historical phenomena. Finally, future research on the LSA will continue to show the ways in which LSA life ways were specialized aspects of global processes of post-Pleistocene adaptation rather than being "timeless" elements of foraging societies as was assumed by earlier ethnographers and archaeologists.

Cross-References

- ▶ Acheulean Industrial Complex
- ▶ Blombos Cave: The Middle Stone Age Levels
- ▶ Central and West African Middle Stone Age: Geography and Culture
- ▶ East and Southern African Neolithic: Geography and Overview
- ▶ North and Saharan Africa: Geography and Culture During the Lower Stone Age
- ▶ Oldowan Industrial Complex
- ▶ Olduvai Gorge Archaeological Site
- ▶ Out-of-Africa Origins
- ▶ Southern and East African Middle Stone Age: Geography and Culture
- ▶ West and Central African Neolithic: Geography and Overview

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Introduction

The African World Heritage Fund (AWHF) addresses a dire need to provide greater protection for World Heritage sites in Africa. The mission of the African World Heritage Fund is to support the effective conservation and protection of natural and cultural heritage of outstanding universal value in Africa (Herbert n.d.). The fund was established in 2006 as an intergovernmental organization to support the protection of World Heritage sites by providing financial support for training, national inventories of cultural heritage sites, and the conservation and management of heritage properties in Africa (Patchett 2006). The aim is to target local populations of the African countries who have signed the United Nations Educational, Scientific and Cultural Organization (UNESCO) convention and support them to implement active approaches to protect World Heritage sites (Herbert n.d.). The major initial contribution to the Fund was a donation of 20 million rand, the equivalent of US$3.5 million, from South Africa (Patchett 2006).

Current Debates

The African World Heritage Fund addresses two issues that are critical to world heritage in Africa: the low number of sites in this region that is inscribed on UNESCO's World Heritage List and the high costs of maintaining the sites that are inscribed on the World Heritage List. The impact of the fund can be judged by an increase in the number of sites in Africa that are inscribed on the World Heritage List and in the number of countries from the region that have sites inscribed on the list or nominations in process.

According to Varissou (2010), the most important task of the African World Heritage Fund is to increase the number of African sites on the World Heritage List. There is a need to impress the importance of listing sites on the local population and to train authorities and site managers of heritage sites with knowledge on how to apply for inscription on the list. In the space of a year, from 2009 to 2010, the fund helped finance 30 sites to conform to the criteria needed to progress for enlistment. When the African World Heritage Fund was established in 2006, only 65 of the 812 sites inscribed on the World Heritage List were located in sub-Saharan Africa and only 24 of the 40 sub-Saharan African states that had ratified the World Heritage Convention had sites on the World Heritage List (Patchett 2006). By 2013, the World Heritage List had grown to 962 properties (UNESCO 2013). Notable sites from Africa that were inscribed during this period include the Sangha Trinational National Parks, situated in the northwestern Congo Basin, at the intersection of Cameroon, Central African Republic, and Congo; the Ounianga Lakes in Chad; Rabat in Morocco; and the Bassari, Fula, and Bedik cultural landscapes in Senegal (UNESCO 2013).

The African World Heritage Fund provides critical support for State Parties in their efforts to ensure that their World Heritage sites conform to the 1972 World Heritage Convention criteria. There is a significant financial burden involved in ensuring that sites inscribed on the World Heritage List continue to conform to the 1972 World Heritage Convention criteria. The maintenance of World Heritage sites is the responsibility of State Parties. In low-income countries, such as those in Africa and parts of Asia, the burden of maintaining sites on the World Heritage List is particularly onerous. In 2013, the critical nature of the situation was indicated by 16 of the 38 sites on the List of World Heritage in Danger being located in Africa (UNESCO 2013). While some of these sites are in danger due to conflict in the region, such as with the Democratic Republic of the Congo, other sites are in danger due to a lack of trained personnel to protect sites or financial resources to put protection measures in place.

The African World Heritage Fund provides both forms of support. To achieve these objectives, the fund requires the implementation of a plan to ensure the sustainability and protection of heritage sites.

The capacity building program established by the African World Heritage Fund addressed a critical need for trained local personnel. As Leitão (2012: 5) points out, Asia and North Africa were the last regions to experience capacity building programs as part of the World Heritage Capacity Building Project. A significant event in this process was a workshop for North Africa which took place in 2012, held in partnership with the Arab Regional Centre for World Heritage and the National Institute for Heritage in Tunisia. The International Centre for the Study of the Conservation and Restoration of Culture Property (ICCROM) and International Union for Conservation of Nature (IUCN) conduct specialized training on World Heritage and conduct assessments to deal with issues surrounding the topic (Leitão 2012: 6). The first two assessments were at the University College Dublin, Ireland, and at the Brandenburg University of Technology in Cottbus, Germany.

Though it was established only recently, African World Heritage Fund plays a critical role in protecting World Heritage sites in Africa.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Southern Africa: Cultural Heritage Tourism Development and Management
- ▶ UNESCO (1972) and Malta (1992) Conventions

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Age Estimation

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Introduction

Age is a measure of how long a person or an object has existed. A reliable estimation of the age of an individual requires there to be a well-defined and documented event to which the duration of a known passage of time can be ascribed. The thorny question then arises about "when" a human starts to exist. This temporal moment of definition between existence and nonexistence can be difficult to fix in relation to the human and generally has three distinct options: the time since fertilization, the time since intrauterine implantation, or, most commonly, the time since birth.

Key Issues

Early Years

The clinical disciplines of Medical Embryology and Obstetrics wish to know the date of fertilization to permit them to calculate the age of an embryo or a fetus. However, unless there has been only one sexual event, then this timing is unlikely to be a certainty, and so clinicians opt to calculate the age of the fetus from a more reliable event – the last menstrual period (LMP). The mother is more likely to recall or at least approximate this date but of course this can also be unreliable as she may genuinely not remember or

may choose to falsify the information for personal reasons. Therefore, even in the earliest stages of human development, age estimation can be imprecise; a fact which is often little understood by the expectant mother who, when given a due date for her baby, is disappointed when that date generally proves to be incorrect. Only some 4–5 % of babies arrive on their due date, with approximately 80 % arriving in the 2 weeks to either side of that date.

To assign an age to a fetus in utero is achieved through ultrasound image measurements of the length of the fetus (crown-rump length), biparietal width of the skull, or length of the long bones, especially those in the lower limb. If the fetus has been miscarried or aborted, then additional measures of weight, head circumference, thorax dimensions, and crown-heel length can be measured. If, however, the remains are skeletonized, then age estimation is normally based on either bone lengths or maturation status of several of the skeletal elements (Scheuer & Black 2000). A fetus can be viable from 23 weeks gestation, but chances of survival are greatly enhanced if it is over 25 weeks. In some contexts, legal abortions of a fetus can be undertaken providing the fetus is less than a prescribed number of weeks of gestation (e.g., in the UK it is less than 24 weeks). Thus, there are two very important forensic questions that can be related to the age of the fetus – (a) was it viable and (b) was the termination legal.

Birth is an eminently definable event in relation to both a time and a specific calendar date. It is perhaps the most important human marker of existence and is celebrated by millions of people as an annual event throughout their entire life. In most western countries, birth is formally recorded through authenticated certification so that "proof" of the date does not rely solely on memory but is supported by verifiable documentation. Indeed, this formal record is so important and desirable that it can carry a high black market price and may be acquired through fraudulent means. This therefore brings the authenticity of the documented information into some debate, and an understanding that forgeries exist is vital to the realistic acceptance that even documentation may not be relied upon. Many less-developed countries may not record birth dates and therefore not have any basis upon which to develop a robust certification process. This leads to difficulties when the age of a person is required to be known and there is no formal paperwork to support the believed assumption. Under these circumstances, what is referred to as "chronological age" may be questioned and may require verification. Government departments, banks, employers, law enforcement agencies, and other legislative authorities require confirmation of the age of the individual with whom they interact, and each can, and frequently does, seek legal recourse to resolve disputes over alleged age assignment (Black et al. 2010). Therefore, the estimation of the age of a person is undeniably of forensic relevance (i.e., pertinent to the courts) regardless of whether the person is alive or dead. The methodologies and principles followed in both circumstances are very similar.

In the case of a deceased person, an assignment of the age at death is an important component of the biological profile of the individual which can ultimately assist with the identification of the remains in forensic and archaeological investigations. Investigation of a crime is exceptionally difficult in the absence of the identity of the deceased, and indeed investigation of the death is critical for the prosecution of a crime. The biological identity of the deceased is comprised of four principal characteristics – sex, age at death, ancestry, and stature. The personal identity of the deceased can then be pursued once these primary characteristics have been attributed. Personal traits of identity may include matching for DNA, fingerprints, dental information, and other, what are deemed to be secondary, indicators of identity including facial appearance. The methods used to estimate age vary little, regardless of whether the deceased is of recent origin or of historical provenance. However, a recent report by the UK Law Commission (2011) suggests that methods may only be deemed admissible for the court if certain thresholds of acceptability are met. While this is not a hurdle faced in the analysis of ancient remains, if it is deemed best practice, then thresholds of what is deemed "acceptable" will need to be determined and agreed upon by practitioners.

Age estimation processes are based on the principle that as time passes (i.e., the further one

progresses from the moment of birth), then a number of biological maturational events will occur that can be mapped and related to the known occurrence and timing of such events. Therefore, there has to be a strong relationship and correlation between two age-related continua: chronological and biological age. The closer biological age is to chronological age, then the greater will be the certainty of prediction of one from the other, but the more they diverge, then the more uncertain will be the estimation of chronological age. The methods utilized in this process tend to show a close and strong relationship between the two ages during childhood, and they start to diverge markedly as adulthood approaches and then move even further apart as middle age approaches. Therefore, the techniques available to forensic anthropologists and osteoarchaeologists permit high levels of accuracy at predicting the age of a child (living or dead), and they are reliable in the later teenage years, acceptable in the early adult years, and very poor in the middle to later years of adult life (Bogin 1999).

Biological age has two components, skeletal age and dental age, and each can be established independently. Skeletal age utilizes information on the timing of formation of bones, their growth, and the pattern of their ultimate fusion to form the final adult product. Almost all growth has ceased in the human skeleton by 30 years of age, and the changes thereafter are degenerative. These are less reliable markers of the passage of time as they are heavily influenced by many factors including genetics, environment, health, nutrition, and lifestyle. To visualize the skeleton in the living requires that the person usually be exposed to ionizing radiation for imaging purposes (X-ray or computed tomography (CT) scans) although magnetic resonance imaging (MRI) does not carry the same health risks. In the deceased, exposure to radiation for imaging purposes is not as restrictive, and indeed to gain access to the skeleton, soft tissue can be removed through maceration, although of course this does not pose a problem if the remains are partially or completely skeletonized. Age can be estimated to some degree from almost every part of the human skeleton, but obviously in the living, the areas that can be targeted are restricted. These generally comprise the wrist and, if possible, the medial ends of the clavicle. The radiographic image of the wrist and hand region provides access to at least 29 separate bones, and therefore age estimation can be considered from birth through to middle adolescence with some degree of reliability (Black et al. 2010). Imaging of the medial clavicle permits an indication of age from later teenage years through to early adulthood, but it does carry some health and safety risks in relation to exposure to radiation for imaging purposes. Textbooks exist on how to establish the age of an individual when living (Black et al. 2010), for forensic purposes (Burns 2006) and in the archaeological arena (White & Folkens 2005), but in reality, they all use similar methodologies.

Dental age is predicated on the pattern of known development, eruption, and shedding of teeth that occurs throughout the life of the child. The first tooth to start to develop does so in early embryonic life and the last tooth to reach occlusion does so in early adult life – therefore, accurate age estimation from the teeth is valid from fetal age through to adulthood, but beyond the eruption of the third molars, teeth become less reliable indicators of age (Blenkin 2009). In the living, teeth are the only hard structures of the body that are visible to the naked eye, and their ability to survive trauma makes them an ideal medium for age evaluation. There is also a largely unsubstantiated, but generally accepted, maxim that dental age is more closely related to chronological age than is skeletal age as the teeth tend to be more protected from environmental insult and so retain a closer parallel progression of the two continua. Therefore, combining estimations of age from the skeleton with those from the teeth will most likely result in an acceptably reliable indicator of age both for the living and the deceased.

Future Directions

Our modern society demands confirmation of how long we have existed, and the scientist does their best to oblige, but it is never, and can never be, a precise operation. This is the area of research that is most likely to be prevalent in

future years as our security-conscious world focuses on who we think we are, who we say we are, and how we can prove it.

Cross-References

- ▶ Ancestry Assessment
- ▶ Bioarchaeology: Definition
- ▶ Dental Anthropology
- ▶ Facial Approximation and Craniofacial Superimposition
- ▶ Imaging Techniques in Bone Analysis
- ▶ Osteology: Definition
- ▶ Sex Assessment

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Agency in Archaeological Theory

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Introduction

Agency is an explicitly humanistic perspective for understanding ancient people and social reproduction. It emphasizes the reciprocal relationship between people's conscious and unintended actions and their social, ideological, and material conditions. Agency is an attempt to bridge three long-standing paradigmatic divides: between theories focused on egocentric individuals "in" society, those concerned with the deterministic nature of normative culture, and theories emphasizing the influence of external (material) conditions on both individuals and society.

After more than three decades of experimentation and critical reflection, there is still little consensus across paradigmatic boundaries as to precisely what agency is (Dobres & Robb 2000, for attempts at a comprehensive definition, see Johnson 1989; Bell 1992; Pauketat 2001; Dornan 2002). Nonetheless, as a conceptual framework and an analytic tool, the utility of agency for making sense of the past is undisputed. And given the heterogeneous interests of twenty-first-century archaeology, perhaps resistance to being pigeonholed by a single set of tenets is part of its wide appeal and its efficacy. For example, recent agency research published across a wide spectrum of archaeological journals, books, dissertations, and edited compendia shows that how agency played out in particular ancient settings varied considerably (e.g., the agentive processes involved in early state formation in Ancient Mexico, Venezuela, and Crete did not unfold in the same manner).

Another aspect of its popularity in archaeology is that the dynamics of agency have shown themselves amenable to empirical investigation. Indeed, practically every kind of archaeological material has been the means to study agency, including post holes, stone tools, trash, monumental stelae, cave art, village layouts, burial mounds, and graves as well as classic material signifiers of technology, economics, prestige, culture contact, and state formation. Methodologically, this is important, because while archaeologists do not "dig up" agency (see below), they can study "it" in any time period, in any place in the world, from practically any paradigmatic standpoint, and using practically any categories of material culture.

The previous three points help explain the appeal of agency across the discipline: (1) lack of definitional consensus allows the concept to be utilized creatively; (2) agency "looks" different in different cultural, historical, and material circumstances; and (3) research on agency is not limited to only certain times, places, processes, or categories of data.

Nonetheless, agency in archaeology has, at times, been employed far too uncritically (e.g., conflating agency with physical actions or all-knowing and self-strategizing individuals). Uncritical use of the concept remains an epistemological, interpretive, and methodological issue that this presentation cannot hope to resolve.

Definition

Agency is notorious for resisting a single clear-cut definition (Dobres & Robb 2000). Not only do archaeologists employ the concept in numerous and sometimes competing ways, but the "thing" itself is a slippery dynamic that plays out different in different settings. While an early and seminal definition of agency (in sociology) defined it as the capacity to make a difference through action (Giddens 1984; see below), this definition is too narrow to capture the many layers of what agency means in contemporary archaeology.

For example, depending on who you read agency in archaeology has been defined in terms of the rational individual, the conscious (or unconscious) negotiation of intersubjective personhood, free will and intentional (self- or group-serving) strategizing, the normative collective and its construction of reality, conscious or (unconscious) resistance to social norms, adept social practice, unintended goofs and their consequences, and the interplay of individuals, structures, events, and history.

At its core, agency in archaeology is concerned to understand the dynamic relationship between the knowledgeable routines of everyday practice and the ability of agents (both individuals and collectives) to act within and upon larger "structures." In this regard, one major tenet agreed upon by most is that although agents are necessarily conditioned by historical, social, and material circumstances, they are not wholly circumscribed by them.

More specifically, agency is about the unfolding and recursive process of social reproduction. It is about individual and collective agents acting in relation (1) to each other; (2) to their cultural norms; (3) to history; (4) to environmental, (5) material, (6) political, and (7) economic conditions; and (8) in relation to a host of local circumstances. Collectively, numbers 2–8 are called "structures." While structures are necessarily of their own making, agents do not fully control them.

In agency theory, the unintended consequences of habitual (largely unconscious) routines loom large in mediating the reciprocity between agents and their structures. For example, while socioeconomic, political, material, and ideological structures are the resources agents use (imperfectly) to make sense of and act in the world, such structures simultaneously shape how agents think and act. Thus, rather like the chicken and the egg dilemma, the question of agency is not about "which came first (agents or structures)?" but about how, in specific settings, they interacted with and shaped one other.

In sum, agency in archaeology is, at one and the same time, a cultural process, a theoretical concept, an interpretive paradigm, and an analytic tool for making sense of the past in terms of an inseparable suite of dynamics. For its advocates, agency is a corrective bridging the inadequacies and limitations of better-established (albeit more narrowly conceived) processual and post-processual approaches to the past. But to others, the acknowledged difficulty with providing a clear-cut definition acceptable to all makes agency a "platitude" more than a "paradigm" (Dobres & Robb 2000: 3).

Historical Background

The initial inspiration for agency in archaeology (and the social sciences more generally) stems from Marx's famous dictum that "men [sic]

make their own history, but they do not make it just as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past" (Marx 1969: 15 [orig. 1869]). The more immediate and palpable influence on archaeology begins in the 1980s, with Anthony Giddens' (1984) work on "structuration" and Pierre Bourdieu's (1977) emphasis on habitus and *praxis* (Ortner 1984). The key points of their ideas, as relevant to archaeology, are summarized below.

Giddens' theory, known as "structuration," seeks to understand how society, social rules, and large-scale structures (specifically, sociopolitical and economic institutions and class ideologies) come to exist outside of the agents who make them possible in the first place. Structuration wants to explain how society's structures are susceptible to change if the agents who create and sustain them have little awareness or control of what's going on. Giddens' "duality of structure," in particular, emphasizes how everyday actions create the normative rules and top-down conditions which recursively act back on their creators in a never-ending "dialectic." Structuration theory takes the question of social change seriously because agents and structures do not exist in a homeostatic feedback loop adapting to each other and the "real" world. Rather, agency and structures are processes of interaction, and their relationship is a dynamic dance in which "external" and objectified conditions (viz., structures) are both the architecture and the resources agents use to live in a world of both social perception and material realties. Importantly, it is in this unstable cauldron of agency and structures that change unfolds.

On the other hand, Bourdieu was particularly concerned to counter structuralist notions that agents are little more than robots unconsciously following deep-seated rules and a cultural logic of which they are unaware and impotent to change. Bourdieu's so-called "theory of practice" highlights habitus, which is defined as tacitly learned social practices and routines of action that serve as the resources with which agents cope with their social, ideological, and material conditions (no matter how imperfectly understood). Habitus and everyday practice (*praxis*) are not only normative strategies to get through the day. As an embodied and meaningful form of knowledge of how to get by in the world, habitus is susceptible to both conscious and unintended alteration. Thus, subtle changes in everyday routines, whether by mistake or by intention, can accumulate to change the structures (i.e., the culture) within which they take place.

Importantly, both Giddens and Bourdieu emphasize that the structures "within which" agency unfolds (i.e., institutions of power, history, social rules, traditional and innovative practices, as well as and knowledge) are neither rigid nor do they exist "out there" and in opposition to agents. But because structures are the means by which agents understand who they are and how the world should work, they are perceived as objective (external) entities.

To summarize, agency theory in the social sciences emphasizes habitus, *praxis*, and structures as different but inseparable aspects of social reproduction. Combined, they not only shape how agency unfolds but also serve as the raw material used to act in the world as agents see fit.

In archaeology, agency is thus premised on the idea that both the structuration process and the habitus of everyday practice are relational and recursive dynamics. Structuration and habitus highlight not only the interplay, or duality, of people and society but also their social, ideological, historical, and material conditions – none of which should be teased apart for heuristic (analytic) ease. In this web of life, past and present, neither structures nor agents can exist without the other, neither wholly determines nor is influenced by the other, and change is built in to the very essence of everyday routinized actions (rather than only through conscious political upheaval, culture contact, or change in the environment).

The question of agency entered archaeological discourse as part of the "post-processual" movement (e.g., Johnson 1989; Bell 1992; Barrett 1994) but is currently investigated by researchers of every paradigmatic stripe (not that they all define agency in the same way; see above). Agency was initially a balm to the impersonal

and deterministic nature of the functionalist and systemic (New Archaeology/Processual) paradigm, which gave more credit to the environment and "needs of the system" than to living breathing people. Thus, the attractiveness of agency was, at first, to "find people" (Robb 2010; but see below for new intellectual trends). A parallel interest in agency can be traced, at much the same time, to frustration with how mainstream paradigms discounted the role of gender, in particular, as (1) a form of everyday practice, (2) as a structure and set of rules shaping actions and perceptions, and (3) as a potential source of wholesale culture change (e.g., Dobres 1995).

For archaeologists, habitus and *praxis* are attractive concepts because we dig up palimpsests of everyday material activities and evidence of culture change at numerous analytic scales (Barrett 2001). Similarly, the structuration process is intuitively familiar because archaeological applications of systems theory have already made familiar the idea that archaeologists can excavate a "system" from the patterning of archaeological remains. But on these two points, there are substantive differences, explicated below (see also Dobres & Robb 2005).

Key Issues/Current Debates

Agency and Projects

While archaeologists dig up the material remains of past activities, those activities are not, conceptually, the same as "projects" (Robb 2010). Projects is a concept better suited to researching the dynamics of the agency/structuration dialectic because agency is about more than just doing something with material culture.

For example, the earliest writing projects were more than just activities. As scribal projects, they wove together the agencies of traders and accountants with scribal communities and elite patrons. Epigraphy on a gravestone or on the walls of a chiefly tomb intimately connected the agencies of dead and the living with the agency of the material being inscribed (see below). Accounting projects concerned not only the herds or cloth being counted and the containers of wine and grain being sealed. Each of these was, in turn, connected with the bone, ivory and clay being used for seals, with the chisels used on stelae, and with the technical recopies for ink and papyrus. Thus, more than activities leaving material traces, early writing projects were overlapping fields of social, symbolic, political, economic, and material agency contextualized within structures too numerous to elaborate here (but see papers in Englehardt 2013).

The Agency of Material Things

Extending the idea of agency beyond the original duality of agents and structures, archaeologists now study the agency of material things (Gosden & Marshall 1999; Gosden 2005). In this formulation the material world is not passive, waiting to be brought to life through the physical activities of people. Rather, the material world of objects and raw materials has its own kind(s) of agency that during the unfolding of agentive projects interacts with and thus in part shapes how agents understand the world and act in it.

But material things are not agentive simply because humans give them meanings, values, and functions. From an agency perspective, things are partners in social life and can contribute to or intervene in the best-laid plans of sentient agents. For example, in crafting and using Ice Age sewing needles, bone and stone (burins) collaborated with, but also occasionally resisted, the wishes, skillful gestures, and know-how of the technicians engaging in those projects. In this sense, the agency of bone and stone not only contributed to the "inalienable" value of bone sewing needles but also helped "make" their makers (Dobres 1995).

Agency and Personhood

As mentioned above, the initial focus on agency in archaeology was to humanize the past through explicit concern with human beings and their meaningful experiences in a material world of sociopolitical, economic, and historical structures. Many archaeologists remain focused on understanding how the mindfully, materially, and socially constituted bodies of agents worked in and through their world to give it meaning and

shape. This research often appeals to phenomenology and its attention to how the corporeal senses of embodied experience become both a locus of meaning making and a medium of agency.

As but one example of the (inter)agency of people, communities, structures, projects, and things, Dobres (2000) has explored how an embodied and corporeal sense of (gendered) personhood was negotiated, tacitly, during the most mundane and habitual projects of artifact manufacture, use, and repair during the Magdalenian (Late Ice Age) in the French Pyrénées. Asking about the agency of Magdalenian personhood led to an empirically grounded exploration of the interrelationship between gestural skill, esoteric and practical knowledge, and normative rules about the right and wrong ways to make and use objects in particular material settings. In turn, this concern with personhood led to an appreciation of the materiality and agency of antler, bone, and ivory as well as the artifacts made from them – as agents in their own right.

Agency and Social Reproduction

Clearly, the resources agents make use to act in the world, and the meanings attached to them come about through the routinized practice and physicality of everyday projects. At the same time, such routines are in a dialectical dance with larger-scale structures (such as tradition and history, politics, and ideologies and of course material conditions). Combined, local practice and large-scale structures constitute the "stuff" of social reproduction. But agents employ an imperfect understanding of their circumstances, and they do so with only partial success and with a host of unintended consequences. Thus, from an agency perspective, social reproduction unfolds through a series of relationships negotiated between (1) the agencies of individuals and communities, (2) the agency of material culture, and (3) between these myriad projects and larger-scale historical traditions and structures.

For example, at Umbro and Penitenzeria (Bova Marina, Calabria), Robb (2007, 2010) has used the lens of agency to consider prosaic projects as social and material forms of agency. Foodways, herding, clay and stone technologies, house construction, burials, and trade – these were overlapping projects (not activities) connecting people to their kin, to their ancestors, and to extrafamilial relationships. But more than the stuff of everyday life and habitus, these projects also reproduced the Italian Neolithic writ large. Robb shows how six items of everyday trash are more than traces of an "economic system." The projects in which they were caught up connected them to social actors, to other objects, to symbolic power, to the social landscape, to fields of memory, as well as and to household rites. Thus, social reproduction during the Italian Neolithic was a partnership interconnecting artifacts, agents, habitus, community, and the social landscape with the *longue durée* of history, memory, economic institutions, space, and the environment.

As well, the question of agency has led to new considerations of power and even the question of wholesale culture change. To generalize, the methodological individualism underwriting "rational actor" models holds that humans have a universal desire for prestige and power and will seize the opportunity, consciously, whenever possible. In stark contrast, from an agency perspective the development of sociopolitical and economic inequality is posed as a historically specific and local question of intersubjectivities and contingencies. While some archaeologists investigate how collective expressions of agency made use of older (normative) socioeconomic and political structures in order to reconfigure them in new and unequal ways, others research how traditional ideologies, habitus, and sociomaterial conditions served as a pool of (imperfectly understood) resources with which communities sometimes resisted and sometimes acquiesced to attempts at altering power relationships.

Agency and Scale

As can be seen above, still another way to think about agency in archaeology is in terms of scale. For some, agency is a way to highlight the local, the historical, and the situatedness of "individuals" or intimate collectivities within larger-scale

structures beyond their ken. But for others, the interest is on those larger-scale structures. Importantly, when one shifts from the question of small ("micro")- to larger ("macro")- scale concerns, it does not mean that localized expressions of agency are no longer relevant. Because in the past agency unfolded at each and every scale one can identify, research focused on any particular scale must be concerned with the overlapping and possibly contested nature of agency at multiple scales.

Thus, the focus on understanding the agency of people and communities in relation to their social, material, and ideological conditions ranges from making sense of the projects and habitual practices of recognizable individuals to the more anthropological concept of "the individual," to communities of agents (who may or may not have been acting in concert), and all the way "up" to the scale of structures far beyond the control of anyone. Similarly, agency can be studied through the remains of a hearth, a single house floor, a village, a trade route, or an empire – because agency unfolded within and through them all.

International Perspectives

In a brief amount of time, agency has become a popular topic in archaeological research across the globe, and increasingly, such work is being pursued by non-Western trained archaeologists. For example, agency has been used to study the origins of writing in Greece, pottery manufacture in Cameroon, culture contact in Hawaii, lithic production in prehistoric Pakistan, identity in Ancient Egypt, and dynastic-period Chinese burials. As a result, expressions of agency are being identified that do not conform to Western notions, such as the agency of the "we" (rather than the "me"). Indeed, across the globe the current state of research on agency in the past may best be characterized as the study of agencies in archaeologies.

Perhaps the most difficult issue facing archaeologists interested in agency is to learn how to "see" and appreciate expressions that were different from those evident in the modern (capitalist) world (e.g., papers in Knappett & Malafouris 2008). It has been far too easy to succumb to the "me, myself, and I" notion of the egocentric individual and describe past expressions of agency in terms of all-knowing individuals (or agenda-driven groups) consciously manipulating the world to suit their fancy. In this regard, international perspectives on agency are a welcome challenge to Western and capitalist descriptions of the past. It is hoped that international perspectives, framed by non-Western theoretical perspectives, will enable us to ask if we can hope to understand, on their own terms, how differently constituted agentive projects unfolded in settings unlike anything known in the present.

These are among the vexing dilemmas research on agency is only beginning to grapple with, and they will be well-served by increasing input from non-Western trained archaeologists and those studying times and settings wholly unlike the present.

Future Directions

What is both vindicating, but at the same time problematic, is that agency has become a ubiquitous part of twenty-first-century archaeological discourse. It is currently employed by Darwinian, evolutionary, and behavioral archaeologists, by processualists and those favoring ecological perspectives, by feminist and Marxist archaeologists, and by post-processualists of every stripe. Nonetheless, there is still much room for analytical, interpretive, methodological, and epistemological introspection and growth. In archaeology, particularly, many issues still need to be explored and elaborated, among them:

- A phenomenological concern with how normative structures become internalized through the situated subjectivity of everyday practice should be leading us to ask: how did non-discursive and tacit forms of agency play out at collective and larger (macro) scales?
- In different times, places, and in cultural settings, archaeologists could be asking: what,

precisely, was the nature of the relationship between embodied and mindful human agents and their externalized social, political, and material conditions?

- For all the focus on the dialectic of agents and structures, archaeologists still tend to take for granted the question of "tradition" and cultural conservatism. Thus, perhaps it is time to ask: how did agency contribute to long-term social stability?
- On the flip side, more work needs to be done on understanding how microscalar forms of agency, played out in local arenas of materiality and meaning making, contributed to wholesale structural change. Among the topics we might explore from this perspective: how did local expressions of agency and habitus contribute to state formation or the development of agriculture?
- Archaeologists with even a passing familiarity with ethnography are well aware that Western notions of agency, "the individual," and personhood depend on a problematic definition inappropriate for much of the past. Though this does help explain why there is growing interest in the agency of material things, we need to keep asking: what other forms of personhood and agency existed in the past?
- More particularly, how can archaeologists conceptualize, much less study, the agency of class, power, gender, ethnicity, or race? Will a one-size-fit-all (Western-centric) theory and methodology work for all these dynamics? Surely not.

Conclusions

While archaeology is all the better for the inclusion of agency in the study of the past, major epistemological, analytical, and interpretive issues remain unresolved (Dobres & Robb 2005). But there is no doubt that as an explicitly humanistic perspective for understanding ancient people and social reproduction in terms of practice, projects, and materiality, agency is a theoretical concept, an interpretive paradigm, and an analytic tool amenable to studying any time, place, and circumstance of interest to archaeologists.

Cross-References

- ▶ Ideology and Materiality in Archaeological Theory
- ▶ Material Culture and Education in Archaeology
- ▶ Phenomenology in Archaeology

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Agnew, Neville

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Basic Biographical Information

Neville Agnew joined the Getty Conservation Institute (GCI) in Los Angeles in January 1988. He came to the Getty from the Queensland Museum, Australia, where he had headed the conservation department, which he was instrumental in establishing when he joined that institution in 1980. Prior to 1980, he had pursued a career in academic and research chemistry in South Africa and Australia. Educated in South Africa, he did graduate research in England and received a doctorate in chemistry in 1967. His conservation work in Australia was mainly on the preservation of outdoor sites, including fossil footprints (the Lark Quarry dinosaur stampede site), a maritime archaeological site (the British warship *Pandora* wrecked in 1791 on the Barrier Reef), and the ruins of a nineteenth-century settlement (the penal colony on the island of St. Helena in Moreton Bay). Among his research activities have been a joint Getty Conservation Institute/New Mexico State Monuments project on adobe preservation, development of techniques for preservation and protection of archaeological sites, and a collaborative project with the U.S. National Park Service at Chaco Canyon, New Mexico.

Dr. Agnew has led and participated in many of the international conservation projects of the institute, notably in China where he has worked continuously since 1989, under the Getty's agreement with China's State Administration of Cultural Heritage, at the Mogao ancient Buddhist grotto site and the Chengde Imperial Summer Resort; and among others, in Egypt on conservation of the wall paintings in Nefertari's tomb and the Great Sphinx at Giza; in Africa on the conservation of the bas-reliefs of the royal Palaces of Abomey and the Laetoli hominid trackway in Tanzania; South America in the Quito historic center; and in the city of Prague on the St. Vitus mosaic project. His long association with heritage conservation in China has resulted in a number of awards: the Friendship Award of the State Council in 2000, the International Scientific and Technological Cooperation Award of the PRC in 2005, and awards from Gansu Province and the Dunhuang Academy. He was instrumental in drawing up national guidelines for the conservation of heritage sites in China. Currently he leads the Getty's collaborative projects in Egypt for the conservation of the Valley of the Queens and

Tutankhamen's tomb and the Southern African Rock Art Project.

Dr. Agnew has authored publications in research chemistry and conservation, including the book: *Cave Temples of Mogao* (with two coauthors), and is a member of several professional associations, including being on the editorial boards of the journals *Conservation and Management of Archaeological Sites* and *Historic Environment*. For 8 years, he was a board member of the National Center for Preservation Technology and Training (a program of the U.S. National Park Service) and served as chair. He has organized major international conferences and edited the proceedings. These include two conferences at the Mogao Grottoes of Dunhuang and the conservation theme at the 5th World Archaeological Congress held in Washington, D.C., in 2003.

Dr. Agnew is currently senior principal project specialist in the Field Projects department of the GCI.

Major Accomplishments

Neville Agnew has successfully sustained significant multiyear international heritage conservation projects in a wide range of cultures and climates. These collaborative projects, as part of the GCI's international outreach, are premised on identifying significant conservation needs or problems and developing partnerships and teams to address the issues. This has required both conceptual understanding and technical knowledge and the ability to lead. Examples of these projects have been the development of the *Principles for the Conservation of Heritage Sites in China* with the State Administration of Cultural Heritage and the Australian Heritage Commission, technical preservation interventions at the Mogao Grottoes, and completion of a decade-long project for conservation of the earth-based wall paintings at this World Heritage Site. Also at the Mogao Grottoes, the *China Principles* were used in drawing up a master plan which in turn led to the development of a systematic methodology for sustainable visitation to the site. In southern Africa, annual workshops have been mounted for conservation and management of rock art. These have been attended by participants from all 12 southern African countries, and linkages are now being forged with traditional owners of rock art sites in Australia.

In Tanzania, the 6-year project for the conservation of the 3.5-million-year-old Laetoli trackway was completed with educational outreach to local and international audiences. Currently in Egypt, in collaboration with the Supreme Council of Antiquities, a comprehensive plan for conservation and management of the Valley of the Queens with its 100 tombs has been completed, while research and study of the tomb of Tutankhamen is well advanced, in preparation for conservation of the wall paintings and presentation and interpretation of the tomb.

Cross-References

- ▶ Aerial and Satellite Remote Sensing in Archaeology
- ▶ Archaeological Stewardship
- ▶ Archaeology and Anthropology
- ▶ Architectural Sites: Monitoring
- ▶ Art, Paleolithic
- ▶ Australia: Maritime Archaeology
- ▶ Australia's Archaeological Heritage
- ▶ Australopithecines
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Chaco Canyon, Archaeology of
- ▶ China: Cultural Heritage Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ China: Domestic Archaeological Heritage Management Law
- ▶ China: Managing Cultural Heritage and the World Heritage List

- China: New Approaches to Heritage Administration
- Conservation and Management of Archaeological Sites
- Conservation and Preservation in Archaeology in the Twenty-First Century
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- Rock Art, Forms of
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Agora in the Greek World

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Introduction

The word "agora" derives from the ancient Greek term ageirein, meaning "to gather together" and is attested as early as the eighth century BCE. It is commonly translated as "assembly," "assembly place," and "market place." The agora was a crucial component of all Greek villages and towns across the Mediterranean. According to Herodotus (1.153), the Persian king Cyrus II conceived of the agora as the single most defining characteristic of an urban settlement. For Homer (*Od.* 9.112-5), the agora was not only a constituent part of an urban environment but also signified a form of order and civilization, since he characterized a community without one, such as that of the Cyclopes, as lawless (*Od.* 9.106). The emergence of the agora has been linked with the birth of the Greek polis (city-state). Antonaccio (1997: 170-80) regards the agora, alongside other features including monumental temples and the council house, as an indicator for urbanization. Civic requirements – political, social, commercial, religious, and cultural – were fulfilled in this public place. It was also a place for public display, with honorific statues for good citizens and benefactors as well as political monuments that often functioned to define the collective identity of the polis. Some of these activities and functions were so closely linked to this space that they came to describe it as well as the term "agora," including *choros* (dance), *agon* (athletic contest), and *ekklesia* (popular assembly) (Kenzler 1999: 306). It was originally an open place, but it soon became home to buildings of civic and sacred importance, in line with the growing need to permanently reserve specific areas for specific activities. However, there was nothing that one might call an archetypical Greek agora. While most examples are attested in urban centers, there were also areas designated as agoras outside of settlements (Strab. 9.1.10) and temporary agoras outside of cities, especially in wartime (Thuc. 1.62.1).

Definition

The earliest references to the *agora* can be found in the *Iliad* and the *Odyssey*. While the exact date of the composition of the epics of Homer is debated, most scholars seem to agree that they were written down in the later eighth or early seventh centuries. For Homer and his audience, *agora* could refer to an actual gathering (*Il.* 7.345; *Od.* 9.112, see also Alcaeus F 130b.1-4; Campbell 2002) or an assembly place (*Il.* 18.497; *Od.* 7.44). Once the Greek polis and its rules for communal living were fully developed in the Archaic period, it came to denote a public space that served as the civic and commercial heart of the Greek city-state. This area was sacred in a similar manner to other elements of the urban infrastructure (Martin 1951: 164-201). It served as the locus of governmental proceedings, archives, religious rites, athletic and dramatic competitions, military activities, trading and shopping, philosophical discussions and chats, and eating and drinking.

Historical Background

Both textual and archaeological sources provide evidence for the ancient Greek agora. The earliest use of the word is attested in the Homeric epics,

where the word is mostly employed in the sense of a gathering of people and a council assembly (*Il.* 2.143-4; *Od.* 2.26) but also as a topographical term (*Il.* 18.274; *Od.* 2.7). It is occasionally unclear whether Homer refers to the agora as an institution or a location (*Il.* 2.93; *Od.* 10.114). The agora plays a significant role in the world that he created in his poems, but it is much debated to what extent the *Iliad* and the *Odyssey* actually portray Greek society in the eighth century BCE; it is, therefore, better to discuss the Homeric world separately. People in the Homeric world come to the agora to attend court sessions, games, and assemblies and to watch dances and athletic contests (Kenzler 1999: 304-6). The agora might also be associated with craftsmen, if indeed the shipyards beside the Phaeacian agora provided ship maintenance services (*Od.* 6.268-9). Especially in the *Iliad* (2.48-83), it is also a place where military matters are addressed. In Homeric Ithaca, the men congregate every morning at the agora to talk and gossip (*Od.* 17.52-72); political meetings usually seem to require the presence of their leader (*Od.* 2.26-7, but 2.6-7). In wartime, gatherings could take place close to ships or on the battlefield (*Il.* 1.305; 8.489-92). The agora is an open, sacred space with few structures, located at the temple of Poseidon in the harbor area on Scheria (*Od.* 6.263-7), or in the lower city, below the acropolis (Kolb 1981: 2-3); assemblies could also be held at other places, such as in the citadel of Troy (*Il.* 7.345). The single most important installation is the *hieros kyklos* (sacred circle); the circle of honorary seats (*thokoi*) marked this place permanently (Kenzler 1999: 53-9, 243-8). In the trial scene depicted on Achilles' shield (*Il.* 18.497-508), the elder noblemen sat on polished stones within this circle while the other men of the community gather around them in the open space. Heralds gave staves to the elders who wished to give judgment. Other authors had different names for this sacred circle, and it was called the "orchestra" in Athens (Plato *Ap.* 26d-e), implying that it served for theater performances and other religious activities. The Spartans termed it according to Pausanias (3.11.9) "choros" (dance), suggesting that it functioned as a dance floor.

The agora plays a crucial role in communal life both in the Homeric world and in ancient Greece. While community matters were openly debated in the epics of Homer, court sessions were held by a small number of representatives and followed by an audience that participated through verbal assent (Kenzler 1999: 304-5). In this sense, the agora was an important place for the strengthening of a community's sense of unity. This basic function was not restricted to the Homeric world. In fact, this never changed even if access to the agora and the relative roles of the worlds of the living and the dead within it were subject to change. It appears that access to this public place was unrestricted in Homeric society though not everybody seems to have had the right or power to decide matters of controversy. Many historical poleis, by contrast, clearly defined the space of the agora by boundary markers (*horoi*) and lustral basins (*perirrhanteria*) set up at its edges, and some excluded by law individuals accused of pollution, such as murderers (Dem. 20.158). Assemblies were occasionally held at hero tombs within Homeric society (*Il.* 10.414-5, cf. Kenzler 1999: 307). The relationship between the living and the dead became more permanent when the agora was placed next to burial grounds. For the Megarians, this was a conscious decision so that the dead could play an active role in communal affairs (Paus. 1.43.3). Other poleis only granted select individuals the right to be buried in the city center. The founder-leader (*oikistes*) was customarily buried and worshipped in the agora of new foundations, as in the case of Cyrene in North Africa (Malkin 2009: 374). The Athenians buried the remains of their local hero and model ephebe, Theseus, in their civic center; his adventures adorned a temple, the so-called Hephaisteion, that stood next to major civic buildings (Paus. 1.17.6).

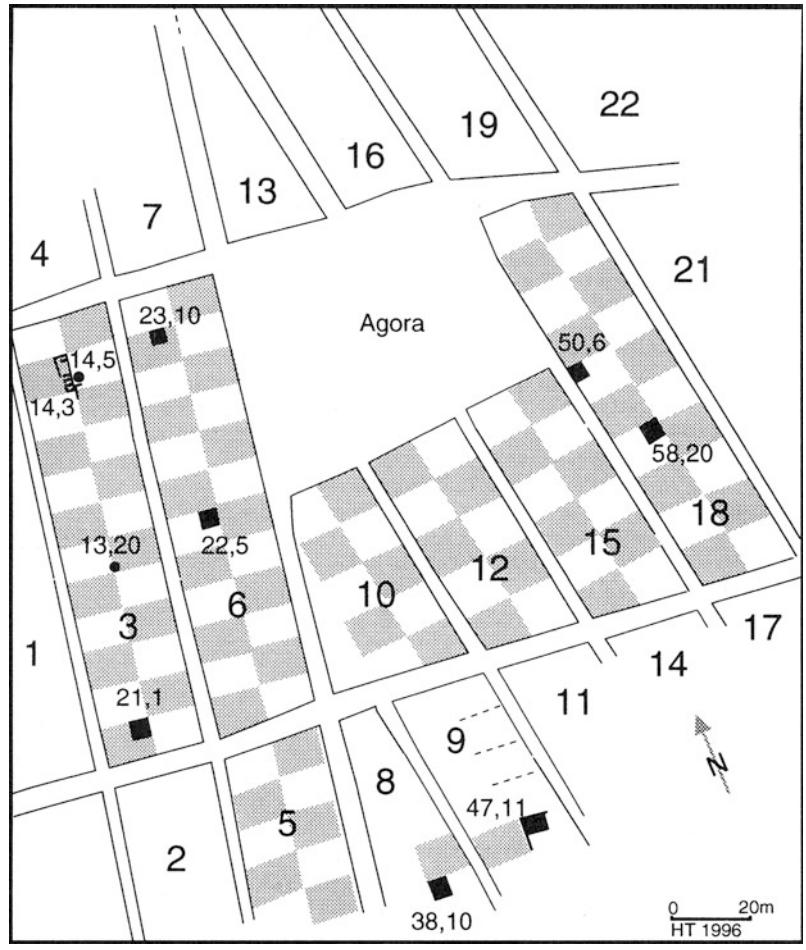
The origin of the agora is much debated. Some scholars believe that the agora of the Early Iron Age was influenced by Minoan palace architecture (cf. Kenzler 1999: 323-6). Other scholars (e.g., Mazarakis Ainian 1997: 273) place more emphasis on the spatial configuration of Early Iron Age settlements and suggest that the open

space in front of a ruler's house may have functioned as a "primitive agora." In any case, the earliest-known spatially defined agoras date to the eighth century BCE, a period that is characterized by the formation of cities and states. The earliest archaeologically attested agora was discovered in Megara Hyblaea in eastern Sicily, a settlement that was founded shortly after 750 BCE and covered a territory of about 600,000 m^2 (Mertens 2006: 64-72; cf. Hoepfner 2006: 3-4 for early settlements on Chios and Andros). The territory of the city of Megara Hyblaea was subdivided into five districts, each of which followed a slightly differently oriented grid system. The spatial planning reserved, among other spaces, an agora on the so-called Plateau Nord, an area of about 4,200 m^2 that was located between two habitation districts, hence its unusual trapezoidal form (Fig. 1). This innovative urban planning solution was copied in Selinus, Miletus, and Piraeus, cities that were also laid out in converging grid-patterns. Another feature of urban planning, the main road connecting the agora with the main urban sanctuary, can be found in Megara Hyblaea's daughter colony, Selinus. At first, the agora of Megara Hyblaea consisted of an open, multifunctional space with altars, and it remains unclear whether its primary function was originally civic or sacred (Bergquist 1992: 134-5; de Polignac 1999). Monumental buildings, including temples, stoas, possibly a *bouleuterion* (council house), were constructed at the end of the seventh century BCE, while a heroon and a banquet house were added much later.

It is perhaps not surprising to find one of the earliest agoras in a colonial context, since "the phenomenon of colonization provided the overall rise of the polis with an enormous impetus" (Malkin 2009: 377). Although processes of urbanization were not uniform throughout the Mediterranean (van Dommelen 2005: 44), in most Greek settlements, they seem to have followed similar trends. Among other things, increasing importance was accorded to the community as a whole and to the public (*to koinon*, *to demion*) rather than the individual (*to idion*) or the household (*oikos*). If necessary, preexisting domestic structures and burials were cleared away for the creation of an agora. Designated spaces in the polis were assigned specific functions and later adorned with purpose-built buildings. Once the civic center was established, it was seldom relocated, as can be seen in Argos (Pariente et al. 1998). This may also have been true for the agora of Corinth, which Donati (2010) recently posited beneath the Roman forum.

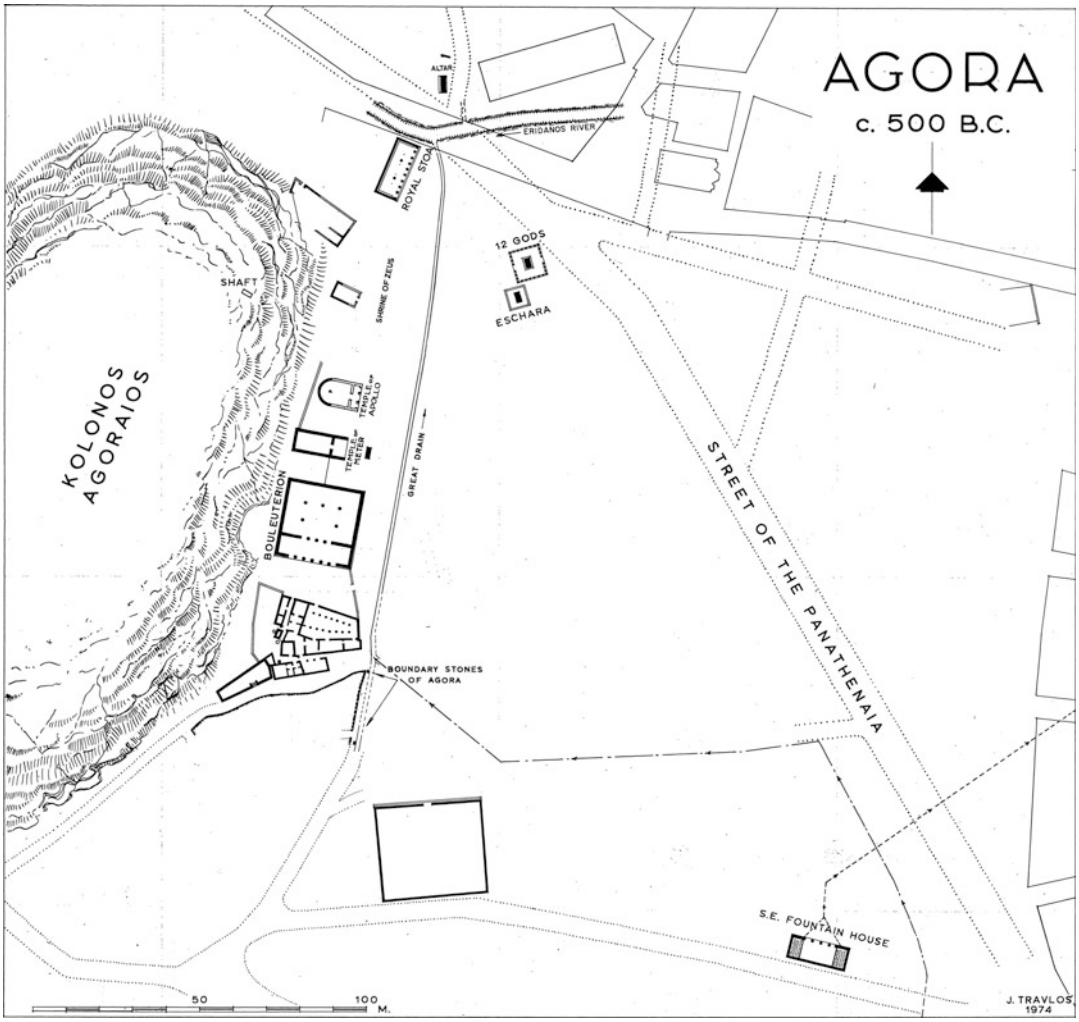
The evidence from the sixth and fifth centuries BCE is somewhat more plentiful, partly due to the construction of permanent administrative buildings and sanctuaries for polis deities. The agora of Metapontium in South Italy, for instance, not only housed a number of shrines and temples but also an impressive amphitheater-like installation that has been interpreted as an *ekklesiasterion* (building for popular assembly) with space for up to 8,000 people. It is possible that the area was already used as an agora before 600 BCE, if the wooden remains discovered here can be interpreted as a stage (*ikria*) (Mertens 2006: 47). As in Selinus and possibly Syracuse (Mertens 2006: 76), it was an integral part of the planned settlement but it was not the focal point of its layout. The agora of Metapontium only became the heart of the city when the settlement expanded in the fourth century BCE. On the Greek mainland, the agoras tended to be less elaborate. The agora of Argos was adorned with two stoas and a temple for Apollo around the middle of the fifth century BCE.

The most famous agora is the agora of Athens, situated directly beneath the Acropolis in the district called the *Kerameikos*. It is also one of the best-published agoras (Camp 2010). This well-known agora is most likely the successor of an earlier agora. The location of the original agora and the date at which the later agora was monumentalized are much discussed. Papadopoulos (2003: 280-97; cf. Hoepfner 2006: 16, fig. 13) recently suggested that the earlier agora was located east of the Acropolis and relocated after 480 BCE. The chronology of the first major building phase in the western part of the new agora has been pushed back to the end of the sixth century BCE in recent scholarship;



Agora in the Greek World, Fig. 1 Plan of the agora of Megara Hyblaea. (Courtesy: H. Tréziny)

Papadopoulos (2003: 295) does not necessarily contradict this view, since he is mainly interested in determining when this place formally acquired its new function. By then, the principal public building of the Old Bouleuterion (Metroon) and perhaps the Royal Stoa had been erected in the northern part of the agora as well as altars and shrines, including the Altar of the Twelve Gods (Figs. 2, 3). The Athenian agora also had its own fresh water supply; the public fountain house was part of a larger water management project that was celebrated on many black-figure vases. Some civic institutions such as the people's assembly were eventually established in the neighborhood of the agora, on the Pnyx or in the theater (McDonald 1943: 45, 47-51, 57-8). If many major buildings of the agora and the erection of boundary markers are associated with the Cleisthenic reforms in 508/7 BCE which resulted in "a united Attica" that was "a functional reality" (Anderson 2003: 5), it can be argued that this newly formed community, in turn, used the agora to strengthen its sense of community and collective identity. The Athenians measured the distances in Athens from the Altar of the Twelve Gods (Hdt. 2.7; *IG* II^2, 2640); the Panathenaic procession crossed the agora; monuments commemorating important people and milestones in the city's history, such as the end of tyranny and victories in the Graeco-Persian Wars, were erected in the agora. It is noteworthy that in addition to the meeting place in the city center, each Attic deme (small community of a citizen body that shared cults and festivals) had its own



Agora in the Greek World, Fig. 2 Plan of the agora of Athens, c. 500 BCE. (Courtesy: Agora Excavations)

"agora" or "theatron," as they were called in inscriptions, in the fifth and fourth centuries BCE (Kolb 1981: 62-74).

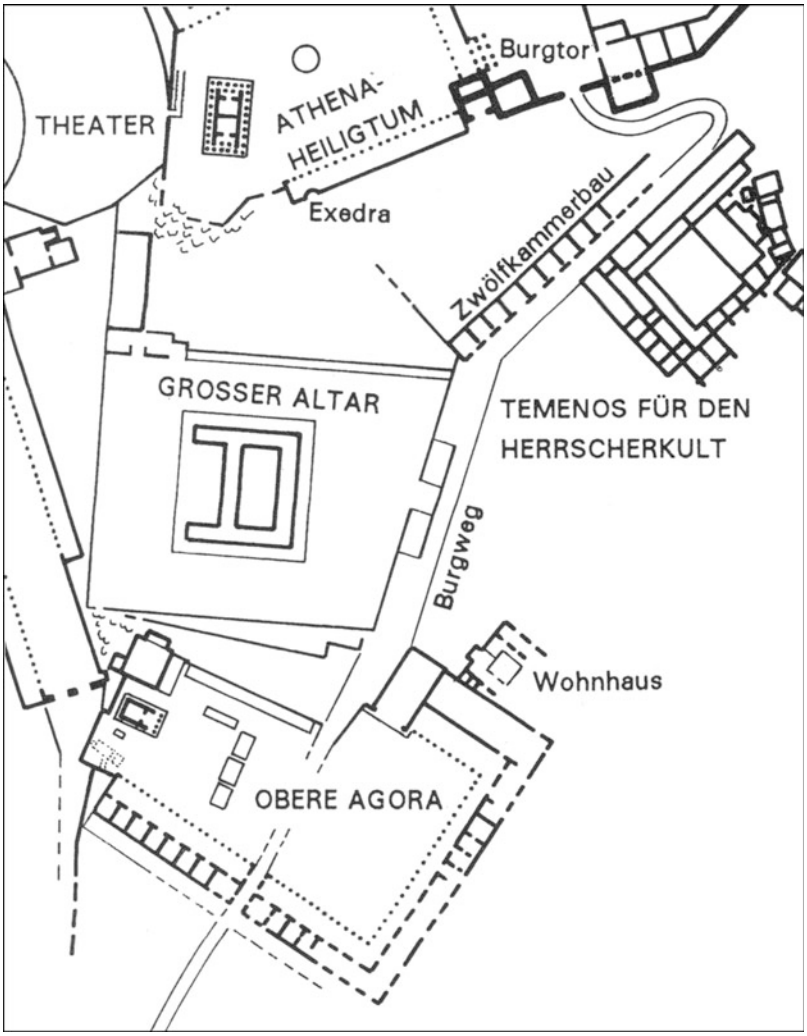
Herodotus (5.101) is one of the first authors to refer to the agora as a marketplace but it soon became the quintessential function of this public place. Some Greek authors such as Herodotus (2.39) and Xenophon (*An.* 1.5.6) even used the term to denote market places in non-Greek societies. Specific products such as vegetables, meat, books, and perfumes were sold in designated spaces in the agora of Athens (e.g., Ar. *Lys.* 557-8), and these spaces were in turn named by the Attic orators after the goods sold there (Poll. 9.47; 10.19). Stoas often had rooms used as shops and workshops that were rented out by the polis authorities. The Attalos stoa on the east side of the agora of Athens consisted of 42 rooms (approximately 5 m by 5 m) on two floors. This additional function made the agora the perfect social meeting place, hence the term *agoraios* for someone who spends much time there (e.g., Hdt. 1.93). For Socrates, the agora was the ideal place to engage passers-by in philosophical discussions. Aristotle (*Pol.* 1331a-b) argued for a separate commercial agora. Two agoras were the norm for most Hellenistic cities. While the market place can be found near the harbor in

Agora in the Greek World, Fig. 3 Model of the agora of Athens, c. 500 BCE. (Courtesy: Agora Excavations)

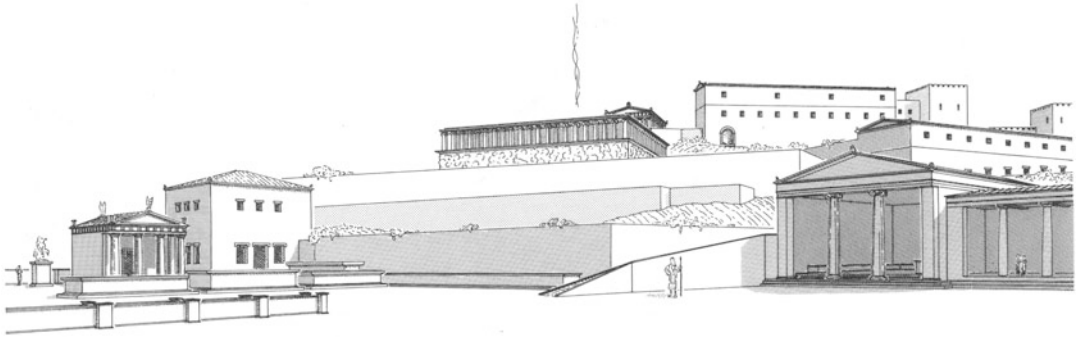
Ephesus and Miletus, the civic and the commercial centers were placed next to each other in Kamarina and Morgantina. The two agoras of Priene were close to each other but of different sizes.

The agora was still a characteristic feature of Greek cities in the late Classical and Hellenistic periods even though their autonomy was often limited to self-government and depended on the approval of imperial powers, and while new institutions emerged and became characteristic features of Hellenistic cities. This was also true for later writers, including Dio Chrysostomus (*Or*. 48.9) and Pausanias (10.4.1). By the Hellenistic period, the agora was monumentally defined and quite often closed off from the surrounding area by monumental public buildings. Yet it was not standardized. One of the most characteristic building types of this period was the stoa defining the boundaries of a central area and housing commercial establishments, as on Delos, at Magnesia on the Maeander and Miletus. Two adjacent sides of the agorai of Kassope, Kolophon, Orchomenos in Arcadia, and Syracuse were closed off by porticos, while the agora of Morgantina in Sicily and that of Thelpousa in Arcadia were framed on three sides. The agora at Messene is a typical example of a completely closed agora. Other cities placed theaters on the edges of their agoras. In the cases of Akrai, Assos, Elis, Mantineia, Morgantina, and Metapontium, the theater served as an *ekklesiasterion* (Kolb 1981: 88), while the theater of Kassope has been interpreted as a *bouleuterion* (Hoepfner 2006: 23). In addition, wealthy benefactors (*euergetai*) sponsored individual buildings within the agora or completely new building complexes. Famous examples of the former include the Stoa of Attalos at Athens and the colonnades and exedrae of the so-called Agora des Italiens on Delos, the function of which is still debated. The most famous example of the latter is perhaps the Upper Agora of Pergamon on the edge of the acropolis (Figs. 4, 5), which was part of the major building project of the Hellenistic King Eumenes II (197-160/59 BCE). As the administrative and religious center of the newly organized royal metropolis of the Attalids, it was adorned – like most Hellenistic agoras – with statues, dedications, and altars (Radt 2001: 48).

The Upper Agora of Pergamon moreover exemplifies characteristically Ionian features according to Pausanias' typology of agoras, namely, the colonnades that enclose large sections of the agora (but do not obstruct the view to the monumental altar; Fig. 5). Many newly founded, refounded, and even modernized late Classical and Hellenistic cities in Ionia used the



Agora in the Greek World, Fig. 4 Plan of the agora of Pergamon, second century BCE. (Courtesy: K. Rheidt)



Agora in the Greek World, Fig. 5 Reconstruction of the Upper Agora of Eumenes II. The reconstruction of the north niche in the foreground is hypothetical. (Courtesy: K. Rheidt)

so-called Hippodamian town plan, in which streets are laid out on a rectangular grid around central, often colonnaded public spaces. Another famous example is the agora of Priene, a city that was refounded in the fourth century BCE. When Pausanias, in the second century CE, visited the agora of Elis, he noted that the local agora with "porticoes separated from each other and with streets through them" was rather old-fashioned and stood in sharp contrast to the agoras of the cities of Ionia and of the Greek cities near Ionia (6.24.2; Jones 1933). The closed-off Ionian agora with few formal entrances may be seen as the predecessor of the forum, the open square, or market place of a Roman settlement or town, even if some of its characteristic features such as the podium temple and basilica were developed in Italy, and some aspects of its layout such as the new architectural concept of a grandiose approach to the forum, as found at Ephesus, Pergamon, and Hierapolis, were introduced much later.

Key Issues/Current Debates

The archaeological evidence for the emergence of the agora is scarce. The location and appearance of the early agora is best documented in systematically planned poleis in southern Italy and Sicily. Here, agoras are centrally located, open places that serve the needs of the community. The earliest civic centers of cities which were never planned as a whole, such as Corinth and Athens, are often difficult to locate or can only be traced archaeologically when buildings were placed along their boundaries. Literary references to an earlier agora exist occasionally, as in the case of Athens, but no traces of this old agora that is mentioned in a note of the second century BCE writer Apollodoros (FGrH 244F 113 and preserved by Harpokration) have been discovered. Owing to the poor archaeological documentation of early poleis, the frequent references to the agora as a social institution and as a place of communication in the epics of Homer have received much scholarly attention. However, the Homeric poems cannot be used as a historical source even if the date at which they were written down can be determined. While it is generally accepted that the Homeric world cannot be mapped onto Bronze Age or Iron Age Greece, it is still debated how to best explain inconsistencies within the poems and how to conceptualize the sociopolitical configuration of Homeric society.

Future Directions

The main area for future research is the early agora. The exact relationship between the origin of the agora and the birth of the polis and urbanization processes needs to be explored in more detail. New discoveries will play a major role in this discussion, since many of the excavated sites have long occupation histories that make it difficult to detect open space with little to no architectural features. A further research area concerns the development of the agora in the Black Sea region.

Cross-References

- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Early Iron Age Greece (c. 1150–700 BCE)
- ▶ Forum
- ▶ Greek Colonialism, Archaeology of
- ▶ Greek Islands (excluding Crete), Archaeology of
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Polis
- ▶ Sicily and Magna Graecia, Archaeology of
- ▶ Stoa
- ▶ Urban Planning in the Greek World

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Agrarian Landscapes of the Historic Period

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Introduction

Agrarian landscapes of the historic period have an often fragile archaeology. Most are still used to produce food, and the fences, walls, and hedges which form their principal remains, or the earthwork traces of earlier systems of farming and land division which survive within them, are thus vulnerable to destruction. Those living and working within what appear to be everyday, functional landscapes are often unaware of their antiquity or historical significance.

Definition and Historical Background

Across much of medieval Europe peasant communities exploited most uncultivated land in common. Grazed intensively for centuries, and cut for fodder, fuel, and much else, these areas

developed as particular forms of habitat – with their own individual suites of flora and fauna – such as moorland, fens, or heaths. In addition, in many districts the arable land was farmed in "open fields," in which the properties of cultivators lay intermingled in the form of narrow, unenclosed strips (each usually less than 10 m wide and frequently less than 7m), across which various communal routines were imposed. Usually, for example, the same crop was cultivated by all those holding land in a particular section of the fields, and large and often continuous sections of the arable lay "fallow," or uncropped, every second or third year, so that they could be dunged by livestock and recover fertility. Open-field strips were usually slightly sinuous in plan, having been distorted over the years. Many took the form of a shallow "reversed S," caused by the way that the plowman moved to the left as he approached the end of the strip, in order to avoid too tight a turning circle.

Open fields took many forms. In Sweden, parts of Denmark, central England, northeastern France, southern Belgium, and central-southern Germany, extensive and highly communal systems existed. These were farmed from large villages and contained the intermixed holdings of substantial numbers of landholders. But more "irregular" field systems, containing the holdings of fewer farmers and normally associated with dispersed settlement patterns, could be found widely across northern Europe, from Cornwall and Brittany in the west to Hungary in the east. Other variants existed in some Mediterranean countries, including Italy and Spain. Open fields first developed in the early medieval period, in many districts before the tenth century, and possibly as early as the seventh. There has been much debate about their origins. The intermixed properties seem initially to have developed as a consequence of partible inheritance and piecemeal colonization (as new land was divided in an equitable fashion among those who had worked to reclaim it). But the emergence of more complex and corporate forms was probably the result of population pressure, technological change (especially the shared use of a large moldboard plow), and the need for elites to facilitate the extraction of rents and services. Their creation involved a measure of systematic planning and, in some cases, the reorganization of existing patterns of settlement.

Open fields disappeared from most of northern Europe between the fifteenth and the nineteenth centuries, but have left a number of archaeological traces. In some areas unhedged and intermixed parcels, larger than the original strips and no longer subject to communal regulation, still survive, as in parts of the Netherlands and France. Elsewhere their essential layout is preserved, in more simplified form, in the current pattern of walls and hedges. This is because in many districts open fields disappeared through "piecemeal" enclosure: that is, landowners gradually consolidated scattered holdings through purchase and exchange, surrounding groups of strips with walls or hedges which thus perpetuated the sinuous, parallel patterns of the former landscape. In addition, in areas of heavy soil individual strips were often plowed in ridges, to facilitate drainage. Because enclosure was often associated with a shift from arable farming to specialized livestock production or dairying, these can be preserved in grass fields as the earthworks known as "ridge and furrow" (Fig. 1), found in particular in parts of the English Midlands but also sporadically in northern France and Germany.

Key Issues

Not all areas of Europe were dominated by open-field agriculture. In the *bocage* of western and much of central France, for example, and in the "woodland" districts in both south eastern and western England, landscapes of enclosed and often irregularly shaped fields, or ones in which enclosed fields and small patches of open fields coexisted, could be found. Both the relative extents of open fields, and their particular character, were the consequence of the complex interplay of demographic, economic, environmental, and social factors, although archaeologists and historians continue to debate the relative importance that should be attributed to each.

Agrarian Landscapes of the Historic Period, Fig. 1 Well-preserved ridge and furrow in western Northamptonshire (Photo credit: T. Partida)

The agriculture of much of northern and western Europe was transformed in the postmedieval period, with the development of greater regional specialization and major increases in productivity. These developments were the consequence of wider changes and pressures which included rapid population growth (especially from the eighteenth century), the emergence of developed market economies, and industrialization. Agricultural "improvement," to use the fashionable eighteenth-century English term, occurred at differing rates in different areas, depending on the wider character of social and economic relations. By the eighteenth century the agricultural primacy of England and the Netherlands was widely accepted, and the new practices which had been developed there widely emulated. New fodder crops – turnips and other "roots," and grasses like clover – were introduced into field rotations, reducing the need for land to lie fallow, and agropastoral areas and other commons and forests were brought into more intensive cultivation. These changes involved the end of communal forms of exploitation and a shift to more individualistic modes of farming. Many areas of common land were now allocated in hedged or walled parcels to particular owners; properties in open fields were either subject to gradual piecemeal consolidation or were reallocated in a planned fashion as private fields – in England, for example, by parliamentary enclosure and in Denmark through the process of *ensgifte*. Nevertheless, these developments were not universal, and open fields were still being reorganized, in Germany and the Netherlands, as late as the eighteenth century. In parts of central and eastern Europe, they survived into the twentieth century and in some cases up until the present.

The enclosure and "improvement" of marginal land in postmedieval Europe had major effects on biodiversity. This period saw, for example, the destruction of more than three quarters of the heaths in Denmark and even more in Brittany. In part, reclamation of such land was made possible by the substitution of organic materials for coal and iron, as Europe industrialized, for heaths, moors, and other rough ground had originally been cropped for fuel and fodder, just as many wetlands had been regularly dug for peat. Indeed, it was the drainage of wetlands which was one of the most striking features of the postmedieval period. Much coastal marsh had been reclaimed in medieval times, but the period from the sixteenth century saw an increase in drainage activity and its extension to the more problematic wetlands, especially those formed in peat rather than marine clays. The Netherlands had long experience of land drainage, carried out from the fifteenth century with the assistance of windmills, and it was largely Dutch engineers

Agrarian Landscapes of the Historic Period, Fig. 2 The ornamental farm erected in the grounds of Racconigi Castle, Piedmont, in the early nineteenth century by Charles Albert, Prince of Carignano (Photo: T. Williamson)

who directed postmedieval reclamation in the Fenlands of eastern England, in the Marais de Poitou and other French marshes, in Lammefjorden and elsewhere in coastal Denmark, and in Poland and north Germany.

Planned enclosures of commons and open fields were assisted by the development of more sophisticated systems of surveying and land measurement, and fields created from the seventeenth century were frequently straight-sided and geometrically shaped: land freed from communal control was now, more than ever, a commodity to be measured and exchanged. Such landscapes can be found across much of northern Europe, although they have survived modern agricultural developments best in the English Midlands, parts of the Netherlands, and southern Scandinavia. Some schemes of enclosure took particularly abstract geometric forms, such as the grid of roads and drainage ditches created when the wetlands at Beemster in the Netherlands were drained in the seventeenth century – now a World Heritage site. Indeed, the new agrarian landscapes of the post-medieval centuries were not purely practical and agricultural in character. They represented the rational transformation of nature and the triumph of modernity over tradition, and it is noteworthy that in this period, in contrast to the Middle Ages, elites often consciously identified themselves with agricultural activities. This was especially true in England, where major eighteenth- and nineteenth-century landowners like Thomas Coke of Holkham in Norfolk were prominent "improvers," the landscapes of their estates often combining, in complex ways, aesthetic and agricultural elements. Many created "model farms" with buildings which were both practical and ornamental in character, often laid out in some whimsical "Gothic" form. Major landowners in other European countries did the same: notable examples include the Gothic farm complex created at Racconigi in Piedmont by Charles Albert, Prince of Carignano, in the early nineteenth century (Fig. 2).

Enclosed fields thus proliferated in the postmedieval period in Europe, and the ways in which they were bounded exhibited elements of both continuity and change with medieval practice. Boundaries in drained wetlands took, in all periods, the form of water-filled ditches. These served to drain the land but also – in areas where livestock farming was important – functioned as "watery fences" to restrain sheep or cattle and to provide them with drinking water (Fig. 3). Reclaimed wetlands are thus characterized by

Agrarian Landscapes of the Historic Period, Fig. 3 In areas of low-lying wetland, field boundaries took the form of water-filled ditches: Halvergate Marshes, Norfolk (Photo: T. Williamson)

an absence of hedges, fences, or walls. In upland areas dry stone walls were generally employed to enclose land, and in the course of the postmedieval period, these often took increasingly regular forms. In lowland districts hedges were generally used (Fig. 4). In medieval and early postmedieval times these had normally been planted with a range of species, partly because of the difficulties of accessing large quantities of hedging material but also because – as well as functioning as stock-proof barriers – they also served as a source of fuel wood. By the eighteenth century the fashion for planting single-species thorn hedges was becoming established, especially in England, as the increasing availability of coal lessened the importance of hedges as a fuel source. Such hedges served to express the divorce of large, modern landowners from the archaic practices of a peasant economy.

Agrarian Landscapes of the Historic Period, Fig. 4 Hedges were the most common form of medieval and postmedieval field boundary across large areas of Europe (Photo: T. Williamson)

International Perspectives

The range of agricultural landscapes found elsewhere in the world, and which were encountered

by Europeans during the great postmedieval diaspora, are too varied to be considered in detail here, but were again shaped both by practical agrarian considerations and by wider social, economic, and ideological contexts. In archaeological terms, the most striking features include the great systems of terraces which are found across much of the Far and Near East, and in the Americas, from the southwest of the United States as far south as northern Argentina. Terraces fulfilled a range of functions. They provided a level area of cultivatable ground in mountainous regions, helped control soil erosion, and assisted in water management. The latter concern looms large in agricultural systems on a global scale, from an early date: examples include the complex forms of perennial irrigation practiced in various parts of the Middle East and Mesoamerica, with water conducted to crops through complex systems of channels, and the systems of basin irrigation practiced in Egypt, where seasonal floods are constrained within embanked fields. Archaeological remains of irrigation are often, in semiarid areas, one part of more complex agrarian strategies. Across much of central and southern America, and in some parts of the USA, "raised fields" – elevated planting areas separated by canals or ditches, often covering very extensive areas of ground – served both to provide drainage and irrigation, depending on the season. The canals also provided a microclimate, giving some protection from frosts, and served as a source of fertility, for their nutrient-rich mud was dredged and spread on the fields.

When European colonists encountered indigenous peoples, existing agricultural landscapes often continued with little change, especially in contexts of colonial dominance rather than large-scale immigration. The great rice terraces of the Ifugao in the Philippine Cordilleras have thus been continuously used and maintained through more than 2,000 years. Where agrarian landscapes possessed relatively few structural elements or the economy was largely organized around hunting and gathering, in contrast, and where the immigrants were themselves numerous, they were more likely to impose elements of their own ways of organizing a countryside – although sometimes these were inappropriate and short-lived, like the attempts by early settlers in New England to lay out fields modeled on the open fields of their homelands. In the southern coastal states of North America, in particular, elements of the landscape of English eighteenth-century estates were often replicated, although here organized mainly around slave production rather than tenanted farms. The long European experience of reclaiming wetlands was also employed in the New World, to create drained marshes like those of the French Acadian settlement at Grande Pré in Nova Scotia, currently a candidate for World Heritage status. But much about the agrarian landscapes of North America was new. In the original thirteen states, field boundaries were normally fenced, or in parts of New England walled, rather than hedged, largely due to the local abundance of wood. Initially post-and-rail fences were created but in the southern states these were soon replaced by the split rail zigzag fences still characteristic of the area. As the colonists spread west, into the northwestern territories, highly rectangular field patterns were created through the organized subdivision of the great abstract grid imposed on the landscape under Thomas Jefferson's direction as an expression of the rational and egalitarian principals of the young republic. This was further extended into the territories purchased from the French in 1803. Here, in a landscape singularly lacking in wood and timber, the fields created as the grid was subdivided were bounded by various forms of wire fence, and especially by barbed wire (invented in the USA in the 1860s), rather than by fences of wood. Across the interior of Australia, too, parcels of land bounded by wire fences, currently the subject of archaeological research and classification, proliferated in the course of the nineteenth century, rendering redundant the practice of running mobile sheep flocks under the control of shepherds.

Viewed in global terms, agrarian landscapes display an almost limitless variety, born not only of agricultural and economic factors but also of wider social, economic, and ideological influences.

Cross-References

- ▶ Estate Landscapes in Historical Archaeology
- ▶ Farmsteads and Rural Life in the United States, Archaeology of
- ▶ Hedges in Historical Archaeology

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Agrarian Landscapes: Environmental Archaeological Studies

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Introduction and Definition

Environmental archaeology has grown to be a major subdiscipline of archaeology, which utilizes scientific approaches from many different backgrounds of academia, including geography, geology, biology, physics, and chemistry (Butser 1982; Dincauze 2000; Bell & Walker 2004; O'Connor & Evans 2005). We can therefore define environmental archaeology in archaeology as "*the study of the environment and its relationship with people through time*"; this has in turn led to the development of distinctive subdivisions of environmental archaeology called *geoarchaeology*, *zooarchaeology*, *and archaeobotany*. Geoarchaeology is concerned with landscape and stratigraphic formation and modification processes and draws mainly on geological, sedimentological, and soil science analytical techniques. Both zooarchaeology and archaeobotany focus not only on human economies and subsistence (diet, health, and nutrition) of both wild and domesticated animals and plants (*paleoeconomy*) but also on broader environmental reconstruction (*paleoenvironment*), such as vegetation succession (Branch et al. 2005).

The reconstruction of agrarian practices, and their landscape and environmental context, is reliant therefore upon the application of scientific procedures utilized in *geoarchaeology*, *zooarchaeology*, *and archaeobotany*. Geoarchaeological procedures include sediment/soil classification, micromorphology, particle size analysis, magnetic susceptibility, and multielement geochemistry. The relevant archives investigated include not only archaeological features, such as ditches and pits, and ancient soils (paleosols), but also geological archives, such as floodplains (alluvium), slope wash in dry valleys (colluvium), aeolian deposits, volcanic and cave sediments, and organic and mineral sediments in bogs and lakes. In bioarchaeology (both *zooarchaeology and archaeobotany*), the key proxies (subfossils) that are recovered from these archaeological and geological archives include animal bones, terrestrial Mollusca, charred seeds and other plant parts, charcoal and phytoliths, and also pollen, fungal spores, and waterlogged seeds. Precise identification and recording of these proxies, and where applicable the utilization of data from ethnographical, ethnohistorical, and documentary sources, is key to the reconstruction of agrarian practices. Good preservation of charred plant remains on many

West Asian and North African archaeological sites, for example, combined with well-established ethnographic models detailing traditional agricultural practices, has indicated the status of the arable fields (e.g., soil type, moisture content), the system of cultivation (e.g., intensive, extensive), manuring regimes, tillage practices, and sowing, harvesting (e.g., uprooting, plucking, or cutting with a sickle or scythe), and processing methods, especially for free-threshing cereals (durum wheat and naked barley), hulled barley, and glume wheat (emmer, spelt, and einkorn). Studies make frequent use therefore of both qualitative and quantitative approaches to evaluate the potential of proxies to provide robust reconstructions of agrarian practices and their wider environmental context. These approaches include the creation of taphonomic models to differentiate between "local" and "regional" signatures of human activity (e.g., pollen analysis) and to elucidate the role of diagenesis in the creation of the subfossil assemblages (e.g., animal bones, pollen). The application of "modern analogue" studies is especially important here, and this has been ably demonstrated with respect to West and Southeast Asian investigations of the history of wheat/barley and rice cultivation (respectively), which has involved gathering essential information on the environmental variables for their growth within specific agricultural regimes (e.g., dry-farmed, irrigated fields, crop rotation).

The integrated study of these archives, both archaeological and geological, and their proxies permits environmental archaeologists to address a range of research themes that may be specific to a single site (e.g., Neolithic settlement), and an event of short duration (e.g., woodland clearance), or relevant at a regional to global scale, and spanning several millennia. Whatever the spatial and temporal scale, collectively they provide important information on the origins and spread of agricultural practices, the development of agricultural systems through time, the impact of agriculture on the landscape and environment, and the changing nature of human diet, health, and nutrition.

Key Issues/Current Debates

Environmental archaeological studies make a considerable, ongoing contribution therefore to improving understanding of the origins and spread of agriculture and the accompanying landscape and environmental changes. Western Asia (from present day Iran in the east to Turkey in the west), for example, is acknowledged as one of the geographical centers for plant and animal domestication ~12–10,000 years ago. In this area, many of the food staples that remain important today, such as wheat, barley, rye, lentils, peas, sheep, and cattle, were morphologically and genetically altered through the processes of domestication and then subsequently spread across Europe over ~6,000 years (Zeder 2008). In the Jordan Valley, an important region of intensive environmental archaeological research, investigations provide a complex picture of farming and its environmental context (Mithen & Black 2011). Charred plant remains and animal bone assemblages indicate mixed farming, with the cultivation of a broad range of key plant domesticates from the start of the Neolithic (~12–6,500 years ago) that included emmer and einkorn wheat, barley, as well as lentil, pea, chickpea, bitter vetch, and flax. The evidence suggests that significant landscape modification accompanied the transition to farming, with programs of water management to feed agricultural land enclosed within terrace walls, thereby enhancing the probability of a regular crop yield. According to the pollen data, the onset of the Chalcolithic (~6,500 years ago) was marked by the first clear signs of woodland clearance for farming, which became extensive ~2,000 years ago with significant deforestation associated with metallurgical activities. These studies have also suggested that periods of rapid climate change in the East Mediterranean significantly influenced the direction of agricultural activities, with periods of higher precipitation seemly favoring the intensification of cultivation at ~6.5–4,000 and ~2.5–1,300 years ago, with olive, grape, and walnut production at its maximum during the Roman-Byzantine period.

Similarly, in SW Turkey, extensive pollen-based land-use histories have revealed evidence for widespread Bronze Age clearance and farming ~3,200 years ago (Eastwood et al. 1998). These studies indicate that, depending upon elevation and local factors, olive, walnut, chestnut, pistachio, and vine were cultivated, alongside cereals, and managed in the woodland. In E Turkey, lake sediment records indicate pronounced human activities from ~3,800 years ago, which became more intensified in the last ~600 years, with evidence for walnut cultivation and the expansion of pastureland, while in central Turkey, there is outstanding evidence for the imprint of agrarian activities on the landscape from the late Roman period based on pollen analysis (England et al. 2008). The presence of walnut, olive, vine and chestnut, and rye, wheat, and barley cultivation suggests arboriculture, pastoralism, and cereal cultivation. At 670–950 CE, there was a marked decline in agrarian practices during the "Dark Age," which was succeeded at 950 CE by renewed cereal cultivation and pastoralism. The impact of Neolithic agricultural practices on the landscape in this region remains less well understood, however, despite the good archaeological evidence for settlement and farming. Indeed, the pollen evidence indicates a predominantly wooded landscape with seemingly low levels of human interference. An alternative interesting possibility is that this wooded landscape was "managed" by deliberate burning to create suitable grazing land and to enhance conditions for cultivation (Roberts 2002; Wick et al. 2003).

In Southeast Asia, environmental archaeological studies of agrarian practices, and their landscape and environmental context, have arguably been less intensively investigated than in West Asia. Comprehensive studies in the Lower Yangtze region (China), however, have permitted an improved understanding of prehistoric farming and one of the key crops for this region: rice. Studies have shown that rice cultivation commenced here ~6.9–6,600 years ago and certainly as early as ~8,000 years ago in other parts of China. This systematic study using rice grains, phytoliths, and spikelet bases has also provided important evidence for the composition of weed species typically associated with rice cultivation, thereby providing a further important evidential base from which to infer cultivation (Fuller et al. 2009). The landscape context for the cultivation involved both water management and burning.

In Europe, environmental archaeological studies have revealed that the spread of agriculture had far-reaching consequences for the landscape and environment (Kaplan et al. 2009). The evidence from both archaeological and geological archives suggests that although the early stages were a mixture of permanent settlement and residential mobility, both cultivation and animal husbandry of the main domesticates from West Asia required the clearance of woodland, which was often associated with biomass burning ("slash and burn"). Although many records suggest that clearance was temporary ("shifting cultivation"), which permitted the woodland to recover, during prehistory, the evidence indicates progressive deforestation of mature coniferous (e.g., fir) and/or deciduous (e.g., elm, lime, oak) woodland and the introduction of field systems and, in some areas, agricultural terracing. This led to the creation of "plagioclimax communities" that were sustained by human interference, e.g., grasslands, heathlands, and moorlands of Northwest Europe and the scrubland of Mediterranean Europe (although regional climatic and edaphic factors were also important in their formation and maintenance).

Evidence for deforestation due to agricultural practices, namely, cereal cultivation and/or animal husbandry, from the Neolithic period onwards is widespread in upland and lowland parts of Europe. Indeed this key "anthropogenic signature" in subfossil records from lake sediments and bogs, combined with archaeological evidence for mixed farming (e.g., charred plant remains and animal bone), has enabled the development of complex regional models of human-environment interaction. For example, pollen data from Northwest Europe indicate two pronounced events, which have been strongly associated with human activities: Neolithic "elm woodland decline" (Parker et al. 2002) and Bronze Age "lime woodland decline" (Grant et al. 2011). These two trees

formed important components of the natural forest cover. Debate over the cause, or causes, of the "primary" decline in elm woodland has continued for several decades, with evidence from Britain and Ireland indicating a very rapid decline in ~36 years (6,343–6,307 years ago). For this reason, woodland clearance for cultivation and grazing, as well as the harvesting of elm leaves, twigs, and branches for winter fodder and bedding, may be a secondary cause. Instead, the rapid spread of disease (caused by ascomycete fungus *Ophiostoma ulmi*), in conjunction with both human activities and climate change (increased continentality), may collectively have contributed to the decline. Whatever the precise cause, pollen analysis has shown that the decline of elm woodland is often associated with cereal cultivation and possibly animal husbandry (presence of dung beetles), which suggests that human groups, albeit at dispersed, low population levels during the Neolithic, were having some localized impact on elm woodland. This probably formed part of a system of forest farming involving residential mobility, short-term woodland clearance, burning, woodland management (pollarding/coppicing), and cultivation. In Ireland, the discovery of the Neolithic "céide fields" provides an exceptional example of a coordinated approach to landscape modification following the introduction of agriculture that provides unequivocal evidence for a marked reduction in woodland cover (pine, oak, elm, hazel, and birch) and the establishment of grassland and finally heathland.

The lime woodland decline, which commenced in Britain ~5–3,000 years ago (Late Neolithic to Late Bronze Age), has also been strongly linked to clearance of the landscape for farming, as well as the provision of fodder for animals. Although, like elm, alternative explanations have been proposed, the overwhelming evidence for its association with contemporaneous cereal cultivation and settlement activities, together with the diachronous nature of the decline ("different times in different places"), provides strong support for a human cause. For example, in S England, the environmental archaeological evidence suggests widespread use of landscape units (valley bottom and side, and hilltop) with mixed farming of emmer wheat and six-row barley, as well as einkorn, bread, and spelt wheat, and pastoralism involving cattle, sheep, pig, and goat that were probably moved on a seasonal basis ("transhumance"). These practices caused not only a change in natural vegetation cover from the Bronze Age onwards (e.g., widespread heathland formation) but also soil status (e.g., podzol and rendzina formation), including a reduction in nutrient quality and pH (acidification), accelerated erosion (colluviation), and paludification (wetland or bog formation) due to impeded drainage. During later prehistory, and into the historic periods, environmental archaeological evidence for the wider landscape and environmental context of farming practices in NW Europe, especially Britain and Ireland, is less available due to the paucity of intensive studies and availability of suitable sites. Nevertheless, those studies conducted in Britain and Ireland suggest marked intra-regional differentiation in the agricultural landscape, with significant temporal variations in land use, e.g., afforestation, pastoralism, and cereal cultivation (Fyfe et al. 2004). Those studies that have benefitted from the combined use of geological, archaeological, and historical archives have provided valuable information on medieval and later agrarian landscapes. In Ireland, for example, studies have revealed that although cattle farming, and barley and oat cultivation, formed the basis of the medieval economy, a shift towards cereal cultivation occurred from 770 CE as a possible response to wetter climatic conditions, which worsened during the Little Ice Age (1350–1850 CE), and led to major changes in settlement patterns and agrarian practices. Indeed, the role of climate change in determining the direction of agrarian activities in Britain and Ireland, and throughout the world, has been a considerable point of debate. For example, pollen-based studies of later Bronze Age farming in Scotland indicate that ~2,900 years ago, a widespread period of climatic deterioration commenced across NW Europe and resulted in a change in land use, rather than abandonment, with the increased importance of grazing in upland areas, and the expansion of

settlement and agricultural land in the lowlands (Tipping et al. 2008). In this example, the evidence indicates that adaptation, rather than collapse of the agricultural system, caused a change in farming activities, which implies a high degree of resilience to environmental stress caused by climate change by human populations living in "marginal" agricultural areas.

In the Mediterranean region, environmental archaeological studies of landscapes have debated the influences of human activities, especially farming, and climate change for many decades. Although the debate continues, there is now a substantial body of sedimentary evidence linked to the archaeological record for catastrophic erosion due to woodland clearance and land use, especially from the Bronze Age onwards (e.g., Greece) (Klinge & Fall 2010). The subsequent construction of agricultural terraces throughout the Mediterranean may therefore have been an important conservation measure to mitigate the risk of further erosion and to ensure the sustainable supply of food for an expanding population. Indeed, environmental archaeological data suggest that abandonment and/or neglect of the terraces caused renewed erosion, accelerated by unmanaged vegetation growth and grazing animals. Periods of erosion have been associated therefore with phases of expansion and contraction in agricultural activities. The modification of the morphology of the landscape, changes in natural soil quality, and reduced susceptibility to erosion, through the Bronze Age development of terrace agriculture in the Mediterranean, was therefore a major innovation (~3,800 years ago). This provided a means of creating a more sustainable agricultural system and ultimately provided an ideal situation for the widespread management of important cultivars, such as olive.

In addition to terracing, an important aspect of Mediterranean agriculture has been transhumance involving the movement of livestock on a seasonal basis between lowland and upland areas, sometimes over considerable distances (Barker 1985). These practices were probably in place from the Early Neolithic, but the expansion of farming into mountainous regions of the Mediterranean from at least the Late Neolithic led to further development of the transhumance network. In Greece, for example, evidence for sheep/goat, cattle, and pigs provides a valuable insight into early agrarian practices, which included the cultivation of emmer and einkorn wheat, and two-row barley and lentil. These crops were initially cultivated in a forested landscape in localized clearings, but pollen records reveal a progressive reduction in woodland that coincided with the development of a broader subsistence economy. In Italy, a similar dependence on emmer, barley, and legumes, as well as sheep and goats, recorded in lowland open air and cave settlements, seemingly led to limited landscape modification until the Late Neolithic (~6,100 years ago). At this time, pollen records from mountainous areas indicate a gradual reduction in woodland cover (e.g., elm and lime) or the changing dominance of tree taxa (e.g., fir to beech), suggesting the increasing influence of human activities. The history of beech woodland in N Italy, in particular, has received considerable attention because of its ability to invade adventitiously mature woodland due to one or more causes, including disturbance and climate change to favorable conditions. The remarkable correlation at many sites between the expansion of beech woodland, increased biomass burning, evidence for pastoralism (archaeological and pollen stratigraphical), accelerated erosion, and the decline of other tree taxa strongly suggests that agrarian practices may have initiated changes in the conditions necessary for beech growth leading to its dominance in vegetation communities (Branch 2012).

Outside Asia and Europe, environmental archaeological studies have demonstrated the existence of multiple centers of plant and animal domestication around the world, with the timing of the transition to farming varying considerably. To highlight this global phenomenon, the broad timing of plant domestication in key centers is illustrated (all "years before present day"): Australasia (e.g., yam and banana) ~7,000; N Africa (e.g., millet and sorghum) ~4–3,000; N America (e.g., squash and sunflower) ~5,000; Mesoamerica (e.g., squash and maize) ~10–8,000; and

S America (e.g., squash, arrowroot, yam, cotton, sweet potato, beans, peanut, manioc, chilli pepper, potato, and quinoa) ~10–5,000. Although the precise reason or reasons for the initiation and adoption of plant cultivation and animal husbandry in many parts of the world remain unclear, the key factors were undoubtedly geographically variable and included measures to mitigate the risk of failure of annual food supplies, population pressure, and climate change (Stahl 1994).

In S America, evidence for landscape modification based on pollen and phytolith data suggests that cultivation probably commenced at least ~7,000 years ago in northern countries, such as Panama, and involved maize, arrowroot, and economically important trees. Throughout S America, the development of raised field agriculture transformed the landscape and enabled the development of a sustainable system by creating a distinctive microclimate and by improving the soil status and nutrient cycling. Similarly, terracing throughout S America is extensive with an estimated ~1,000,000 ha in Peru alone. The importance of terrace agriculture in many parts of the Andes, like the Mediterranean region, cannot be overstated. Environmental archaeological studies indicate that the construction of terraces transformed the morphology of the landscape while also creating the basis for a highly innovative and sustainable agricultural system that primarily permitted the cultivation of maize and quinoa, an interpretation verified by parallel studies of archaeological and geological archives using pollen and phytolith analyses. Archaeological studies have permitted detailed investigations of the terrace structural organization and development, especially their irrigation and drainage, and the physical properties and composition of the soil infilling the terraces using techniques such as micromorphology and geochemistry. Studies in central and southern Peru, for example, have revealed multiple phases of terrace construction during later prehistory, with evidence for possible soil enrichment through manuring and/or fallow periods, and localized landscape erosion triggered by the construction activities (Branch et al. 2007). Interestingly, there is evidence in several parts of Peru for the abandonment of terraces, such as those of the Wari civilization (500–1000 CE), and their subsequent reconstruction prior to the Colonial Period (1533 CE). While the persistence of terrace agriculture confirms the importance of terraces in the agricultural system, the precise reason for their occasional abandonment remains unclear. Correlation of archaeological and paleoecological studies with paleoclimatic records from ice cores in Peru and Bolivia indicates, however, that periods of rapid climate change, e.g., at ~1000 CE, may have been the cause. The onset of drought therefore may have led to the collapse of Wari irrigated terrace agriculture, an argument supported by the contemporaneous decline of the "Tiwanaku civilization" raised field agriculture on the shores of Lake Titicaca. The development of terrace agriculture and maize cultivation in the intermontane valleys of the Andes has been linked to the formation of complex social and economic systems, e.g., Wari. Maize growth formed part of a broadly defined agricultural model that saw the utilization of a wide range of ecosystems, and included the cultivation of bitter potatoes, and herding of llama and alpaca, above the maximum elevation of maize cultivation (3,700 m above sea level).

In Mesoamerica and N America, the history of maize has also been the primary focus of many environmental archaeological studies. The main sources of evidence have been phytoliths in pottery residues and dental calculus, as well as in soils, lakes and bogs, and macrofossil specimens, and associated archaeological artifacts indicating food production. Evidence has pointed to the conversion of the landscape and environment by shifting cultivation ("swidden"), terrace agriculture, and raised field systems. The collapse of these intensive practices due to nutrient depletion and soil erosion has been strongly associated with the demise of the Mayan civilization (Santley et al. 1986). Alternatively, the evidence for a well-developed system of

environmental and crop management suggests that other external factors may have triggered the collapse. The evidence for extensive deforestation and hydrological changes, together with an overreliance on maize cultivation, suggests, however, that the Maya did not facilitate the development of a long-term sustainable agricultural system.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Near East (including Anatolia): Origins and Development of Agriculture
- ▶ Rice: Origins and Development

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Agricultural Practice: Transformation Through Time

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Introduction

Agricultural production is a dynamic process that evolves out of interactions between plants, animals, the environment, and the food needs of human communities. Through time, agricultural practices changed as farmers developed new techniques to meet demands presented by both their physical and sociopolitical environments. The diversity of past agricultural practices and how they changed through time are reflected in a range of archaeological datasets, from large-scale landscape modifications such as irrigation and field systems to small-scale shifts in plant and animal ecologies. Archaeologists employ a range of methodologies to document the diversity of past agricultural practices and to understand the reasons for change.

A unifying topic in the archaeological study of transformations in agricultural practices through time is that of intensification. Intensification is the increase of agricultural output per unit of land per unit of time (Brookfield 1972). Two aspects of intensification that archaeologists study are (1) documenting the diverse range of intensification practices that past farmers employed and how they changed through time and (2) understanding the reasons why farmers needed to increase production. Both aspects of agricultural production relate to other important aspects of ancient human societies including population size, the environment, and sociopolitical dynamics.

Definition

Around the world, the adoption of agriculture as the primary means of obtaining food came after the initial domestication of plants and animals. In many places, there was a long period of time in which domesticated plants and animals supplemented foraging activities or "low-level food production" (Smith 2001). For a variety of reasons, ranging from climate change to social demands, most of these societies eventually became reliant upon agriculture and foraging became a supplemental practice.

Being a committed agriculturalist requires a fundamental shift in the relationship people have with their environment. In order to assure that a domesticated plant reproduces successfully and in sufficient quantities each year, farmers must learn to manage the dynamic environments in which the plants live and grow. Aside from the crops themselves, farmers must manage inclement weather (hail, frosts, drought), water, soil quality, and competitors (both plants and animals). Each region of the world presents unique characteristics, which have given rise to the diversity of agricultural strategies developed by people through time and space. Despite this diversity, there are common trends seen across the globe as societies became increasingly dependent on agricultural production.

Agricultural Practices

In his book, *Smallholders, Householders: Farm Families and the Ecology of Intensive, Sustainable Agriculture*, anthropologist Robert Netting (1993) provided a useful framework for categorizing the various practices nonindustrial farmers utilize to maintain productive agricultural systems: (1) soil moving and management, (2) water regulation, (3) restoring/increasing soil fertility, (4) diversification of production, and (5) protection of plants from growth-inhibiting competition. Each category is defined and discussed below with some specific examples and a general commentary of how these practices change through time. The types of archaeological evidence and the methods used to study each category are also described.

Soil Moving and Management

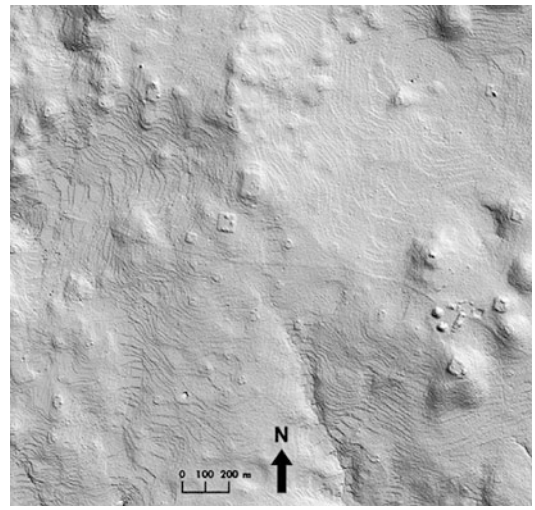
A variety of practices involve moving or manipulating the earth in order to support plant growth

and control erosion. This can range from simple tilling to more permanent landscape modifications, such as terracing, elevating raised fields, and constructing paddy or pond fields.

In most regions, early agriculture occurred in areas with soils that were loose enough to till with simple tools, such as digging sticks or handheld hoes, including alluvial soils along river floodplains and loess deposits. As agriculture expanded, people often had to modify more difficult terrain in order to make it suitable for planting. For example, in mountainous regions with steep slopes such as the Andes, expansive systems of terraces were constructed. Another major innovation with reference to soil manipulation was the ox-drawn plow. While it initially helped farmers in the Near East farm more efficiently in river valleys, its introduction into Europe permitted expansion of farming into areas with deep, firm soils (Sherratt 1981).

Archaeologists have traditionally studied agricultural practices associated with soil moving and management using aerial and pedestrian survey, as well as analysis of stone, wood, and metal artifacts associated with tilling. Topographic maps and aerial photographs have long been used to document regional field systems. New technologies such as remote sensing with satellite photography and, most recently, airborne light detection and ranging (LiDAR) provide more expansive regional coverage, filters to highlight variations in soil and vegetation, filters to digitally remove obstructive features such as dense vegetation, and in some cases, provide higher resolution of features. For example, the use of LiDAR has revealed extensively terraced hillsides around the Classic Maya site of Caracol that had for centuries been obscured by tropical forest (Chase et al. 2011) (Fig. 1).

Soil manipulation can also be detected in geoarchaeological data sources such as soil profiles, sediment cores, and microstratigraphy (Lehmann et al. 2003). Finally, archaeobotanical datasets can reveal increased soil manipulation through the study of plant species associated with clearance such as a decline in forest species and increase in agricultural weeds.



Agricultural Practice: Transformation Through Time, Fig. 1 LiDAR 2-D image of Ceiba Terminus at Caracol, Belize, showing hundreds of constructed terraces (From Chase et al 2011: 394, with permission)

Water Regulation

Farmers utilize a range of strategies to regulate water either to increase its supply or remove it. Water regulation systems that bring and retain water to fields include canal networks, check dams, and pond or paddy fields. Systems that help eliminate water include raised fields or mounded fields.

Early farmers used naturally well-watered areas such as receding floodplains or, in the case of rice, naturally flooded areas. As with soil manipulation, which is in part related to water regulation, when farmers wanted to expand their planting area, they needed to invent ways to transport water from the original source, maintain it, or, in some cases, remove it.

Extensive irrigation systems were developed in arid regions such as Egypt and coastal Peru. Elaborate wet farming systems that involve both canals and water-retaining fields developed throughout East and Southeast Asia and the Pacific. Throughout the Americas, farmers developed raised-field systems in naturally inundated areas.

Archaeologists use the same range of survey and remote-sensing methods as discussed for soil manipulation and management. There are also

innovative uses of archaeobotanical evidence to document the use of irrigation. For example, researchers observed an increase in the size of wheat and barley phytolith skeletons in periods associated with increased irrigation in the Near East and Egypt (Rosen 1994).

Restoring/Increasing Soil Fertility

An important process often associated with intensification is the reduction of the fallow period, or the time in which the field is allowed to rest. The fallow period is crucial for rejuvenating the nutrients in soils; however, if food needs require fields to be more continuously productive, humans can intervene to replenish nutrients and restore soil fertility.

Restoration of soil fertility has been accomplished through a variety of strategies such as crop rotation and adding fertilizer. Rotation involves planting different crops with different soil requirements over successive years. Legume crops are particularly crucial in these systems as they fix nitrogen and can improve soil quality. In Eurasia, legumes are often planted after cereals, and in Central and North America, indigenous farmers planted beans together with maize and squash.

Farmers also add nutrient-rich materials such as animal dung, kitchen or midden ashes, plant litter, and even animal parts to increase fertility. Fertilizing with dung is very common in regions with domesticated animals such as goats, sheep, and cows in Eurasia and camelids in the Andes. Muck from canals and ditches can be excavated and added to the planting field.

In tropical regions, soils tend to be thin and acidic, greatly limiting their natural productivity. These areas are most well known for the use of slash-and-burn or swidden agriculture, where plots of forest vegetation are cut and burned to create ashy, nutrient-rich planting surfaces. Such plots can be used for 4–5 years, but the nutrients are eventually depleted and the area is often overrun with weeds and pests. These plots are abandoned and new ones are cleared. Swidden farming is considered to be an extensive system of production and only able to support relatively small populations.

In the Amazon basin of South America, archaeologists have recently discovered that ancient farmers actually improved soils through a combination of slow burning forests, or creating what is known as a biochar, and possibly adding household waste. This increased the fertility of the soils and these "terra preta do indio" or Amazonian Dark Earths (ADE) are still sought after by modern-day food producers in Brazil. These deposits have been documented and studied by sedimentologists and micromorphologists to understand the practices that formed these unique soils (Lehmann et al. 2003).

When ancient cultivated areas are identified, several geochemical and geoarchaeological methods can help determine if they have been supplemented with fertilizer. There are also several indirect measures that together with other evidence may point to fertilization and soil restoration. These include the presence of manure-producing animals, nitrogen-fixing legumes, or nitrogen-loving (eutrophic) plant species in the archaeological record. Recently, researchers working in the Near East have argued that increased nitrogen levels in human isotopes throughout the Neolithic may reflect fertilization of fields rather than increased meat consumption (Bogaard et al. 2007).

Diversification of Production

Unlike our modern, industrial farming systems that focus on the mass production of a few crops, ancient and subsistence farming systems incorporated a wide range of crops and varieties that were often interplanted and rotated based on local environmental conditions and food needs. They also incorporated domesticated animals and pastoral activities.

The indigenous farming systems that developed and spread throughout the world involved a range of domesticated plant species including seed crops, legumes, tubers, fleshy fruits, and nuts for food and wood, fibers, and resins for industrial uses. For example, in the Andes of South America, ancient farmers grew many varieties of potatoes, as well as other tuber species such as *oca*. They also grew the grain crops quinoa and maize and in some areas

leguminous crops such as tarwi and common bean. In more temperate climates, they managed food and spice-producing tree species such as huarango and molle. Additionally, they raised guinea pigs and two species of camelids, llamas and alpacas.

Through time farmers developed many varieties of individual crops and adopted and exchanged new crops for many purposes. Some varieties were selected for their ability to withstand local climatic variations and others were developed to meet diverse culinary tastes and traditions. While there were local developments of crop species and varieties, the spread of different domesticated plant species into new regions also played an important role in changing agricultural practices. In some cases, these new crops were simply integrated into existing cropping systems, such as maize in the Andes. In other cases, the introduced crops eventually replaced some of the indigenous ones, such as in eastern North America where the indigenous crop complex that included sunflower, maygrass, chenopod, and knotweed was eventually replaced by the Mesoamerican tripartite of maize, beans, and squash.

Archaeobotanical remains provide the primary means for studying the composition of past cropping systems. Carbonized, dessicated, or waterlogged macrobotanical remains have provided a great deal of insight into the role of seed crops, legumes, durable fruits, and woods. Tubers and fleshy fruits have been more difficult to study because they often do not preserve, but advances in microbotanical analyses of phytoliths and starch grains are improving our knowledge of these very important species. Finally, analysis of human isotope levels also contributes to the study of cropping regimes, particularly for the introduction and spread of C4 plants, such as maize in the Americas (Hastorf & DeNiro 1985).

Protection

Finally, all farmers must deal with the unwanted plants, animals, and insects that inhabit the fields and present competition or danger to the crops. Pests often increase as farmers intensify agriculture because some species, for example, members of the sunflower and mustard families and some rodents, are especially adapted to the highly disturbed environments in cultivated plots and fields. Additionally, as certain crops are cultivated more frequently for human consumption, they are more readily available to the insects that prefer them.

Several practices can help reduce the number of unwanted species such as plowing or planting toxic or pungent species that deter animals or birds. To remove unwanted plant species, often referred to as weeds, farmers intermittently enter the growing fields and manually remove them. Intercropping diverse crops and varieties, as well as maintaining a crop rotation system, can also serve to reduce pest populations or at least reduce the risk of complete destruction by them. Certain types of wet farming, such as pond and paddy fields, can help reduce the number of weeds and animals in fields. In his study of wet versus dry farming on Futuna Island in the Pacific, Patrick Kirch (1994) found that wet fields required much less work weeding than the dryland farming fields. Fences and earthen barriers also aid in keeping unwanted animals and even other humans away from the crops.

Detecting these types of practices in the archaeological record can be challenging. Fencerows or physical barriers may be encountered in surveyed or excavated field systems. Weedy species are common in archaeobotanical assemblages, particularly in areas where the dung of grazing animals is burned. These assemblages can provide insights into the types of species present in the fields but not necessarily if or how they were removed (Jones et al. 1999). Archaeobotanical studies of crop processing stages may reveal the removal of weedy species during the grain cleaning process (Hillman 1973). Zooarchaeological studies also provide insight into the animal pests that may have inhabited fields. For example, in the American Southwest, the ubiquity of field and house rodents increased as farming became the primary form of subsistence (Dean 2005). Although farmers do not want these ruderal plant and animal species to destroy their crops,

they are often useful resources in their own right. Some weedy plant species can be eaten as greens or used for medicine, while garden hunting can provide an important source of animal food.

These categories provide a general overview of the various strategies farmers employed, how they may have changed through time, and how archaeologists can document them. While understanding this diversity is important, it is also important to understand *why* such practices changed through time.

Historical Background

Theories of Agricultural Change

Archaeologists have long recognized that transformations in agricultural production were linked to other fundamental changes in human prehistory such as the development of complex societies and the founding of cities. V. Gordon Childe (1950) believed that the "Urban Revolution" could only occur once agricultural production was great enough to support non-farming specialists who could produce prestige goods and engage in trade. Julian Steward (1955) and Karl Wittfogel (1956) both argued that the first states emerged in arid regions that required irrigation to expand and intensify agriculture. They believed that a centralized and hierarchical system of governance was required to organize the construction, maintenance, and distribution of water in expansive irrigation systems.

Another factor that early thinkers associated with agricultural production was population. In 1798, Thomas Malthus (2004 [1798]) argued that agricultural production generally could not keep up with population growth. Unless a new technology could be introduced, overpopulation would be checked by famine or war. He did not consider, however, the political or social factors that may have caused such tragedies. This idea was challenged in 1965 by Danish economist Ester Boserup (1965), who, based on observations of nonindustrialized agriculturalists in Africa and Asia, argued that population growth is not limited by available agricultural technologies but that demographic pressure actually stimulates agricultural change. She found that as populations grew, farmers reduced the amount of time they left their fields in fallow and increased their work in the fields by weeding, fertilizing, and plowing in order to make them more productive. In cases where population size fell or pressure was reduced, they would shift back to more extensive land use.

Key Issues/Current Debates

Recent archaeological inquiries and debates have built upon these previous ideas and have attempted to determine which of these various factors, environment, population, and/or sociopolitical dynamics, may have brought about transformations in agricultural production. The main arguments are summarized below.

Population

Boserup's (1965) theory of population growth as the primary cause for agricultural intensification found much support among anthropologists and archaeologists. Such a pattern was documented among modern-day farmers in Africa and the Americas, and the definition was further refined (e.g., Brookfield 1984; Turner et al. 1993). Archaeologists argued that there was support for population causing agricultural intensification in areas such as Peru (Cohen 1977).

Boserup's theory has also received much critique. One set of critiques focuses on Boserup's unilinear evolutionary scheme of ever-decreasing fallow periods as the primary trajectory of intensification (Table 1). As described in the section on agricultural practices above, however, there are many ways to increase production such as implementing innovative irrigation or cropping systems (Morrison 1994). Another critique focuses on her lack of consideration for the role of environmental or ecological variables. She saw the evolution of ever-decreasing fallow as independent of local environmental conditions, but new research shows this may not be the case. Finally, researchers have found other reasons as to why people may

Agricultural Practice: Transformation Through Time, Table 1 Esther Boserup's (1965: 15-16) intensification scheme of decreasing fallow periods

Types of land use	Fallow period	Vegetation
Forest-fallow cultivation	>10 years	Forest regeneration
Bush-fallow cultivation	5–10 years	Some shrub, tree regeneration
Short-fallow cultivation	1–2 years	Grass regeneration
Annual cropping	Months	Cropped once a year
Mutli-cropping	None	Cropped two or more times a year

intensify agriculture aside from population growth. These ideas are discussed in more detail below.

Environmental Conditions

Boserup challenged environmentally deterministic models but to such an extent that she largely ignored how natural conditions shape the dynamics of agricultural systems. Boserup's scheme of forest fallow to multi-cropping is not applicable to more arid regions. As Wittfogel (1956) and Steward (1995) pointed out early on, the primary means of intensification in particularly arid regions is through irrigation.

In some cases, environmental conditions prohibit the possibility of intensification. In extremely arid regions, where rainfall is highly variable (seasonally and/or annually) and where irrigation is not possible, it is not worth increasing investment in fields that will likely fail due to drought. This seems to have been the case in the Wupatki region of New Mexico in the twelfth century CE (Stone & Downum 1999). Here, a volcanic eruption deposited fertile ash in a valley normally not suitable for agricultural production. Although the population did subsequently increase in the area, rather than intensify the production of individual fields, settlement patterns and territory markers indicate that farmers protected large areas of land in order to maintain a more extensive land-use strategy because intensification would have been too risky in this particularly arid region.

Finally, researchers argue that in some regions where rainfall is unpredictable, intensification practices, such as terracing or irrigation, are not implemented to meet the needs of population pressure but as a risk reduction strategy. For example, maize irrigation in parts of the Basin of Mexico did not increase yields compared to successful dryland farming but secured the production of the crop during years of low rainfall (Nichols 1987).

Social and Political Variables

Another important topic related to explaining agricultural transformations is the role of social and political variables. One theory is that agriculture is often intensified to meet political rather than population demands. For example, in New Guinea and the Pacific Islands, communities overproduce pigs and taro or yams for large feasts that will boost the social status of certain individuals. Although one result is the increased power and prestige of particular individuals, the community members also benefit by taking part in the feasts and ceremonies sponsored by this individual (Brookfield 1972). Shifts in political power can also drastically transform how and what types of food are produced. Expansive states and empires often reorganized food production in their new territories. For example, the Inca empire shifted highland potato farmers into lowland valleys and required them to produce more maize (Hastorf 1993).

The other issue that links social and political power to agricultural transformations is the "hydraulic hypothesis" proposed by Steward (1955) and Wittfogel (1956). They posited that complex irrigation or field systems require a more centralized form of governance. Much like Boserup's intensification model, Steward and Wittfogel's ideas generated much enthusiasm. Archaeologists argued that the irrigated pondfield systems of the Hawaiian Islands were governed by complex chiefdoms (Earle 1980) and that the large-scale raised-field production in the Lake Titicaca Basin of Bolivia was directed by the Tiwanaku state (Kolata 1986). This model has been challenged, however, with ethnographic and archaeological cases showing how

decentralized communities can operate large-scale irrigation and field systems such as on the north coast of Peru (Netherly 1984).

The theories summarized above focus primarily on single causes such as population, environment, or politics that bring about changes in an agricultural system. As archaeologists have learned more about the complexities of past and present agricultural systems, they have realized that no single factor or "prime mover" can explain how they developed and changed (Morrison 1996). For this reason, archaeologists now aim to understand the multivariable processes or courses of agricultural change by considering multiple archaeological datasets, such as those described above.

International Perspectives

From the examples provided above, the study of past agricultural strategies and transformations has been quite international and comparative in nature. Aside from teaching us about past dynamics in agricultural systems, archaeological studies of agricultural transformation have the potential to inform us about modern-day agricultural issues.

Rehabilitation of Ancient Farming Technologies

In some underdeveloped countries and regions, the study of lost, ancient agricultural techniques has led to rehabilitation projects aimed at improving local economies. For example, there have been several raised-field rehabilitation projects in highland and lowland Bolivia and Peru (Fig. 2). Ancient raised fields that were likely in use between 800 and 1200 CE were reconstructed in the Lake Titicaca basin of the Andean highlands (Erickson 1988; Kolata & Ortloff 1996), and the Llanos de Moxos of the Amazon basin (Erickson 1980). Initial experiments showed them to be highly productive. Several development projects aimed at helping these communities use this technology to improve food production were instituted but none of them lasted very long (Swartely 2002). Why these projects were unsuccessful has forced archaeologists to think more carefully about the differences in food production between today and the past and about our models of how these field systems originally functioned. Were raised fields used because they were more productive than dryland fields, or did they simply supplement dryland agriculture? Is the labor and effort

Agricultural Practice: Transformation Through Time, Fig. 2 Ancient raised fields in the Pampa Koani, Bolivia

needed to construct and maintain such field systems too great for small communities? Or has the economic structure of the modern, market and city-oriented labor force made rural, agricultural projects that require large, continuous labor inputs no longer viable or valuable? While such projects have the potential to help modern-day communities, they also help us refine our understanding of the past.

Future Directions

Archaeologists continue to pursue more information on the particular trajectories of agricultural transformation across the globe. The trend towards considering a broader range of reasons for and strategies of agricultural change will lead us to a better understanding of both differences and similarities among different world regions. Early studies of agricultural change tended to focus on landscape modifications such as field and irrigation systems. While we will continue to learn more about such systems with new technologies such as LiDAR, the greatest advancements will be made through analytical techniques in botanical and geochemical analyses that reflect other important agricultural practices such as fertilization, soil management, and pest control.

Cross-References

- ▶ Aerial Archaeology
- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Andes: Origins and Development of Agriculture
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Garden Hunting
- ▶ Isotopic Studies of Husbandry Practices
- ▶ Paddy Soils: Environmental Analyses

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Agricultural Practices: A Case Study from Papua New Guinea

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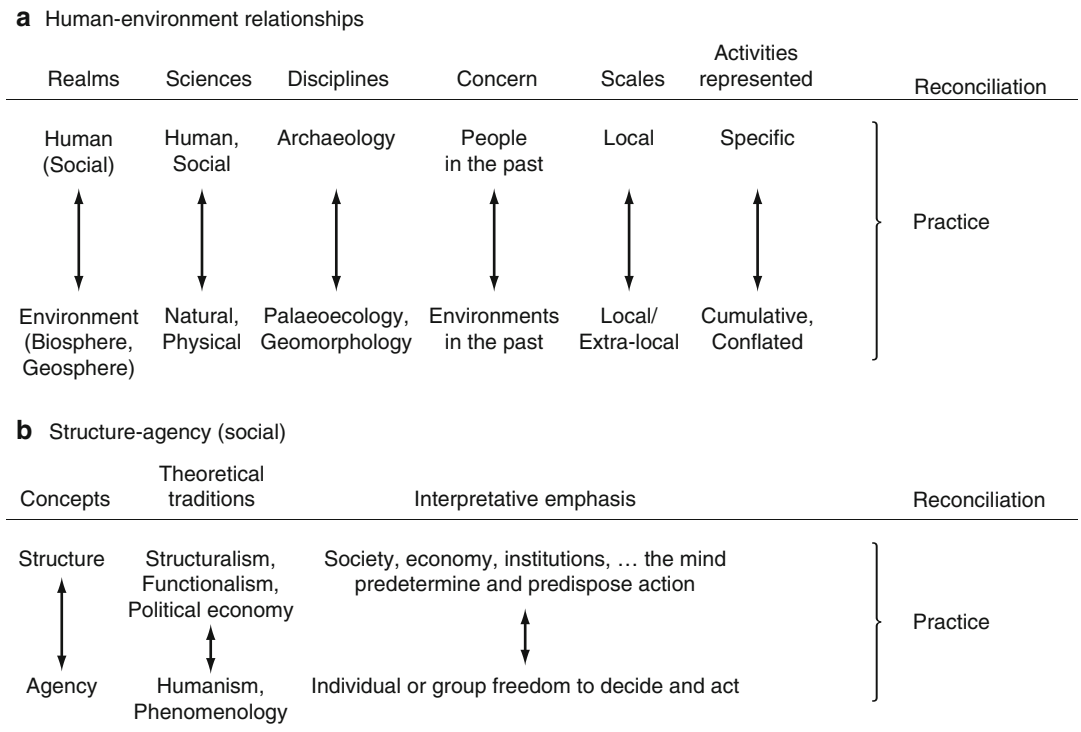
Introduction and Definition

A useful methodological tool to help unravel the complexities of how early agriculture emerged within a given locale is the concept of "practice" (following Bourdieu 1990; see Denham 2005, 2009, 2011; Denham & Haberle 2008; Bruno 2009; Jussuret 2010). In archaeology, practices represent human actions in the past, including habitual modes of behavior and dispositions, as well as individual idiosyncrasies (Barrett 1994). As such, the concept of practice has been proposed as a useful way to overcome various dualisms, or binary divisions, that permeate the study of human-environment interactions and social relations, whether in the past or present (Fig. 1; Denham & Haberle 2008; Denham 2009).

From one perspective, practices represent the nexus of human-environment relations because they mark the intersection of social life with the biosphere and geosphere (Fig. 1a); practices are structured by the environment, while simultaneously acting upon and changing that environment. Any practice represents the intersection between people and their world. From another perspective, practices are a manifestation of, and represent the nexus of, more abstract structure-agency dichotomies that pervade the social sciences and humanities (Fig. 1b). Practices focus upon what people did rather than upon seeking to



Agricultural Practices: A Case Study from Papua New Guinea, Fig. 1 Schematic diagram showing how the concept of practice reconciles various dichotomies inherent to the understanding of human-environment (*upper*) and human-human (social) relations (*lower*) in the past (Amended version of Denham & Haberle 2008: Fig. 2)

unravel the degrees to which someone's actions are structurally determined (whether by social, economic, or mental structures) or represent their predispositions or are a product of individual improvisation. As such, practices subsume and encapsulate the inherent recursivity of human-environment interactions and social relations, respectively.

The concept of practice, though, does not address questions of ultimate causation, which remain open to variable speculation (Denham & Haberle 2008: 484-485):

> . . . in trying to explain why people did something in the past - whether in terms of what caused something to happen or in terms of what it meant to people in the past - we are continually drawing on our own frames of reference about how people behave and what governs that behaviour, ie, we continually fall back on patterns of thinking derived from our understanding of the world today. Consequently, we populate the past with *Homo economicus* and *H. ecologicus*, such as resource maximisers and optimal foragers . . ., or we try to distinguish conscious or unconscious patterns of behaviour from the evidence of past practices.... In attempting to address questions of 'why?' there is a continual interplay between what happened in the past and how that past is made meaningful in the present.

Having said this, a focus on practice draws our attention away from questions of "why," or from questions of ultimate causality, to the "what" and "how" something happened in the past. As a result, the concept has considerable utility for understanding the emergence of agriculture in a particular locale.

Key Issues

A Practice-Centered Method for Investigating Early Agriculture

A practice-centered approach is useful for archaeologists studying early agriculture because it focuses attention upon the multidisciplinary

evidence of what people did in the past. Specific practices associated with cultivation may potentially include burning, forest clearance, gathering, plot preparation, transplantation, planting of seed, dibbling, staking of plants, tillage, construction of raised beds and mounds, and digging of drains or ditches. Some of these are relatively generic, constituent practices that are common to many forms of plant exploitation, including agriculture. As such, a practice-based framework provides common conceptual ground to understand and compare different forms of plant exploitation, such as agriculture and foraging, and to chart how these were transformed through time and across space (Denham 2008; Denham et al. 2009).

Within this conceptual framework, forms of plant exploitation represent higher-order categories associated with how various constituent practices co-occur, or are "bundled," within particular historico-geographical contexts. This bundling effectively reconstructs how constituent practices articulate and intersect within a locale at different times in order to determine which forms of plant exploitation plausibly occurred in the past and to show how these were transformed through time (following Hägerstrand 1970). This practice-centered method is designed to circumvent some of the laden "semantic" (Harris 1996) debates concerning the definition and attribution of monolithic categories such as "agriculture" or "foraging" to different forms of plant exploitation in the past.

Methodologically, a chronology of practices in the past can be reconstructed relatively directly from archaeological remains and indirectly through the interpretation of paleoenvironmental proxies, such as charcoal, phytoliths, pollen, and sediments. Using the Kuk Swamp evidence from the highlands of Papua New Guinea as an example, archaeological evidence of past plant exploitation and cultivation practices has grounded more equivocal paleoecological evidence of landscape transformation and archaeobotanical evidence for the presence and use of food plants (Denham & Haberle 2008). It is not just that multidisciplinary evidence for different practices co-occurs in time and place, but the archaeological evidence enables the different lines of evidence to be integrated and linked to specific practices, thereby enabling their "bundling" into forms of plant exploitation.

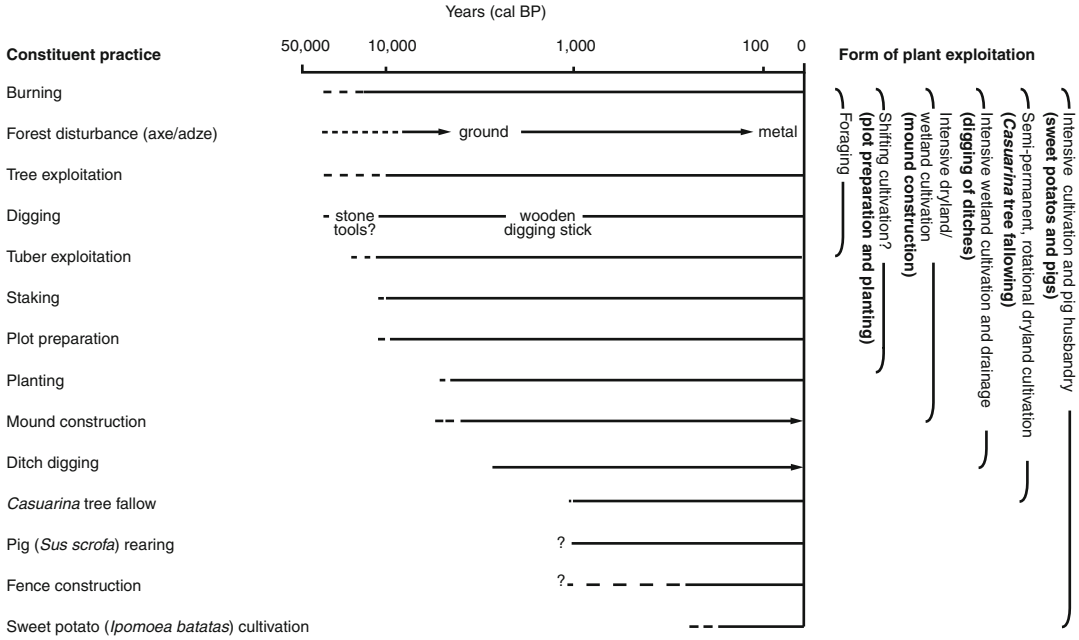
At Kuk Swamp, archaeological excavations documented artificially constructed mounds dating to 7000–6400 cal BP on the wetland margin. One of the fills between these mounds contained anomalously high *Musa* spp. banana phytoliths, while paleoecological evidence from several fills indicated a dramatic transformation of the landscape to grassland at this time (Denham et al. 2003). In the highland New Guinea context, these lines of evidence suggest mounded cultivation of crops, including bananas, as well as the exploitation of tuberous plants on the wetland margin within a landscape denuded and maintained as grassland.

The multidisciplinary evidence, the chronology of practices, and the interpretation of plant exploitation in the past should be reconstructed for a particular landscape or restricted region, rather on broader spatial (or chronological) scales. Today cultivation practices and major crop plants can vary considerably across Papua New Guinea, including from one valley to another (Bourke & Harwood 2009). Similarly, forms of plant exploitation are likely to have varied considerably across the island of New Guinea in the distant past (Denham 2005, 2011). In seeking to reconstruct plant exploitation in the distant past, particularly the emergence of agriculture, the conflation of records from geographically dispersed regions may provide a highly inaccurate portrayal of what actually happened at any given locale – the interpretative sum can be greater than the evidential parts (Denham 2009: 661).

These ideas are illustrated, and have been developed in order to understand, the long-term history of plant exploitation and the emergence and transformation of agriculture in the highlands of New Guinea.

Early Agriculture in the Upper Wahgi Valley, Papua New Guinea

Various lines of multidisciplinary evidence have been used to reconstruct a chronology of practices in the past for the Upper Wahgi Valley, Papua New Guinea (Fig. 2; following Denham & Haberle 2008). The chronology of practices has

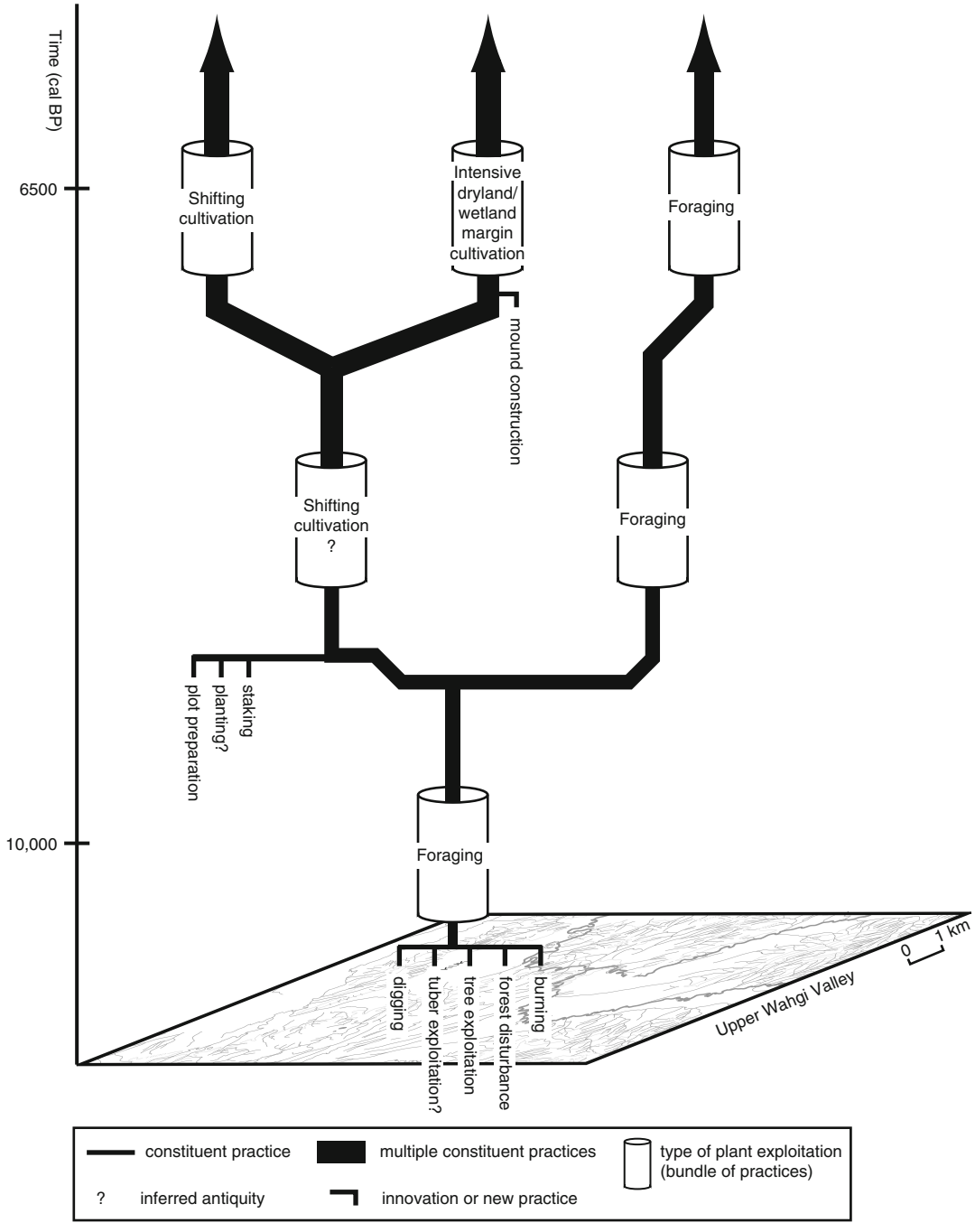


Agricultural Practices: A Case Study from Papua New Guinea, Fig. 2 Chronology of practices and associated forms of plant exploitation reconstructed for the Upper Wahgi Valley using multidisciplinary lines of evidence (Amended version of Denham & Haberle 2008: Fig. 9)

been cross-referenced with, and bundled into, forms of plant exploitation that have been documented ethnographically in the region. The chronology and resultant interpretations are secure because they are derived from archaeological, geomorphological, and paleoecological investigations at multiple sites (including wetlands, rockshelters, and open sites) within a confined region of one valley in the highlands.

The practice-centered method charts the emergence and transformation of agriculture through time in the Upper Wahgi Valley (Fig. 3). Continuities with earlier forms of plant exploitation, such as from foraging to shifting cultivation, are clearly demonstrated. To illustrate, multiple constituent practices are associated with traditional forms of foraging that occurred since the beginning of the Holocene, including burning, forest disturbance, tree exploitation, tuber exploitation, and digging. The additions of plot preparation, staking, and inferential evidence for planting to the practical repertoire are suggestive of some form of shifting cultivation on the floor of the Upper Wahgi Valley during the early Holocene. Additional definitive evidence for planting and mound construction indicates more intensive forms of cultivation on the wetland margin at Kuk Swamp at 7000–6400 cal BP. Subsequent innovations, introductions, and transformations of agriculture occurred following the inception of ditch digging from 4,400 to 4,000 years ago, the adoption of *Casuarina* tree fallowing from c. 1,200 years ago, and intensive pig rearing and sweet potato cultivation within the last few hundred years.

Each transformation, or augmentation of the plant exploitation repertoire, results from the adoption of additional practices, whether of local innovation or extralocal introduction. Significantly, forms of plant exploitation need not



Agricultural Practices: A Case Study from Papua New Guinea, Fig. 3 Schematic representation of the bundling of practices into forms of plant exploitation reconstructed for the Upper Wahgi Valley during the early-to-mid Holocene (Amended version of Denham 2009: Fig. 2)

be supplanted by successive transformations. In the Upper Wahgi Valley context, each reconstructed form of plant exploitation broadens the repertoire that people draw upon simultaneously in different parts of the landscape. Consequently, the long-term history of agriculture is not unilinear; rather it becomes increasingly multilinear and adaptive to different parts of the landscape, as well as to different landscapes, through time. The practice-centered method is designed to highlight the transformative aspects of plant exploitation, rather than viewing each form as a static, monolithic entity (Denham 2009).

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Bananas: Origins and Development
- ▶ Domestication: Definition and Overview
- ▶ Kuk Swamp: Agriculture and Domestication
- ▶ Sugarcane: Origins and Development
- ▶ Taro: Origins and Development
- ▶ Yams: Origins and Development

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Agriculture: Definition and Overview

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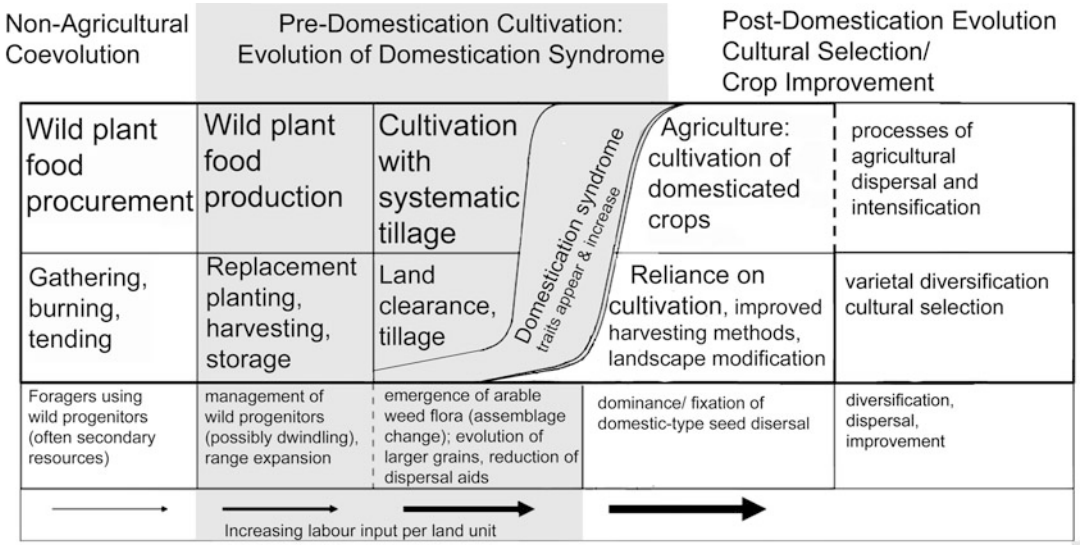
State of Knowledge and Current Debates

Introduction

Agriculture is the most comprehensive word used to denote the many ways in which crop plants and domestic animals sustain the global human population by providing food and other products. The English word agriculture derives from the Latin *ager* (field) and *colo* (cultivate) signifying, when combined, the Latin *agricultura*: field or land tillage. But the word has come to subsume a very wide spectrum of activities that are integral to agriculture and have their own descriptive terms, such as cultivation, domestication, horticulture, arboriculture, and vegeculture, as well as forms of livestock management such as mixed crop-livestock farming, pastoralism, and transhumance. Also agriculture is frequently qualified by words such as incipient, proto, shifting,



Agriculture: Definition and Overview, Fig. 1 An evolutionary model from foraging to agriculture, in which the transitions to cultivation, domestication, and agriculture are separated and potential archaeological indicators are suggested (Modified from Harris 1989 and Fuller 2007)

extensive, and intensive, the precise meaning of which is not self-evident. Many different attributes are used too to define particular forms of agriculture, such as soil type, frequency of cultivation, and principal crops or animals. The term agriculture is occasionally restricted to crop cultivation excluding the raising of domestic animals, although it usually implies both activities. The Oxford English Dictionary (1971) defines agriculture very broadly as "The science and art of cultivating the soil, including the allied pursuits of gathering in the crops and rearing live stock (*sic*); tillage, husbandry, farming (in the widest sense)." In this entry, we too use the term in its broadest, inclusive sense.

In the published literature on early agriculture, there is a tendency for the word agriculture and many of its subsidiary terms to be used vaguely without precise definition, and sometimes their connotations overlap, for example, proto/incipient and shifting/extensive. There is need to clarify much agricultural terminology to avoid confusion (Harris 2007: 17-26), particularly because the multidisciplinary nature of research on the subject leads to many concepts being used that derive from disparate disciplines; principally archaeology, anthropology, biogeography, genetics, linguistics, and taxonomy. In this entry, we cannot review comprehensively all the typological terms currently used in discussions of the origins and early development of agriculture. Instead we focus on the two most fundamental processes that led to agriculture, cultivation and domestication (of plants and animals), and then comment on some of the terms used to denote particular categories of agricultural production. In conclusion, we return to agriculture itself as a process of landscape-scale food production.

This approach, leading from consideration of cultivation through domestication to agriculture (Fig. 1), proposes that agriculture is a form of land use and economy that resulted from the combination of cultivation (a bundle of human actions focused on preparing soil and planting, tending, and harvesting plants) and domestication (a bundle of genetic and morphological changes that have increased the ability of plants to adapt to cultivation). Cultivation and domestication are related as cause and effect, a change in human strategy with consequences in genetic adaptations of another organism, which increased the interdependencies of both. In the next two sections, we explore the nature of and interaction between cultivation and domestication over time

in light of mainly archaeological evidence together with some genetic data, including exploration of the concept of "pre-domestication cultivation."

Cultivation

Cultivation is an activity through which humans become directly involved in the management of the lives and life cycles of certain plants. In abstract terms, this can be considered a change from a largely extractive approach to subsistence (collecting) towards a highly regulative one (Ellen 1994), with seasonal scheduling of labor for delayed returns and storable product. In practice, cultivation involves manipulation of soil, water, and other components of the plant environment. At its most basic, it involves sowing of seeds on soil which has been cleared of other vegetation. In low-intensity systems, this may come about through burning of vegetation (slash and burn) or by taking advantage of fresh deposits of silt by river floods (e.g., *décrue* agriculture; Harlan & Pasquereau 1969). It usually involves preparation of the soil by tillage. Tillage methods and tools vary from simple handheld devices (digging sticks, spades, hoes) to team-employed tools, such as the Andean "foot-plough," to animal-powered ards and true ploughs (Steensburg 1986). Other important variables include the addition of nutrients to the soil by such means as manuring, multiple cropping with nitrogen-fixing species (usually legumes of the family Fabaceae), or using crop rotations with legumes or fallow periods. This represents an important component of cultivation, i.e., scheduling the seasons of sowing and harvesting and interannual patterns in crop rotation and fallowing.

Water is a key input into any cultivation system, and in some regions it had a central role in the origins of agriculture. For example, control of water levels was essential in the development of early rice cultivation in China (Fuller & Qin 2009). Successful cultivation of the perennial ancestor of *japonica* rice involved extending shallow and wetland-margin habitats by clearing competing vegetation, as use of these slightly less-watered microenvironments would have increased grain production. The earliest preserved field systems for rice cultivation consist of small (1–2 m diameter) fields interconnected to each other and to frequent deep water pits that served to drain water from the growing rice.

Cultivation represents an important change in human strategy as people start to manipulate the soil and the composition of plant communities to enhance yields of particular plants later. This has led many researchers to infer that morphological domestication came about through unconscious selection. In other words, people did not set out to domesticate plants but to manipulate productivity through cultivation. The new environment created by cultivation can cause unintended domestication, as the cultivated species adapts to these new circumstances.

In recent years, archaeobotanical research has aimed to identify the practices of cultivation prior to the emergence of domesticated species. Such evidence for pre-domestication cultivation can be inferred from the presence of arable weed assemblages, which may be demonstrated by the statistical composition of wild-seed assemblages or by the modern ecological characteristics of species that recur archaeologically but have little or no known human uses (Willcox 2012). As is well known from later agricultural periods, archaeobotanical assemblages are made up predominately of crops and weeds, together with some gathered fruits and nuts, and this pattern begins to emerge by the earliest Pre-Pottery Neolithic in Southwest Asia and in the middle Neolithic in parts of China (Fuller & Qin 2010). This approach draws on the well-developed tradition in European archaeobotany of using weed-seed assemblages to infer the cultivation ecology of fields (Jones 1988).

Domestication

Domestication is most clearly defined as a biological phenomenon, that is, by traits in crops that result from adaptation to cultivation and by which they differ from close wild relatives. Several recurrent "domestication syndromes" can be recognized as sets of characters that define domesticated crops and characterize

domestication as a form of convergent evolution under cultivation (Fuller 2007). The domestication syndrome differs for different kinds of crop plants, according primarily to how they are reproduced, by seed or by cuttings, and what plant organ is the target of selection (grain, fruit, tuber).

The best defined domestication syndrome is that for grain crops, including cereals, pulses, and oilseeds. While all of these traits are the product of cycles of harvesting and sowing from such harvests, the actual selection pressures seem to come from two different aspects of cultivation. First are some traits selected for by harvesting and the crops' growing reliance on humans for seed dispersal. Second are traits that relate to soil conditions, as tilled fields are essentially early successional communities on empty soil, which is generally loose and allows deeper burial of seeds. Although there are six essential syndrome traits in seed crops, only the first four have some chance of archaeobotanical preservation in some species.

First (1) is the elimination of natural seed dispersal, such as through non-shattering rachis in cereals and non-dehiscent pod in pulses and oilseeds. This is often regarded as the single most important domestication trait as it makes a species dependent upon the farmer for survival. It also means that human labor must be used to thresh crops and separate seeds, pods, or spikelets instead of natural dispersal occurring at maturity (Fuller et al. 2010). This trait can only evolve under conditions of harvesting, such as uprooting, use of sickles, or harvesting when crops are mature rather than green. This trait is readily identifiable in cereal rachis or spikelet-base remains, and has been studied in rice, wheats, barley, pearl millet, and maize, but is less evident in the preserved remains of many other crops. However, not all harvesting methods necessarily select for this, which means there are conceivable systems of "non-domestication cultivation" (Hillman & Davies 1990), or there may be weak selection leading to very protracted evolution of this trait within populations (Fuller 2007; Allaby 2010). It is worth noting that any individual plant, or archaeological specimen, either has wild-type or domesticated-type dispersal, but domestication is working on populations, and therefore domestication status should be determined for assemblages as representative of past populations. Recent archaeobotanical evidence tends to suggest relatively weak selection for this trait (Fuller et al. 2010).

A second connected trait (2) is reduction in aids to wild seed dispersal. Plants often have a range of structures that aid seed dispersal, including hairs, barbs, awns, and even the general shape of the spikelet in grasses. Thus domesticated wheat spikelets are less hairy, have shorter or no awns, and are plump, whereas in the wild they are heavily haired, barbed, and aerodynamic in shape. Varieties of wild rice are always awned and heavily barbed, while many cultivars are awnless and those with awns have fewer barbs. Rather than being positively selected by harvesting, this comes about by removal of natural selection for wild-type dispersal adaptations, and therefore under domestication, such traits require less metabolic expenditure. This trait may sometimes be visible in archaeobotanical material but is rare and non-diagnostic and does not provide a definitive means of identifying domestication archaeologically. Because this trait shifts gradually and non-diagnostically, it can be regarded as indicating "semidomestication."

Two additional traits of the domestication syndrome may be widespread, but they are not recoverable archaeologically: (3) synchronous tillering and ripening, sometimes including a shift from perennial to annual. Planting at one time and harvesting at one time will favor plants that grow in synchronization. Another trait (4) is a more compact growth habit with apical dominance, such as a reduction in side branching and denser spikes or seed heads. In some species, such as in several pulses, this involved a shift from a climbing habit to self-standing. Harvesting methods, like those that select for non-shattering types, can also favor plants with single and compact parts to be harvested.

Two more important traits are thought to relate primarily to an aspect of soil conditions,

i.e., planting seeds into more deeply tilled soils. These are traits that relate to rapid germination and early growth. On the one hand (5) is the loss of germination inhibition. In the wild, many seeds will only germinate after certain conditions have passed – conditions of day length and temperature – or after the seed coat is physically damaged. In wild legumes, for example, this may mean that 90 % of seeds will fail to germinate. By contrast, crops tend to germinate as soon as they are wet and planted. This is simply selected by planting as those seeds that do not germinate will fail to contribute to the next harvest and subsequent crops planted from it. This is regarded as a key domestication trait, especially in pulses and pseudo-cereals (e.g., *Chenopodium* spp.) This change is often signalled by changes in the seed, such as thinner and less ornamented seed coats. On the other hand it is a trait, widely studied in archaeobotany, that can be regarded as a "semidomestication" trait. Trait 6 is increasing seed/fruit size. This is likely to be selected for by open environments and deep burial in disturbed soils. This has the added advantage of increased seed weight which tends to increase harvest yields from a given number of crop plants. Comparative studies, for example, between related species, show that larger seeds germinate more quickly and effectively than smaller seeds, and thus this should be selected for by tillage and cultivation generally. As seeds readily preserve, archaeological populations of them can be measured to track changes in average sizes and size ranges, to trace this trait over time. In the case of cereals, selection seems to be focused on seed thickness/breadth rather than length (Fuller et al. 2010).

While for seed crops, predominance of the above traits marks domestication, the end of a process of biological evolution, the determination of domestication sequences is much more difficult in vegetatively cultivated plants such as roots and tubers (Hildebrand 2003, and see the section below on Vegeculture). Because harvest of tubers focuses on a starchy storage organ rather than a reproductive organ, harvesting practices by humans are unlikely to pose strong selective pressures on the next generation. In addition, because tuber plants tend to be perennials, the harvested individual will tend to grow back, reducing the potential to select for improvements across generations. In many cases, cultivation practices may induce the useful part of the plant – the starchy organ – to exhibit phenotypic alteration without changes in its genotypic makeup, such as the improved tuber size produced by yams in loosened, prepared soil as opposed to harder unprepared soils (Chikwendu & Okezie 1989). Thus tuber crops can be cultivated for long periods and on an extensive field scale without undergoing morphological domestication. In addition, archaeologically recovered tuber fragments (parenchyma) tend to preserve few morphological attributes relevant to phenotypic or genotypic change. There is some research which suggests that micro-remains such as starch grains have increased in size with tuber domestication (Piperno 2012). As a result of these factors, the study of early vegecultural systems tends to focus on establishing the presence of potential crop species and inferring practices of landscape modification and management, such as soil mounding, ditch digging, and vegetation burning (see, e.g., Denham 2007).

Specialized Types of Livestock Management and Crop Production

In this section, we examine briefly several distinctive types of agriculture that developed over time into specialized systems focused on the production of food and often also secondary products such as hides, hair, wool, building materials, and many other useful items.

Mixed Crop-Livestock Farming

One of the most significant variables in the historical differentiation of agricultural systems is whether domestic livestock were fully integrated with the processes of crop cultivation as beasts of burden and agents of soil fertilization as well as producers of food. Such systems of "mixed farming" or "agropastoralism" developed early in only a few regions. They did so most comprehensively in Southwest Asia (and later in Europe) where domesticated herd animals – cattle, sheep,

goats, and pigs – were raised in close conjunction with wheat, barley, and other cereal and pulse crops as producers of meat, milk, hides, hair, wool, and dung and as traction animals used for ploughing, load-bearing, and other purposes (Harris 2002). A comparable system of mixed farming evolved in East and Southeast Asia where water buffaloes became an integral component of the system of wet-rice (padi) cultivation (Hoffpauir 2000), although this may have been millennia after rice had spread throughout China and much of Southeast Asia (Fuller et al. 2011).

In other regions of early agriculture where domestic herd animals were present, they were not fully integrated with crop cultivation as providers of food, fertilizer, and traction. Thus, in northern tropical Africa, cattle, camels, sheep, and goats, and in the Andean region of South America camelids (llama and alpaca), were not fully incorporated into indigenous systems of cereal, pulse, and root-crop cultivation.

Pastoralism

The full incorporation of domestic herd animals into systems of mixed farming requires permanent facilities such as barns, sheds, stalls, fenced fields, and other enclosures for confining the animals and controlling their movements. This contrasts with pastoral systems that are characterized by more mobile methods of management. The term pastoralism derives from the Latin *pastor*, meaning a herdsman or shepherd, and it applies to mobile systems in which the herd animals, principally sheep, goats, cattle, horses, donkeys, camels, llamas, alpacas, and reindeer, are raised to provide food and other products and as pack and riding animals. The essence of pastoralism is that people move with their animals. The spatial and temporal scales of their movements range from short daily movements of flocks and herds to and from pastures near their owners' settlements (diurnal grazing) to longer seasonal movements by part of the local community with their animals to higher and/or more distant pastures (transhumance), to the most fully mobile system in which families migrate from pasture to pasture with their herds throughout the year and from year to year (nomadic pastoralism). Nomadic pastoralists own and largely depend on their animals, although they have historically obtained some of their food and other supplies by trading with or raiding settled agricultural communities. In fact, all nomadic pastoralists depend to some degree on crop products for their food and often also for supplementary fodder for their animals.

Few if any fully nomadic pastoral groups still exist in the modern world, but in the historical and prehistoric past, this way of life was followed extensively in the deserts of northern and eastern Africa and southwestern and central Asia. The pastoralists' herds consisted mainly of sheep and goats, with the roles of horses and camels varying from region to region, and in the high latitudes of Eurasia a variant form of reindeer pastoralism became established (Ingold 1980).

Horticulture

Horticulture has two contrasted connotations in the literature on traditional agricultural systems and the origins of agriculture. The first relates directly to the origin of the word from the Latin *hortus*, meaning garden (juxtaposed to *ager*, field), and in this literal sense it refers to the cultivation of plots of land adjacent or quite close to the houses of the cultivators. Such gardens are normally smaller than fields, which are usually located farther from their associated settlements. A greater variety of plants, especially perennial shrubs and trees, tend to be cultivated in gardens than in fields, which are commonly devoted to one or only a few types of crop. Also, whereas most fields are cultivated in seasonal cycles, gardens are usually tended continuously, especially in the tropics where long growing periods favor year-round production. Another distinctive feature of house gardens is the presence in them of many adventitious wild and weedy plants. They add to the floristic and structural diversity of the plant community and enhance its ability to provide a great variety of edible, medicinal, and other products such as flowers, fibers, dyes, containers, and construction materials (see, e.g., Coomes & Ban 2004).

The contrasts in size and floristic diversity between gardens and fields are widely recognized

in the literature on early agriculture, for example, in the terms "fixed-plot horticulture" and shifting or "swidden" cultivation and the German *gartenbau* and *ackerbau*. Small, continuously tended plots close to dwellings have been proposed as probable arenas of early plant domestication (Harris 1973: 398-401), but very little archaeobotanical research on past garden cultivation has as yet been undertaken.

Secondly, the terms horticulture and gardening have been used to denote agricultural systems that combine field cultivation of annual root and/or seed crops with growing mainly perennial tree, shrub, and herbaceous plants in gardens – a mixed cropping system that, when trees are a major component, is sometimes alternatively described as agroforestry. This connotation of horticulture has been used particularly in descriptions of traditional, and by implication early, systems of cultivation in Melanesia and the Pacific Islands, but this usage tends to obscure the useful distinction between field and garden cultivation.

Arboriculture

The term arboriculture, from *arbor* the Latin for tree, is used to specify agricultural systems focused exclusively or largely on the cultivation of trees and shrubs for the production of fruits and seeds and, in some species, also for ancillary products such as wood for construction and leaves for thatch, fiber, etc. The term, which is sometimes equated with agroforestry (see above), refers mainly to the specialized cultivation of fruit- and nut-bearing trees and shrubs in single- or mixed-species orchards and plantations. It can refer also to plantations of trees for timber production, although this process is more usually described as forestry.

Arboriculture differs from horticulture in that the plants are grown in less floristically diverse communities on larger landholdings. Traditional systems of arboriculture include oil-palm plantations in tropical West Africa and olive, almond, and walnut orchards in the circum-Mediterranean region. Arboriculture has attracted much less attention in the literature on the beginnings and early development of agriculture than the cultivation of cereal, pulse, and root crops, and fruit- and nut-bearing trees are likely to have been a much more important source of food among many hunter-gatherer groups than among early farmers (Harris 2012: 37-9). It tends to be difficult to differentiate specialized arboriculture from more floristically mixed traditional systems of horticulture, and it is seldom possible to do so on the basis of archaeobotanical data alone (see, e.g., Gosden 1995 and Latinis 2000). At present, most of what can be inferred about arboriculture in premodern times comes from historical and ethnoecological evidence.

Vegeculture

The word vegeculture is used to describe agricultural systems that produce mainly root and tuber crops with underground storage organs consisting of starch-rich roots, root and stem tubers, corms, and rhizomes. The crops are reproduced asexually by planting pieces of a parent plant such as parts of tubers, stem cuttings, or sprouts, rather than being grown from seed. Vegetative reproduction made possible the domestication of tuberous plants by replicating the characteristics of parent clones and then selecting and multiplying useful phenotypic variations that arose in planted stock, such as unusually large or smooth-skinned tubers. The process did not involve directional genotypic change from wild progenitor to domesticate as occurred in seed-crop domestication. Root and tuber domestication has taken place within the limits of phenotypic variation determined by an unaltered genotype, but morphological changes under domestication have nevertheless been substantial, for example, decreased flowering and in tubers changes towards greater size and starch content and reduction in bitterness and in the numbers and length of thorns.

Although root and tuber and seed crops are often cultivated together, vegeculture is the traditional mode of agricultural production in many parts of the humid and seasonally dry tropics. Until recently, little macrobotanical evidence of vegeculture had been found because the soft tissues of root and tuber crops are seldom preserved (except in very dry or waterlogged archaeological

contexts), but advances in microbotanical techniques for identifying remains of tuberous plants in the form of phytoliths (silicified particles of plant tissues), parenchyma (vegetative storage plant tissues), and starch grains preserved in sedimentary deposits are now beginning to illuminate the prehistory of vegeculture in several regions of the tropics (Hather 1994; Fullager et al. 2006; Piperno 2012).

Agriculture as Landscapes of Food Production

The beginnings of food production represent a strategic shift in human behavior, towards the manipulation of the soil environment and through an influence on the composition of plant populations grown in that soil, via preferential seeding and tending of one or a few species. While cultivation may involve a range of practices, and these will tend to select for morphological domestication, at least in seed crops, we can define agriculture in relation to the scale of cultivation, its prominence in local landscapes and in contributing a major component of human diet. In this sense, *agriculture* is the form of land use that represents a *change in the landscape*, as people regularly cultivate, raise, and focus more attention on domestic plants and/or animals. Agriculture creates fields for larger-scale production of crops and livestock. While small-scale cultivation may involve a few plants, agriculture involves the creation of substantial fields of sown vegetation on such a scale that it should, in principle, be recognizable in regional palaeovegetation datasets, recoverable from palaeosols, and a prominent part of the inferred source of archaeological plant remains. How one distinguishes agriculture from small-scale cultivation varies according to the parameters of particular geographical and cultural contexts.

Irrigation systems are one notable and widespread way in which distinctive landscapes of agriculture have been created. Control of water can be focused either on its removal (drainage) or by adding water to otherwise locally dry areas to allow cultivation where rainfall is insufficient to enhance productivity. In riverine agriculture, such as that associated with ancient Mesopotamia and Egypt (Butzer 1976), this took the form of canals and basins that helped to conserve floodwater and distribute it more evenly and widely. In some mountain environments, such as the Andes, canal systems, often closely associated with cultivated terraces, were also developed to bring steep slopes into agricultural production (Donkin 1979). Some irrigation systems incorporated manual water-lifting devices, such as the *shaduf* which was widespread in Egypt and Southwest Asia by c. 1,500 BCE and allowed buckets of water to be raised above the level of canals and fed onto the fields. By the Classical era, cattle-driven water wheels (*saqia*) made lifting water more efficient and increased the extent of arable lands in river valleys. In regions that relied on rainfall for cultivation, deep wells to tap into groundwater, and surface reservoirs (tanks), were developed to store water. In some of the driest margins of cultivation around the Iranian plateau, in Central Asia, Arabia, and the Sahara, systems of underground tunnels or galleries (*qanats*, *karez*, *foggara*) began to be built several thousand years ago to collect subsurface water from piedmont slopes and direct it out to fields and palm groves in the adjacent plains (see, e.g., English 1968; Magee 2005).

Many other types of agricultural landscape, not referred to here, were developed in premodern times as an increasing proportion of the inhabited earth's surface was transformed by agriculture and as the human population became progressively more dependent through the Holocene, for its food and other needs, on a growing number of domesticated plant and animal species.

Cross-References

- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeobotany

- ▶ Domestication Syndrome in Plants
- ▶ Domestication: Definition and Overview
- ▶ Landscape Domestication and Archaeology
- ▶ Vegeculture: General Principles
- ▶ Yams: Origins and Development

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Agroforestry: Environmental Archaeological Approaches

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Introduction

Agroforestry, the deliberate incorporation of trees in farming systems, is a very widespread practice with many variants, some of them presumably ancient. Archaeological investigation of these systems requires multidisciplinary research across disparate temporal and spatial scales, combining archaeobotanical, paleoecological, and ethnobotanical studies and focusing on agroecosystems rather than their individual constituents. The recent increase in such studies is part of a growing awareness of the intricacies of past human impacts on environments and of the diverse and complex histories of farming. Recognition of the biodiversity and variability of management practices in traditional agricultural systems has begun to stimulate revised models of the trajectories of peopled landscapes. New research questions in archaeology are supported by an expanding array of analytical techniques which draw on a wide range of sciences including molecular biology, genetics, chemistry, geophysics, information technology, and ecology.

The characteristics of trees, especially their slow maturation and long life, contrast with those of the annual and short-lived crops most often emphasized in archaeological studies of the origins and development of agriculture. Understanding the incorporation of trees in agroecosystems requires research at scales encompassing whole landscapes and long sequences of environmental change at fine resolution. Revised models of the effects of human manipulations of plant communities are developing as archaeobotanical, paleoecological, and associated research gradually expands the information base.

Definition

The Oxford English Dictionary lists "agroforestry (n.) as agriculture in which there is integrated management of trees or shrubs along with conventional crops or livestock" (http://www.oed.com/view/Entry/4197 [accessed June 26, 2012]) and cites the following earliest usage from Bene et al. (1977: 41): "One of the objectives of *agroforestry is to 'domesticate' and upgrade shifting agriculture to maximize sustained production on less well-endowed land."

Definitions of agroforestry that state similar objectives, and prescribe remediation of damage caused by unsound agricultural practices, are common in literature on rural development. Usage of the term agroforestry has extended to include many forms of polycultural farming in which trees are incorporated, practiced by

independent small-scale farmers worldwide. In this broader usage, agroforestry may be synonymous with or include arboriculture, forest farming, orchard-gardens, silviculture, and similar terms. Clarke and Thaman (1993) distinguished the first, prescriptive definitions as constituting institutional agroforestry and the second broader usage as traditional or indigenous agroforestry. In the second sense, agroforestry is a useful collective name for land-use systems in which woody perennials are deliberately grown on the same piece of land as agricultural crops and/or animals, either in some form of spatial arrangement or in sequence.

Historical Background

The word agroforestry came into common use with the establishment of the International Council for Research in Agroforestry (ICRAF), following the recommendation of Bene et al. (1977). This was a response to the perception that tropical forests were increasingly threatened by agricultural expansion. Agroforestry research became a topic of major interest among agricultural scientists, at first centered on Africa and restricted to a small range of practices aimed at soil improvement. The term agroforestry has gradually been adopted in other disciplines, especially anthropology and geography, to cover the wider range of traditional polycultural systems which include trees. The literature on agroforestry is now enormous.

Deforestation in the tropics was one among a number of environmental concerns that in the last decades of the twentieth century prompted wide-ranging research on causes and rates of environmental change. Cultural, ecological, and historical aspects of human agency have been an important part of this research, which has at times fueled political controversy over issues such as indigenous rights and conflicting claims to resource use.

The expansion of archaeological and related research over the last few decades has made clear that human-environmental interactions are complex and variable across time and space. Simplistic developmental trajectories, based on hypothetical sequences of the practices by which human groups have drawn food and other resources from their environments, have been superseded by more complex local and regional sequences. These are based on a wide range of evidence from many disciplines, derived from a profusion of new, analytically sophisticated research techniques and revised research questions.

Recent research on tropical forests has shown that these are mostly not primeval remnants of an ancient, unpeopled world and that human impacts on them are not restricted to relatively recent degradation, nor are they inevitably destructive (Brookfield 2001; Baghwat et al. 2008). There has been an upsurge of interest in traditional small-scale tropical forest farming systems, many of which can be described as agroforestry, drawing together descriptions in older literature with newly identified variants. Ethnobotanical studies have shown that local systems of plant management often articulate elements that lie outside common analytical conceptions of agroecosystems, thus extending the boundaries of human influence on vegetation across space and over time (influential examples are Yen (1974) for Oceania and Alcorn (1981) for Mexico).

Traditional, subsistence-oriented agroforestry systems encompass fixed, rotational, and shifting fields and may include trees for food, fuel, medicine, forage and other uses, as well as for soil improvement and erosion control. While there is a strong association with tropical rainforest, there are tropical savanna and temperate examples as well.

Among the most familiar agroforestry systems (though not usually so-described) is the archetypical palm-fringed tropical South Pacific island. Its traditional components, apart from coconuts, include iconic ornamentals such as hibiscus and gardenia, breadfruit, and other tree crops, along with root and herbaceous food crops. These Pacific farming systems have often been characterized as arboriculture (Yen 1974), emphasizing the tree crop component, which is certainly distinctive but nevertheless an integral part of the larger system (Clarke & Thaman 1993).

Another classic exemplar of an agroforestry system is the Guatemalan orchard-garden minutely described and mapped by Anderson (1952: 137–40). And in northern Luzon, in the Philippines, Conklin's (1980) detailed research over many years on the monumental rice terraces of the Ifugao showed how they are embedded as one component, albeit overwhelmingly picturesque, of an intricately managed and flexible landscape architecture in which "woodlots" are essential. These carefully managed mini-forests provide food, medicine, firewood, and construction materials but most importantly, anchor the water and soil that maintain the terraces (Conklin 1980; Brookfield 2001: 18–20).

The literature describing traditional systems of tree management in the tropical New World expanded rapidly during the 1980s and in Southeast Asia, especially Indonesia, in the 1990s (summarized in Brookfield 2001: 140–56). Regional surveys of modern agroforestry practices often begin with thumbnail accounts of past practices for which high antiquity is asserted (e.g., for China, Hsiung et al. 1995; and Europe, Eichhorn et al. 2006). Although it is commonly accepted that the widespread and varied traditional forms of agroforestry systems have considerable time depth, evidence of this is often weak. In a few areas, the detailed ethnographic and ethnobotanical descriptions of extant traditional agroforestry systems have attracted the attention of archaeologists and provided the impetus for research on the origins and development of these tree-based agroecosystems, using archaeobotanical and paleoecological evidence. Such research contributes to wider debates among archaeologists and others on Pleistocene to Holocene environmental change, human-environmental interactions in general, and trajectories of plant-based human resource use in particular.

Key Issues/Current Debates

Tropical rainforests, under increasing threat from the encroachments of the modern world, have become the focus of increased attention from many disciplines: ecology, climatology, biogeography, and the politics of resource use prominent among them. Rates of change, at all scales and time periods, are a critical and highly contentious issue, as are the nature and timing of human impacts. The recent upsurge of multidisciplinary interest has largely rewritten tropical rainforest ecology and has opened new debates in archaeology and historical ecology.

Most archaeological research on agroforestry and related systems has so far been concentrated in the tropics, especially the New World, where establishing evidence for plant food production is problematic. Tropical agroecosystems are a poor fit for standard theoretical frameworks concerned with agricultural origins, in which the sharp contrasts of foraging/farming and wild/domestic are supported by relatively well-defined domestication syndromes of annual seed crops (Fairbairn 2005). Systems based on these crops do not furnish comprehensive models of the much greater range of practices which produce foods from plants managed in modified environments. Perennial crops, especially those propagated vegetatively, have been largely overlooked in synthetic models linking domestication processes and landscape management (McKey et al. 2012). Because of their long life spans and slow growth, tree crops are an especially difficult category (Kennedy 2012). Recent research has begun to increase the range of plants examined, as new techniques in archaeobotany are more often applied, and comparative collections expanded.

Understanding the development of crop assemblages and agroecosystems has tended to be sidelined by research, especially recent genetic research, on individual crops. Current archaeological research on local and regional trajectories of prehistoric human resource use ranges in scale from the isotopic signatures of dietary histories of single individuals to cultural and environmental transformations over millennia. The complexity of new data requires very specialized technical skills and more sophisticated models than ever. The challenge to develop interdisciplinary collaborations,

based on shared understanding of complex laboratory methods matched with the flexibilities needed for field research, has never been greater.

International Perspectives

Although agroecosystems that might be described as agroforestry exist virtually throughout the cultivated world, archaeological research on these has been concentrated especially in the tropics. In temperate areas of the Old World, where research on the prehistory of agriculture has concentrated especially on the cereals, other crops, including trees, have tended to be considered species by species, if at all. Their integration as part of agroecosystems has been less of an issue than their incidental presence in cultivated landscapes.

Recent archaeological work in the New World has focused directly on agroforestry. In tropical Central America and Amazonia, there is an emerging consensus of widespread modification and more or less intensive management of forest, including successional fallows (reviewed by Brookfield 2001: 141–6). However, debate continues about the origins of particular crops, the directions and rates of spread of these, and the sequence of practices associated with their management.

Landscape-focused, multidisciplinary research on agroforestry and management of water resources around the Mayan site Tikal has recently been renewed (see Further Reading, below). In western Ecuador, in a valley-wide study, Stahl and Pearson (2012) drew together macrobotanical, phytolith, and faunal data from archaeological contexts to infer that pre-Columbian agroforestry was practiced, producing a managed landscape mosaic in which domesticated annuals were combined with perennial tree crops and useful forest taxa. In the Peruvian Andes, Chepstow-Lusty and Winfield et al. (2000) used historical and ethnographic data along with pollen cores and archaeologically provenanced charcoal from fuel wood, to examine Inca management of trees for firewood, construction, and tool making. Their data imply that this management would also have protected water resources.

In the Pacific, the relatively rich ethnohistorical and ethnobotanical records of traditional agroecosystems of the small, remote islands, especially those of Polynesia, form a particularly striking paradigm of landscape transformation under human management. Most of the plant food resources of these islands are human introductions. Archaeobotanical and paleoecological research on these islands is increasingly directed to resolving local sequences that span both prehuman and human phases of environmental change and to disentangling human action from other causes of environmental change. Human agency here includes construction of agricultural features such as terraces and ponded fields and extensive tree planting as well as erosion and deforestation. Athens et al. (1996) considered development of the traditional agroforestry system of Kosrae, a Micronesian high island, using pollen, sedimentological, and macro- and micro-charcoal evidence derived from cultural and noncultural contexts. They argued that this system, in which the trees and other crops are introduced cultigens, was established rapidly after the first colonization and persisted relatively unchanged for nearly two millennia. In contrast, developmental sequences have been proposed for other remote Pacific islands, starting with shifting cultivation which is then gradually transformed by intensification of land use and management of the introduced tree crops.

Further west, on larger islands of the southwest Pacific, the time span of human settlement extends back to the Pleistocene. The extended trajectories of human resource use are enmeshed with the effects of late Pleistocene climate change and include transition from hunter-gatherer to agricultural economies and domestication of local plants as well as extensive landscape modification. On these large islands, cultivated and wild populations of closely related tree species coexist, often without easily defined boundaries between them.

Ethnobotanical and other descriptions provide incomplete coverage of the very diverse agroecosystems, many of which are tree based (Kennedy 2012). Archaeobotany in these islands confronts the pioneering challenges of poorly specified models and inadequate reference collections (Fairbairn 2005). Archaeobotanical and other evidence for sequences of resource use is scarce, especially in the lowland areas of tropical rainforest. In the densely populated intermontane valleys of highland New Guinea, the striking diversity of extant intensive agricultural systems reflects a long and complex prehistory. Haberle (1998) collated chronological data from 16 archaeological and 23 paleoecological sites across the highlands, showing indirect evidence of changes associated with agriculture over the last 2000 years. These include most notably an increase in pollen of *Casuarina*, likely to represent a nitrogen-fixing species (*C. oligodon*) widely planted today for firewood and construction, and recognized as having sacred/aesthetic value and as a soil improver. There are also changes in palynological and sedimentological data indicative of landscape disturbance. Tephra chronology and sequences of archaeological features articulate with the other records to show an overall picture of dramatic and widespread change. Since these changes are not synchronous across the highlands, Haberle (1998) suggests that they reflect human activities, including adoption of new crops and new management practices such as agroforestry, as well as climatically driven environmental change.

In Southeast Asia, the large literature describing extant systems of agroforestry is mentioned above. This record raises questions for archaeobotanical and paleoecological research that are yet to be addressed in any detail. The region suffers from much the same challenges of pioneering research as the large islands of the southwest Pacific to the east (Fairbairn 2005). In some areas, including the islands of Java and Borneo, it is commonly assumed that systems such as fallow management and household orchards are historically recent developments, but evidence for this is lacking (Brookfield 2001: 146–7).

In Africa, the literature on modern agroforestry systems is enormous, and the remedial interventions that this literature documents were first developed there. There is nevertheless recognition in this literature of the existence of traditional forms of agroforestry, though without much evidence for their antiquity. Archaeological studies have begun to remedy this. For example, Neumann et al. (2012) point out the widespread importance in archaeological sites, all over West and Central Africa from the semiarid Sahel to the humid rainforest, of intensively exploited trees, especially those with oil- and fat-containing seeds and fruit, over at least the last 2,500 years. Archaeobotanical and other records elucidating how and when these trees have come to be integrated with other crops are so far very limited. Some of the trees, notably oil palm (*Elaeis guineensis*), are now important crops on the world market. Genetic research to improve this resource is very likely to provide useful insights relevant to its past. As elsewhere, archaeological evidence for the origins and development of African traditional agroforestry systems needs more research oriented to archaeobotanical and paleoecological questions.

Future Directions

Since the role of human agency in environmental change is currently a subject of great interest, the extended time scale contributed by archaeological studies is likely to be increasingly valuable. Archaeological research based on multidisciplinary collaborations enables the investigation of complex linkages between patterns of human resource use and environmental change, encouraging the development of more sophisticated models than before.

Human use of plant resources is undergoing reassessment, as new techniques allow more direct and detailed data bearing on previously difficult questions, such as the constitution of individual diets, rates of genetic change of plants under human management, and fine-grained environmental fluctuations. As a result, existing models of the ecological relationships that

underpin human subsistence are subject to renewed critique (e.g., Zeder 2012).

Insights from the extensive new research on agroforestry and related practices in the New World are likely to be influential and to stimulate similar work in other areas.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Landscape Domestication and Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology

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Aguigah, Angèle Dola

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Aguigah, Angèle Dola, Fig. 1 Mrs. Angèle Aguigah

Basic Biographical Information

Dr. Angèle Dola Akofa Aguigah (Fig. 1) is the first female archaeologist from Togo. She was born 4 December, 1955, in Lomé, Togo, where she grew up. Dr. Aguigah is the first female archaeologist in Togo and one of the only archaeologists in the region to defend two doctoral theses in archaeology. In 2007, Dr. Aguigah was admitted to the rank of Living Human Treasures of Togo.

Dr. Aguigah undertook her higher studies in France, where she obtained at the University of Paris I, Pantheon-Sorbonne, a License in Archaeology and general History of Art (1978–1979), a MA in African Archaeology (1980–1981), a Diploma of Advanced Studies (1981–1982), and a Ph.D. in African Archaeology (1982–1986) (Aguigah 1986). She also obtained a Certificate in Regional Planning and Urbanism from the National Arts Centre of Paris in 1992. In 1991, Dr. Aguigah started work on a second African Archaeology Ph.D. thesis, successfully defended in 1995 at the University of Paris I, Panthéon-Sorbonne, under the supervision of the late Professor Emeritus Jean Devisse (Aguigah 1995).

Dr. Aguigah is a Senior Lecturer at the Universities of Lomé and Kara (Togo) and also teaches art history at the School of African Architecture and Urbanism. She is the Head of the Archaeological Program of Togo and a consultant in cultural heritage. She has given courses in several universities in West Africa, France, and the United States of America. She has directed several archaeological excavations and her research on Notsé, Tado, Dapaong, Nook (Togo), and Bè sites is the subject of an exhibition at the National Museum of Lomé (Togo).

She has participated in several international conferences and scientific events and is a member of several associations and networks, including the UNESCO-Network Forum at the World Heritage Centre of UNESCO, the Council of African Museums, and the Board of Directors of the West Africa Museums Program. Dr. Aguigah's administrative duties include being Secretary-General of the Association of Heritage Friends, Lomé; Vice-President of Togolese ICOM (International Council of Museums), Lomé; President and

member of the Togolese ICOMOS (International Council on Monuments and Sites), Lomé: and in 1999–2001 President of West African Archaeological Association (WAAA). She is still the current president of this Association (2013–2015). She is also President of the Network of African Women Ministers and Parliamentarians section of Togo.

Dr. Aguigah has received many decorations and awards during her career. Notable among these are the Order of Merit from the University of Lomé (1999); Knight of the French Order of Academic Palms (2002); Officer of the Order of Mono, Togo (2002); Award of Excellence at the University of Lomé (2005); and a Distinguished Personality of the African Jubilee of Independence of Togo (2010).

Major Accomplishments

Dr. Aguigah's fieldwork across the Togolese territory has contributed to knowledge of the rich archaeological heritage of the country and to the protection and management of this heritage. One of her major accomplishments is rehabilitation of the archaeological sites of Notsé, Bassar, and Tcharè (Togo). As a consultant to UNESCO, she undertook an inventory of the intangible cultural heritage in Togo in 2008. She is currently coordinator of the ongoing study of the caves sites of Nook and Mamproug for their registration on World Heritage list of UNESCO.

Dr. Aguigah has occupied high positions in her country. She was Minister Delegate to the Prime Minister's Office in charge of Private Sector of Togo (2000–2003) and Minister of Culture of Togo (2003–2005). This last function enabled her to put her competences as an archaeologist to the service of her country. The concrete actions that she undertook included the presentation of the "Cultural Landscape of Koutammakou" and its registration in the World Heritage list of UNESCO, the first cultural landscape registered in Togo; realization of the first edition of "Heritage Month" in the Togo official launch of the site of Koutammakou; revaluation of endangered culinary heritage through the presentation of dishes in the maritime region, Aného; carrying out a study on the development of cultural industries and identifying opportunities for economic growth in Togo; creation of Regional Directions of Culture in the context of decentralization of culture in Togo; facilitation of an exhibition "Museum and Heritage Woman" at the artisanal center of Lomé for International Women's Day; meeting with tour operators and travel agencies on the socioeconomic management of heritage sites; and coordination of the cultural policy of Togo on an international level in the context of globalization, cultural diversity, and intercultural dialogue.

Dr. Aguigah has contributed to the training of several generations of archaeologists in West Africa. In addition, she has participated in important archaeological fieldwork particularly the excavations of the Loropéni ruins southwest of Burkina Faso, required for the registration of this site on the UNESCO World Heritage list in 2009.

Cross-References

- ▶ International Council of Museums (ICOM)
- ▶ International Council of Museums (ICOM): Code of Ethics
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS) (Museums)
- ▶ World Heritage List: Criteria, Inscription, and Representation

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'Ain Difla Rockshelter

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Introduction

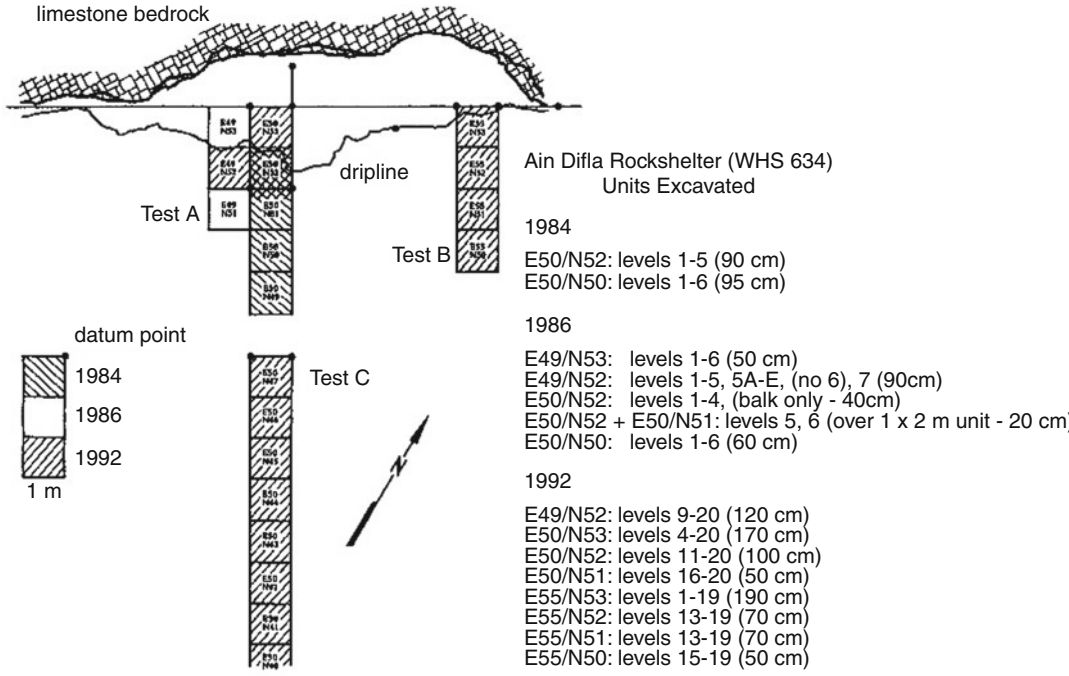
'Ain Difla (WHS 634) was discovered by Burton MacDonald's Wadi Hasa Survey in 1982 and was partially excavated by Geoffrey Clark in 1984, 1992, and 1993; by Clark and Gary Rollefson in 1986; and by Zeljko Rezek in 2010 and 2011 (Fig. 1). Located at c. 780 m above sea level in the Wadi Ali, a southern tributary of the Wadi Hasa in west-central Jordan, the site consists of a small wedge of sediment preserved under the overhang of a large rockshelter, the contents of which have mostly been emptied by fluctuations in the course of the wadi, now located some 12 m below it. Intact deposits cover about 35 m^2 and extend to a depth of c. 6–7 m in the talus slope in front of the rockshelter (Fig. 2). Preservation within the rockshelter is a function of its location, nestled within a recessed cavity that protected it from lateral erosion and slope retreat.

Definition

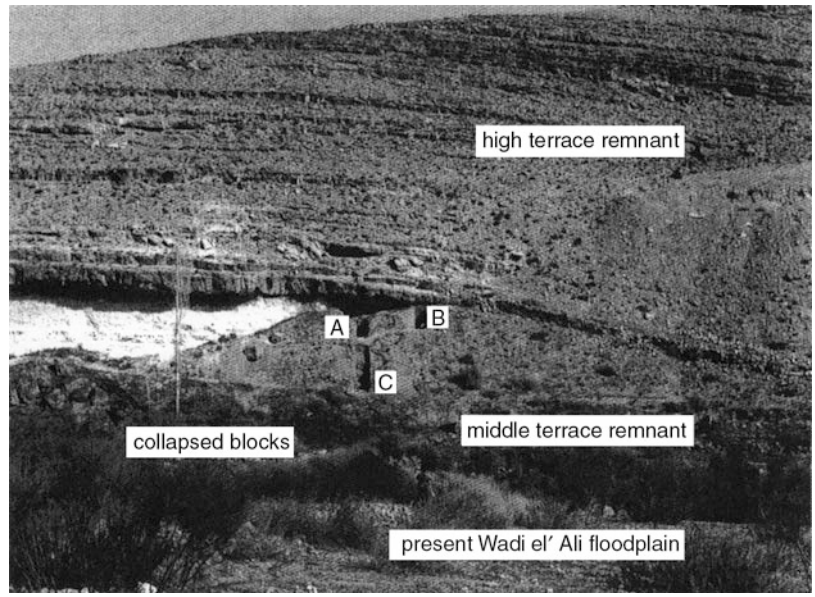
Field profiles record approximately 30 thin, moderately sloping (7–15°) to subhorizontal layers or lenses in Tests A and B, which reached a depth of 2.1 m below datum. Excavation proceeded by 10 cm arbitrary levels (spits) because the natural stratigraphy of the extremely dry sediments was very hard to follow clearly. Three primary sediment "packages" comprise (1) surface debris, roof spall, deflated silts, and pockets of calcreted organic residues (0.0–0.6 m); (2) organic silts and oxidized sands associated with weathering and water-laid (possibly seasonal) sedimentation (0.6–1.4 m); and (3) more consolidated flowstones and breccias interstratified with organic lenses that accumulated episodically and were subsequently calcified (>1.4 m).

A geological section, Test C, was excavated to a depth of 7 m below datum to determine the relationship of the rockshelter fill to the high (12–30 m) and middle (3–7 m) terraces of the wadi. It showed that, although scattered artifacts occurred in fragments of both terraces, relatively intact cultural deposits backed up against the shelter wall were confined to the talus slope fronting the site. Six primary depositional units were recognized, variously subdivided. The lowest part of the sequence rests on what appears to be a fragment of the middle terrace and consists of alluvial sands and silts, gravel stringers, and local slope wash (units 6–4A). Unit 3B records an episode of brecciation, and the upper part of the sequence consists of slope collapse, scree, mixed colluvium, rubble, and roof spall (units 1–3A).

Northwest of the rockshelter, three massive blocks of tufa (calcium carbonate precipitates) cover the mid-slopes of the Wadi Wanid, a tributary of the Ali. The base of the highest of these lies at approximately the same elevation as the upper third of the occupation levels in the rockshelter and is thought to be roughly



'Ain Difla Rockshelter, Fig. 1 A plan view of the 'Ain Difla rockshelter (WHS 634): units excavated during the 1984, 1986, and 1992 field seasons in Tests A, B, and C (After Clark et al. 1997: 80)



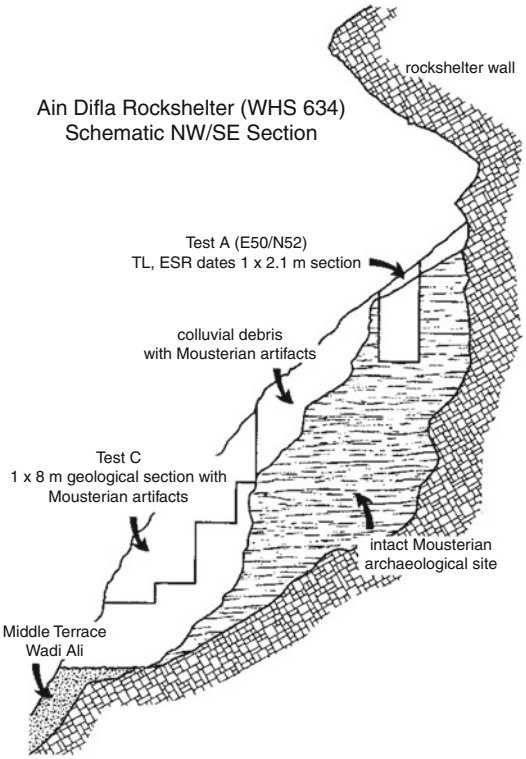
'Ain Difla Rockshelter, Fig. 2 View of 'Ain Difla from the south bank of the Wadi Ali showing the locations of Tests A–C, the high (12–30 m) and middle (3–7 m) terraces, and the present wadi floodplain (foreground). A linear pile of boulders from a major collapse of the shelter overhang can be seen to the left. The position of these rocks indicates that the shelter overhang extended at one time at least 10 m beyond its present location (After Clark et al. 1997: 78)

contemporaneous with it. Dated to 141 ± 20 ka BP, it represents an ancient spring that could have recharged the aquifer that fed the active wadi systems during the Upper Pleistocene prior to the cut and fill sequences registered in the middle and low (0.5–1.5 m) terraces (Fig. 4).

'Ain Difla is a Middle Paleolithic (Mousterian) site dated by 10 thermoluminescence (TL),

thorium/uranium (Th^{230}/U^{234}), and electron spin resonance (ESR) determinations to 180–90 ka BP. The site was assigned to the Middle Paleolithic based on the absence of any later materials in the initial surface collection (1982) and the presence of elongated Levallois points. The excavations produced an assemblage of 19,132 stone artifacts, one of the largest from the region. Statistical descriptions of the lithic assemblage using standard Bordesian indices and ratios, a use-wear study of a sample of the Levallois points, the stratigraphy, sedimentology, landscape geomorphology, paleontology, and palynology, have been published (Lindly & Clark 1987, 2000; Clark et al. 1987a, b, 1997; Schuldenrein & Clark 1994, 2001, 2003; Mustafa & Clark 2007).

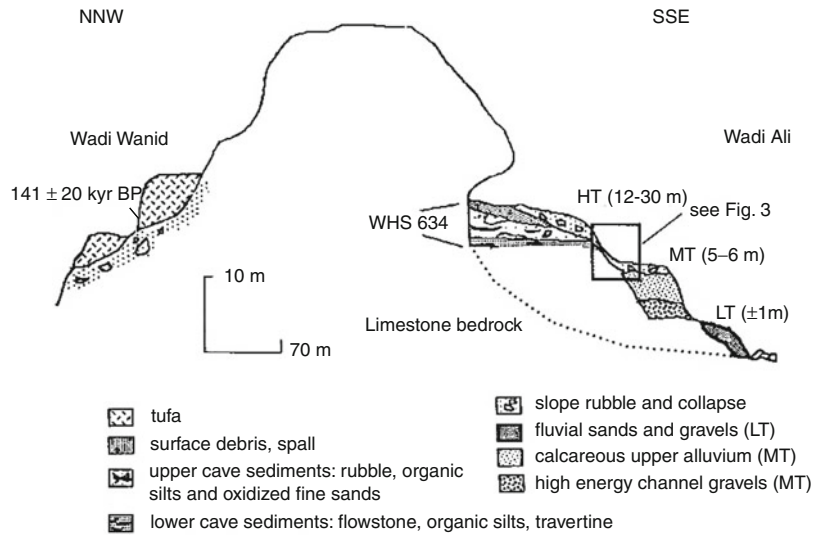
Although samples were taken from the entire sequence, pollen was recovered only from Levels 1 and 3. These layers are dominated by non-arboreal taxa indicating steppe vegetation (Chenopodiaceae, Tubuliflorae, Artemisia, Gramineae, Cruciferae), suggesting that the last phase of occupation took place during a cool, dry interval, perhaps MIS 6 (186–127 ka BP): or the early part of MIS 5 (121–27 ka BP). A TL determination from Level 5 (105 ± 10 ka BP) dates the latest possible occupation at 'Ain Difla because the pocket of sediment that constitutes the site extended up to within about 50 cm of the shelter overhang.



'Ain Difla Rockshelter, Fig. 3 A schematic NW/SE section through the 'Ain Difla rockshelter showing gross stratigraphy in relation to bedrock and to what is probably the middle terrace of the Wadi Ali – not drawn to scale (After Clark et al. 1997: 79)

Faunal analyses are also consistent with a cool, dry, steppe environment. The sparse assemblage is largely confined to teeth and is dominated by equids (wild ass, horse, or possibly, zebra – *Equus hemionus*/*asinus*; *Equus* sp. indet.) and caprids (goat or ibex – *Capra* spp.) but gazelle (*Gazella* sp. indet.) are also present. Grassland grazers, gazelle and equids (three species) are indicators of steppe or steppe/desert conditions, consistent with the dry conditions indicated by the pollen.

Technological, typological, and metrical analyses of the 'Ain Difla lithics are consistent with previous studies that align 'Ain Difla with the Tabūn D-type Levantine Mousterian. First defined by Dorothy Garrod at Mugharet et-Tabūn, a cave on Mt. Carmel, Tabūn D-type assemblages are typically made on laminar blanks (blades, elongated points) derived from Levallois and non-Levallois unipolar convergent and bipolar cores (Fig. 3). Based on core reconstructions, Meignen (1994) notes a change in the volumetric concept of reduction that differs little from that of Upper Paleolithic blade industries. Tabūn D assemblages often contain a higher frequency of retouched pieces when compared with those assigned to Tabūn C and B. Bifaces are usually absent, and those reported by Garrod at Tabūn layer D could have resulted from mixture with uppermost Layer E, assigned to the Acheulo-Yabrudian (Bar-Yosef 1998). Tabūn D-type assemblages are reported from Tor Abu Sif and Sahba, in the Judean Desert; at Rosh Ein Mor and Nahal Aqev 3, in the central Negev highlands; in the Galilee at Hayonim lower layer E; at Jerf Ajla and Douara Cave



'Ain Difla Rockshelter, Fig. 4 A schematic NNW/SSE section through the cuesta ridge separating the drainages of the Wadi Ali and the Wadi Wanid – vertical scale exaggerated (After Clark et al. 1997: 80)

layer IV, in the Palmyra Basin; the Hummalian sites at El Kowm, in Syria; and at the 'Ain Difla rockshelter, in west-central Jordan. TL and ESR dates from Tabūn and 'Ain Difla indicate temporal spans of 270–170 ka BP (Mercier et al. 1995) and 184–90 ka BP (Clark et al. 1997) respectively, suggesting that human use of the site falls in the latter half of the Levantine type D Mousterian chronology. No human fossils have so far been recovered from any D-type site, so the authors of this Mousterian facies remain unknown. Neanderthals have been found in association with Type B industries at Kebara and Amud and with Type C industries at Tabūn, whereas early modern humans are associated with Type C industries at Qafzeh and Skhūl. Although dated sites are few, there is general agreement that the D-type industries mostly predate the last interglacial (MIS 5, 127–71 ka).

Although Middle Paleolithic sites are fairly common and well-published west of the Jordan Rift (see, e.g., Bar-Yosef 1998), stratified Middle Paleolithic sites in Jordan are confined to 'Ain Difla, and to Tor Sabiha, and Tor Faraj rockshelters in the Wadi Hisma below the Ras en'Naqb escarpment in southern Jordan (Henry 1995, 2003), and the open-air sites of Ar Rasfa on the eastern edge of the Jordan Rift in the northwest part of the country (Ahmad & Shea 2009) and WHS 621, at the eastern end of the Wadi Hasa (Clark et al. 1987).

Except for a very low incidence of retouched pieces (1.1 %), 'Ain Difla is in good agreement with descriptions of the Levantine Type D Mousterian. Typological and technological comparisons with other Levantine Mousterian sites suggest that the evolution of the blade-rich Mousterian can be viewed as a continuum between the early (Tabūn) and late (Boker Tachtit) Mousterian, that (on any index) 'Ain Difla falls somewhere around the middle of that continuum, and that after about 47 ka BP, Mousterian laminar technologies develop more or less continually into the early Upper Paleolithic Ahmarian. It might also be the case that blade-dominated industries long predate the Mousterian itself, extending far back into the Lower Paleolithic (Monigal 2001).

Key Issues

'Ain Difla derives its importance from several aspects of modern human origin (MHO) research in the Levant and from an ongoing debate about the compositional integrity and behavioral implications of the basic analytical units used there, the Mousterian facies defined by Garrod at Tabūn.

MHO research in the Levant is guided by two conceptual frameworks that, in their extreme forms, are almost diametrically opposed to one

another: (1) the multiregional continuity (MRC) model (e.g., Wolpoff et al. 2000) and (2) the recent African origin (RAO) or replacement model (e.g., Stringer 2007). MRC advocates emphasize strong evidence for continuity in adaptation based on fossils and on archaeology and supported by studies of symbolic and mortuary behavior. MRC holds that archaic *Homo sapiens* evolved independently into anatomically modern humans in the Levant and elsewhere, that gene flow through interactions between neighboring groups was sufficient to maintain species integrity over large areas, and that differences between archaic and modern *H. sapiens* are subspecific or populational, rather than specific. RAO emphasizes the results of genetic analyses of human mitochondrial DNA and "spread-and-replace" scenarios drawn from certain construals of pattern in the archaeological record. RAO maintains that anatomical moderns arose as a speciation event in an isolated region of east Africa and that they migrated, radiated, or dispersed from Africa throughout Eurasia after c. 100 ka, eventually replacing all other archaic hominins over the range originally colonized by *Homo erectus*.

'Ain Difla is important in MHO research because evidence from the site supports Jelinek's arguments for local continuity in cultural development at Tabūn (e.g., Jelinek 1981). At neither site are there any indications of obviously intrusive elements, as would be expected under the RAO models proposed by Stringer (e.g., 2007) and others. The core tenet of the RAO model is that if anatomically modern African immigrants were moving into the Levant and replacing indigenous archaic populations there, that process should be evident in the appearance of a distinctive cultural repertoire, with an archaeological "signature" that differs from that of the indigenes and that it should be discernible in differences in adaptation between archaic and modern populations. While changes in technological continuity are not necessarily related to changes in human morphology, continuity in adaptation as monitored by the archaeology tips the balance in favor of multiregional continuity as the hypothesis best supported by the available evidence (Mustafa & Clark 2007).

The 'Ain Difla research is also noteworthy in an epistemological sense because work there has had important implications for pattern in the Levantine Mousterian and what it might mean in terms of human behavior. The large collection from the site has been compared to those from 19 other Levantine sites classified by reference to the 3-facies sequence at Tabūn (Culley et al. in press). Keeping in mind that 'Ain Difla is only a small part of a much larger site, now destroyed, the work showed that human occupations were ephemeral and episodic, of short duration, by small numbers of people and that there was little evidence for prolonged use of the locality. A dozen small circular or oval hearths attest to visits by perhaps three to six individuals, a pattern most consistent with an overnight hunting camp by a small party dispatched for some particular purpose from a larger residential base located elsewhere. There is little evidence for core preparation, primary and secondary reduction, and almost no retouched pieces, indicating the provisioning of mobile individuals with a limited number of tools they could carry with them, rather than the full repertoire of lithic processing activities expected at a long-term residential base.

Work at 'Ain Difla is ongoing, with current efforts directed toward refining the radiometric chronology of the upper sequence using optically stimulated luminescence (OSL) dating of sediments from Levels 1–5.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Hunter-Gatherers, Archaeology of
- ▶ Lithic Technology, Paleolithic

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Aitken, Martin

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Basic Biographical Information

Following a B.A. in physics and a D.Phil. in high energy physics at the University of Oxford, Martin Aitken (1922–) was appointed in 1957 as the Deputy Director of the Oxford Research Laboratory for Archaeology and the History of Art which had been established two years earlier through the combined efforts of Lord Cherwell and Professor Christopher Hawkes under the directorship of Edward (Teddy) Hall. Martin Aitken then continued to work at the Oxford Research Laboratory until his retirement in 1989.

Major Accomplishments

In the early days, his two main research interests were magnetic dating and magnetic prospection,

of which the former remained an ongoing interest throughout his career. Initially, magnetic dating involved the measurement of the past direction of the Earth's magnetic field using large samples extracted from in situ kilns and hearths, but later, the method was extended to the measurement of the past intensity of the magnetic field, an approach that did not require in situ samples but could be applied to pottery sherds. Although as a dating method, the technique never realized its initial expectations; the results have helped toward our understanding of the origin of the Earth's magnetic field and are thus an example of the contribution of archaeology to science rather than vice versa.

In 1958, he undertook the first successful magnetic survey on an archaeological site using a proton magnetometer which had been developed and built in the Oxford Research Laboratory. Originally developed to locate kilns for magnetic dating, it was immediately found that the proton magnetometer could also be used to detect filled-in pits and ditches, as well as stone walls surrounded by topsoil. Thus, the very considerable potential of magnetic prospection for the investigation of archaeological sites prior to excavation was established, and as a result, magnetic prospection, using various types of magnetometer, is now extensively used on archaeological sites throughout the world.

One consequence of his involvement in magnetic prospection was the emergence of the International Symposium on Archaeometry. In 1962, he organized a course for archaeologists who had purchased proton gradiometers from the Oxford Research Laboratory. During subsequent years, regular reunions of these gradiometer users were held in Oxford, and gradually the scope of these reunions expanded to include other aspects of archaeometry until eventually they evolved into the annual (now biennial) International Symposium for Archaeometry, of which the 39th symposium was held in 2012. From their inception, he was Chairman of the Standing Committee responsible for their organization, subsequently, from 1990 to 2008, taking on the role of President.

In 1960, he initiated the first detailed research into the use of thermoluminescence (TL) phenomena for the dating of archaeological ceramics. Subsequently, luminescence dating was his primary research interest through until his retirement and beyond. Thus, he was actively involved in all the wide-ranging developments that occurred from its beginnings as a method for dating and authenticating ceramics, through TL dating of burnt flint and calcite deposits in caves, to the development of optically stimulated luminescence (OSL) dating of sediments. Again, the first Specialist Seminar on Thermoluminescence Dating that he organized in Oxford in 1978 evolved into the current triennial International Conference on Luminescence and Electron Spin Resonance Dating, of which the 13th conference was held in 2011. As a result, he established the Oxford Research Laboratory as an internationally recognized center of excellence for luminescence dating.

In addition to more than 150 scientific papers, he published the first comprehensive textbook on archaeometry, entitled *Physics and Archaeology* (1961, Interscience Publishers, London). Subsequently, as well as a second edition of *Physics and Archaeology* (1984, Clarendon Press, Oxford), he published books entitled *Thermoluminescence Dating* (1985, Academic Press, London), *Science-Based Dating in Archaeology* (1990, Longman, London), and *An Introduction to Optical Dating* (1998, Oxford University Press, Oxford). In addition, until 1989, together with Professor Edward Hall, he edited the journal *Archaeometry* from its humble beginnings as the Bulletin of the Oxford Research Laboratory through to its current status as one of the primary international journals for the subject. He has further contributed to the development of archaeometry through his supervision of a succession of research students, several of whom have continued to work in the field and become authorities in their own right.

Recognition of his contribution to the subject both nationally and internationally came: first, in 1983, with his election as a Fellow of the Royal Society and second, in 1985, when he was given an ad hominem Chair in Archaeometry by the University of Oxford.

Thus, throughout his career, Martin Aitken has been at the forefront of research in archaeometry and has played a major role in ensuring the subject's national and international recognition within both the archaeological and scientific communities. Therefore, he can be truly seen as one of the "fathers" of archaeometry, even though, having confined his research to scientific dating and prospection methods, he has always regarded himself as being primarily a physicist rather than an archaeological scientist.

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- ▶ Archaeometry: Definition
- ▶ Hall, Edward T.
- ▶ Research Laboratory for Archaeology and the History of Art (University of Oxford)

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Akrawi, Aysar

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Basic Biographical Information

Aysar Akrawi's educational background is in history and political science, and she has undergone extensive training in senior management. Previous positions have included setting up and managing The Queen Noor College for Civil Aviation and introducing and implementing entrepreneurial projects for women in rural areas of Jordan.

Major Accomplishments

Aysar Akrawi has occupied the position of executive director of the Petra National Trust (PNT) since 1994. In this capacity, her responsibilities are diverse. As it is the aim of the Trust to advocate for the preservation of the cultural and natural heritage as well as the integration of the local communities in the decision-making process of the PAP and the Petra region, she is responsible for the planning, implementation, and supervision of the Trust's projects; the local and international publications; and coordination with governments, other NGO's, international donors, and international preservation organizations and societies. Finally, she is also responsible for the correlation with the media, educational systems, and action groups with the purpose of increasing public awareness of the World Heritage Site of Petra.

One of PNT's major roles throughout Aysar Akrawi's tenure has been advocacy for protection of Petra and its associated Outstanding Universal Values.

PNT has called for maintaining a rational balance between the dictates of the site's fragile environment and the role of tourism in the region's economy. Community involvement in the development and protection of this important heritage remains a high priority for PNT.

A major mechanism for this inclusion is the Petra Junior Ranger Programme, in which youth from the communities surrounding Petra learn about the site and its significance to their heritage. This project raises awareness among future decision makers, arming them with important knowledge and skills. Additionally, PNT has implemented conservation projects with local, national, and international partners that save both monuments and lives. The PNT furthermore pivotally serves as the institutional memory of developments in the state of management and conservation of Petra.

Cross-References

- ▶ Living Communities: Local Communities in Site Management and Advocates for Site Preservation
- ▶ Petra, Archaeology of
- ▶ Petra National Trust and the Challenge of Site Management at Petra
- ▶ World Heritage List: Criteria, Inscription, and Representation
- ▶ World Heritage Objectives and Outcomes

Further Reading

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Aksum: Environmental Archaeology

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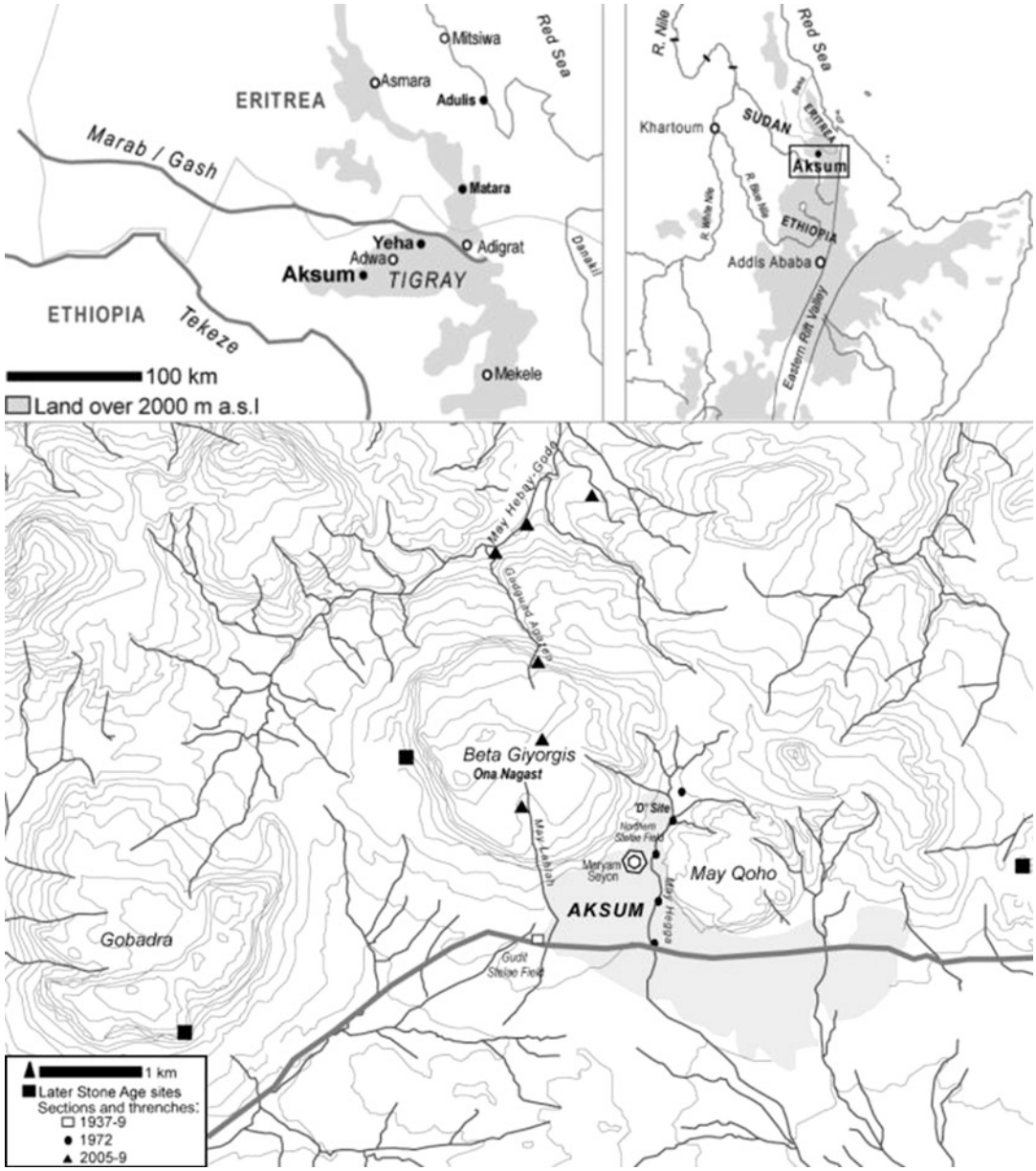
Introduction

Rising above the Sudanese lowlands to the north and the Red Sea coastal plains to the east, the highlands of northern Ethiopia and Eritrea have long been recognized as a center of plant domestication and host of some of the earliest complex societies of sub-Saharan Africa. The intensification of contacts with southern Arabia in the first millennium BCE favored the development of complex societies and, later, the emergence of the Kingdom of Aksum (BCE 50–CE 800). Aksum is located on a gentle plain at the heart of the Tigray highlands (Fig. 1) which provided excellent ground for the new kingdom to thrive for almost a 1,000 years by engaging in long-distance trade and commerce, developing literacy and coinage. The adoption of Christianity in the mid-fourth century CE furthered Aksum's importance within and beyond northeast Africa. This historical significance has fostered intensive archaeological research in the region, but the history of its diverse environment has received little scholarly attention until recently. Today, Aksum (UNESCO World Heritage Site, 1981) is one of the most important archaeological sites of Africa and remains the leading religious center for the Ethiopian Orthodox Church. As environmental archaeology in Ethiopia and Eritrea grows, the historical contexts of landscape change are becoming increasingly prominent in current debates about land degradation and sustainable resource uses.

This review begins by outlining the environmental aspects that have been explored by archaeological research at Aksum. The historical background traces the emergence of archaeological research through three main phases: the "discovery" (1900s–1940s), the "consolidation" (1970s–1980s), and the "diversification" of the last two decades. A third section explores the emerging critique of environmental history models in the light of new research findings and changing perspectives. The review ends with a remark on the emphasis on the role of environmental archaeology (and history) to current debates on heritage management, land degradation, and sustainable resource use.

Definition

Environmental archaeology in the northern highlands of Ethiopia has focused on three main



Aksum: Environmental Archaeology, Fig. 1 Map of Aksum: (*top row*) regional map and the location of Tigray; (*bottom row*) the Aksum area (contours are at 20 m interval)

topics: (1) the development of settlement and its impact on the landscape, (2) the availability and management of environmental resources, and (3) the legacy of past land uses into present-day landscapes and societies. The emphasis on these topics is much the result of advances in archaeological methods and the sociopolitical transformations that have shaped modern Ethiopia. Intensive archaeological survey and reconnaissance records have provided data for reconstructing the settlement history of the Aksum plain. However, while the research focus on the development of the kingdom has produced well-defined settlement trajectories for the first

millennium CE, the records for the periods before the emergence of Aksum and following its decline are patchy, and there are important gaps. For example, excavations at rockshelter sites have elucidated aspects of the later prehistoric occupation (c. ninth/eight millennia BCE) in the hills surrounding the Aksum plain (Phillipson 2000), but the landscape that hosted these early groups is poorly understood. In fact, no solid environmental record is available from Aksum for this period, though regional and continental datasets of past climate are available. The regional record of significant climate amelioration at the beginning of the Holocene (c. 10,000 BCE) has been linked to the peopling of the area (though sporadic occurrences of Early Stone Age and Middle Stone Age material point to much earlier frequentation). Substantial environmental records are available only for the Aksumite periods, broadly encompassing the rise of social complexity and the demise of the kingdom (c. 700 BCE–CE 800). Studies of plant and animal remains, and geoarchaeological investigations have contributed to illuminating aspects of the subsistence base of the kingdom and its impact on the landscape. Archaeobotanical and zooarchaeological studies have concentrated on settlement sites and funerary contexts, and geoarchaeological data come mainly from landscape sequences and buried soils (or paleosols). Regional climatic records provide further sources of information, but the physical diversity of the northern Ethiopian-Eritrean highlands together with patchy archaeological records makes it difficult to build solid correlations (see below). The cultural and environmental history following the decline of the Aksumite kingdom (c. 800 CE onwards) is poorly understood, but there is now indication that Aksum's countryside was not abandoned (Fattovich 2008). In addition, buried soil records, palaeobotanical data, and historical sources provide supporting evidence for prolonged settlement and arable land use throughout the second millennium CE.

Over the last decade or so, the implications of environmental reconstructions beyond archaeological research have begun to emerge. Geomorphological and land evaluation studies have often linked past land uses to present environmental degradation (e.g., Nyssen et al. 2004). The links between intensifying agriculture and the decline of the Aksumite kingdom feed into discussions about traditional land uses and their contribution to present environmental conditions. This highly debated topic is unlikely to find consensus until a far more coherent and richer body of data is available. In fact, while Aksum is arguably the place where most archaeological research has taken place, environmental and land evaluation studies have targeted other areas of the Ethiopian-Eritrean highlands and beyond. Thus, correlations between local archaeological evidence and regional environmental proxies rely on questionable geographical, cultural, and temporal uniformities.

Historical Background

Discovery (1900s–1940s)

Archaeological investigation at Aksum begun in the early 1900s with the Deutsche Aksum-Expedition (hereinafter DAE) led by Enno Littmann. The German team comprehensively recorded ancient monuments at Aksum and other sites of Tigray and Eritrea. The detailed analysis of ancient architecture, inscriptions, and material culture was published in four volumes (Littmann et al. 1913) and laid the foundations of Aksumite archaeology. Although this team was not particularly concerned with environmental aspects, the expedition's photographic archive includes several panoramic views of Aksum's landscape in 1906 and, thus, before the occurrence of main reforestation programs, infrastructure building, and urban development, which later transformed significant parts of the Ethiopian highlands. This is a remarkable source of information that remains largely untapped. The DAE publication offered the first detailed description of the local archaeology, which Carlo Conti Rossini (1928) discussed within a coherent historical context and linked to textual and oral sources. This includes, for example, reference to oral traditions linking the "fall" of Aksum to the destruction caused by the external

Aksum: Environmental Archaeology, Fig. 2 View of Aksum's landscape, November 2007: taken from Beta Giyorgis hillside, near "D site," and looking northward (Photo: F. Sulas)

invasions, droughts, and famines. However old some of these local traditions may be, they are preserved in manuscript texts compiled in much later periods than those to which they refer. That said, these sources offer remarkable information on Aksum's landscape, and some have long been referenced in support of archaeological interpretation (see Fattovich 2008).

In the 1930s and 1940s, systematic excavations at Aksum included the recording of landscape stratigraphy. In 1937, while in Aksum for the relocation of a stele to Rome, Ugo Monneret de Villard (1938) conducted a topographic study of the area and investigated the stratigraphic sequence of the plain. He identified two main phases of sediment depositions next to the Cathedral Maryam Seyon (Fig. 2): the earliest phase would have preceded the rise of Aksum, and, in particular, it would have occurred before the erection of the monoliths at the Northern Stele Park; a second phase would have taken place after the decline of the kingdom. Shortly afterward, further sedimentary data were collected by Salvatore Puglisi (1941), who led the *Missione Archeologica Italiana* at Aksum and sought to expand research beyond the then known archaeological area by surveying other sectors of the plain. Puglisi excavated a main residential building and conducted test excavations to the west and northeast of the old town where he recorded a stratigraphic sequence of cultural layers interspersed by alluvial deposits (Fig. 2). In the 1950s and 1960s, the newly established Ethiopian Institute of Archaeology (Addis Ababa, 1952) sponsored further systematic research by French scholars who excavated important monumental structures and sites. The results of these studies provided new evidence for outlining the early cultural sequence of Aksum and its surroundings.

Consolidation (1970s–1980s)

The early 1970s saw the beginning of large-scale excavations and surveys at Aksum and its surroundings by British, Italian, and American archaeologists. The new research programs were designed to examine the environmental factors and cultural processes involved in the development of the Aksumite kingdom (e.g., Munro-Hay 1989; Ricci 1990; Michels 2005). However, these were cut short by widespread sociopolitical unrest that culminated in the demise of the Ethiopian monarchy in 1974 and the establishment of the Derg regime (1974–1991). The new political setting halted field research for nearly two decades, but this interruption provided time for elaborating and publishing the results of the research conducted in the early 1970s. In particular, two main works laid the foundations for subsequent modeling of the environmental and settlement history of Aksum. In 1972,

Butzer (1981) had conducted preliminary geoarchaeological investigations in the Aksum plain, which included the application of soil micromorphology. The results were elaborated into an "archaeo-sedimentary" sequence that, for the first time, provided an integrated framework for linking cultural developments and environmental change. Although the chronological frame available in the 1970s has now been revised, Butzer's sequence remains the main reference point for any environmental reconstruction of the Aksum area. The analysis of several sections in the core archaeological area (Fig. 1) led Butzer to conclude that four aggradation phases had occurred at Aksum. The first aggradation phase (c. BCE 150–CE 150) was associated with a period of increased precipitation and the growth of Aksum as a regional political center. The second aggradation phase was linked to the erosion of degraded agricultural lands upslope as a result of heavier rains and settlement and demographic increase (see below). The last two phases of aggradation occurred several centuries after the decline of the Aksumite kingdom.

Shortly after Butzer's work at Aksum, the American team led by Joseph W. Michels conducted a systematic survey of the region comprised between Aksum and Yeha (Fig. 1). During the 6 months of intense fieldwork, the survey documented over 250 ancient sites, and the resulting database not only included archaeological information but also a new classification of settlement types and records of modern land uses (Michels 2005). The results of Michels' work (2005; an interim report was published in 1984) were fundamental in showing the intensity of ancient settlement over a diversified environment and the links between landscape characteristics and land uses.

Diversification (Since the Early 1990s)

Following the establishment of the Federal Democratic Republic of Ethiopia in the early 1990s, the country regained enough political stability for resuming fieldwork. New research programs began investigating the development of farming and livestock holding, the settlement system and subsistence base of the Aksumite kingdom, and the short- and long-term impact of land use practices on the environment. In 1993, two large-scale archaeological projects started at Aksum: David W. Phillipson (2000) led the British Institute in Eastern Africa's research in the plain, and the Italian-American expedition directed by Rodolfo Fattovich and Kathryn A. Bard resumed research on the adjacent hill of Beta Giyorgis (Fattovich et al. 2000). In addition to sharing a multidisciplinary approach, both projects combined large-scale excavations and systematic surveys for over a decade, and, thus, they ensured an unprecedented continuity of research. The British expedition excavated a number of sites to the north and west of the town. The excavations of rockshelter sites, as mentioned, clarified aspects of later prehistoric occupation. Research on later periods included the excavations at Aksumite sites and, significantly, the first rural settlement known as "D site" (domestic). This low-status satellite farming settlement was located to the north of the old town (Figs. 1 and 2) and yielded evidence for two distinct occupations: an early farming-based settlement (c. 700–400 BCE) and, after a significant hiatus, a lower-status occupation in the sixth century CE. Botanical and faunal assemblages revealed a widening of the resource base from the early phase and included the first appearance of African cereals such as tef (Boardman 1999; Phillipson 2000). The records from "D site" and other sites show that Near Eastern and African crops were grown from at least the mid-first millennium BCE and possibly earlier (Bard et al. 2000; D'Andrea 2008). Near Eastern plants (i.e., barley, emmer wheat, flax) were the most common groups and were most likely associated with dry farming. Since the mid-first millennium CE, there is evidence for an increase in food plants, cereals, pulses, oil, and fiber plants (Boardman 1999). With the exception of few species (grape, sorghum, finger millet), there is a remarkable continuity between the later Aksumite times and today (Phillipson 2000: 420). A similar scenario is illustrated by the results of exploratory pollen analyses on archaeological sediments from Beta Giyorgis hill, which point to the presence of an open grassland vegetation cover with tree patches from the mid-first millennium

Aksum: Environmental Archaeology, Fig. 3 Archaeologists at Aksum, May 2006, from the *left*: Charly French, Marco Madella, and Rodolfo Fattovich (Photo: F. Sulas)

BCE (DiBlasi in Bard et al. 2000). While further palynological studies have yet to be undertaken, research on plant resources and vegetation history has gradually diversified. Recent developments include ethnobotanical approaches to reconstruct crop processing and taphonomic processes (D'Andrea 2008) and analyses of phytoliths and charred wood, from buried soils and sediments to acquire information on the vegetation history (French et al. 2009). As for zooarchaeological studies, the faunal assemblages from settlement sites at Beta Giyorgis and Aksum show a predominance of domesticated mammals (cattle, sheep, and goat), suggesting that animals were kept for meat, by-products, and labor (Bard et al. 2000; Phillipson 2000). These first studies showed the potential of zooarchaeology for investigating environmental and resource use aspects of the Aksumite culture. However, no further research in this direction has been conducted and, in the absence of taphonomic studies, the role and use of animal resources is still poorly understood.

The last decade has witnessed the first local archaeologists working at Aksum (Tekle Hagos 2001) and the opening of the first archaeology department in the country (2006) at the newly established Axum University. New research projects were set up to investigate the local landscape history by combining geoarchaeological, palaeobotanical, and remote sensing techniques (Schmid et al. 2008; French et al. 2009). At the same time, Fattovich and his team (Fattovich 2008) resumed intensive and systematic surveying to complete the archaeological map of the greater Aksum area (Fig. 3). Other recent studies also include geo-pedological research on past soil erosion (Ciampalini et al. 2008). As detailed in the following section, these new developments provide the basis for rethinking a series of aspects concerning the theories and methodologies of environmental archaeology in the region.

Key Issues/Current Debates

Recent research advances call now for a reconsideration of a series of long-established ideas about Aksum's past. First, new archaeological findings from Tigray and Eritrea indicate that a mosaic of cultures and subsistence strategies populated the region during the first millennium BCE (Phillipson 2012). This evidence calls for a rethinking of former cultural sequences emphasizing the importance of a single culture (namely, the Pre-Aksumite culture) and farming. While these were part and parcel of Aksum's development as a kingdom, other cultures and ways of life played important roles in the broader region that was later under the control of the Aksumite kingdom. Second, there are substantial temporal

and spatial discrepancies between the archaeological and landscape data at regional and local scale. A wide range of regional data about past environment and climate come from lake deposits and landscape sequences in areas and regions (see, e.g., Nyssen et al. 2004), for which archaeological evidence is very limited, if not absent altogether. On the other side, the remarkably rich cultural record from Aksum has been associated with limited local landscape data until recently; these were almost exclusively based on Butzer's 'archaeo-sedimentary' sequence, linking the rise and demise of Aksumite cultures to increased rainfall, population growth, and intensified land use. Since the mid-1990s, the study of plant and animal remains and, more recently, geoarchaeological research have provided new local data that suggest a more complex scenario. Studies of plant macro- and microfossils (seeds, charred wood, pollen, and phytoliths) indicate the presence of a woody savannah vegetation cover at Aksum before, during, and after the kingdom was in place, and there is no evidence for the occurrence of woodland and, subsequent, land clearance. This is further illustrated in the sedimentary record from the hilltop of Beta Giyorgis, hillsides, and river valleys north of the town (Fig. 1) that indicates prolonged landscape stability associated with permanent settlement and land uses from the mid-fourth millennium BCE until about 1600 CE (French et al. 2009). On hilltops and uplands, buried thick soil horizons were associated with settlement and farming, while buried soil records from hillside deposits may have been linked to pastures. The botanical remains (phytoliths and charred wood) from the buried soils reflect a substantially stable woody savannah vegetation cover with tree patches nearby watercourses and settlements, of which palm trees were a significant component. However, the impact of the climatic fluctuations on the vegetation is still unclear, but the cyclical alternating of wet and dry pulses, possibly including thunderstorms and aridity peaks, is likely to have had some impact on selected landscape niches. The possibility of localized, intense, and climate-driven events, such as natural fires and the partial removal of vegetation by erratic rainfall, requires careful consideration.

Today, Ethiopia is undergoing major landscape transformations due to urban development and agricultural programs, and these changes are having a significant impact on the "traditional" lifestyles of the rural population. Modern Aksum is situated in a buffer position between international borders, a war-prone zone where rain/crop failure and political instability are actual rather than potential threats. A main theme of current research targets precisely the debate about present-day landscape conditions: are they the results of mismanagement since people permanently settled down, started farming, and ultimately transformed Aksum's landscape? Or have both human and natural forces contributed to change? If so, what lesson can be learned from the past? These questions highlight the need for studies designed to understand the interrelated histories of land use and degradation. As outlined above, archaeological research has long focused on the development of settlement and the emergence of social complexity, and only a limited number of studies have addressed the potential effects of agriculture and other land uses on the landscape.

International Perspectives

Since the early 1980s, the decline of the kingdom in the late first millennium CE has been linked to environmental degradation due to population pressure, arable land use intensification, and increased precipitation. This thesis has then been integrated with large-scale survey data on settlement patterns and applied for modeling a cultural history of Aksum, whereby human-induced factors inhibited landscape readjustments to climatic shifts. However, recent work has begun to question a number of assumptions based on earlier research. First, recent large-scale landscape investigations using a variety of archaeological science techniques are now regularly able to elucidate finer details from buried landscapes that indicate intrinsic linkages between human exploitation of landscapes, soil and vegetation change, and long-term climate change. The development of geoarchaeology

has had a fundamental role in placing human activity in changing landscape settings by deciphering long-term trajectories of landscape change and by identifying the effects of human settlement on the sustainability of landscapes under human pressure. In Ethiopia, human activity as a factor of soil formation and development has rarely, if ever, been considered. Instead, an increasing number of studies, particularly pertinent to tropical environments, are showing how important the perception of local people is for addressing soil issues. In addition, recent archaeological survey has also indicated a greater time depth and gradual intensification of settlement development in the northern Aksum area over at least the last four millennia. As such, archaeology has moved beyond simple equations linking state formation, settlement expansion, agricultural intensification, and consequent deforestation, erosion, and soil degradation. Rather than raising new questions, these considerations refocus perspectives and viewpoints for old issues: was intensification of agriculture a result of decreased land productivity, or environmental/climatic worsening or increased population/market demands, or a combination of all of these?

Future Directions

Throughout the twentieth century, the understanding of the relationship between the development of subsistence systems and environmental changes at Aksum was based on a combination of multi-scale and multidisciplinary data. The interpolation of environmental data, which informs our wider research question of human settlement, was drawn from regional scale and context-specific archaeological records. The Aksumite urban development has long been linked to the idea of an agricultural substratum dependent on irrigation and responsible for land clearance. However, it is now clear that woods were not a common feature of the local landscape either before or during the Aksumite period and that agriculture relied on rainfall. Even if some aspects of ancient resource management have been investigated, site-specific studies and informed research are still very few. Furthermore, important issues such as terracing and field systems have yet to be addressed, albeit clearly priorities within the context of a changing landscape. A greater amount of environmental and archaeological records are needed particularly now that relevant comparable datasets are being acquired from elsewhere in Tigray (e.g., Gebru et al. 2009). The retrieval of landscape information is needed to contextualize non-environmental factors affecting societal decision-making over time. A greater amount of archaeological and historical data on the typology/typologies and distribution of rural settlements is necessary to address urban development and, subsequently, the decline of the Aksumite kingdom. The trajectories of settlement and land use diversification need to be addressed within their environmental and ecological contexts. Indeed, the paucity of buried landscape records implies that any attempt at modeling synchronous histories of forest expansion/clearance or the impact of changing rainfall, to mention just two important topics, has to rely on assumptions of environmental and cultural uniformity across vast regions.

Perhaps, the most compelling task currently facing archaeology and cognate disciplines concerns the development of multiple "applied approaches". In this respect, there are a number of opportunities and challenges for archaeological research at Aksum. The applied nature of archaeology has often been confined to the spheres of heritage creation and conservation, and tourism development. However, archaeology has much to offer to integrated, environmental research and can act as a bridge to link theories and methods from the humanities and earth sciences. Past societal responses to environmental stresses and opportunities were chosen from within a range of cultural and ecological constraints, and the understanding of these responses informs contemporary responses to present and future environmental risks.

Cross-References

- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Macrobotany

- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Butzer, Karl W.
- ▶ Geoarchaeology
- ▶ Landscape Archaeology
- ▶ Oral Sources and Oral History
- ▶ Phytolith Studies in Archaeology
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology
- ▶ Taphonomy: Definition
- ▶ Zooarchaeology

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Akurgal, Ekrem

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Basic Biographical Information

Ekrem Akurgal was born on the family farm in the village of Haifa, near Tulkarem, Palestine, in 1911. At the age of two, his family returned to Turkey and he started his education at home. He graduated from Istanbul Males High School in 1932. As a requirement of the period of which the Turkish Republic was recently established, and due to new cultural and historical policies, he was sent to Germany as a scholarship student in 1932 and studied classical archaeology under Gerhart Rodenwaldt until 1940. In 1941 he was promoted to associate professor in Ankara University's Faculty of Languages, History and Geography and in 1949 became professor and professor emeritus in 1957. Akurgal served as the dean of the faculty from 1958 to 1959.

Major Accomplishments

Akurgal founded an archaeology library in the faculty that contains nearly 6,000 books which are mostly published in foreign languages. This provides students and scholars with convenient access to an important reference resource. Akurgal excavated and revealed ancient sites such as Foça (Phokaia), Çandarlı (Pitane), and Çeşme - Ildırı (Erythrai) veBayraklı (old Smyrna). He has written numerous publications on ancient Greek, Hittite – Hatti, and ancient Anatolian civilizations in various languages. He was a member of seven academies in Europe and also an honorary member of many scientific institutions: the University of Bordeaux (1961), the University of Athens (1988), the University of Lecce (1990), and the Anatolian University (1990) where he was awarded the title of honorary doctor.

Ekrem Akurgal received the Order of Merit of the Federal Republic of Germany (1979), Goethe Medal (1979), Republic of Turkey Ministry of Culture Great Award (1981), Italian Commendatore Order (1987), and French Légion d'Honneur Officier (1990). He died in İzmir in 2002. His studies were continued by his wife, Meral Akurgal, who was an archaeologist and the closest assistant of Akurgal when he was alive.

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▶ Hellenistic and Roman Anatolia, Archaeology of

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Ali Kosh: Agriculture and Domestication

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Introduction

Ali Kosh is a small mound on the Deh Luran plain of western Iran, close to the Iraqi border (32°33′26 18″ N and 47°19′30 11″ E). The site's prominence owes to its having revealed the first substantial evidence from charred plant remains of early stages of domestication in the Near East. Using the (at the time) new method of flotation, archaeologists recovered tens of thousands of seeds from Ali Kosh (Neolithic) and nearby Tepe Sabz (Chalcolithic), whose analysis by Hans Helbaek, a Danish paleobotanist (Helbaek 1969), showed an evolving competence in agriculture.

Key Issues

Excavated in 1961 and 1963 by Frank Hole and Kent Flannery, Ali Kosh is divided into three phases denoted by changes in plant and animal use, building types, burials, grinding stones, chipped lithics, and other artifacts (Hole et al. 1969; Hole 1977). The Bus Mordeh and Ali Kosh Phases are preceramic, while the Mohammad Jaffar Phase has some of the oldest ceramics in Iran. Radiocarbon dates show that the site was founded around 7500 cal. BCE and abandoned by 7000 cal. BCE (Zeder & Hesse 2000; Zeder 2000).

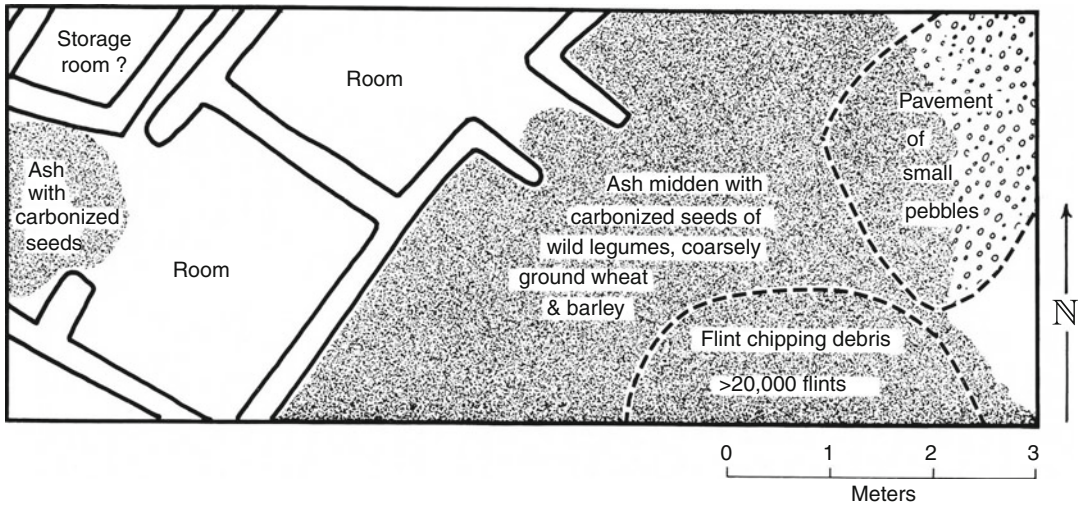
The Deh Luran plain, situated near the base of the Zagros Mountains had rich wild resources for the settlers to exploit and fertile soil in which to plant crops. The site was established near a marshy lake, which provided food resources, such as fish, water fowl, crabs, and turtles, as well as plants such as sea club rush whose seeds are edible. Local-hunted fauna included gazelle, onager, cattle, and pigs. The people also made extensive use of the wild-plant resources, including alfalfa, spiny milk vetch, *Trigonella* (a small plant of the pea family), various grasses, goosefoot, and fruit of the caper. While such plants were edible, because of their small seeds, they required considerable time to process. The people also imported and planted the larger-seeded emmer wheat and two-row hulled barley, neither native to the Deh Luran steppe. This basic picture of an important reliance on wild foods continued throughout the occupation of Ali Kosh, although their use diminished as domesticates increased, and the floral composition of the steppe gradually changed owing to cultivation, grazing by herds of goats and sheep, and gradual burial of the marsh by geological processes.

Bus Mordeh Phase

Using red-clay slabs cut from the edge of the marsh, the first people at Ali Kosh built small rooms whose floors were covered with reed matting (Fig. 1). They planted emmer wheat and two-row hulled barley and kept a small herd of goats, but hunting and fishing provided a major part of their subsistence. It is probable that the people migrated into the mountains during the summers where cooler temperatures and fresh grass would be available for their herds. While they made thousands of small bladelets of flint, their inventory of grinding stones was limited. A small number of pieces of obsidian arrived from a source in Turkey, one indication of wide regional contacts. Although no burials were recovered, a number of beads and pendants made of boar tusk and shell are indications of personal decoration.

Ali Kosh Phase

A change in architecture is one of many differences with the Bus Mordeh Phase. By this time, red clay was no longer accessible, and walls were made of large slabs of clay cut directly from the land surface, and the houses were larger. Two such structures, with a narrow corridor between, lay next to an open courtyard with a brick-lined hearth. The courtyard was littered with stone tools for butchering animals, and the corridor between the buildings was filled with discarded bones (Fig. 2). In addition to using mats on the floor, they also made simple baskets, some of which may have been waterproofed with asphalt, taken from



Ali Kosh: Agriculture and Domestication, Fig. 1 Plan of Zone C2 (Bus Mordeh Phase). Small rooms of *red*-clay bricks and lithic workshop covered with the *ash* midden

a seep near the site. Although there was no pottery, there were carefully made stone bowls and shallow trays of limestone, as well as clay figurines, mostly of goats and possibly humans, as well as other enigmatic clay objects. A copper bead hammered from a native source on the Iranian plateau attests to contacts, as does the increased amount of obsidian. This phase sees a proliferation of grinding stones in various new forms, implying a more sophisticated approach to the processing of wild plants and domestic crops.

There are burials beneath the houses, generally in small pits in which the bodies were tightly wrapped in matting and placed in a seated position. The skulls show annular cranial deformation, which elongates the skull. Numerous beads and other ornaments were on the bodies, some of which had been coated with red ochre.

Mohammad Jaffar Phase

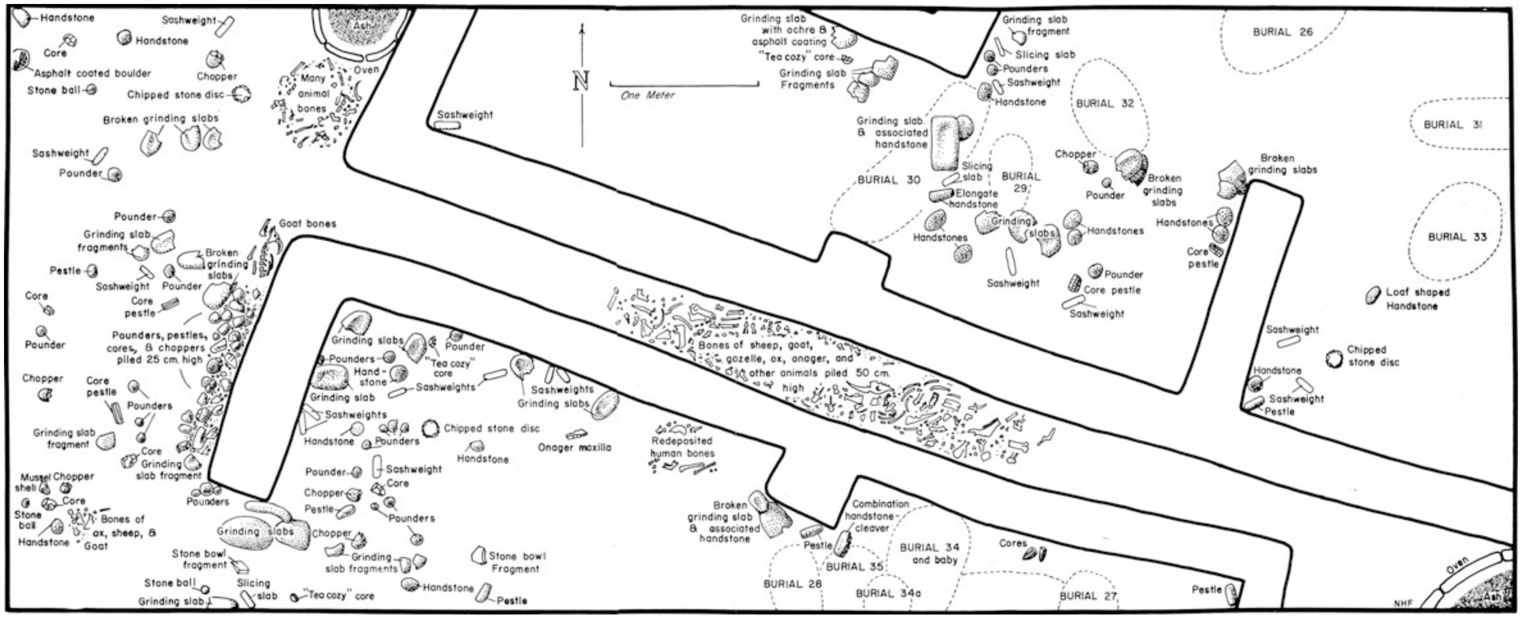
The presence of pottery, lightly fired, chaff-tempered wares in three types – plain unpainted bowls, painted vessels, and red burnished bowls – denotes this phase and provides excellent stylistic links with other excavated sites in western Iran and Iraq, such as Sarab, Guran, and Jarmo.

The herds, consisting of both goats and sheep, show the characteristics of full domestication, and they now comprised the majority of faunal remains, although hunting of the large ungulates continued. The steppe vegetation now had *Prosopis*, a woody perennial with edible pods which, with fumaria and goose grass, are indications of grazing and cultivation. The filling of the marsh is attested by the absence of water-loving plants. In other words, human use and geological processes over the centuries had degraded the local environment.

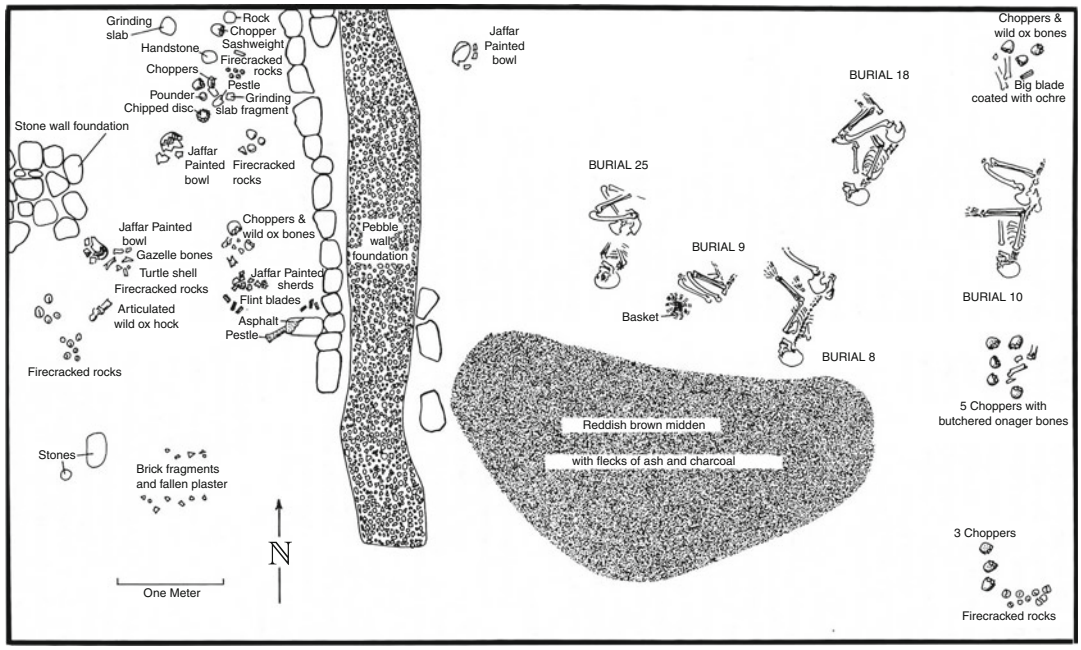
Many of the flint, clay, and stone objects made in the Ali Kosh Phase continued in use, but a further innovation was the combination of shallow-basin grinding slab and mortar.

Together with grinding implements carried over from earlier times, there never had been as varied an array of artifacts to deal with the processing of cereals, which still were not "free-threshing."

Houses in the Mohammad Jaffar Phase showed further evolution. Now the walls had stone bases to control soil moisture, and the walls were of straw-tempered mud bricks (Fig. 3). Outside the houses are a number of burials lying in fetal position on their sides. Gone is cranial deformation, but a new array of ornaments occurs: bell-shaped pendants of marble, as well as labrets (one found in place), and beads of turquoise. Obsidian from eastern Turkey, seashells from the Gulf, specular hematite from Fars (southern Iran), and turquoise



Ali Kosh: Agriculture and Domestication, Fig. 2 Plan of Zone B2 (Ali Kosh Phase). Parts of two houses and courtyard, with lithic and faunal remains in situ



Ali Kosh: Agriculture and Domestication, Fig. 3 Plan of Zone A1 (Mohammad Jaffar Phase). To the *left*, a stone-founded wall of a house with tools and fauna. On the *right* are burials outside the structure

(possibly from northeastern Iran) are all evidence of widespread contacts through some means of exchange or transmission.

Because of its importance in the history of Deh Luran as well as to western Iran generally, the site has been designated as a protected reserve, off-limits to any non-archaeological activity.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Goat: Domestication
- ▶ Sheep: Domestication
- ▶ Wheats: Origins and Development

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Allen, Jim

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Basic Biographical Information

Frederick James (Jim) Allen was born in Gosford, NSW, Australia, in 1938. Graduating

B.A. (Hons.) from Sydney University in 1965, Allen then undertook research for his doctorate in the Department of Prehistory at the Australian National University, being awarded the degree in 1969. From 1969 to 1972, he was a Lecturer in Prehistoric Archaeology in the Department of Anthropology at the University of Papua New Guinea. Following this, he took up an appointment as Research Fellow and then Fellow in the Department of Prehistory at the Australian University until 1985. During that time (in 1974), he was appointed Commonwealth Fellow, St John's College, Cambridge, UK. In 1985, he left the ANU to become foundation Professor of Archaeology at La Trobe University in Melbourne, Australia, retiring to become an Emeritus Professor in 1999. Allen's La Trobe years saw him take up Visiting Professorships in Auckland (1989) and Utah (1993). From 1993 to 1998, he was an Australian Research Council Senior Research Fellow. In retirement, he has also been a Member, Centre for Archaeological Research, Department of Archaeology and Natural History, Australian National University (1999–present), and a Research Professor, Department of Anthropology, University of Utah (2004–present).

Major Accomplishments

Allen has a unique position in the history of archaeology in Australia. Beginning at the University of Sydney with a training in Classical Archaeology, Allen moved to the Australian National University to undertake Ph.D. research on the historic site of Port Essington (1966–1969), completing the first ever dissertation on historical archaeology in Australia. Allen then moved to the University of Papua New Guinea (1969–1972) where he became a pioneer of prehistoric and protohistoric archaeology in that country.

Allen has contributed to a revolution in scientific knowledge about the prehistory of Melanesia and Tasmania. Returning to the Australian National University (1972–1984), Allen played a pivotal role in founding the field archaeology of island Melanesia, through his leadership of the Lapita Homelands Project. In addition, Allen became involved in the prehistoric archaeology of Tasmania, which increased in intensity with his move to become foundation professor at La Trobe University (1985–1993), where he led the Southern Forests Archaeological Project. These major passages of fieldwork lay the groundwork for significant publications related to the archaeology of greater Australia. They also provided the framework for several major doctoral dissertations and other ancillary research. Allen has played a vital role in training several generations of Australian archaeologists and founded the Department of Archaeology at La Trobe University, Melbourne, in 1985.

Although he retired from academic archaeology in 1998, Allen has continued to conduct foundational research in Australian prehistoric archaeology and to draw together the threads of his diverse experience and knowledge of regional archaeology. Beginning with his work on developing models of prehistoric trade for egalitarian communities along the Papuan coast, which underscored the complexity of trade as a social act; then moving towards an exploration of colonization as a vector for increasing social complexity in Melanesia; and finally resting on a deep consideration of the prehistoric settlement of Australia and its consequences for the subsequent history of Aboriginal societies over the last 50,000 years, Allen continues to be vitally engaged in the research process. The importance of Allen's long connection with regional archaeology and its broader consequences was recognized by his election as Foreign Associate of the US National Academy of Sciences in 2012.

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Allen, Mitch

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Basic Biographical Information

Mitch Allen is an archaeologist, publisher, and instructor. He obtained a Bachelor of Arts degree in Anthropology from the University of California, Santa Barbara; a Master's degree in Near East Studies from the University of Michigan; and, in 1997, a Ph.D. in Archaeology from the University of California, Los Angeles. His dissertation was concerned with Philistia, the Neo-Assyrians, and world systems theory (Allen 1997). Allen has taught at several universities in the United States, such as Mills College, the University of Maryland, Santa Clara University, and Diablo Valley College. Allen has taught and published on an eclectic mix of subjects, including the ancient Near East, archaeology, and scholarly publishing. The latter was borne out of 35 years of experience in the publishing industry.

Major Accomplishments

Allen is best known for his career in publishing, during which he has overseen the publication of over 1,000 books, articles, and software products. After working as an executive editor at Sage Publications, a social science publisher, Allen founded AltaMira Press in 1995 and directed its first 10 years. Under his supervision, AltaMira Press became a leading source of texts on cultural resource management, public history, and applied anthropology, among other topics. In 2005, Allen left AltaMira Press to establish Left Coast Press Inc. There, he publishes books and journals in the humanities and social sciences, covering a broad range

of topics such as anthropology, archaeology, sociology, ethnic studies, gender studies, heritage studies, public history, museum practice, qualitative research, and ethics. Allen's goal with both AltaMira Press and Left Coast Press was to create a space in which to produce progressive works (e.g., on indigenous and postcolonial archaeologies) and "find alternatives to traditional publishing" (Allen 2005). The latter can be demonstrated by the variety of unconventional textbooks Allen has published, including those that take the form of comic books and novels. Allen also encouraged the development of materials that would address gaps in scholarship, arguing that "our role is as much to shape scholarly output as to facilitate it" (Allen 2007a: 197). For example, at his urging, a textbook on archaeological ethics was written.

In addition to publishing the work of others, Allen has contributed several of his own publications, many of which are practical guides to navigating professional or academic life. He has advised on topics such as creative teaching methods (Allen 2007b), writing memorable and engaging works (Allen 2002), and the nature of academic publishing (Allen 2003; Allen & Joyce 2010).

In 2013, the World Archaeological Congress (WAC) gave Allen an International Achievement Award in recognition of his contributions to archaeological scholarship and publishing. Allen had collaborated with WAC to produce new publications such as the *WAC Research Handbooks in Archaeology*, the *Archaeology and Indigenous Peoples* series, and the journal *Archaeologies*.

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- ▶ Ethics in Archaeology
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- ▶ Postcolonial Archaeologies

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Alpaca and Llama: Domestication

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Basic Species Information

Four camelid species inhabit South America today: the vicuña (*Vicugna vicugna*) and its domesticated form alpaca (*Vicugna pacos*), and the guanaco (*Lama guanicoe*) and its domesticated form the llama (*Lama glama*) (Kadwell et al. 2001). Since their initial contact with humans in the late Pleistocene and early

Holocene, camelids have been an important resource for the South American people. Initially camelids were a primary source of food, which ultimately led to their domestication in the mid-Holocene. Over the last several thousand years, domesticated camelids have become important in many aspects of human life, from textiles to religious practices. In the sixteenth century, the Spanish conquest had a devastating impact on camelid populations. Tax records of herd sizes registered a 90 % decrease during the first 100 years of Spanish occupation (Wheeler 2012). Therefore, we do not have a clear understanding of the diversity of alpaca and llama that existed under pre-conquest husbandry practices.

The vicuña is the smaller of the two wild camelids (35–50 kg), with very fine fiber (~12.5 μm) (Wheeler 1995; Mengoni Goñalons 2008). Alpaca closely resemble their wild vicuña ancestor, *V.v. mensalis*, but are slightly larger (adult weight 55–65 kg) with coarser, white to brown, and black fiber (~32 μm). Studies of pre-Spanish, alpaca mummies indicate that intensive selection for phenotype and high quality fiber production was practiced (Wheeler 2012). Two recognizably different varieties exist today, although they do not breed true. Alpacas with the "suri" phenotype have long dreadlock fibers, while those with the "huacaya" phenotype have a crimped fleece. They are also an important source of meat in South America.

Guanaco are larger (85–140 kg) and have coarser fiber (16.5–24 μm). Llamas are very similar in size and morphology to their wild guanaco ancestor, *L. g. cacsilensis*, although fleece color, texture, and fiber diameter have changed as a result of selective breeding (Mengoni Goñalons 2008; Wheeler 2012). Due to their robust nature, llamas have traditionally been used as pack animals, making possible the Inca expansion from southern Columbia to central Chile. However, they were also bred for fine fiber production prior to Incan times. These latter varieties have largely disappeared today, and although llama have several distinct fleece phenotypes, only the woolly (ccara), non-woolly (chaku), and dreadlock (suri) varieties are generally recognized.

Archaeological evidence tracking the timing and location(s) of camelid domestication in South America includes direct evidence (tooth morphology, osteometry, bone, and fiber morphology), indirect evidence (change in abundances and age groups), and contextual evidence (corral structures, art, and other cultural artifacts) (Mengoni Goñalons 2008). Archaeological evidence suggests that alpaca and llama were used by the native people for a variety of purposes, including fiber for textiles, bones for tools, dung for fuel and fertilizer, pack animals for transportation of goods, and in religious ceremonies. Other evidence suggests that the high-elevation, montane Puna (grassland) region, which extends from central Peru, through Bolivia to northern Chile and northwestern Argentina, was the area in which the domestication of both camelids occurred (reviewed in Wheeler 2012 and Mengoni Goñalons 2008).

Alpaca were likely first domesticated in the humid Puna region of Peru during the early to mid-Holocene. Archaeozoological evidence, primarily based on tooth enamel patterns unique to alpaca, from Telarmachay rockshelter suggests that alpaca were domesticated prior to 6,000 years ago. Faunal remains from other sites suggest that alpaca were brought to lower elevation mountain valley areas ~3,800 years ago and into coastal sites in the last 1,000 years (Wheeler 2012). Similar to its ancestor vicuña, alpaca had a more restricted range than guanaco and llama. The historical distribution of alpaca included the Puna of Peru, Bolivia, and northern Chile, as well as the inter-Andean and coastal valleys of Peru (Mengoni Goñalons 2008).

Archaeozoological evidence indicates that llama were likely domesticated ~5,000–3,800 years ago at multiple locations in the Puna of the central Andes (northwest Argentina and northern Chile) and possibly in the high Andes of Peru (Wheeler 2012 and Mengoni Goñalons 2008). Beginning ~1,400 years ago, llama were brought into areas previously uninhabited by their wild ancestors such as Ecuador and southern Columbia. Generally, archaeologists have

considered llama domestication independent, but more research is needed to fully understand the relationship between alpaca and llama domestication.

Both llama and alpaca figured prominently in the economy of the pre-Incan cultures, as well as the Incan empire (1470–1532 CE). At the site of El Yaral in southern Peru, naturally mummified alpacas and llamas from the Chribaya period (850–1470 CE) document both religious sacrifice of these animals and selective breeding for fine fiber production in both domestic forms (Wheeler 1995). Under the Inca, alpaca and llama production was strictly controlled by herding specialists and emphasis was placed on breeding animals for sacrifice to specific deities, for fiber production for the state-controlled textile industry, and as pack llamas for the army.

Although it is possible that the extant varieties (e.g., suri and huacaya alpacas, ccara, chaku, and suri llamas) are in fact relicts of highly selected Inca or pre-Inca varieties, the vast majority of alpacas and llamas reared in the Andes today are not the object of selective breeding practices. Genetic analyses of contemporary llama and alpaca populations have confirmed that extensive bidirectional hybridization has occurred (Stanley et al. 1994; Kadwell et al. 2001), possibly as a result of the breakdown of traditional breeding practices during the chaos of the Spanish conquest. Although guanaco and vicuña can produce fertile offspring when forced, there is no evidence that hybridization occurs in areas where their ranges naturally overlap. Only 6–20 % of alpacas are free of llama ancestry, making the preservation of alpacas an urgent necessity.

Morphological and osteometric studies and DNA analysis have revealed that the domestication of South American camelids played out against a complex recent evolutionary history, potentially involving yet incompletely understood additional camelid taxa. Along with data from stable isotopes, these methods will be key to developing a better understanding of the timing and locations of domestication for both llama and alpaca, as well as the role of hybridization in pre-conquest breeds.

Cross-References

- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Camels: Domestication
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Animal Domestication: Recent Advances

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Basic Biographical Information

Dr. Nezar AlSayyad is an architect, planner, urban designer and urban historian. He is a Professor of Architecture, Planning, and

Urban History at the University of California at Berkeley where he currently serves as Chair of the University's Center for Middle Eastern Studies (CMES) and the Director of the International and Area Studies Graduate Program. AlSayyad holds a B.S. in Architectural Engineering and Diploma in Town Planning from Cairo University, an M.S. in Architecture from the Massachusetts Institute of Technology and a Ph.D. in Architectural History from UC Berkeley.

Major Accomplishments

He is the recipient of many grants and awards for his research, books, films, and projects. In 1988, AlSayyad co-founded the International Association for the Study of Traditional Environments (IASTE). Today, he still serves as the Association's President and Editor of its highly acclaimed peer-reviewed journal *Traditional Dwellings and Settlements Review*. Professionally, AlSayyad has an active practice in the Middle East and the US and is the Principal in XXA-Office of Xross-Cultural Architecture, an Architecture, Urban Design, and Planning firm with several award-winning credits. AlSayyad is the author, co-author, editor, or co-editor of many books. Additionally, he has written, co-produced and co-directed two NEA – funded public television programs, "Virtual Cairo" and "At Home with Mother Earth."

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Altai: Paleolithic

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Introduction

The Altai range is located at the cross-roads between Central and Northeast Asia, between 49–52° N latitude and 32–88° E longitude. The Altai plain borders it in the north and the Ob River Basin opens to the west on the Siberian plain. On the northwest border stand the Salair and the Alatau ranges and in the southwest, the western Sayan range. In the south, the Mongolian Altai runs east to the Gobi Desert and joins the Kazakh steppe to the west. In the southwest, the Altai is separated from the Central Tian Shan by the plains of the eastern Balkash, by the Tarbaghatay range, and by the surrounding

Zaisan. The plains reach the Xinjang and the Taklamakan desert via the Turpan-Ami depression and southern and Inner-Mongolia via the western edge of the Gobi desert.

The Altai Mountains are the result of a complex and contrasted history. Several periods of complete flattening (e.g., Early Mesozoic, Late Paleozoic) of the landscape have been recorded and the current setting was initiated during the Late Jurassic (Chlachula 2001). The Siberian Mountains are seen as the continuity of uplifting processes starting from the Baikal region, progressing from east to west and reaching the Altai-Sayan during the late Pliocene.

The Altai alpine ridges, such as the Chuya, Saylugem, Katun, and Kuray, include peaks with a maximum elevation of 4,506 m asl. The high plateaus of more than 2,000 m in elevation (e.g., Ukok, Chulyshman, Ulugan) represent a third of the Altai territory and intermediate mountain landscapes, ranging between 800 and 2,000 m asl, account for about half of it. These are mainly located in the northern and western regions and their relief is shaped by active hydrographic networks and by selective erosion. Intermediate mountain landscapes were formed by the erosion of the peneplains of large plateaus (Shahgedanova 2003). Two main lakes, the Markakol and the Teletskoe, are located respectively at the southern and northern edges of the Altai range. The current climate is continental with contrasting seasonal climatic inversions. The winters are generally cold with mean temperatures ranging from −16° C in the foothills to −36° C in the high mountains (Shahgedanova 2003). The minimum temperature is recorded in the Chuya depression, reaching −60° C. Precipitation is stronger in the northwestern part of the Altai, as the southeast is more arid (Chlachula 2001).

The earliest sedimentary deposits in the Anuy river valley were first attributed to the last interglacial, c. 120–110 ka, when karsts were formed due to the exposure of carboniferous formations (Baryshnikov & Maloletko 1997). Such a chronological attribution is consistent with the tectonic activity recorded at the end of the Middle Pleistocene that would be responsible for a deepening of the valley system by about 100 m the Anuy River and about 200 m in the Katun River. This view, however, has been challenged on the basis of radiothermoluminescence (RTL) measurements providing ages of c. 225 ka for the pebble and gravel layers at the base of the Anuy alluvial plain (Derevianko et al. 2003).

During the first half of the twentieth century, the interest for Paleolithic research in the Altai was stimulated by the collection of surface artifacts at the confluence of the Katun and the Biya rivers and with excavations in the Byisk area. In 1954, S.I. Rudenko reported evidence of Paleolithic occupation at Ust-Kanskaya Cave, along the Charysh River. Rudenko quickly noted some Mousterian typological features on the lithic assemblage, and eventually attributed the human occupation to the Last Glacial based on the fauna recovered. A.P. Okladnikov recognized affinities with the Mousterian from Western Europe and Central Asia and until the discovery of Ulalinka site in 1961, Ust-Kanskaya was considered the most ancient Paleolithic site in the Altai. Okladnikov discovered and excavated important sites in the region, such as Strashnaya Cave, Denisova Cave, and Kara-Bom and remains a major figure in Altai Paleolithic archaeology. His work in Uzbekistan, the Baikal area, Mongolia, and the Far-East led him to consider the existence of a vast Sibero-Mongolian Levallois technocomplex (Fig. 1).

Among his students, A.P. Derevianko appears as the most influential contributor to Paleolithic research in the Altai region. He participated in the discovery of the Anuy I open-air site in 1983 and Okladnikov Cave in 1984. At about the same time, excavations started at Maloyalomanskaya Cave, in the Katun basin. Derevianko discovered the site of Ust-Karakol 1 at the confluence of the Karakol and Anuy Rivers. The latter was first excavated in 1986 (sector 1) and excavations at the nearby site of Anuy II started in 1989. Since the beginning of the 1990s, the sites of Karama, Anuy III, and more recently, the Mousterian site of Chagyrskaya were discovered and his team.

Altai: Paleolithic, Fig. 1 A.P. Okladnikov (*left*) and A.P. Derevianko (*right*) (Photo credits: IHMC RAS St. Petersburg, IAE SBRAS Novosibirsk)

Following Okladnikov's legacy, Derevianko undertook numerous international expeditions (e.g., Montenegro, Uzbekistan, Mongolia, Far-East) and developed many collaborations. This approach generated a rich data set upon which synthetic models of population dynamics could be built (Derevianko 2011) (Fig. 2).

Paleolithic sites are mostly located in the northwestern and in the central part of Gorny-Altai, between the Alpine relief and the northern plain. They lie in intermediate mountain zones, generally between 300 and 1,200 m asl. In the northwest, Strashnaya Cave and Chagirskaya Cave are located in the Charysh Basin. Okladnikov Cave, Isrkra Cave, Karama, Anuy I-III, Denisova Cave, Ust-Karakol, and Kamminaya Cave are located in the Anuy basin and Ust-Kanskaya is located further south along the Charysh, in the Central Altai. Ulalinka was found near the city of Gorno-Altaisk, and the Biyka Cave complex and the site of Kara-Tenesh lie upstream along the Katun River. The Tiumechin complex and the Kara-Bom site are located near the Ursul river, and Maloyalomanskaya Cave can be found along the Mala Yaloman, a small tributary of the Katun. Only a few sites such as Barbughazy, Torgun, and Yustid are found in the southeast, and they are mainly attributed to the final stages of the Paleolithic.

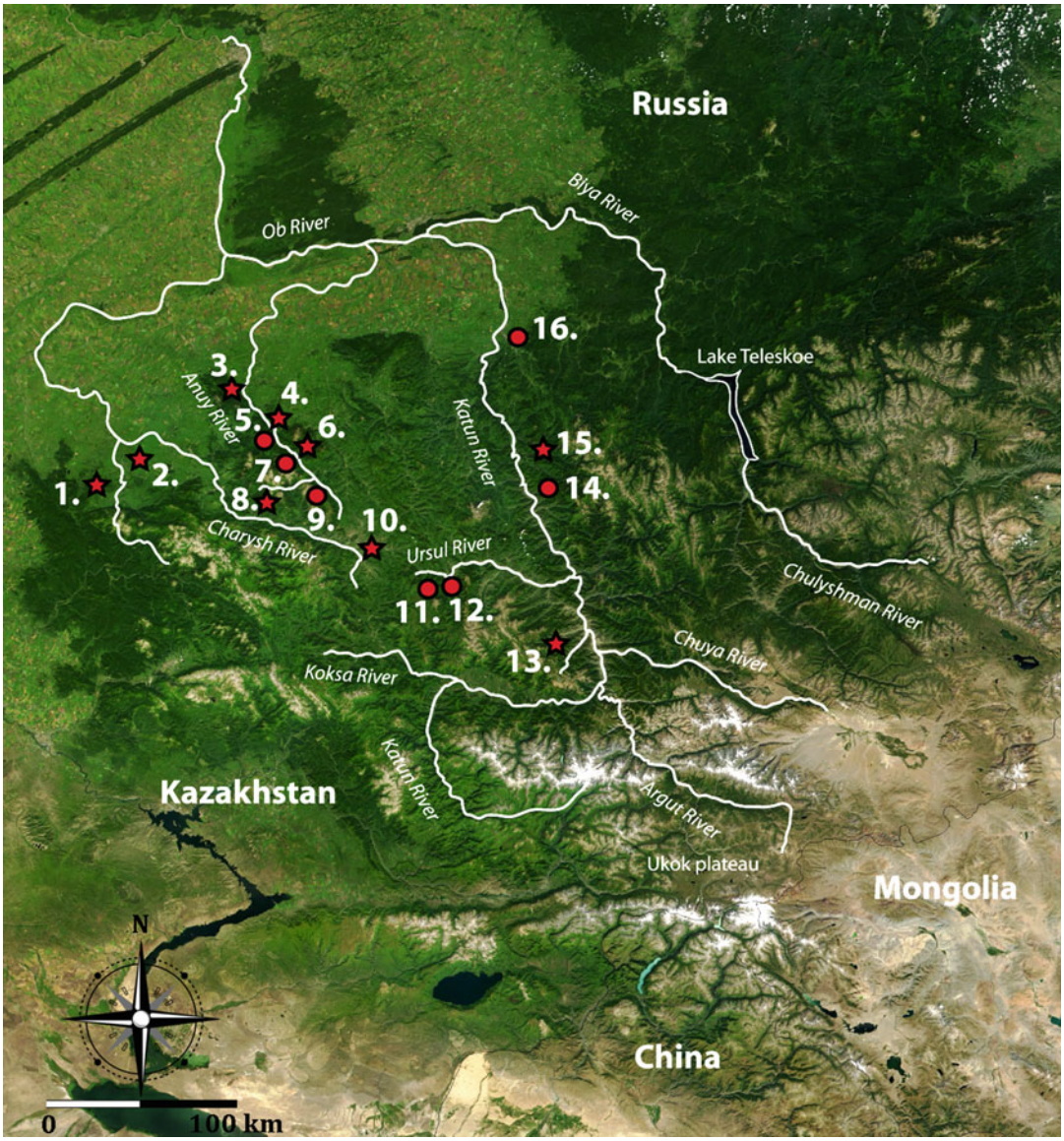
Definition

Based on the Eurasian system of division, three main periods can be recognized during the Paleolithic of the Altai: the Lower, Middle, and Upper Paleolithic. The Lower Paleolithic corresponds to the first human occupation of the Altai that would start c. 800 ka. The Middle Paleolithic would start sometime at the end of the Middle Pleistocene and last until c. 50 ka. The Upper Paleolithic covers a time range from c. 50 ka to the end of the Pleistocene.

Key Issues/Current Debates

The Lower Paleolithic

According to Derevianko (2011), the Altai was first colonized by small populations of *Homo erectus/ergaster* starting from c. 800 ka, that subsequently disappeared from the region c. 500 ka. The site that would best represent this first wave of human occupation is Karama, along the Anuy River (Derevianko & Shunkov 2009). The diversity of the exotic flora is said to fit with a Middle Pleistocene attribution and the RTL dates of 643 ± 130 ka and 542 ± 110 ka have been obtained on the lower portion of the sequence (layers 8–14). Although the identifiable artifacts do not include handaxes, Derevianko



Altai: Paleolithic, Fig. 2 Location of the main Paleolithic cave (*stars*) and open-air (*circles*) sites in the Altai (Adapted from Nasa Visible Earth). *1* Strashnaya Cave – *2* Chagyrskaya Cave – *3* Okladnikov Cave – *4* Iskra Cave – *5* Karama – *6* Anuy I-III – *7* Denisova Cave – *8* Kamminaya Cave – *9* Ust-Karakol 1 – *10* Ust-Kanskaya – *11* Kara-Bom – *12* Tiumechin 1–4 – *13* Maloyalomanskaya Cave – *14* Kara-Tenesh – *15* Biyka Caves – *16* Ulalinka

and Shunkov tend to emphasize elements that would fit with an Acheulean attribution. The technology is described as cores on pebble blanks and flakes with subparallel dorsal pattern. The tool-kit includes various kinds of scrapers (including naturally backed examples), Clactonian notches, and choppers. More surprising is the reported presence of core-like endscrapers with abrupt retouch. Derevianko acknowledged that the first Lower Paleolithic occupation of the Altai is elusive and likely represents a short-term event. Discovered in 1961, the site of Ulalinka was originally presented by Okladnikov as evidence of Lower Paleolithic human occupation.

Altai: Paleolithic, Fig. 3 Denisova Cave (Picture by N. Zwyns)

The chronological attribution beyond the Bruhnes-Matuyama reversal and the authenticity of the lithic artifacts became, however, quickly controversial. The period following the initial peopling of the Altai corresponds to a gap in the archaeological record followed by what is interpreted as a replacement of population (Derevianko 2011). Based on assemblages from the lowermost layers in the Denisova Cave main chamber, Derevianko suggested that a new population settled in the Altai during the Middle Pleistocene, around 300 ka (Fig. 3). These newcomers bring the first evidence of Levallois and blade technology. Although first mentioned as Mousterian, the archaeological material is also seen as derived from a Late Acheuleo-Yabrudian (Derevianko & Postnov 2004).

The attribution of these assemblages to the Lower Paleolithic is mostly based on RTL dates. At one standard deviation, ages between 330 and 130 ka were obtained on the layer 22. Two inversions of magnetic polarity have been recorded and, following the dating of the layer, interpreted as Biwa I (220–176 ka) and Biwa II (330–266 ka). This contradicts estimations based on tectonic, geomorphology, and small mammals that suggest a formation of the karstic system too closer to the last Interglacial. Furthermore, some authors have warned that the RTL method follows different assumptions than the standard TL and that unbleached particles in cave sediments may be problematic for luminescence dating. In front of the cave, the lower part of the sequence is attributed to the last interglacial and the single magnetic inversion recorded is currently assigned to the Blake episode.

The Middle Paleolithic

The Altai Middle Paleolithic is described as belonging to two main variants. Based on Levallois indexes and on frequencies of Mousterian elements, Shunkov (2005) recognizes a Mousterian variant opposed to a Levallois-Mousterian variant. This variability was interpreted as reflecting different settlement patterns of a single MP tradition. Mousterian assemblages, which are only represented in cave sites, would represent long-term occupations. On the contrary, the Levallois-Mousterian seasonal occupations are associated with open-air contexts. A behavioral ecology approach was further developed by P. Wrinn (2010). Based on the occurrence/absence of formal tools or chips that would testify to tool rejuvenation or raw material management, he classifies MP occupations into three main categories: ephemeral/task specific, ephemeral generalized, and intermittent generalized occupation. His analysis of the fauna and of the lithic frequencies suggests a low intensity of human occupation in the region. The Altai is then seen as a refugium for hominins during cold phases.

The *Levallois-Mousterian variant* is mainly represented by the assemblages from the middle part of the section at Denisova Cave (layers 20–12), the lower and middle part of the sequence at Ust-Karakol I sector 1 (layers 19–12), and the lowermost cultural layers at Kara-Bom. In addition, the variant possibly occurs at Ust-Kanskaya and Strashnaya Cave. Kara-Bom and Ust-Karakol assemblages show a technology characterized by

the production of Levallois points from tabular cores. The reduction is mostly unidirectional but also includes bidirectional instances, with occasional removals of debordant blanks to reshape the convexities of the core. The reduction system includes the production of elongated spalls. Although it should be supported by additional chronometric data, the Levallois-Mousterian would appear during the OIS5e, c. 120 ka and eventually disappear from the region at the beginning of OIS3.

The *Mousterian variant* is defined based on the material from Okladnikov and Chagirsakaya Cave. Recently, Derevianko and Markin suggested that these two sites illustrate the existence of a distinct MP facies, relatively late, and intrusive, which they call the Sibiryachikha variant (Derevianko & Markin 2011). It is characterized by a lack of Levallois elements and by a good representation of Mousterian retouched tools, such as various types of sidescrapers and notches. These assemblages seemingly appear at the beginning of OIS3, around 55–50 ka, and last at least until the middle part of OIS3, c. 37 ka. The Sibiryachikha assemblages are said to represent Neandertal populations moving across Central Asia (e.g., Teshik-Tash) and subsequently penetrating in the Altai under the demographic pressure of the spreading Modern Human populations.

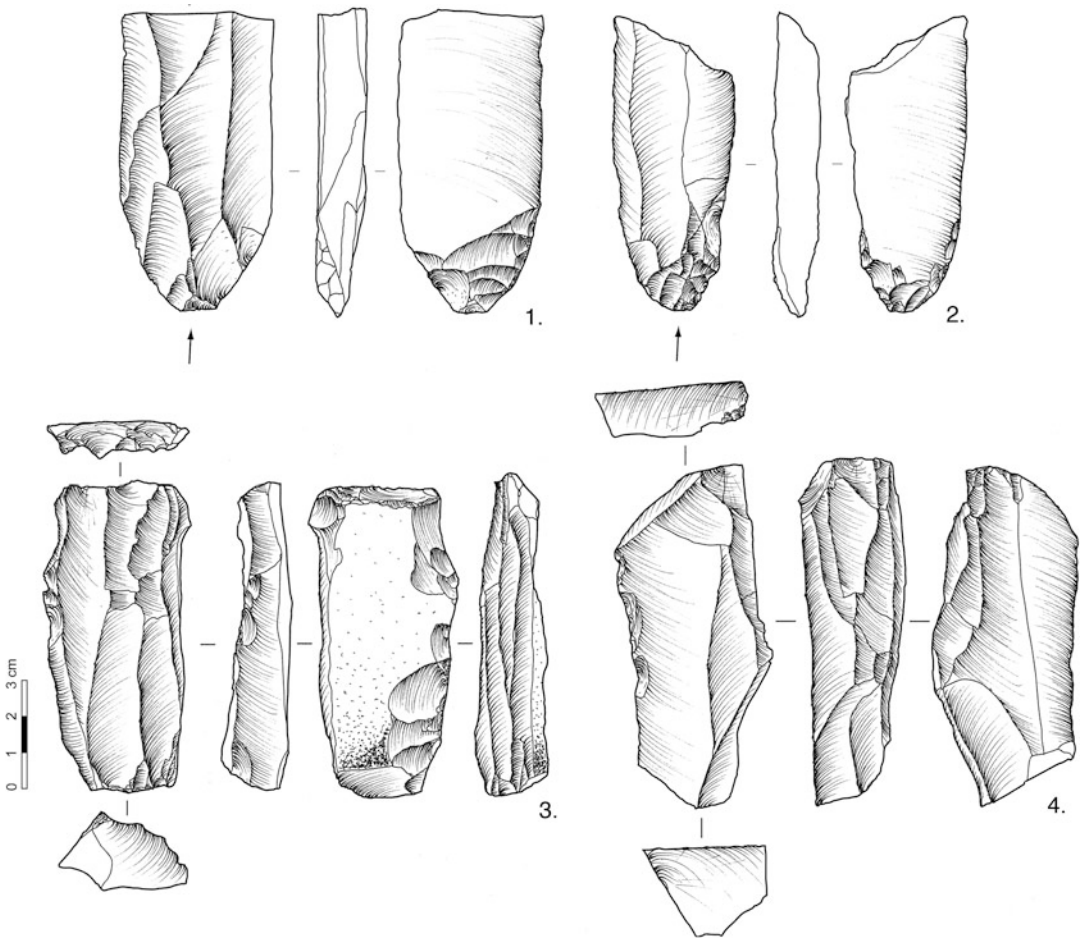
In sum, two variants can be distinguished among the MP assemblages from the Altai. The Levallois-Mousterian is better represented in the archaeological record and seems to predate the appearance of a more elusive, and apparently intrusive Mousterian. How much seasonal, functional, or cultural factors are responsible for such variability is not yet clear.

The Upper Paleolithic

The local Levallois-Mousterian is said to have gradually evolved into two main UP variants, the Ust-Karakol and the Kara-Bom variants. Derevianko (2011) sees both UP trends as the result of an incipient evolution from a local Middle Paleolithic background. In his model, the latter process is used to support a scenario of multiregional emergence of modern human anatomical and behavioral features. Other authors have underlined the role of site-formation processes to explain the apparent transitional character of some assemblages or the regional discontinuity of human occupation (Wrinn 2010; Zwyns 2012). Following these views, the Altai data set may support to models in which population movements more consistent with the Out-of-Africa hypothesis.

The Kara-Bom variant (or *Initial Upper Paleolithic*) is defined on the basis of levels OH5 and OH6 from the eponymous site, but is also described at Ust-Karakol 1 (sector 1, OH5.5 and OH5.4), Kara-Tenesh, Maloyalomanskaya Cave, and in the Byike complex. The defining technological features are clearly expressed in the production of laminar blanks (Fig. 4). Asymmetrical blade cores were reduced from two opposed platforms. The main flaking surface is usually located on the broad face of the core and one of the narrow faces is used to reshape lateral convexities. Large and robust blade blanks are produced and retouched whereas thick technical side blades were turned into burin-cores to detach small laminar blanks (Zwyns et al. 2012). This technology is seemingly associated with an early appearance of ornaments, starting from c. 42 ka. The Kara-Bom trend has been considered as an example of local and gradual transformation of the technology observed in the underlying Middle Paleolithic layers (Derevianko 2011).

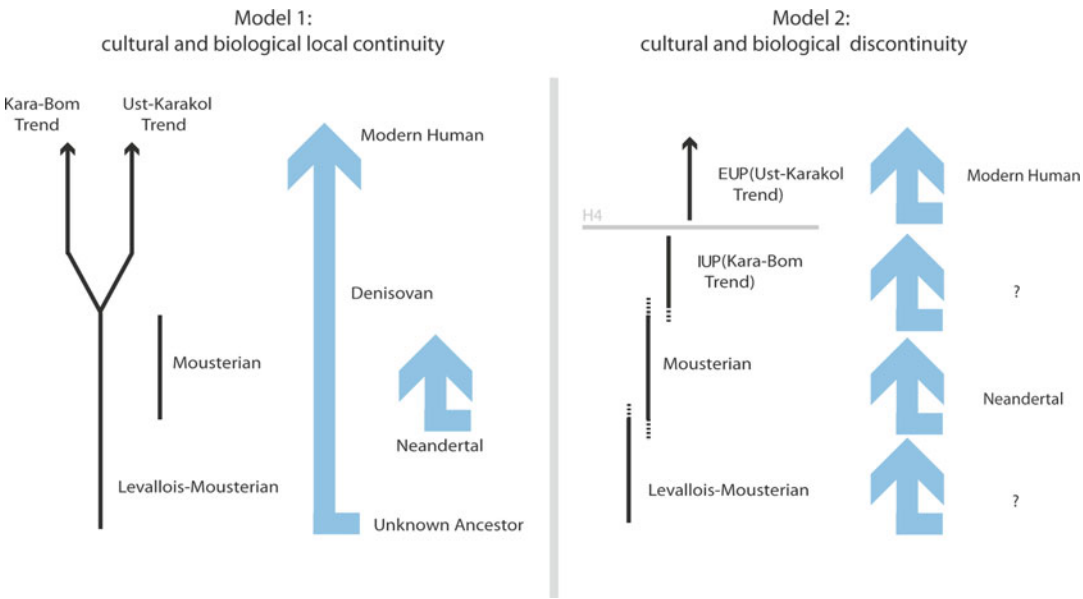
The *Ust-Karakol variant* (or *Early Upper Paleolithic*) first occurs during the middle phase of OIS3. It is marked by the production of small laminar blanks from narrow-fronted and carinated cores reduced by direct percussion. It is associated with the generalization of bone tools and fully developed forms of ornaments. The defining assemblages are Ust-Karakol 1 (sector 2) layers 11–8, but other assemblages from Anuy I-III, Strashnaya upper levels, Tyumechin-4, and Ushlep 6 are considered analogous. It is said to have evolved from a Levallois background assigned to OIS5e at Ust-Karakol 1, sector 2, (layers 19–18). Originally described as non-Levallois, the central chamber of Denisova Cave was later said to illustrate the same gradual development, between 100 and 30 ka, toward



Altai: Paleolithic, Fig. 4 Initial Upper Paleolithic (the Kara-Bom variant) from Ust-Karakol 1 sector 1. 1, 2, blade with inverse proximal retouch; 3, bidirectional blade core; 4, burin-core. (Drawings by N. Zwyns)

genuine UP (layers 11 and 9). Although the Ust-Karakol trend is sometimes listed as a possible source for the spread of microblade technology in Northeast Asia, the early UP assemblages display no clear evidence supporting an early use of pressure flaking.

A recent study based of the laminar technology of Kara-Bom and Ust-Karakol variant supports the existence of two main technical traditions at the beginning of the Upper Paleolithic (Zwyns 2012). By comparison with Europe and the Levant, the Kara-Bom variant is assigned to the Initial Upper Paleolithic (IUP) to describe the presence of derived UP features without necessarily implying a local transition. The IUP definition reinforces analogies proposed by numerous authors (e.g., Derevianko 2011) with sites from the Cis-Baikal (e.g., Makarovo-4), Trans-Baikal (e.g., Tolbaga, Barun-Alan, Khotyk, Kamenka A and C, Varvarina Gora, Podzvonkaya), or Mongolia (Tolbor 4). The IUP is followed by an Early Upper Paleolithic (EUP) phase with a shift toward developed UP features (Ust-Karakol variant). The latter correspond to a series of behavioral changes in terms of economy (emancipation of the bladelet production) knapping techniques (shift to soft hammer), but also probably in terms of weaponry (composite spears). Although they are poorly dated, the two phases appear separated by a significant time span and by climatic events such as Heinrich 4 (Fig. 5).



Altai: Paleolithic, Fig. 5 Main models of Upper Paleolithic emergence in the Altai: summary (see text for references)

According to the chronometric data, the Upper layers of Anui 2 document human presence during a time span that covers the end of OIS3 until the Late Glacial Maximum. It is not yet clear if human groups inhabited the lower valley of the Altai during the LGM or if the record illustrates a regional discontinuity in human occupation. It seems, however, that the occupational hiatus is more clearly marked than in the piedmonts. Starting from OIS 2, the blockage of river systems driven by the expansion of mountain glaciers led to the multiplication of lakes. Eventually, periodic drainage events may have caused catastrophic floods that may represent a source of bias in the archaeological record for the period between 26 and 13 ka.

Human Remains

At Okladnikov Cave, dental remains occur in stratum 2 with a left lower molar, but also in stratum 3 with a left lower premolar, a left lower molar, and a right lower molar. Postcranial remains are found in stratum 2 with an adult humerus, and in stratum 3 with a subadult humerus and a hand phalanx. The good preservation of the collagen extracted from the phalanx, from the subadult humerus, the femur, and from the adult humerus has led to the reconstruction of the mtDNA sequence which has been identified as Neandertal (Krause et al. 2007). The archaeological assemblage is Mousterian but the dating of the human occupation is far from clear. Direct dates would indicate that the Neandertal presence in the area lasted until at least 37 ka 14C BP.

At Strashnaya Cave, eight deciduous teeth presumably belonging to a single individual come from an unclear stratigraphic context that can be attributed to the UP. The specimens could not be assigned to a clear taxon. At Maloyalomanskaya Cave, the discovery of a single human tooth has been reported, but no detailed description has been published.

At Denisova Cave, two teeth have been found in the 1984 collection from the central chamber. Denisova 1 is an upper central incisor found in layer 12. Although it has been previously published as a human tooth, Viola et al. (2011) assign it to a worn incisor from a large bovid. Denisova 2 is a deciduous molar (right first lower) found in layer 22.1 that would date to at least OIS 5e. In 2000, layer 11.1 of the south gallery yielded a tooth belonging to a young adult and identified as a third or second

upper molar (Viola et al. 2011). Denisova 3 is the proximal epiphysis of a juvenile manual phalanx uncovered in layer 11.2 of square D2 of the east gallery. The phalanx belongs to a distinct individual with an age evaluated at around 6–7 years old. Both mtDNA and nuclear DNA were extracted from these remains, resulting in the identification of a hitherto unknown archaic hominin (Krause et al. 2010; Reich et al. 2010). The nuclear DNA indicates that these hominins, referred to as "Denisovans," belong to a lineage sharing a common origin with Neandertals that post-dates the split with MH ancestors. Initial morphological descriptions of the tooth noted a set of archaic features not seen in Neandertals or in early modern humans, further suggesting a distinct evolutionary history.

At the recently discovered Chagysrkaya Cave, Viola and colleagues (2011) described human fossils associated with layers 6b and 6c. Chargyrskaya 1 is a worn upper deciduous canine and Chagyrskaya 2 is an atlas fragment. Both fossils are associated with layer 6b. Chagyrskaya 3 is an upper premolar and Chagyrskaya 4 is a lower incisor. Both are worn and small and would fall outside the range of Neandertals. Nevertheless, the mtDNA is under reconstruction; although the results are not fully published, they seem to indicate an attribution to Neandertals (Viola et al. 2011). The rich lithic and fauna assemblage is assigned to the Mousterian and the excavation is still ongoing.

Future Directions

The recent identification of the Denisovans in the Altai opens up new perspectives for understanding the peopling of Asia. Genetic data suggest that, apart from some present-day populations from Melanesia and Australia, Denisovans did not contribute significantly to the genome of Eurasian populations (Reich et al. 2011). The current geographical distribution of the Denisovan genetic input lead to the hypothesis that the Altai might represent the northern edge of their territorial expansion. Where and when they did interbreed with MHs is still unclear and the current data do not rule out other sterile encounters.

The human fossils from Denisova Cave have not been directly dated. New radiocarbon dates were produced on cut-marked bones and bone tools that belong to the same layers as the Denisovan fossils. The results indicate post-depositional admixtures from subsequent and underlying layers (Reich et al. 2010). The chronological and cultural attributions of the Denisova hominins remain, therefore, uncertain. Although it shows the first occurrence of modern behaviors, the IUP assemblages predate the earliest known MH fossil from Siberia. According to the data at hand, the latter appears contemporaneous of the EUP. The Altai Neandertals are, up to now, the only taxon clearly associated with an archaeologically defined unit, namely, the MP of Mousterian variant. The makers of the Levallois-Mousterian variant are still unknown and the identity the IUP populations is yet to be found.

Finally, the apparent complexity of the Altai Paleolithic human occupation likely reflects a lack of reliable and comparable chronological data. Recent steps taken toward the identification of human remains in clear archaeological, taphonomic, environmental, and chronological contexts have already proven to be highly valuable. Further efforts to acquire high-resolution datasets are, nevertheless, essential in order to test current models. There is a few doubt that it will provide new keys for the understanding of the peopling dynamics in a region that stands as a gate between Central and Northeast Asia.

Cross-References

- ▶ Fossil Records of Early Modern Humans
- ▶ Mongolia: Paleolithic
- ▶ Mousterian Industry Tradition
- ▶ Neanderthals and Their Contemporaries

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Altamira and Paleolithic Cave Art of Northern Spain

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Introduction

There are more than 120 caves in the Cantabrian side of Northern Spain that preserve rock art produced during the Paleolithic. In 1985, one of them, Altamira, was declared World Heritage as it represents "a masterpiece of human creative genius" (Criterion I & III: http://whc.unesco.org/en/criteria/). In 2008, this same recognition was extended to another 17 caves in the region.

Some of the archaeological sites with Cantabrian Paleolithic cave art have also produced outstanding portable art pieces on bone, antler, or stone (Corchón 1986; Barandiaran 1989).

Definition

Cave art of Northern Spain extends along a 400-km coastal zone, from the Bidasoa's to the Nalón's river basin, coinciding with the distribution of the karstic lithology of the Cantabrian coast. Especially noteworthy are the concentrations associated with the mouth of the Sella and the Saja-Besaya river basins; the Nalón, the Pas, and the Asón middle basins; or the coastal areas of Llanes and Castro Urdiales (González Echegaray & González Sainz 1994).

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 1 Distribution map of decorated caves on the Cantabrian coast of the Iberian Peninsula (D. Garate)

This area is one of the classic regions of Paleolithic cave art (Balbín Behrmann 2004), together with the Pyrenees and the Dordogne, and other emerging regions such as Andalusia and Ardèche. New sites continue to be discovered, increasing the number of sites and gradually redefining the characteristics of this artistic tradition.

Altamira was not just the first recognized decorated cave, but one of the most outstanding because of its artistic quality and the quantity of motifs preserved. The cave was discovered in 1879 by the daughter of Marcelino Sanz de Sautuola who for years had studied the cave. The discovery generated a huge controversy about the finding's authenticity, which was only resolved in 1902, when the existence of Paleolithic art was accepted by the broader scientific community (Moro Abadía & González Morales 2004). The turn of the century brought the first systematic surveys that resulted in the discovery of other new and spectacular decorated caves (Alcalde del Rio et al. 1911) (Fig. 1).

After one and a half centuries of research, the wide variability and the specific features of each site are now well known (González Sainz 2004). Each of these is unique, and we have identified a number of graphic devices that were continuously reused throughout the Upper Paleolithic with art assemblages involving hundreds of figures such as Peña Candamo, Llonín, Tito Bustillo, Altamira, Castillo, or La Garma. Others, however, were only decorated at specific points in time but, in some cases, also in a very profuse manner (e.g., Ekain or Altxerri). In some cases (such as in Cullalvera), the artists penetrated the farthest depths inside the caves for their activities. But quite often (such as in La Lluera, Chufín, or Venta Laperra), the decorated panels are located near the entrances, even illuminated by natural light.

Most of the others have very modest assemblages with only a few images represented. This suggests that the artistic production was not probably the main activity practiced at these sites (Fig. 2).

Figurative subject matters are dominated by animals. From the beginning are horses, bison, aurochs, and goats, but during later periods, the horse and the bison dominate the iconography as is found in other regions (Pyrenees and Dordogne). The animals appear together with specific geometric signs such as rectangles divided internally, rectilinear forms with central bulges, and simpler shapes such as cupules in rows or clouds of dots. Although there are a few human figures, there are representations of vulvas and hands stencils are abundant.

The techniques used by the artists are basically painting and engraving. The color palette was limited: different hues of black, yellow, and red. The first was obtained from charcoal, burned bones, or manganese oxides, while the others

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 2 Panel of the polychromes of the Altamira cave (P. Saura/ Museum of Altamira)

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 3 Main panel of Tito Bustillo cave (R. de Balbin)

were produced using different sorts of iron oxides. The color was applied directly as a crayon or as a processed paint. The application of the pigment with the fingers to produce dotted animals is a technical peculiarity specific to this region. Engravings made with flint tools or with the fingers on soft surfaces had different depths and were produced by one or repetitive strokes.

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 4 Panel of the hands of the El Castillo cave (P. Saura/Council of Culture, Tourism and Sports, Government of Cantabria)

In this case, multiple striping to indicate animal fur, especially on deer, is also specific to the region (Fig. 3).

Key Issues/Current Debates/Future Directions/Examples

Paleolithic art research presents a number of common problems in the various regions where it appears. It is difficult to interpret its original meaning, and the establishment of chronological sequences has been a priority, given the difficulties of directly dating the art. Even though the message originally transmitted by the Paleolithic images cannot be recovered, through their study we can explore the lifestyle and the way the artists understood the world and, by extension, to the societies that created them (Fig. 4).

Chronological Distribution

The improvement of radiocarbon and other dating techniques has demonstrated that a highly developed art form existed from the beginning of the Upper Paleolithic.

The chronology of art production in caves along the Cantabrian coast requires further research. Radiocarbon dates remain controversial (Fortea Perez 2000–2001), and other techniques such as calcite formations dating, under or superimposed over the figures, provide a lower degree of resolution. Thus, the thermoluminescence dates from Venta Laperra and Pondra caves offer a minimum age for the decoration of these caves, and these are significantly older than expected (González Sainz 1999). Uranium series applied to calcifications at Altamira, Tito Bustillo, and Castillo (Pike et al. 2012) are surprisingly old, and the accuracy of this technique is still being debated.

In any case, it seems that artistic skills were not the result of a progressive learning throughout thousands of years of European Paleolithic art. Advances in dating techniques will allow us to reconstruct in a much more precise way the sequence of this first art of mankind.

Altamira and Paleolithic Cave Art of Northern Spain, Fig. 5 Zaldei panel with polychrome horses in Ekain cave (Basque Government/J. Wesbuer)

Style, Territory, and Identity

The spatial settlement of hunter-gatherer groups in the territory is given by the combination of sedentary behaviors and a range of mobility. Within these parameters, social activities develop. In this sense, art is understood as a graphic code associated with a specific community and is an indispensable tool for the characterization of groups of Paleolithic hunter-gatherers.

In the Cantabrian coast, the graphic traditions of the Early and Upper Paleolithic were significant (Moure Romanillo 1994). This includes the open air rockshelters or sites decorated with deep engravings representing animal forming palimpsests and especially concentrated in the Nalón basin and the deep caves with red animal paintings composed of small digital dots arranged in pairs, whose main focus of which is found on the river Asón. The caves of the central part of the region have fine striated engravings which represent animal fur, which also present on pieces of portable art. In all cases the most common animal is the deer, accompanied by horses, aurochs, and bison. Traditionally these regional styles were interpreted as successive and independent but, in the light of the recent chronological findings, they could have overlapped in time, reflecting the presence in the territory of different human groups (Garate 2010).

By the end of the Upper Paleolithic, the Cantabrian regional particularities are replaced by some artistic interregional linkages encompassing also the Pyrenees and the Dordogne (Fig. 5).

Cross-References

- ▶ Europe: Paleolithic Art
- ▶ Europe: Prehistoric Rock Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Rock Art, Forms of
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Altitude Environments in Archaeology

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Introduction

Since humans have evolved as a low-elevation species, to live and thrive at high elevations, our species had to develop physiological, genetic, and cultural adaptations to this extreme environment. Although it is probable that humans made seasonal forays into high-elevation environments perhaps beginning in the Lower Paleolithic in Africa, the permanent occupation of high-elevation environments occurred relatively late in prehistory. The adoption and spread of plant and animal cultigens, along with acquired genetic adaptations, allowed high-elevation inhabitants, particularly in the world's high plateaus, to create complex polities.

Definition

High-elevation (or altitude) environments are defined as those at and over 2,500 masl (meters

above sea level). It is at this elevation that native lowlanders first experience hypoxia, which is the reduced partial pressure of oxygen. At sea level, for example, arterial blood is 97 % saturated with oxygen; at 3,000 m, it is at 90 %; and at elevations between 4,000 and 5,000 m, saturation decreases by almost 30 % when compared to sea level (Beall 2001: 426-28). Hypoxia begins to affect lowlanders at c. 2,500 m above sea level and has both direct and indirect effects on health status, reproduction and growth, nutritional status, and work capacity. However, these effects on human biology are differentially expressed across time and can be characterized as being of either short- or long-term consequence. Importantly, hypoxia is the stressor that is least amenable to intervention and amelioration via cultural adaptations. Over the long run, then, the establishment of permanent habitation at elevations above 2,500 m depended upon the appearance of acclimatizations (phenotypic plasticity), true adaptation (the appearance of genes capable of overcoming the selective pressures of hypoxia), or some combination of the two.

High-elevation ecology is determined by a complex interaction of climate, altitude, and topography and can be characterized by five primary features (Aldenderfer 1998: 2-4): (1) environmental heterogeneity, (2) extremeness, (3) low predictability, (4) low primary productivity, and (5) high instability and fragility. High-elevation environments tend to be patchy in both space and time, and consequently, there is significant variability in the location, size, and duration of resource patches. At high elevation, two aspects of extremeness are important: temperature and hypoxia. Even in tropical mountains like the Andes, cold is a constant problem. Humans must cope with cold by cultural adaptations that have significant material and energy costs, and thus divert resources from the subsistence quest. Hypoxia affects plant morphology and metabolic processes, which in turn affects primary productivity. The combination of cold, hypoxia, and aridity in high-elevation environments creates a context of low primary productivity. Only the most extreme deserts and polar environments of the planet have lower primary productivity than those at high elevation. Finally, high-elevation environments are highly susceptible to wind and rain erosion and extreme colluvial processes which can modify terrain, change stream courses, and destroy resource patches, thus contributing to the overall patchiness of the high-elevation landscape.

The two primary extremes of high-elevation environments – hypoxia and cold – act as stressors on human biology and affect all facets of life, especially reproduction, growth, health status, morbidity, mortality, nutritional status, and work effort. Although the existing indigenous peoples of modern high-elevation environments have a variety of physiological adaptations based upon selection for alleles identified as promoting improved oxygen transport and that ameliorate the negative effects of hypoxia, these developed over time and would have acted as constraints on the earliest inhabitants of high-elevation environments and their descendants. A consideration of these stressors is necessary because they have had a significant effect on the range of human *cultural* adaptations and historical outcomes of cultural evolution and change at high altitude. Constraints on fertility or exceptionally high neonatal mortality rates, for example, which are known to affect migrants to high elevation, may well have led to lower growth rates of highland populations, especially in the generations immediately following their founding by lowlanders. And since high-elevation peoples tend to have higher basal metabolic rates, they would have required on average more calories than comparable low-elevation peoples. This may in turn have had important effects on cultural strategies when dealing with problems relating to environmental packing, diet choice under restricted mobility, resource intensification, and both short- and long-term changes in resource availability. Mobility strategies themselves may have been substantially affected due to demands imposed by basic caloric requirements as well as the greater work effort required to traverse rugged mountain topography. Although it is important not to cast these stressors in an overly deterministic role, they did have tangible effects on a variety of aspects of human life at high elevation.

Altitude Environments in Archaeology, Fig. 1 Areas of the world at elevations greater than 2,500 m above mean sea level

There are relatively few places on the planet that exceed 2,500 m in elevation (Fig. 1). Most are the peaks and surrounding high terrain of the mountainous regions of North America (the Alaska Range and the Rocky Mountains), Central America (including the Basin of Mexico), South America (the Andean chain), Europe (the Alps and Caucasus), the Middle East (Zagros), the Asian mountain systems (Himalayas, Tien Shan, Kunlun Shan, and Altai ranges), and Africa (peaks in Ethiopia and Kenya). Aside from the Greenland and Antarctic plateaus, which owe their elevation to massive glaciers and icecaps, there are three major plateaus at high elevation: the Ethiopian plateau, the Andean altiplano, and the Tibetan plateau.

Historical Background

The study of high-elevation environments in archaeology has been significantly undertheorized. Although archaeological research has been done in all of the world's high plateaus and surrounding mountainous regions, virtually no serious consideration of how the stressors of hypoxia and cold affected the ways in which these environments were first entered, then permanently occupied. Clive Gamble's *Timewalkers* (1993) recognized high-elevation environments as extreme and noted that they were among the last places on the planet to be occupied permanently. However, there was no discussion of the physiological factors that would have challenged early inhabitants, and instead the ruggedness and difficulty of the terrain and its productivity were emphasized.

Key Issues/Current Debates

There are two major debates and areas of emphasis in modern studies of high-elevation environments: evaluations of the evidence for the initial peopling of the world's high plateaus and mountainous regions and debates involving contrasting explanations for their relatively late permanent occupation.

Evidence for the Peopling of the World's High-Elevation Regions

Although evidence for the occupation of the world's high places is relatively recent in human prehistory, it is possible that some of our hominid ancestors may have used elevation zones above 2,500 m as early as 1.5 mya along the Rift Valley rims near the southern margin of the Ethiopian plateau. Acheulian-style hand axes and Middle Stone age artifacts have been found in surface contexts on the plateau at elevations up to 2,300 m, but no permanent occupation dating before 5,000 years ago has yet been documented upon it (Phillipson 2005). However, sites such as Melka Kunture (2,300–2,400 m), which

contains Olduwan, Acheulian, and Middle Stone Age materials, also include the fragmentary skeletal elements of *Homo ergaster* and *Homo erectus*, and the Gadeb locality (2,400 m), which contains Developed Olduwan and Acheulian materials dated between 1.5 and 0.7 mya, suggests the possibility that higher-elevation regions on the nearby plateau could have been utilized on a seasonal or temporary basis (Aldenderfer 2006).

The antiquity of the occupation of the Andean altiplano is constrained by the antiquity of the human presence in the New World. Aside from a handful of controversial sites as well as a number of potential candidates for an early human presence in the New World in active excavation, the only reliable archaeological data for the earliest site in the Americas is from Monte Verde, located in lowland south-central Chile and which is dated to between 14,220 and 13,980 BP (Dillehay et al. 2008). However, other lines of evidence, including mitochondrial and Y-haplotype DNA, biometric data on skeletal remains, and linguistics push an initial occupation of the New World back substantially further, perhaps between 15,000 and 30,000 years ago (Powell 2005). Even the number of migrations to the Americas is now hotly debated, with one, two, three, and more suggested by different lines of evidence.

Although there is controversial evidence of an early occupation of the Andean highlands at Pikimachay (2,850 m) between 12,000 and 20,000 years ago, this assertion is not widely accepted (Aldenderfer 2006: 362). Currently, the most widely accepted dates for the initial colonization of the altiplano suggest that it was initiated around 11,500 BP by foragers moving from low-elevation sites into the Andean highlands to procure resources such as obsidian and to hunt in newly opened niches (Aldenderfer 2008). A more permanent, longer-term occupation of the highlands appears first in the central Andes at sites like Pachamachay and Telarmachay by 10,000 BP, and 9,500 BP further to the south at Asana and in the highlands of northern Chile and northwestern Argentina (Aldenderfer 2008).

The dating of the earliest occupations of the Tibetan plateau is similarly controversial (Aldenderfer & Zhang 2004; Aldenderfer 2011). Although there has been speculation that the initial occupation of the Tibetan plateau was as early as 50,000 years ago, more recent research suggests that the earliest occupation of the plateau is no earlier than 30,000 years ago and could be much later in time. Xiao Qaidam (3,100 m asl) is found on the extreme northern fringe of the plateau, and the original dating of the geological context at Qaidam indicated that the site dated between 33,000 and 35,000 years ago. A more recent examination of the geological context of the site places it in time between 3,000 and 11,000 years ago, with the latter the most probable date given a reassessment of the cross dating of the stone-tool assemblage (Aldenderfer 2011: 142). Other candidates for an as yet uncertain early occupation include Siling Co (4,600 m) and Chusang (4,200 m). However, the sites with the most reliable dates are found on the northeastern margin of the plateau and include Heimahe 1, Jiangxigou 1, and Locality 93-13. Together, these total to five distinct occupations dating between 15,000 and 13,000 years ago. They are found at elevations between 3,200 and 3,300 m (Madsen et al. 2006). However, the excavators of the sites assert these sites represent short-term, temporary encampments of foragers that were connected to lower-elevation base camps. It is not until c. 5,900–4,145 BP that a permanent occupation of the plateau can be identified. This is Karou, found on the extreme eastern margin of the plateau at an elevation of 3,100 m. The site has substantial semisubterranean structures, a single cultivar – foxtail millet (*Setaria italica*) – and two species of likely domesticated animals – an unidentified bovid and pig (*Sus scrofa*). Other Neolithic sites with different cultivars – "naked" barley (*Hordeum vulgare* L. Varnudum) and domesticated sheep and yak – appear on the plateau slightly later in time and at higher elevations (Aldenderfer 2011: 144-46).

The occupation and utilization of high-mountain environments, as distinct from high plateaus, is similarly late. There is no strong

evidence for the use of high-elevation zones in the Alps, Caucasus, Zagros, and African mountains until well after the advent of the Holocene (c. 10,000–12,000 years ago); however, like the plateaus, it is possible that areas above 2,500 m were used sporadically and for very brief periods during glacial interstadials and other warming periods as early as the Middle Paleolithic. The Himalayas, as well as the mountain systems to the north of the Tibetan plateau, reflects a similar situation, with foothill zones and moderate elevations showing Paleolithic era occupations followed in the Holocene by more significant occupations of foraging peoples in high-valley systems (Dambricourt-Malassé 2008). Finally, the New World mountain systems show no permanent occupations at high elevation at any time. Instead, these mountain systems were used on a seasonal basis by foragers. Of note is the Basin of Mexico, which lies at an average elevation of c. 2,200 m. Early Holocene foraging peoples used the surrounding higher slopes but made no permanent encampments in them until well after the appearance of cultivars.

Debates over the Timing of the Late Permanent Occupation of High-Elevation Regions

Compared to other extreme environments, such as the world's deserts and polar regions, high-elevation environments were occupied relatively late in human prehistory. The New World plateaus could not have been occupied before humans arrived into the hemisphere. In the Old World, however, our hominid ancestors occupied the low-elevation fringes of most major mountains and plateaus throughout much of the Pleistocene, yet did not move into them.

I have argued that three conditions served to promote or constrain the permanent occupation of high-elevation environments by our ancestors: physical accessibility, resource availability, and the capacity for behavioral flexibility for long-term survival in an extreme environment (Aldenderfer 2006: 363-366). In the Old World, both the timing of access and the availability of resources would have been dictated by the pulse of glacial advance and retreat. However, there were multiple times over the past 1 mya in which our ancestors could have moved into and lived on the high plateaus. Behavioral flexibility was by far the most significant constraint on the process. From a cognitive perspective, our ancestors had the ability to create complex foraging systems capable of dealing with strong seasonality and cold stress by the end of the Middle Pleistocene. Further, the controlled use of fire, which would have been essential for life in extreme cold, also has a relatively early origin. However, high-mountain peoples would also have required adequate clothing to mitigate the effects of cold stress, and these did not appear until the advent of the Upper Paleolithic some 50,000 years ago.

But cultural adaptations can only mitigate, not ameliorate, the effects of hypoxia, so in the long run, our ancestors had to acquire genetic adaptations to it. It is well known that the native peoples of the world's high plateaus have different phenotypic responses to hypoxia, and thus it comes as no surprise that there appears to be important variability as well in the genes that promote adaptation to hypoxia (Beall 2013). At present, the antiquity of these genetic adaptations remains to be determined. For example, one prominent study of the timing of genetic divergence between native Tibetans and Han lowlanders for alleles thought to be important in promoting more efficient oxygen transport in less than 3,000 years, a finding that is contradicted by archaeological evidence for the occupation of the plateau that suggests a permanent occupation of at least 6,000 years ago and quite possibly much earlier (Aldenderfer 2011). Similar studies have yet to be conducted for the Ethiopian plateau and Andean altiplano.

Future Directions

As with many research questions in archaeology, more data will be required to begin to resolve many questions regarding the peopling of the world's high places and the timing of permanent occupation upon them. Research strategies that

focus upon accessibility and the timing of possible openings onto plateaus from surrounding lowlands offer some real promise. So-called ice patch archaeology – the examination of areas once covered by permanent snow that have begun to melt as global warming intensifies – is beginning to provide new data into specific routes into mountainous terrain or the locations of possible foraging territories. The discovery of Ötzi, the frozen remains of a person who died in a high alpine setting (3,210 m) around 5,200 BP in what is now the Austrian-Italian border, is a dramatic example of what may be discovered as research intensifies.

Another line of evidence that may provide some insight into high-elevation genetic adaptations is ancient DNA (aDNA). If skeletal remains of sufficient antiquity and conditions of preservation can be located, it may be possible to examine these samples for the presence of genes and alleles thought to promote adaptation to hypoxia.

Cross-References

- ▶ Adaptation in Archaeology
- ▶ Andes: High-Altitude Archaeological Sites as Cultural Heritage
- ▶ Glacial Landscapes: Environmental Archaeology
- ▶ Human Evolution: Use of Fire

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Amazonian Dark Earths: Geoarchaeology

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Introduction

Amazonian Dark Earths (hereinafter ADEs) are expanses of anthropogenic soils that formed on generally nutrient-poor upland soils of the Amazon basin during pre-Columbian times. Expanses of ADEs range from <1–80 ha, and overall agricultural aptitude is higher than the vast majority of soils in the region. These soils are much sought after by local farmers who use them to grow specific crops. Most of the documented expanses of ADEs are found on Tertiary-age sediments located in riparian and interfluvial positions of the Amazon basin. However, instances are also

reported on Quaternary alluvial sediments and on human-made earthworks, highlighting that the formation of these soils was an outcome of specific forms of pre-Columbian settlement. The discovery of ADEs alongside the main waterways of the region has been a crucial Rubicon for Amazonian archaeology: these soils record the effects of pre-Columbian indigenous societies' creative manipulation of environmental affordances. Thus, they highlight that human inhabitation of the Amazon basin was, and is, much more than efficient adaptation to environmental limitations. Their ubiquity provides strong evidence for the existence of more sedentary and demographically denser indigenous societies in the Amazon basin before European colonization. Moreover, examined from a strictly archaeological perspective, ADEs are one of the best archaeological signatures of sedentary occupations in a region with limited archaeological preservation potential. ADEs are *sui generis* archaeological artifacts of extraordinary relevance for present-day concerns: soil scientists are currently studying the properties and formation of ADEs in order to develop techniques of soil amelioration that permit recuperation and amendment of degraded and infertile soils.

Definition

ADEs collectively refer to circumscribed expanses of organically enriched mineral soils found mostly within the non-flooding terrain of the Amazon basin. Expanses of these soils vary in size, shape, and location: linear expanses have been reported as patches extending over hundreds to thousands of meters along *terra firme* (non-flooding) bluffs that overlook the major waterways of the basin. However, smaller patches, either oval in shape or draping the horizontal surface of the landform on which they are located, also exist on relict floodplain locations, on *terra firme* areas adjacent to alluvial lakes and flooding forest, on *terra firme* interfluvial terrain away from large rivers, and on alluvial sediments. Moreover, soil horizons with similar characteristics are reported on both shell middens and artificially constructed pre-Columbian mounds found in flooding landscapes of the Amazon basin and beyond.

The topsoil of ADEs (the A horizon) is generally darker (grey, brown, or ink black in color) and deeper (not infrequently reaching down to 60 cm) than the thin A horizons of regional soils. Studies distinguish between *terras pretas* (black earths), i.e., pottery-rich dark soils with a deep A horizon, and *terras mulatas* (brown earths), larger surrounding or adjacent expanses of darkened soils whose surface horizon lacks archaeological artifacts but whose nutrient status is intermediate between *terras pretas* and the broader soilscape (Sombroek 1966). Many scholars consider this contrast to reflect a distinction between sedentary pre-Columbian settlements and associated outfields. The vast majority of studies of ADEs concentrate on settlement-related *terras pretas*. These studies demonstrate that compared to the underlying B horizon or comparable adjacent soils, the A horizon of ADEs shows a higher cation exchange capacity, a more basic pH, and higher concentrations of, among others, organic carbon, calcium, phosphorus, manganese, potassium, barium, copper, manganese, strontium, and zinc. Estimates of black carbon contents using molecular markers, such as benzenepolycarboxylic acids, suggest that the A horizon of settlement-related ADEs occludes up to 70 times more pyrogenic carbon (charred plant matter, i.e., charcoal) than adjacent Oxisols. This observation has been marshalled to suggest that high black carbon concentrations are key to the high organic matter retention of these soils (see Glaser & Birk 2011 for a recent review).

Historical Background

Amazonian Dark Earths were first described in nineteenth-century Brazil as "Terra Preta de Índio" (Indian's Black Earth) or simply as "terras pretas", the reference to "Indians" being a reflection of the fact that abundant pottery shards of evident pre-Columbian age could be seen on the surface. An anthropic origin for

ADEs was advocated in these first descriptions: pioneering geologists like Smith and Hartt unhesitatingly related cultivated ADE patches to villages of former indigenous peoples (Myers et al. 2003). The results of the first soil chemistry analyses conducted on ADEs allowed Katzer (1903) to argue that their high fertility was the result of unusual concentrations of charcoal and decomposed organics in the fine earth fraction, properties which he argued had also made them attractive to farmers in the past. As early as the 1920s, ethnologist and archaeologist Nimuendajú (see Neves 2004) noted that their geographical distribution and associated archaeological remains (including artifacts, earthworks, and roads) suggested they had originated in densely populated, sedentary pre-Columbian settlements.

For the first part of the twentieth century, however, these opinions remained isolated. Nimuendajú's archaeological research went unpublished and, more significantly, was beyond the intellectual web of earth scientists until the mid-1960s. The size of farmed expanses in the Brazilian Amazon, the fact that many local farmers did not recognize their human-made origin, a lack of clear-cut evidence for their contemporary formation, and the scant attention accorded to them by important Amazonian archaeologists (see below) led some researchers to advocate a variety of "geogenic" models for their origins. In broad outline these models argued that ADEs are patches of fertile soils that formed from localized, non-anthropogenic accumulations of organic and/or mineral materials of fossil, volcanic, or peaty origin. However, Klinge (1962) argued that high total and soluble phosphoric acid concentrations of ADEs evidenced an anthropogenic origin. In parallel, Hilbert (1968) whose archaeological research documented the co-occurrence of dark earths and ceramic archaeological remains along the main rivers of the western half of the Brazilian Amazon, observed that ADEs formed on different types of Oxisols (Red and Yellow Latosols in the Brazilian soil classification). Like Nimuendajú, he suggested that ADEs resulted from long-lived settlement.

It was undoubtedly soil scientist Wim Sombroek's (1966) interpretation of the physicochemical characteristics measured in settlement-related ADEs located on the Belterra plateau (near Santarém, Brazil) that convincingly refuted geogenic models for their origin. Sombroek pointed out that the overall topography and drainage of the plateau were incompatible with suggestions that organic material had accumulated in small water bodies. He next noted that instead of the random spatial distribution to be expected from a natural phenomenon, the landscape position of ADE expanses suggested deliberate selection of areas suitable for the invigilation of navigable waterways. He then reported particle size and x-ray diffraction data that evidenced the same overall texture and kaolinitic parent material in *terras pretas* and neighboring soils, effectively overruling a source in volcanic debris. Finally, he enunciated the distinction between *terras pretas* and *terras mulatas*, i.e., between settlement-related anthrosols and settlement-peripheral anthrosols, and presented distributional evidence that expanses of the former were often associated with much larger surrounding or adjacent areas of the latter. It is fair to say that Sombroek settled the matter of anthropogenic *vis-à-vis* geogenic origins in the 1960s.

Although Sombroek's work inaugurated the modern era of studies of ADEs, discussions of Amazonian pre-Columbian history did not initially take stock of their presence or ultimate significance. This lack of attention was not trivial in the face of contrasting understandings of pre-Columbian societies advanced by leading scholars of the day: Betty Meggers (1971) militantly disregarded suggestions that Amazonian upland soils could be made fertile and thus envisioned a low ceiling for sedentism and demographic growth based on the retroduction of ethnographically observed slash-and-burn agriculture. Donald Lathrap (1970) placed his weight behind the suggestion that the crop base of large pre-Columbian populations would have relied on intensive cultivation of rich alluvial sediments. While some argued that the agricultural aptitude of upland soils was not *per se* low nor necessarily unchanging (Carneiro 1983), this lack of attention to Sombroek's findings all but blinded

archaeologists to the possibility of creative manipulation of environmental affordances in the past until the 1980s (Herrera et al. 1980-1; Eden et al. 1984; Andrade 1986; Mora 1991), when pioneering pedo-archaeological investigations in the Colombian Amazon highlighted the part that ADEs could have played in permitting denser populations in pre-Columbian times. On the other hand, Sombroek's research was a crucial intellectual referent for the first systematic survey of ADEs in the Brazilian Amazon, led by geographer Nigel Smith (1980). Significantly, Smith presciently surmised that the dark color of these soils was a result of the deposition of comminuted charcoal and argued they were the correlates of the large settlements that had been sighted by European explorers in the sixteenth century. Recognition of their ubiquity, in turn, permitted links with studies of Amazonian resource management – specifically practices resulting in deliberate environmental alteration (Posey 1984) and/or the presence of biotic legacies in the landscape (Balée 1989). These inferences eventually prompted a reassessment of geographers' arguments about pre-Columbian settlement patterns and population density (Denevan 1992, 1996). It is accurate to say that since the late 1980s and 1990s, ADEs have become an increasingly more important component of archaeological arguments about pre-Columbian Amazonia (Heckenberger et al. 1999; Petersen et al. 2001; Arroyo-Kalin 2010a).

Key Issues

The Makeup of ADEs

Many of the concentrations of edible or useful fruit trees marshalled by Balée (1989) as evidence of anthropogenic disturbance grow on expanses of ADEs (see also Junqueira et al. 2011). Some researchers have considered ADEs as remains of pre-Columbian house gardens produced by the deliberate composting of settlement residues (Andrade 1986; Myers 2004), others perceive them as an outcome of the accumulation, perhaps also management, of waste associated with settlements (see review in Erickson 2003; WinklerPrins 2009; Schmidt 2013, in press), yet others postulate that alluvial inputs make these soils more productive (Herrera et al. 1992; Woods 1995), and still others emphasize the role that pottery production may play in understanding their makeup (Lima et al. 2002; Schaefer et al. 2004; Sergio et al. 2006). It is evident that these opinions do not necessarily exclude each other, especially because a single, Amazon basin-wide account of these soils' formation processes is unlikely to exist. This explains in part the appeal of the "kitchen midden" model (Sombroek et al. 2002), which suggests that a combination between the decomposition of excrements, household garbage, bone, and organic constructions, and the concentration, of ash and charcoal derived from ground-level fires are the most important inputs leading to the formation of settlement-related ADEs. A rise in soil pH associated with organic waste is argued to permit the formation of resistant organo-mineral complexes and thus augment the retention of a more stable pool of organic matter (Sombroek 1966); larger quantities of pyrogenic carbon are considered to provide more ubiquitous sorption sites for metals; a combination of illuviation and faunal mixing of comminuted and/or decomposed constituents is considered responsible for homogenizing these inputs and for the strong melanization that characterizes these soils (Vacher et al. 1998; Kern et al. 2004; Topoliantz & Ponge 2005); both organic and inorganic inclusions are thought to become metabolized by soil microbes and stabilized through humification (Glaser & Birk 2011).

Micromorphological studies have been crucial to ascertain some of these processes as well as the ubiquitous presence of microscopic charcoal, bone, and pottery fragments in ADEs. Soil micromorphological methods were initially deployed by soil scientists (Lima et al. 2002; Schaefer et al. 2004) to compare *terras pretas* and nearby Oxisols. This study permitted linking the aforementioned anthropogenic inclusions and enhanced elemental concentrations. A geoarchaeological study using soil micromorphology (Arroyo-Kalin 2008b; Arroyo-Kalin et al. 2008; Arroyo-Kalin 2010a; Arroyo-Kalin 2012) expanded these results

significantly. By comparing ADEs from within archaeological sites and contrasting observations between clayey- and sandy-textured ADEs from different archaeological sites, it showed that high levels of nutrient enhancement covary with the presence of microscopic inclusions (especially charcoal and bone), highlighted that high densities of microscopic pottery fragments and baked clay are reflected in high magnetic susceptibility values for these sediments, and presented empirical evidence to distinguish between settlement-related *terras pretas* and settlement-peripheral *terras mulatas*. *Terras mulatas* were found to contain a significant volume of microscopic charcoal (lower than *terras pretas*) but, despite high nutrient status, only negligible fragments of microscopic bone, pottery, or burnt clay. Magnetic enhancement of *terras mulatas* has been interpreted as evidence that soil microscopic charcoal did not originate *ex situ* but from repeated near-surface burning associated with past management. Coupled with micromorphological observations suggesting scraping, raking, and/or churning of the soil, this research provides important support for Denevan's (2004) suggestion that *terras mulatas* are the result of spatially concentrated, fire-intensive cultivation practices in pre-Columbian times. It also emphasizes that settlement-related ADEs bear the material signatures of midden material, house floors, and other activity areas.

From a geoarchaeological perspective, important questions arise about the buildup of settlement-related ADEs, which are anthropogenic cumulic soils that in many cases lack a clear source of sediments nearby. Micromorphological analysis accords a role to bulking-up of the sand- and silt-sized fractions by large quantities of microscopic inclusions of anthropic origin, to mixing by soil fauna, and, indirectly, to ash deposition (Arroyo-Kalin et al. 2008). These observations shed light on two conceptual models for ADE horizonation: Vacher et al. (1998) suggest that vegetation clearance associated with the implantation of settlements would lead to destruction of organic litter, after which inhabitation-related production of organic and mineral inputs and the modification of mineral surfaces through trampling, soil removal, and other activities would lead to the formation of a modal O-A-B soil profile with clearly established eluvial and illuvial subhorizons. The upper subhorizon would be directly affected by settlement activities and the lower one would accumulate inputs from the settlement surface. Visible differences between these subhorizons would be obliterated as the lower subhorizon becomes saturated with pigmenting soil constituents, effectively resulting in melanization. At site abandonment, a new mineral surface (A horizon) would be developed through upwards translocation of sediments by soil fauna, obliterating settlement-related sedimentary structures (e.g., compaction) and interring artifacts in the organically enriched sediment matrix. Woods (1995), in contrast, highlights that the accumulation of organic and mineral material would tend to bury the original surface, resulting in rising of habitation surfaces as subsequent occupations takes place. Given a modal O-A-E-B soil profile, he argues that organic inputs would result in an enhancement of the activity of soil fauna as well as strong melanization of the new A horizon, transforming the sediments of the original A-E-B sequence into a transitional AB horizon. Further sedimentation associated with continued habitation would tend to result in repetition of the same process, i.e., buildup at the surface and down mixing as a result of increased activity of soil fauna. While Woods' model is particularly useful to explain the thick A horizons most commonly noticed by soils scientists, there are elements in both models that resonate with empirical observations: ADEs should not be understood exclusively as thick A horizons that have expanded downwards but as an outcome of the accumulation of settlement debris, the effects faunally induced burrowing, mixing, and/or churning of soil material; of the upwards or "conveyor" translocation of sediments from lower in the deposit; and of a higher overall deposition of organic matter (Arroyo-Kalin 2008b).

The Making-Off of ADEs

In his classic review of Amazonian pre-Columbian community patterns, Myers (1973)

argued that the larger and more complex settlement layouts that could be derived from ethnographic and ethnohistorical sources – single-family house communities, multi-family rounded or circular houses, plaza-centered groups of houses (including cases of multiple malocas around a plaza), and linear groups of houses strung alongside rivers and lakes – were all characterized by scrupulous maintenance of the patios, plazas, or circular plazas within, behind, or around which dwellings were located. These maintenance practices resulted in debris accumulating as secondary refuse in either linear middens behind rectilinear rows of houses or in ring-shaped middens around other types of settlements (from single and multi-family house-based settlements to plaza-centered groups of houses). Erickson's (2003) recent survey of the ADE formation literature reexamines Myers's (1973) classic survey and suggests that ADE expanses could result from a combination between specifically shaped refuse accumulations, remobilization of enriched soils once they have formed, and overlapping occupations characterized by different settlement layouts. These suggestions are borne out by the compounded results of different ethnographic studies in Amazonia: Deboer and Lathrap's (1979) ethnoarchaeological study of San Francisco de Yarinacocha, in the Peruvian Amazon, shows that secondary refuse resulting from constant sweeping and raking of household and plazas/patios should, under ideal conditions, accumulate in settlement-peripheral middens and (to judge from the settlement plan they present) specific activity areas such as food preparation and pottery firing areas (see also Siegel & Roe 1986). Zeidler (1983) describes a 3-year-old Achuar dwelling as a thatch-roofed oval area of some 160 m^2 enclosed by walls formed by upstanding peach palm logs. He observes that the position of debris within the house reflects, first, gender-ordained, communal, and personal activity areas and, second, maintenance of clean spaces through sweeping. However, he also notes that the periodicity of sweeping opens up opportunities for artifacts to become interred as a result of trampling, a process that is assisted by sedimentation of ash, charcoal, and burnt soil produced by and accumulated adjacent to combustion features. In the upper Xingú region, research along the southern periphery of the Amazon basin has highlighted circular plaza-centered villages surrounded by rings of dwellings as contexts for the formation of ADEs (Heckenberger 2005; Schmidt 2013, in press). Chemical and physical analyses of a ringlike string of elevated rubbish middens behind house structures as well as house sediments and plaza sediments show the lowest values of pH, organic matter, phosphorus, calcium, potassium, manganese, magnesium, and sodium in the latter areas, intermediate values within abandoned houses, and high values within middens. Middens form distinctive patterns on the landscape consisting of linear mounds along backyard edges and trails. These are used for the cultivation of home garden crops but can also be levelled to place houses on them. Comparable data are presented by Hecht (2003) at the Kayapó settlement of Gorotire, which identifies different types of middens beyond plazas and houses and records comparatively higher concentrations of key elements as a result of planned waste management. Silva's (2003) study of an Asuriní village similarly shows how regular maintenance of public spaces produces large middens behind houses, some being deliberate pilings of large amounts of debris and others more incidental accumulations. In northwest Amazonia, early-twentieth-century ethnographic descriptions show thatch-roofed longhouses enclosing spaces internally divided into communal areas used for meals and transit, compartments for nuclear families, and areas in which manioc processing takes place. Fireplaces of different kinds and purposes were frequently used in different parts of the longhouse, resulting in the production of charcoal and ash. Many accounts suggest that the interiors were swept regularly, sometimes accompanied by wetting of the otherwise dry floors (Koch-Grünberg 1995 (1909)). More recent observations (Arroyo-Kalin, field notes) suggest that floors of thatch-roofed structures are characterized by buildup of sediment in which significant amounts of organic debris, ash, and charcoal accumulate.

Roofed precincts restrict the transportation of airborne sediments permitting, among other things, the accumulation of soot particles on the underside of roof thatching (in new houses, this is encouraged to increase water-proofing). A number of different researchers (Neves et al. 2003; Neves et al. 2004; WinklerPrins 2009) point to various forms of localized "dooryard" burning of organic debris that could result in localized, within-settlement concentrations of charcoal and other debris. Other activity areas of potential interest for the formation of ADEs are smoldering fires under racks used for smoking fish and, perhaps most intriguingly, areas in which pottery tempered with *caraipé* (obtained by ashing the bark of *Licania octandra*) was produced. The *caraipé* link deserves more focused research given that it could permit linking ADE formation to particular ceramic techno-sylistic traditions. All in all, it is clear that a variety of contexts for the formation of ADE must be considered.

ADEs in Space and Time

An up-to-date map of the spatial distribution of reported expanses of ADEs is being developed as a Google Earth map (WinklerPrins & Aldrich 2010). The overall distribution suggests ADEs are ubiquitous in the Amazon basin but, on the whole, less frequent or underreported as one approaches the westernmost lowlands of the Amazon basin. In terms of occupations, the oldest reported ADEs are associated with c. 3rd millennium BCE preceramic occupations of the Massangana phase, Jamari river, in the upper Madeira basin, Brazil (Miller 1992). However, the vast majority of occupations include ceramic remains and charcoal that date from around or after 0 CE and, in many instances, from around 500 CE. Most of these occupations peak around or after 1,000 CE (Arroyo-Kalin 2008a; Moraes & Neves 2012). Some controversy has existed about the extent to which *terra preta* sites reflect continued inhabitation as opposed to overlapping short-lived occupations (Meggers 2001; DeBoer et al. 2001; Heckenberger et al. 2001; Neves et al. 2003; Neves et al. 2004; Neves & Petersen 2006). A comparison between the 14C dates of soil-embedded microscopic charcoal and macroscopic charcoal associated with archaeological remains shows that the pyrogenic carbon pool of *terras pretas* is coherent with the most intense human occupations inferred from archaeological evidence (Arroyo-Kalin 2012). At the Manduquinha site, a relatively small ADE expanse occupied over a period of approximately 300 years prior to European contact, horizontal variability in elemental concentrations of the A horizon is interpreted as evidence for areas of transit, middens, dwellings, and shells heaps, effectively suggesting a relatively stable settlement layout persisted during occupation (Kern et al. 2004). Studies of multicomponent sites (e.g., Heckenberger et al. 1999; Neves 2003; Mora 2003; Moraes 2006) support Woods' contention that ADEs are accreting deposits in which numerous occupations are recorded. Thick A horizons in ADE are generally associated to anthropogenic enrichment of multiple surfaces and subsequent mixing by soil fauna, sometimes appearing as subhorizons to other earth scientists (Arroyo-Kalin 2008b). Evidently this suggests that many of the best-known ADE exemplars are large sites with protracted and intensive occupation histories. However, less-evident, perhaps incipient anthropogenic horizons are found associated with occupations that reach back to the early to mid-Holocene (Arroyo-Kalin 2010a).

Future Directions

While much recent literature has emphasized the unique Amazonian character of these soils (Lehmann et al. 2003; Glaser & Woods 2004), archaeological investigations show that similar anthropogenic modifications are found beyond the Amazon basin, for instance, in the north of Colombia, in the Orinoco basin, in the Guianas, and in subtropical areas south of the Amazon basin proper. This has led some to propose the need to reconsider the distribution of anthropogenic dark soils of pre-Columbian origin within the broader geographical context of the Neotropics (Graham 2006). Even casual perusal of studies from further afield highlights that

anthropogenic soils and sediments have been linked to a very broad variety of situations, i.e., underscores the need to examine ADE formation processes with attention to historical regional specificities. Notwithstanding, the significant appeal of their study in the Amazon basin ultimately resides in a heritage of archaeological interpretations that regards the Amazon basin as hostile to population growth and sedentism. ADEs lay to rest this suggestion and effectively tackle down the received truth that soil fertility was an insurmountable limit for pre-Columbian populations.

Amazonian Dark Earths are prized to this day by farmers because they achieve higher yields of staple lowlands cultivars such as manioc, permit the growth of acid-intolerant crops such as maize, and concentrate a high diversity of edible/useful fruit trees. The overall spatial distribution of ADEs might suggest co-occurrence between these soils and regions where bitter manioc is cultivated (Arroyo-Kalin 2010a; Fraser et al. 2011). However, more intensive archaeological survey is required to ascertain broad patterns of regional distribution as well as to determine any significant temporal gradients in their formation. Detailed consideration of their variability and associated plant and animal fossil assemblages is called for to answer a number of archaeological research questions: given the ubiquity of microscopic bone fragments and the fact that bone apatite is a source of P and Ca, can fertile ADEs be linked to the ability of past populations to tap into abundant faunal resources? If this is the case, then new and interesting questions arise regarding the feedback mechanism between fishing, the main source of protein in Amazonia, and the development of fertile agricultural soils (Arroyo-Kalin 2010b). A further question can be asked: to what extent have we grasped the full variability of the ADE phenomenon? Here it is crucial to take into consideration the little that we know about the variability of intra-settlement and, especially, settlement-peripheral soils (*terras mulatas*), which can be expected to vary according to broad precipitation patterns (Arroyo-Kalin 2012). One might also ask: were some of the well-developed expanses that we see today recycled for crop cultivation in the pre-Columbian past? Did they play a role in permitting the cultivation of certain crops? Were they dump heaps for the domestication of autochthonous Amazonian lowland crops? What does the spatial patterning of known occurrences indicate in terms of pre-Columbian population density and livelihoods (Arroyo-Kalin 2010b; cf. McMichael et al. 2012)? To what extent did increased soil fertility in ADEs lead to specific locales becoming more contested by pre-Columbian populations (Arroyo-Kalin 2008a)? Such questions can only be answered through interdisciplinary research that includes archaeological perspectives: it is otherwise impossible to establish basic spatiotemporal parameters that permit examining ADEs as historical outcomes of multiple processes. In conclusion, it can be stated that ADEs provide a paradigmatic example of a trans-generational and cumulative transformation of the landscape – one with incidental *and* deliberate components – in an environment long regarded as impenetrable. Consequently, the study of ADEs ultimately angles on the increasingly more significant role that human niche construction (Laland et al. 2000) – as a long-term process associated with cultivation, husbandry, and sedentism – is set to play in archaeological thinking in coming decades.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Archaeological Soil Micromorphology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Chemical Survey of Archaeological Sites
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Urban Dark Earth

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American Academy in Rome

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Basic Information

The American Academy in Rome, founded in 1894 and chartered by the United States Congress in 1905 and 1912, is an independent center for the development of United States artists and scholars. Its present institutional form dates to 1914, when the American Academy, newly consolidated with the American School of Classical Studies in Rome (founded 1895 under the auspices of the Archaeological Institute of America), took up a joint campus on the Janiculum Hill, encompassing 11 acres.

The Academy still operates under its 1912 charter as "an institution for the study and practice of the fine arts and for the study and investigation of the archaeology, literature, and history of the Classical and later periods." The Academy appoints its "Rome Prize" Fellows through a juried competition (with now typically four out of an annual total of c. 30 fellowships reserved for ancient studies). In addition to a small staff (which includes a Professor-in-Charge for the humanities), a complement of residents (appointed by the Academy's Director), affiliated fellows, and visiting scholars and artists presently fill out the Academy community each year.

Major Impact

The Academy's most significant contribution to archaeology is the five decades (1947–1999) of excavation it organized at the site of the Latin colony of Cosa in southwestern Tuscany, tracing developments in the town and its territory from the important era of growth in the second century BCE through the early and later imperial and then medieval periods. More generally, the Academy can be credited for the field training of many American archaeologists at Cosa and other more loosely sponsored digs in Rome and Italy, as well as through various summer programs it has offered.

By the time of the physical merger of the American Academy and American School on Rome's Janiculum in 1914, the School had a substantial library, an archaeological museum (principally assembled by Richard Norton, its Director from 1899 to 1907) and cast collection, a $100,000 endowment, and continuing subscriptions from a number of foundations and colleges. It also had admitted women members since the

turn of the century. However, the consolidated American Academy, now organized into two schools ("Fine Arts" and "Classical Studies"), would see women as full Fellows only in the Classics and Archaeology fields until the post-World War II period.

The pivotal year 1914 opened with Albert William Van Buren (American School Fellow in 1906) as Professor of Archaeology and in charge of the library. In that same year, the death of Thomas Spencer Jerome (US Consul on Capri) brought an important endowment jointly to the Academy and University of Michigan for a lecture series on Roman topics that bears his name. A journal, *Memoirs of the American Academy in Rome*, began in 1915, with a *Papers and Monographs* series soon to follow in 1919. In the period between the two Wars, Van Buren closely supervised an archaeologically based course of study for the classical Fellows and shorter-term visiting students that included intensive explorations in Rome and travel in Latium, Campania, and Greece. (Links between the new Rome Academy and the American School of Classical Studies at Athens, which dates to 1881, were close from the start.) A Classical Summer School was founded in 1923 that condensed the curriculum for Rome and environs for the benefit of American teachers of classics.

The disruptions caused by World War II led to the shutting of the Academy from 1940 to 1945. By that time, the institution had firmly established itself as a premier archaeological training ground for future American academics and museum curators. The Academy's impact here can perhaps best be seen in the significant number of both its scholars and artists who played a prominent role in forming and serving in the military Monuments, Fine Arts, and Archives (MFA&A) section that proved highly effective in preserving cultural properties in Europe during and immediately following the Second World War. The Academy also opened its properties in 1945 and 1946 for "leave courses" in archaeology and other subjects to military personnel and members of the US Embassy in Rome.

During the war years, the Academy's Trustees decided that it would henceforth broaden the institution's humanistic fields to encompass medieval and Renaissance studies and (apparently with a view toward reducing overhead) discontinue the system of courses in both the Schools of Fine Arts and Classical Studies. These were significant choices that proved decisive for the Academy's present identity as a center for independent study and advanced research. Other measures included a revitalization of the Jerome Lectures and energetic participation in the new (1946) International Union of the Academies in Rome and International Association of Classical Archaeology (AIAC). The creation of the Fulbright Program in 1946 soon enabled the Academy to introduce two Italian scholars per year into the community, many of them archaeologists. One of the most important dividends of the "internationalization" of the postwar Academy was German photographer Ernest Nash's establishment there in 1957 of the Fototeca Unione archive, which remains a vital center of visual documentation on Roman architecture and topography.

Already in 1944, the Academy's Trustees had started discussions about finding a working excavation site once peace was restored in Italy. In 1947, former Fellow (and Yale University faculty member) Frank E. Brown returned to the freshly reopened Academy as Professor-in-Charge and Director of Excavations. Brown moved quickly to systematize and prune the Academy's museum holdings and to identify Cosa as the most promising site for an institutional dig. Excavations started at Cosa in 1948 and work continued (under Brown for almost three decades, followed by Russell T. Scott and then Elizabeth Fentress) at regular intervals until 1999 with a series of publications that is still ongoing. The Academy also constructed a small museum on the site (1964–1968), which it turned over to the Italian government in 1981 when it was fully furnished. The research methods and results from especially the early years of work at Cosa have done much to stimulate work in Republican urban archaeology elsewhere in Italy, most directly Fregellae, and provided valuable comparanda for other sites, including the situation of Republican Rome itself.

The postwar years saw the Academy make repeated attempts to expand its public acceptance in the United States and to increase revenues for its ambitious programs, including the Cosa excavations. Financial pressures led to the creation of a full-time paid Executive President based in New York starting in 1969. But one of many welcome developments was the decision in 1973 by the Andrew W. Mellon Foundation to endow the position of Professor-in-Charge, with Frank Brown as the first incumbent (1974–1976).

Though the central organization of the sustained work at Cosa as a multiyear institutional project has so far proved unique, the Academy has sponsored numerous other excavations at varying levels. These range from work in Rome by Frank Brown on the Regia (1964–1966, still mostly unpublished), Russell T. Scott in the Area Sacra of Vesta (1987–1996), and Eric Hostetter on the northeast slope of the Palatine hill (1989–1995) to formal patronage of a large-scale University of Michigan excavation at Gabii in Italy conducted by Nicola Terrenato (2008–present). The American Academy also has established two annual summer programs on the analogy of its long-standing Classical Summer School, one devoted to Roman archaeology (first in 1991) and another to Roman pottery (2006). An effort of some 25 years to reorganize and properly catalogue the Academy's museum holdings has resulted in the creation of a new (2008) archaeological repository and seminar room dedicated to Richard Norton and A. W. Van Buren.

Notable past Fellows of the American Academy and its predecessor the American School who have made significant contributions in Mediterranean archaeology include Charles Rufus Morey (completing his Fellowship in 1903), Esther Boise Van Deman (1909), Charles Densmore Curtis (1915), Lily Ross Taylor (1920), Charles Alexander Robinson (1926), Howard Comfort (1929), James Henry Oliver (1930), Frank E. Brown (1933), Lucy Shoe Merritt (1937), Lawrence Richardson, Jr. (1950), Emeline H. Richardson (1952), William L. MacDonald (1956), Michael Jameson (1959), R. Ross Holloway (1960), Maria Teresa Moevs (1964), James Packer (1964), Susan Downey (1965), Russell T. Scott (1966), Malcolm Bell III (1970), Joseph Carter (1971), Eric Hostetter (1983), Ingrid Edlund-Berry (1984), and C. Brian Rose (1992), among many others. Archaeologists have often filled the rotating post of Professor-in-Charge, most recently Elizabeth Fentress (1996–1999) and 2006 Fellow Kimberly Bowes (2012–present).

Cross-References

- ▶ Archaeological Institute of America (AIA)
- ▶ Latium Vetus, Latium Adjectum

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American Anthropological Association (AAA) and Ethics

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Introduction

The American Anthropological Association (AAA), established in 1902 and currently with

over 10,000 members, has a long and conflicted history of professional ethics. Originally comprised mainly of academic anthropologists, the organization now features members from a diverse set of educational backgrounds and employment positions. Anthropologists today can be found in the board room examining organizational behavior, in a hospital room observing patients, or in the classroom assessing the significance of archaeology at a construction site. Anthropologists undertake a particularly wide array of research methods, from physical measurements and blood draws by biological anthropologists to ethnographic interviewing and participant observation by cultural anthropologists, to the collection of artifacts and oral histories by archaeologists, and more. As a result, anthropologists encounter wide-ranging instances of ethical dilemmas and debates.

Key Issues

Over the century of its existence, the AAA has arrived at some agreed-upon ideals of what it means to be an ethical anthropologist. In the AAA Code of Ethics (2009), the emphasis is on a "primary ethical obligation" to the "people, species, and materials they study and to the people with whom they work." The AAA Code of Ethics provides guidelines for best practices but rarely provides easy answers. Development of the AAA Code of Ethics has been ongoing and was not an immediate priority for the organization. In fact, the first formal code of ethics passed by an anthropological group was enacted in 1948 by the Society for Applied Anthropology. The concept of applied anthropology itself has engendered its own set of debates. In 1971 the AAA issued the Principles of Professional Responsibility, and in 1998, after much contentious discussion, the first formal AAA Code of Ethics was agreed upon by the membership. This was recently revised in 2009. The 2009 version is more nuanced than earlier versions and purposefully ambiguous on questions of classified research, leaving it up to the individual anthropologist to interpret. The association has been in intense deliberations about the code of ethics for several years – a debate prompted in part by highly publicized programs in which some anthropologists have worked for the US military in Afghanistan and Iraq, while at the same time, there are growing numbers of scholars who have started doing proprietary research for public and private companies and institutions. Central issues for anthropologists engaging in these types of action are those of transparency, conflicting obligations (toward funders, employers, the AAA, etc.), and the dissemination of the research outcomes.

Historically, conversations surrounding ethical issues within the AAA have been reactive rather than proactive, generated by moments of crisis like Vietnam, Cambodia, Project Camelot (the 1964-5 US Army project to assess the sources of insurgency in Latin America using knowledge gained from anthropologists and other social scientists) and the potential destruction of the archaeological record during uprisings in Egypt, Libya, Qatar, Syria, and the Yemen. Changes to the code in the 1990s were intended to address earlier failings, but events in Iraq and Afghanistan in the mid-2000s renewed calls for a more active policy on ethics. Throughout the AAA's debate on ethics, critics have charged that the association has been too slow to respond and that it has been unwilling to develop a process for repudiating actions judged unethical. Former chair of the AAA Committee on Ethics, Janet Levy, has suggested that earlier iterations of the ethical code provided no real guidance or direction for archaeologists and/or biological anthropologists to deal with issues such as the destruction of archaeological resources, the international trade in antiquities, or the bushmeat trade in nonhuman primates. For many years, ethics work by the AAA focused entirely on issues of cultural/linguistic anthropologists; the four-field nature of anthropology was not captured in ethics debates (Levy 1994).

Anthropological archaeologists have duties to systematically excavate, analyze, and report on the archaeological record while collaborating with the local communities and governments

where they work. There are overarching issues of control over the production of archaeological knowledge, custodianship of cultural heritage, the legacy of colonialism, and ongoing requests for the repatriation of artifacts and remains. The Native American Graves Protection and Repatriation Act 1990 (and its recent amendments) was passed to address the rights of lineal descendants, Indian tribes, and Native Hawaiian organizations to Native American cultural items, including human remains, funerary objects, sacred objects, and objects of cultural patrimony. This has encouraged both archaeologists and museums to reevaluate their practices in relation to Native American materials.

The relationship of archaeologists with the military also raises difficult issues. In 1919, Franz Boas, one of the founding members of the AAA, was censured by the organization for his critique in *The Nation* of anthropologists (including archaeologists) who acted as informants (spies) during WWI. Recently archaeologists who work with the military to protect archaeological sites in Iraq, Afghanistan, and Syria have faced condemnation by some anthropological colleagues for collusion and for implied support for military intervention. As it currently states, the AAA's Code of Ethics (2009) is merely intended to provide anthropologists with the tools needed to engage in the development and maintenance of an ethical framework. Critics find the wording overly vague and not appropriately prescriptive.

At best ethics and anthropology are situational and often contradictory. Arriving at a code of ethics for the practice of anthropology is a long, negotiated, ongoing process, which is greatly enhanced by education and the recognition that there are complex conversations involving the various scenarios that anthropologists from all areas of the discipline face. Just as there are often no truly right and wrong answers, codes of ethics can in no way be considered the last word on ethical practice by anthropologists. As of November, 2011, the AAA Executive Board has received a draft of a revised code of ethics. All ethical debates are ongoing projects.

Cross-References

- ▶ Cultural Heritage Management and Armed Conflict
- ▶ Ethics and Human Remains
- ▶ Ethics in Archaeology
- ▶ Ethics of Collecting Cultural Heritage
- ▶ Forensic Anthropology: Definition
- ▶ Repatriation: Overview
- ▶ Stakeholders and Community Participation

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American Association of Physical Anthropologists (AAPA)

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Basic Information

The American Association of Physical Anthropologists (AAPA) was founded in 1930 after being proposed to and supported by Section H (Anthropology) of the American Association for the Advancement of Science (AAAS) in 1928. Aleš Hrdlička was the principle driving force behind the founding of the AAPA, also having launched the *American Journal of Physical Anthropology* (*AJPA*) in 1918. Hrdlička served as the first editor of the journal (1918-1942) and the first President of the AAPA

(1930-1931). An early history of the AAPA in Spanish can be found in Comas (1969) with an English translation by Alfonso and Little (2005). Today, the AAPA (http://www.physanth.org/) has grown from its charter membership of 83 in 1930 to a membership of nearly 2,000 physical or, as often called, biological anthropologists. The early members were drawn from anatomical, medical, and anthropological professions, whereas contemporary membership is broadly represented by the biological, medical, and social sciences. It is the largest professional society in physical/biological anthropology in the world. Annual meetings often draw 1,000 or more professional, associate, and student members and other attendees.

Major Impact

The professional goals of the Association are to promote and advance the development of research, education, and public outreach within the science of physical (biological) anthropology. Theoretical perspectives and the content of research in biological anthropology are derived from a number of sources. Of primary importance is *human evolution*, including past processes, as represented by human fossil remains and artifacts reflecting past human cultures. Human evolution is also studied as ongoing evolution, that is, the diversification of humans by microevolutionary and hereditary processes. Another theoretical focus is on the uncovering of patterns of *human variation* and its sources – evolutionary, developmental, and historical. A third theoretical focus derives from its anthropological roots: this is the search for *interactive biological and cultural/behavioral processes* that define us as human. Current subfields of biological anthropology include skeletal biology, bioarchaeology, forensic anthropology, human population genetics and molecular anthropology, human population biology, reproduction and child growth, paleoanthropology, and primatology. Each of these subfields is represented by members of the AAPA, and substantial cross-disciplinary research is conducted by these members and others from the biological, health, and anthropological sciences.

The AAPA officers include a President, either Past President or President-Elect, Vice President, and Secretary-Treasurer. The Executive Committee is constituted of these four officers, the two editors of the *AJPA* and the *Yearbook*, and four additional elected members. A new nonvoting member of the Executive Committee is a graduate student liaison. There are a number of specific subcommittees charged with issues of career development, education, history, awards, and the like. A Code of Ethics was prepared in 2003, and "Position Statements" cover a variety of topics that are germane to the profession. Some of these include positions on "Biological Aspects of Race," "Native American Graves Protection and Repatriation Act (NAGPRA)," "Teaching 'Scientific Creationism' in Public Schools," and "Disposition of Culturally Identifiable Human Remains."

There are two publications associated with the AAPA: *American Journal of Physical Anthropology* and the *Yearbook of Anthropology*. The journal, which began as a quarterly, is now published 12 times each year, with an additional issue devoted to the annual meeting program and abstracts. The *Yearbook* was founded in 1946 by Sherwood L. Washburn and Gabriel W. Lasker as an annual that originally published reprints of important articles that were not easily available to North American anthropologists, as well as reports of the Wenner-Gren Foundation summer workshops in the 1940s and early 1950s. During the 1970s, the Yearbook was reorganized to publish solicited and unsolicited reviews of important topics to the profession. The annual meeting, usually held in the spring, and which at its inauguration included 30 papers, now constitutes a program with more than 400 posters and 400 podium presentations. The AAPA annual meeting ordinarily meets for 3 days. However, there are a number of smaller sister societies that meet in conjunction with the AAPA which lengthens the meeting to 5 or 6 days. These societies are American Dermatoglyphics Association, American Association of Anthropological Genetics, Dental Anthropology Association,

Human Biology Association, Paleoanthropology Society, and Paleopathology Association.

Numerous awards and sponsorships are provided by the AAPA for professional members and for student members. The Charles R. Darwin Lifetime Achievement Award (est. 1992) and the Gabriel W. Lasker Service Award (est. 2006) are given annually. There is an Early Career Executive Committee Mentoring Opportunity that carries with it travel funding, and several Professional Development Grants for early-career, nontenured faculty or postdocs. The William S. Pollitzer Student Travel Awards to attend the annual meeting were given to more than 40 students in 2012. Finally, there are cash awards for Student Presentation Prizes given for outstanding poster or podium presentations. Five prizes are named after distinguished past members of the AAPA: Juan Comas, Earnest A. Hooton, Aleš Hrdlička, Mildred Trotter, and Sherwood L. Washburn. These awards and prizes recognize the achievements of senior and junior members of the AAPA, and they support the next generation of biological anthropologists as developing scientists.

The American Association of Physical Anthropologists is an active professional society that has been growing in membership since its beginning in 1930. With the exception of the WW II years, there have been annual meetings each year, and the journal will have its 100th anniversary in less than a decade (2018). Fiftieth anniversary (Boaz & Spencer 1981; Spencer 1982) and 75th anniversary (Little & Kennedy 2010) reviews of physical anthropology and the AAPA provide overviews at these time junctures.

Cross-References

- ▶ Darwin, Charles R.
- ▶ Forensic Anthropology: Definition
- ▶ Hrdlička, Aleš
- ▶ Paleoanthropology Society
- ▶ Repatriation Acts: NAGPRA Repatriation in Tribal Practice

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American Institute for Conservation of Historic and Artistic Works (AIC)

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Basic Information

The American Institute for Conservation of Historic and Artistic Works (AIC; http://www.conservation-us.org) is the national membership organization supporting conservation professionals in preserving cultural heritage by:

- Establishing and upholding professional standards
- Promoting research and publications
- Providing educational opportunities

- Fostering the exchange of knowledge among conservators, allied professionals, and the public

Incorporated as a nonprofit organization under article 501(c)(6) of the United States Tax code in 1972, its membership of 3,700 includes archaeological conservators who are active around the world.

AIC holds annual meetings in venues across the United States. General session themes range from the theoretical to the practical, while specialty group sessions focus on topics of particular interest to those practicing in fields ranging from architecture, books and paper, electronic media, paintings, photographic materials, textiles, and objects, including wooden artifacts and archaeological materials.

In addition to supporting the production and dissemination of a variety of online and print conservation publications, AIC publishes a peer-reviewed journal, the Journal of the American Institute for Conservation, which is available as a benefit of membership and on Conservation Online (http://cool.conservation-us.org/), JSTOR (www.jstor.org), and, as of 2013, through Maney Publishing (www.maney.co.uk).

Major Impact

As the national body that represents archaeological conservators in the United States, the AIC provides professional standards and guidelines that directly pertain to the conservation and preservation of historical and archaeological resources. These include legal and ethical considerations for treating artifacts obtained through illegal or unethical excavation, professional conduct and respect towards various cultures and societies, educational and training guidelines for archaeological conservators, and guidelines for the examination and scientific investigation of artifacts which are applied to field excavations, in situ preservation, and conservation treatments used for archaeological materials. The AIC also encourages collaboration with allied professionals to ensure the best possible understanding and outcome in preserving our collective cultural heritage.

Within the AIC, the Archaeology Discussion Group (ADG) is a network of professional conservators who work with, or are interested in, the conservation of archaeological objects, structures, and sites. The ADG is a working group of AIC's Objects Specialty Group. Their members work in many different areas including for museums and other cultural institutions and organizations, in private practice, for archaeological or historical sites, as well as teaching in academic programs. Many ADG members are also affiliated with national and international archaeological, scientific, and cultural heritage organizations. These include the American Association of Museums, the International Council of Museums and the Committee for Conservation, the International Institute for Conservation of Historic and Artistic Works, the Archaeological Institute of America, the Society for Historical Archaeology, the American Schools for Oriental Research, and the Materials Research Society, which help to further promote conservation, and specifically archaeological conservation, worldwide.

One of the central goals of the ADG is to facilitate communication and collaboration between AIC and professional archaeological organizations in the United States. The AIC and individual members promote interdisciplinary relations with various professional archaeological organizations, including the Archaeological Institute of America, the Society of Historical Archaeology, the Society of American Archaeology, and the American Schools for Oriental Research through the presentation of papers and posters at annual meetings, organizing and moderating specific sessions and workshops dedicated to conservation, and through AIC sponsored exhibit booths at these conferences.

The AIC also provides scholarships and grants to aid in the professional development of members through workshops, publications, and

outreach efforts and provides grant funding for specific conservation projects. In addition to these opportunities, the organization promotes safe practices through resources provided by the Health and Safety Committee. Disaster Response and Recovery can also be provided to archaeological sites and collections that have experienced damage through natural or man-made disasters.

Cross-References

- Conservation and Management of Archaeological Sites
- Conservation and Preservation in Archaeology in the Twenty-First Century
- Conservation in Museums
- Conservation, Restoration, and Preservation in Classical Archaeology
- Cultural Heritage Outreach
- Field Stabilization of Movable Heritage
- Underwater Sites in Archaeological Conservation and Preservation

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American Pioneers and Traditions

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Introduction

The Americanist tradition of archaeology is defined by comparatively oriented research that draws heavily on an innovative tradition of regional-scale fieldwork (Willey & Sabloff 1980; Willey & Phillips 2001[1958]). Many early pioneers worked in multiple culture areas of the Americas, seeking direct connections between the archaeological record and living or historical indigenous peoples and fostering close ties with anthropology as a result. This brief outline covers seminal developments in stratigraphic excavation, regional survey, and other field methods within their historical and geographic context.

Definition

Stratigraphic excavation in the Americas began nearly two decades after its initial development in Europe, but then quickly became part of standard archaeological practice. The stratigraphy of the Emeryville Shellmound, near San Francisco, was explored by the German archaeologist Max Uhle in 1902 and by the American Nels Nelson in 1906 (Uhle 1907; Nelson 1909). The Mexican archaeologist Manuel Gamio, together with Franz Boas – his graduate advisor at Columbia

American Pioneers and Traditions, Fig. 1 WPA trowelmen at work, Thompson Village Site, Tennessee (Image courtesy of the Frank H. McClung Museum, University of Tennessee (62HY5[B]))

University and generally acknowledged "father" of American Anthropology – initiated a chronological sequence for Central Mexico in 1911 (Gamio et al. 1921). This work involved ceramic collections at six sites surrounding Mexico City and Gamio's excavation of nearly 6 m of superimposed cultural layers at Azcapotzalco. Two years later, Nelson participated in stratigraphic excavations at the Paleolithic cave site Cueva de El Castillo, Spain, and returned to New Mexico convinced of the importance of the methodologies he learned there, which he then applied to Southwestern archaeology through his work in the Galisteo Basin (Nelson 1914). The pace of stratigraphic work in these culture areas accelerated rapidly and spread elsewhere. Direct successors within these two regions include George Vaillant's excavations of nine Central Mexican sites, while a curator at the American Museum of Natural History, and Alfred Kidder's 15 years of investigations at Pecos Pueblo, sponsored by the Peabody Museum of Harvard University and of Phillips Academy (e.g., Kidder 1924; Vaillant 1937). Both projects were critical to establishing cultural sequences and served as benchmarks for future excavations in Mesoamerica and the Southwest.

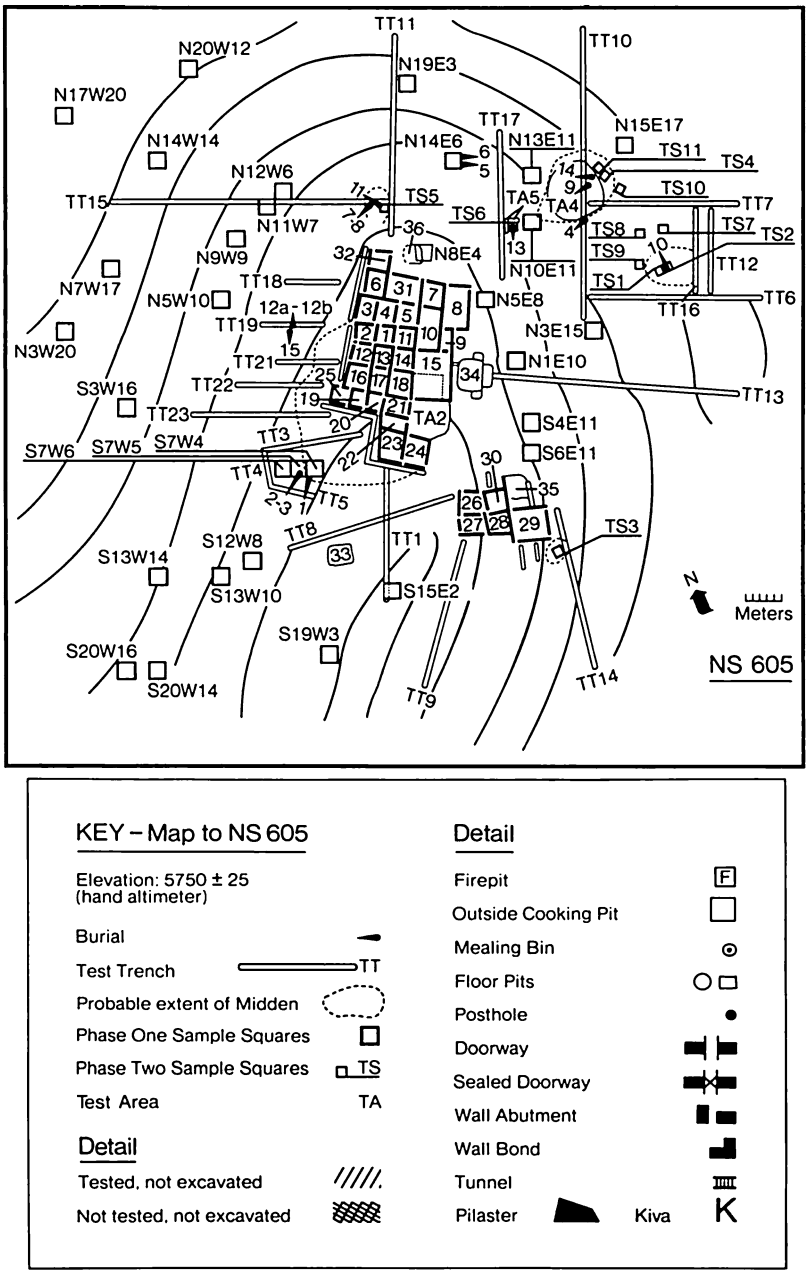
Part of Franklin D. Roosevelt's New Deal put Americans back to work during the Great Depression by offering jobs as laborers on archaeological survey and excavation crews led by trained professionals (Lyon 1996; Fagette 2008). This boon to US archaeological research resulted in investigations in 36 states and included the widespread adoption of methods such as excavation by horizontal stripping, spraying sediments for better visibility of features and strata, plotting the post molds and pit features of perishable structures (Fig. 1), and the circulation of manuals on field and lab methods. New Deal archaeology also saw the professionalization of historical archaeology in the USA. Whereas earlier excavations had focused primarily on architectural restoration, J. C. Harrington's 1934–1941 investigations at Jamestown, Virginia, included excavations targeted especially at areas lacking architecture, in order to document the ditches and fence lines that defined property boundaries, and the collection of all artifacts with special attention to context (e.g., Harrington 1955).

Gordon Willey (Fig. 2) launched the field of regional archaeology (aka landscape archaeology) with his 1946 survey of Peru's Virú Valley while working for the Smithsonian Institutions' Bureau of American Ethnology (Willey 1953). Willey followed this project with over two decades of settlement research in Central America and Mesoamerica. His work transformed global archaeology by demonstrating that sites cannot be understood in isolation,

American Pioneers and Traditions, Fig. 2 Gordon Willey at Tula, Mexico (Gordon Willey Slide Archive, courtesy of William L. Fash)

nor should archaeologists focus exclusively on large or architecturally conspicuous sites; rather, sites must be viewed holistically, as parts of ecological and cultural landscapes. Field methods in the Virú Valley included the production of site maps from aerial photos, "ground truthing" these maps in the field using a compass and measuring chains, recording details of site setting and architecture, and plotting all sites on a valley map made by the geographer F. W. McBryde. In North America, Willey's long-time collaborator Philip Phillips developed a similar approach during his 1940–1947 survey of the Lower Mississippi Valley, undertaken with James Griffin and James Ford, the latter of whom worked with Willey in Virú (Phillips et al. 1951). The greater use of test pits in the Mississippi Valley reflects the differences in surface cover and visibility between the arid coast of Peru and temperate woodlands of the eastern USA. Full test pits or shovel test pits are much more common in surveys of densely vegetated regions of the Americas such as the Eastern Woodlands, Maya Lowlands, and Amazon Basin, compared to drier regions of western North America, and the highlands of Mesoamerica and the Andes.

The regionally oriented and stratigraphically deep research of Stuart Struever in the Lower Illinois Valley during the 1960s was highly influential for its use of multi-scalar sampling strategies (within sites, ecozones, and regions) and of flotation as a means of recovering small ecofacts and artifacts (e.g., Struever 1968, 1971). Field sampling methods were further developed by projects such as the Chevelon Archaeological Research Project, directed by Fred Plog (1974); the New Survey of the Southwest Archaeological Expedition of the Field Museum (e.g., Hanson & Schiffer 1975); and the Prehistory and Human Ecology in the Valley of Oaxaca Project, directed by Kent Flannery (1976). These projects emphasized the importance of some element of randomness in the placement of test units in order to minimize biases based on initial assumptions of the patterning of subsurface remains and to derive statistically significant samples upon which to build social interpretations. The choice of squares or trenches as sample units might be determined by the depth of deposits – as was done by Flannery and colleagues, who found trenches to be more efficient for deep sites in Oaxaca, thereby avoiding "telephone booth" style pits – or the strategies could be integrated at the same site, as was done by Hanson and Schiffer at the Joint Site Pueblo (Fig. 3).



American Pioneers and Traditions, Fig. 3 Site sampling by squares and trenches at the Joint Site Pueblo, Arizona (Hanson & Schiffer 1975: Fig. 5) (Image courtesy of the Field Museum)

Key Issues/Current Debates/Future Directions/Examples

The Americanist tradition of cross-cultural comparison drawing on regional archaeological datasets is exemplified by work such as Flannery's and by Robert McC. Adams's (1966) comparative study of urbanization in Mesopotamia and Mesoamerica. Building on this base of pioneering researchers, methods in American archaeology continue to develop, today increasingly incorporating new spatial technologies and material sciences in the field. This is not only true of archaeology sponsored by universities and museums but also of Cultural Resource Management (CRM), which

is currently the public face of archaeology and largest employer of archaeologists in the USA.

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- Early Excavations Around the Globe
- Excavation Methods in Archaeology
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- Gamio Martínez, Manuel
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- Indigenous Archaeologies: North American Perspective
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- Surface Survey: Method and Strategies
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American School of Classical Studies at Athens (ASCSA)

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Basic Information

The American School of Classical Studies at Athens (ASCSA) was America's first overseas research center and is still the largest in terms of assets, programs, and constituencies. It is

a nonprofit organization based in the United States; its Trustees were incorporated in 1881 in Massachusetts for the purpose of founding the ASCSA in Greece. ASCSA's website is at http://www.ascsa.edu.gr.

Major Impact

Since then ASCSA has provided American graduate students and scholars a base in Greece for pursuing studies in the history and civilization of the Greek world. ASCSA remains today a teaching institution, providing through its academic programs, opportunities for graduate students, undergraduates, secondary school, and college teachers, as well as other scholars to study at first hand the sites and monuments of Greece. ASCSA is also a major research center for postdoctoral scholars pursuing independent research in a broad range of fields in the humanities, archaeological science, and social sciences from antiquity to modern times.

ASCSA operates two internationally renowned libraries, the Blegen Library with approximately 100,000 volumes dedicated to Greece and related regions and cultures from prehistory to the end of the antiquity and the Gennadius Library with over 120,000 volumes concentrating on the Greek world and Balkans after the end of antiquity to the modern day, two archival repositories, and the Wiener Laboratory for Archaeological Science. ASCSA sponsors two major excavations in Greece and related research centers at Corinth and in the Athenian Agora, administers other American excavations and research activities in Greece, and supports a major publications program, publishing up to ten titles per year and an award-winning, quarterly journal, *Hesperia* (ISSN: 0018-098X; E-ISSN: 1553-5622).

Many scholars of classical antiquity consider the Blegen Library to contain research collections in their field comparable to those at major research universities, while the Gennadius Library holds a diverse collection of books and rare bindings, manuscripts, works of art, and archival collections that pertain to Medieval and modern Greek culture. Important among the collections of the latter are first editions of Homer, rare Bibles, diaries of early travelers to Greece, unique maps of Greece and the Mediterranean, the diaries and letters of Heinrich Schliemann, and the papers of many of Greece's most important political and cultural figures, including Greece's two Nobel Prize-winning poets, George Seferis and Odysseas Elytis. The archives of the Blegen Library contain records of many important archaeological projects, as well as photographs and the personal papers of renowned archaeologists who have conducted work under its auspices. Inaugurated in 1992, the Wiener Laboratory for Archaeological Science is one of the leading laboratories of its kind in Greece, especially in the fields of biological anthropology, zooarchaeology, geoarchaeology, and environmental studies (including the study of organic residues and botanical remains).

ASCSA presents lectures, workshops, and conferences on topics related to Greece and neighboring regions in all periods. Lectures are videotaped and made available on the ASCSA website (http://www.ascsa.edu.gr). In addition, the ASCSA's digital library, also available through the website, offers wide access to archaeological records from the excavations at Corinth and the Athenian Agora and research materials from the libraries and archives.

From its founding, ASCSA has sponsored excavations at major sites in Greece. Its excavations at Corinth began in 1896 and are one of the world's longest continuous projects, as well as serving as a training ground for generations of young ASCSA archaeologists. Located on a hill above the strategic Gulf of Corinth, the ancient site is vast, encompassing over 6 km^2 within its walls; the more than 60 acres of the site that have been explored thus far include the acropolis of Acrocorinth, the city center, and its two ports on the Corinthian and Saronic Gulfs – Lechaion and Kenchreai. Excavations by ASCSA have documented Corinth's history and its territory from the Early Neolithic period (6500–5750 BCE) to the modern day (http://www.ascsa.edu.gr/index.php/excavationcorinth/). Some 40 volumes in ASCSA's Corinth series have been

published, while other monographs and numerous articles in *Hesperia* also record the results of investigations.

The second long-term excavation of ASCSA is in the civic, political, and commercial center of ancient Athens, the Athenian Agora. Since 1931 ASCSA has excavated this large archaeological site in the heart of the city, documenting its 5,000-year history (http://www.ascsa.edu.gr/index.php/excavationagora/). Excavations have yielded finds ranging in date and character from pottery of the late Neolithic period (c. 3000 BCE) to the contents of nineteenth and twentieth century basements. The Agora of the fifth and fourth centuries BCE, however, has been the main focus of attention, and its exploration has revealed primary evidence for the functioning of the ancient Athenian governmental institutions that played a formative role in the foundations of western democracies. There are few ancient sites more important in Greece, and none for which the excavation records are more critical for documenting the unparalleled achievements of Classical Athens. ASCSA has published some 40 volumes in a series on the Athenian Agora, as well as numerous other monographs, booklets and guidebooks for the general public, and scholarly articles in *Hesperia* and elsewhere.

Since its founding ASCSA has overseen numerous other excavations and surface surveys in many parts of Greece, though often with particular focus on the Peloponnese and Crete. Recent projects are at Gournia in eastern Crete, at Gla and Thebes in Boeotia, and in the Sanctuary of Zeus at Nemea. (For a list of and links to other projects affiliated with ASCSA in recent years, see http://www.ascsa.edu.gr/index.php/fieldwork/Affiliated-North-American-Field-Projects).

Cross-References

- ▶ Agora in the Greek World
- ▶ Bioarchaeology: Definition
- ▶ Classical Greece, Archaeology of (c. 490–323 BCE)
- ▶ Classical (Greek) Archaeology
- ▶ Crete, Archaeology of
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Amheida, Archaeology of

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Introduction

Amheida is a substantial ancient settlement located in the northwest extent of Egypt's Dakhleh Oasis. Amheida is a multiphase site that reached its greatest expanse under Roman rule (first century CE to fourth century CE). Its ancient name was Set-wah ("resting place"), and it was known as Trimithis during the Roman Period. This site is the largest surviving ancient settlement within the oasis.

Definition

Amheida was one of the most important towns in the Dakhleh Oasis during the Roman and Byzantine centuries. Documentary sources indicate that it became a city by the fourth century and was regarded on the same level as other significant cities in the Oasis Magna, which consisted of Dakhleh and the Khargah Oases to the east (Wagner 1987: 191). The diversity and extent of

archaeological remains at Amheida attest to this significance. The substantial aboveground remains and surface pottery scattered across the urban center and cemeteries extend from at least 2.5 km north-south and 2 km east-west. These remains represent dates ranging from Pharaonic to Late Antique periods, and the surrounding environs contain evidence of prehistoric lithic scatters, Old Kingdom ceramics, and several cemeteries. Despite a long occupational history, Late Antique ruins dominate the visible site surface today. The historical trajectory of Amheida complements that of the greater Dakhleh Oasis in that it reached its apex during the Roman Period.

Key Issues/Current Debates/Future Directions/Examples

History of Research and Excavation

Outsiders have known about Amheida since European explorers first ventured to Egypt's Western Desert. Sir Archibald Edmonstone, a British explorer, became the first European to visit the oasis and Amheida in 1819. Renowned explorers, Bernardino Drovetti and Frédéric Cailliaud, visited the oasis shortly thereafter. Since its European discovery, both specialists and nonspecialists visited Amheida (Boozer 2013). The site came into prominence in 1979 when the Dakhleh Oasis Project (DOP) discovered classical wall paintings on the site during its survey of the entire Dakhleh Oasis (Leahy 1980; Mills 1980a, b).

Modern archaeological fieldwork began in 2000, directed by Roger Bagnall. It was first under sponsorship from Columbia University and then by New York University, along with additional partner institutions. Early excavations, begun in 2004, focused primarily on the house containing wall paintings discovered in 1979 (Boozer 2005). These excavations later expanded to include additional domestic structures, temple mound, and conservation of a pyramid and of a monumental mud brick tomb.

Urban Layout

Survey continues to define the extent and form of Amheida's urban fabric, although preliminary conjectures regarding the layout can be made at this time. Amheida manifests a diversity of structure types, as can be expected for a major regional center. The houses seem to be single – or, in some cases, possibly two-story – mud brick structures with mainly barrel-vaulted roofs and some palm reed and mud flat roofs. Industrial areas can be found distributed among the domestic structures but primarily along what we currently understand to be the edges of the city. A temple mound on the west side, around which the Roman settlement curves, and mortuary structures along the southern side are also clearly evident among the surface remains. Agricultural fields occupied the low-lying surrounding landscape. Governmental, administrative, or so-called public buildings have not been identified securely yet. Even so, it seems that the area just east of the temple mound may have been a focal point on the site as surface remains indicate a number of large, elaborate structures that may have served civic functions. Moreover, the houses excavated closest to this area appear to be of particularly high status.

There are two major streets currently identifiable at Amheida. First, a broad east-west-oriented road provided access into the city from the east. It leads from the industrial and domestic area on the northeastern extent of the site toward an area north of the temple mound, but it turns sharply off axis and then stops abruptly before reaching the temple mound itself. It is the widest-identified road at Amheida at nearly 7 m wide. It appears that the road and the structures along its easternmost extent may have been built during a single phase of construction.

The second major street is a north-south-oriented road that extends from the mortuary area in the southeastern portion of the city to the north. This road appears to have had structures built into it over time, which made it less effective as a major conduit across the city. In addition to these major roads, there are some less-fully traced out streets and alleys. One runs roughly parallel to the major north-south road and is located between this road and the temple mound. Some additional east-west-aligned streets also occur. Curiously, the project has not yet identified any streets connecting the eastern

settlement area with the temple mound nor has any trace of the temple dromos been found.

There are several areas that indicate localized planning. For example, the northeastern part of the site appears to have been laid out in a single phase, and the structures in this area share similar plans. An area located in what appears to be the center of the Roman site also contains houses that, from the surface, appear to share similar layouts. Likewise, in an area just south of the temple, a series of roads delineate the eastern boundary of a housing block where at least one significant, decorated house is identifiable on the basis of surface architecture (Boozer 2007: 109–14).

Domestic Structures

Domestic structures have been a key focus of this project since its inception, and this project has made a major contribution to our understanding of Romano-Egyptian domestic life (Boozer 2012).

A fourth-century house (B1) provides us with a wealthy dwelling that contained Greek mythological wall paintings in a central, domed room and wallpaper motif wall paintings in a number of side rooms. These figural scenes are unique within Roman Egypt at this time and also inform us that occupants of the oasis were more au fait with Roman Mediterranean cultural norms than might otherwise be expected. Measuring 15 × 15 m, this house was largely square in plan view and had a clustered plan of access between rooms. Most of the rooms were covered in barrel vaults, although one room contained a dome, potentially with an oculus, and there were flat roofs constructed out of palm reeds and beams with a mud plastering over at least two rooms. Minimal material culture was recovered from this structure. Damp conditions did not preserve soft organic materials as well as at other sites within the oasis, particularly Kellis (Ismant el-Kharab). The other materials that survive include a substantive corpus of ostraka, which provide information about the owners of this structure, dependency relationships within the region, small-scale economic data, and also political information because one of the owners was a city councilor (Serenos) (Bagnall & Ruffini 2004, 2012). Ceramics are of a generally high quality with respect to the local assemblage, and there are other artifacts that point toward higher status occupants. Preliminary analyses suggest that the occupants consumed foods common within the broader Roman Empire and sustained an existence looking more toward the Mediterranean than one might have expected, given the peripheral location of the site (Boozer 2007: 122–90, 2010, 2012).

The vicinity of the house has also been explored. Children appear to have been educated in three rooms along the north end of the house. Red dipinti on the walls indicate that these children were educated in classical Greek traditions and particularly rhetorical verse composition (Cribiore et al. 2008; Davoli & Cribiore 2010). South of the house lies another unexcavated house with an identical overall footprint and a similar layout within. Sondages beneath the excavated house indicate that it is located on top of a Roman bath house that possibly dates to the third century CE and was constructed out of mud and baked brick. Only a fraction of this structure has been excavated thus far, due to the overlying domestic structure. Excavations have recently begun on an additional structure (B6), located northwest of this house. This structure contains approximately ten rooms and a central, columned room. These preliminary results may suggest Roman Mediterranean influences on the architecture, but more excavation is required.

A mid- to late third- to early fourth-century CE house (B2) was also excavated in its entirety. This house is located in the northeastern part of the site in an industrial and domestic quarter. The house measures 121 m^2. Like the larger house, this structure is constructed out of mud brick, demonstrates a clustered plan of access over its square plan, and employed barrel-vaulted roofs. No evidence of roofing was recovered from the central room. Cooking facilities are present both within the house as well as an exterior courtyard, suggesting potential changes in food preparation practices or different facilities used for different types of cookery. The material culture was preserved in great densities and included a small percentage of

organic remains. Objects and texts connect the inhabitants to a range of activities including linen weaving, trade, and low-level water management. This evidence indicates that the inhabitants may have participated in small-scale management of production and transportation activities, which may provide useful avenues of research into mid-level economic relationships. The domestic assemblage as a whole shows a combination of Egyptian, Greek, and Roman influences. This range may indicate that the inhabitants had mixed ethnicities, that social status was linked with ethnic material goods, or that the inhabitants did not have a vested interest in identity politics (Boozer 2007: 191–247, 2011, 2012).

The vicinity around this house has also been explored. A courtyard exterior to the house contained a bread oven with a platform and appeared to have served as a stable for animals such as donkeys. The street adjacent to the house was also excavated, revealing multiple street levels as well as foundation trenches in common between the house and the street (Boozer 2007: 193–5, 237–9). The DOP cleaned and mapped the surface of a structure across the street from this house, revealing a house that was subsequently provided with kilns for small-scale ceramics production (Hope 1980: 307-11).

Temple

Amheida's temple was dedicated to the Egyptian god Thoth, god of writing and wisdom. The temple itself, although looted in antiquity and again in more recent times, has provided substantive information on the occupational history and religious life within the Dakhleh Oasis. Excavations of the numerous Ottoman looter pits that dot the temple mound have indicated that the site was occupied since at least the Old Kingdom, and the material recovered from these excavations suggests that there may have been a settlement located on what became the temple mound in later years. New Kingdom remains include an ostracon with a school exercise (Kaper 2010).

The epigraphic material from the temple has provided a particularly important collection of cartouches with Pharaonic and imperial names that indicate governmental investment in this region. The recovered cartouches provide us with some of the construction history of the temple and associated chapels, although interpretations may change as they are based on a highly fragmentary data set. Minor building took place under the Theban 23rd Dynasty (King Pedubast c. 800 BCE) and the early 26th Dynasty (Nekau II, 610–595 BCE, and Psamtek II, 595–589 BCE). Major construction seems to have started under Amasis/Ahmose II (569–526 BCE) and the Persian ruler Darius I (522–486), both of whom contributed a new chapel with vaulted ceiling. The Roman Emperor Titus (CE 79–81) built a new Roman period temple on the site, and Domitian (CE 81–96) both demolished older structures and contributed a new larger sanctuary, which was extended under later emperors as yet anonymous (Kaper & Davoli 2006; Kaper 2009). The epigraphic material also provides us with some intriguing clues about local oasite traditions. In the Third Intermediate Period, Dakhla was ruled by an egyptianized Libyan tribe, called the Shamain (Kaper & Davoli 2006; Kaper & Demarée 2006; Kaper 2009). This epigraphic material suggests that these late dynasties incorporated the oasis region structure much more thoroughly into their regional ruling than had been attested previously. Moreover, the Persian Period finds have provided some of the most substantial indications of a Persian presence in this distant oasis.

The material culture recovered from the temple mound includes fragmentary glimpses into local cultic practices and the occupational history of Amheida. For example, ceramic coffins containing un-mummified birds were recovered from the temple mound. Such deposits were common from the Late Period through the Roman Period and served as votive offerings. The remains included a range of birds (raptors, ibis) as well as other animal fragments. The ibis was long associated with Thoth, while the raptors should be associated with other gods venerated in the oasis such as Horus or Ra-Horakhty. Offerings to Osiris were also found in the form of 45 bronze statuettes, fragments, and pendants of the god. In addition to these finds, ceramics dating back to the Old Kingdom have been recovered, including large quantities of bread molds.

Future Directions

Topographic survey will continue to expand and fill in detail to the urban and cemetery layout of Amheida, and excavations will continue in the areas previously investigated in order to deepen our understandings of the areas surrounding excavated structures. For example, excavation has commenced in an additional structure (B6) located in the vicinity of the fourth-century house (B1). These excavations will continue to refine our understanding of the distinctions between public and private architecture in this site, since previously excavated domestic structures in Dakhleh are much larger and more opulent than previously suspected. Excavations will continue in the vicinity of the third/fourth-century house (B2) in order to understand neighborhood affiliations, small-scale production, and ethnic affinities in Roman Egypt. Likewise, additional research will take place on the temple mound in order to recover additional information about the construction history of this temple, the occupational history of Amheida, and the history of the oasis in general. Geological and geomorphological surveys will continue in the future to understand the landscape of the city and of its surroundings. The project also intends to begin a mortuary and physical anthropological component in the near future.

Cross-References

- ▶ Domestic Architecture, Roman
- ▶ Hellenistic and Roman Egypt, Archaeology of
- ▶ Late Antique Egypt, Archaeology of
- ▶ North Africa, Roman

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Amphitheater

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Introduction

The amphitheater is one of several classes of building that were developed to accommodate a range of entertainments and spectacles in the Roman world. It is one which was an exclusively Roman development, and which was traditionally associated with gladiatorial display. As a building type, it was relatively late in reaching its canonical form and associated facilities. Debates about the origins of both the structures and the types of display have monopolized scholarly attention, although recent research has clarified many points (Futrell 1997; Welch 2007). Partly as a result of senatorial opposition as well as cultural conservatism, permanent amphitheaters were not constructed in the city of Rome until the very late first century BCE, despite the fact that they were being provided earlier for other cities in Italy. In the provinces, most amphitheaters were constructed in the first to early third centuries CE corresponding to the chronology of epigraphic evidence for arena displays, though it should be noted that not every city had one, nor were they always constructed on a monumental scale. In the Eastern Mediterranean, a more complex situation prevailed which involved the limited provision of purpose-built amphitheaters and the much wider modification of preexisting entertainment venues for arena displays.

Definition

The permanent amphitheater is recognizable by its elliptical plan, with an oval arena completely surrounded by seating (Golvin 1988; Welch 2007). This is the literal meaning of the Greek word "*amphitheatron*," which from the time of Augustus gradually came to be used for this structure (Vitruvius, *de Arch* 1.7.1; *Res Gestae* 24; see also Dio 43.22). The earliest, datable permanent amphitheater is at Pompeii (Italy), and in the dedicatory inscription (*CIL* 10.852, 70–65 BCE), it is termed as "*spectacula*," a word usually used for the entertainments themselves, and one clearly employed here because such buildings had yet to acquire a specific terminology.

Gladiatorial displays (*munera*) had their origins in aristocratic funerary rites, and as such played an important role in elite display and competition in the Republic. They were staged in the Forum Romanum, the traditional location for aristocratic funerals, and the temporary spectator facilities required for the displays became increasingly elaborate. These facilities may have provided a model for the ovoid plan of early permanent amphitheaters elsewhere in Italy (Golvin 1988: 56-8; Welch 2007: 30-71). Investigations during the mid-twentieth century under the paving of the Forum Romanum located a central corridor, with four lateral arms bisecting it at regular distances 15 m apart, which excavators dated to the mid-first century BCE. Access up into the open piazza was provided by 12 shaft openings. Traces of installations in these galleries are reminiscent of the system of cages and pulleys for winching performers and animals up into the arena that would later be installed beneath the arena in some developed amphitheaters of the imperial period (Coleman 2000: 227-8). The amphitheater at Pompeii was dedicated by C. Quinctius Valgus and Marcus Porcius, *duoviri* of the new colony established

at Pompeii in 80 BCE; they paid for the structure with their own money and in accordance with their magistracies (Golvin 1988: 33-7; Welch 2007: 74-7). The building was located just within the eastern city walls, and measures 135 by 105 m externally. In common with other early amphitheaters, it was not provided with the extensive vaulted substructures, and the main support for the seating was formed by upcast from digging out the sunken arena. The exterior retaining wall at the upper level was built of *opus caementicium* faced with *opus incertum*, strengthened by buttresses, and with staircases that provided spectator access to the top of the *cavea*. At the north and south ends were broad, sloping corridors leading down into the arena. It was not until 29 BCE that Rome received its first permanent amphitheater, built by T. Statilius Taurus. It stood in the southern Campus Martius, and was financed by the *manubiae* (a general's share of the booty) he received from his successful campaigns in Africa (Dio 51.23.1; Suetonius, *Augustus* 30.8; Golvin 1988: 52-3; Welch 2007). Little is known about it except that it was small and built of stone and wood; Dio referred to it as a "hunting theater" (*theatron kunegetikon*) and probably it was never used as a fully public venue. It was destroyed in the fire of 64 CE.

Key Issues/Current Debates/Future Directions/Examples

Key Example: The Colosseum

The most famous, and most influential, of all amphitheaters in the Roman world was the Flavian Amphitheater in Rome, better known today as the Colosseum (Gabucci 2001; Lancaster 2005; Welch 2007) (Fig. 1). It was begun by Vespasian on the site of the drained lake of Nero's Domus Aurea and dedicated in 80 CE by Titus after his father's death**.** This was a grand and monumental building of four stories, 52-m high, standing on elliptical concrete foundations 12-m deep. It was an astonishing feat of planning and engineering on an unprecedented scale. With outer dimensions of 188 by 156 m and an arena measuring 80 by 54 m, an estimated 100,000 m^3 of travertine was used for the façade with 300 t of iron to clamp the blocks together. A combination of materials was used: concrete, travertine, and tuff, which allowed architects to address the specific structural challenges inherent in its design. The vaulted substructures beneath the *cavea* comprised a series of passages, corridors, and staircases. The three outer arcades formed two outer, annular corridors 7-m high covered by concrete barrel vaults. One further ring corridor

Amphitheater, Fig. 1 Colosseum, view of the arena

closer to the arena was constructed of brick-faced concrete with a veneer of marble; this particularly grand passageway was used by those accessing the ringside seats set aside for the elite. These annular passages were intersected by the radial passages that accommodated staircases, superbly organized for ease and control of access. Although the access system was used in both the theaters of Marcellus and of Pompey in Rome, here it was perfected so that the building perfectly incorporated the functional demands of a segregated society into its fabric (Edmondson 2002).

The design of the façade, broken up by arches, was framed by traditional orders (Tuscan, Ionic, and Corinthian), and helped to relieve the visual heaviness of the building. A similar treatment had already been employed for the exterior of the Theater of Marcellus (ded. 13 BCE). The topmost level of the Colosseum facade, possibly not completed until the reign of Domitian, was a plain wall with windows alternating with Corinthian pilasters. It is at this level that the corbels for the awnings (*vela* or *velaria*) are preserved. Beneath the now lost wooden floor of the arena is an elaborate system of subterranean passages and chambers where animals and gladiators were held in readiness and winched up to the arena level or let up along ramps (Connolly 2003; Lancaster 2005). These had a very simple arrangement in wood at the time of the inauguration, such that scholars have suggested that the arena could have been flooded for full-scale aquatic displays, as implied by the literary sources (Dio 66.25.2-4; Coleman 2000; Gabucci 2001; Connolly 2003; Dodge forthcoming). There is still much debate about the logistics of such an enterprise, made more difficult by the fact that the arena substructures (*hypogeum*) have been much refurbished and rebuilt over time. However, such substructures and their access points can be better appreciated in the amphitheaters at Capua and Pozzuoli in Campania. Here the arena floors of concrete are still in place, and the trap doors for hauling up animal cages can still be clearly seen (Golvin 1988).

Welch has demonstrated that the provision of amphitheaters in Italy and the western provinces during the late republican and early imperial periods was linked to army training, and to veteran settlement and entertainment, as at Pompeii and Capua (Welch 2007: 88-91). These first permanent amphitheaters came to represent an important display of Rome's power and culture in Italy, and late first century BCE colonies also provided the context for the earliest amphitheaters in the provinces, as at Carmona (Spain) and Corinth (Greece) (Golvin 1988: 41-2; Welch 2007: 255-9; Dodge 2009; 2010). In the early imperial period, this colonial association continued within Italy, for example, at Aosta and Verona. Both colonies and provincial capitals provided important contexts for amphitheatrical building projects in the provinces, as at Lyon (France), Mérida (Spain), and Carthage (Tunisia) (Golvin 1988: 82-3, 109-10, 122-3; Bomgardner 2000: 128-41).

Amphitheaters in the Provinces

Amphitheaters survive in large numbers in Italy, North Africa, the Danube region, and the Western provinces, although with much variation in size and design, for example, at Capua (170 m by 139 m), second in size only to the Colosseum; Nîmes and Lyon; Carthage, El Djem (Tunisia); and Lepcis Magna. Extramural amphitheaters were also built and survive at some tribal capitals in Britain, as at Silchester and Cirencester (Wilmott 2008). Legionary bases around the empire were routinely provided with an extramural amphitheater, for example, at Vetera (Germany), Caerleon and Chester (Britain), Carnuntum (Austria), and Lambaesis (Algeria) (Golvin 1988: 80, 88; Futrell 1997: 147-52). All are relatively small, both in overall size and scale of construction.

In the British and Gallic provinces a hybrid structure, built to function as both theater and amphitheater, was often constructed, for example Les Arènes in Paris (France). It is unclear if these "theater-amphitheaters" (also, confusingly, referred to as "semi-amphitheaters" by some modern commentators) were more amphitheater than theater and what kind of performances took place in them (Golvin 1988; Dodge 2009). They were generally not elaborately constructed, utilizing earth banks retained by masonry walls as supports for the seating (*cavea*). Similar theater-amphitheaters were also associated with

Amphitheater, Fig. 2 Pergamum. Amphitheater

rural shrines in Gaul, as at Sanxay, and these perhaps should be interpreted as a continuation of the classical connection between temple and festival games as seen in the Greek sanctuaries at Delphi and Epidauros, and continued in Italy, for example, at Pietrabbondante. The only example of this type of hybrid theater-amphitheater outside the northwestern Provinces is at Lixus in Morocco (Golvin 1988). There may also have been an economic element in this design, maximizing the facilities available in a single building.

By comparison with the West, there are far fewer purpose-built amphitheaters known in the eastern Roman provinces. This has been traditionally explained by the idea that the Greek East was more "civilized" than Italy and the Western Provinces, and therefore would not have indulged in the kind of blood sports these structures accommodated. However, 22 purpose-built amphitheaters have already been identified in the East (Dodge 2009). The earliest example was constructed at Antioch-on-the-Orontes in the later first century BCE (Malalas 216.21-217.4; Libanius *Orations*, 2.219). Malalas referred to it as "a place of single combat" (*monomachikon*). The simple form of this building, partly rock-cut with no arena substructures, was probably similar to other contemporary amphitheaters known in Italy and the West, for example, at Paestum (Italy) and at Carmona. None of the amphitheaters in the Roman East have the monumentality and arena substructures seen in the West, as Nimes, Mérida, or El Djem, except perhaps Pergamum and Cyzicus (Golvin 1988; Dodge 2009) (Fig. 2).

Problems of Definition

There are many venues that do not fit simple modern characterizations, both in terms of ancient terminology and the range of events staged within them. This is particularly true of the eastern empire that had an already existing building stock of theaters and stadia. What has become clear in recent years is the extent to which venues were modified and remodeled to maximize the flexibility for staging a range of entertainments. This was achieved in a number of different ways. In theaters, the most common method was the construction of a wall around the orchestra, often with the removal of the lower rows of seats and the reduction of the stage-building to create an arena-like space, as at Corinth (Dodge 2009); the removal of the seats created a high podium wall providing both protection and better viewing for the spectators. These modifications are mainly second century CE in date, or later, but some occurred as early as the first century CE, as at the Theatre of Dionysus in Athens. Stadia were adapted in a similar way at the curved end of the structure to create a mini-arena, for example, at Perge (Welch 1998, 1999; Dodge 2009).

Very few entertainment buildings have been fully excavated and properly published, making their dating and structural history problematic. Despite the massive scale of construction and public investment, some have been completely lost. Thus, new discoveries in recent decades have been particularly important, advancing knowledge in the provision of these buildings and the engagement of the local populations in typically "Roman" cultural pursuits. For example, an amphitheater was identified and excavated in the late 1980s and 1990s in London, the provincial capital of Britannia (Bateman 2008). The identification in 2006 of an amphitheater at Sofia (Bulgaria) has made another addition to the lengthening list of amphitheaters in the Eastern part of the Empire, further emphasizing that Roman spectacles were enjoyed as much in the Greek East as in the Latin West (Welch 1998, 1999; Dodge 2009; Velichkov 2009).

The most northerly amphitheater occurs in a military context in Scotland associated with the Antonine fort of Inveresk (Wilmott 2008); the most easterly examples have been identified at Palmyra in the Syrian desert and Dura-Europos on the Euphrates (Rostovtzeff et al. 1936: 72-7; Golvin 1988: 139; Hammad 2008; Dodge 2009). Interestingly, the latest amphitheaters were constructed in the third and early fourth centuries CE, for example, at Beth Guvrin (Israel) (Dodge 2009), at a time when the gladiatorial games themselves were becoming far less frequent, and indeed late evidence is nonexistent in the West outside Italy. As combat displays declined, arenas continued to provide a venue for the other types of display with which they had long been associated – animal displays, acrobatics, and dancing. This continuity is very evident in the early sixth century CE writings of Cassiodorus and the contemporary diptychs of Constantinople (Cassiodorus *Variae* 5.42.6-10; Dodge 2009, 2010: 73-6).

Cross-References

- ▶ Architecture, Roman
- ▶ Romanization
- ▶ Urban Planning, Roman

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Anaerobic Conditions (Bogs, Waterlogged, Subaquatic): Preservation and Conservation

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Introduction

Archaeological artifacts which have been lost, abandoned, or deliberately deposited in the ground will become included in the natural cycles of decay and the return to nature. This normally results in the survival of only the more robust materials such as stone, shell, and ceramics and the partial survival of metals, glass, bone, and other inorganic materials. The most abundant materials used by mankind are of organic origin such as wood and plant materials, skins, and other animal products. These will normally all be destroyed through microbial activity and biodeterioration, leaving barely a trace. But occasionally these materials do survive, albeit in a greatly altered state, through becoming included in anaerobic waterlogged deposits. Where such conditions pertain not only do a greater range of artifact materials survive but also environmental macrofossil remains such as small bones, insect parts, plant remains, seeds, and pollen resulting from the interaction between humans and their immediate surroundings. Waterlogged archaeological deposits therefore represent a particularly valuable source of information about past cultures and environments, requiring special management and protection.

Definition

Anaerobic, or anoxic, conditions are formed by the exclusion of air from the burial medium through water saturation. This denies the microorganisms (mainly fungi and bacteria) responsible for biological decay the oxygen which their metabolism requires. These oxygen-free or "reducing" conditions can also provide excellent protection against corrosion for metals such as copper, lead, and iron whose normal corrosion is as a result of oxidation processes (Selwyn 2004).

Artifacts composed of organic materials (wood, leather, and animal and plant fibers) can survive burial in anaerobic deposits for many hundreds or thousands of years, but only if the artifacts become well sealed within anaerobic deposits and with their chemical equilibrium undisturbed and at a depth that does not permit exchange of oxygenated water from the deposit/air interface. Anaerobic waterlogged conditions most commonly exist in the sediments at the bottoms of rivers and lakes; in fenlands, marshes, and peat bogs; and in urban contexts where the natural water table is raised artificially through centuries of deliberate dumping of organic debris.

Key Issues/Current Debates/Future Directions/Examples

Wetlands have always been a focus of human activity and settlement, offering means for defense, transport, and trade or the ready availability of natural resources. Where anaerobic conditions persist into modern times, preserved cultural materials of many different types and sizes may be anticipated. Discoveries are almost always made due to modern exploitation, such as gravel extraction, peat digging, land drainage for agriculture, the dredging of rivers, and construction. Among the largest waterlogged wooden structures discovered in recent years are ships and large boats, normally discovered in silted up river harbors, on river beds, or incorporated into riverbanks. In the UK prehistoric dugout canoes are regularly found during gravel extraction in the flood plains of rivers or in the digging of drainage channels and artificial lakes. The remains of prehistoric settlements and associated trackways, constructed entirely out of wood, are often found accidentally or as a result of rescue excavations on sites threatened with

the dewatering and shrinkage of overlying protective peat layers. Wetlands, especially bogs, can also contain remarkable assemblages of well-preserved artifacts of many material types, taken to be votive or sacrificial deposits. Bogs can also be the last resting places of human sacrifices, as in the case of the Danish bog bodies and Lindow Man (Stead et al. 1986), found during the commercial digging of peat. Culturally rich waterlogged deposits also exist in many ancient cities, such as London and York in the UK and the major ancient towns in Scandinavia. These highly organic contexts, sometimes referred to as "black earth," contain domestic, craft, and industrial waste, timber foundations, and environmental remains – all of which, when properly excavated and researched, can provide a highly detailed picture of the life and activities on that particular site and its surroundings, sometimes over many centuries.

Artifacts of organic origin can often be preserved sufficiently well that the surfaces still bear an extraordinary level of detail. Wood artifacts and structural timbers often bear the clear signs of the tools used in their shaping, allowing the type and size of the cutting tool to be identified. Even the "tool signature," the minute signs of damage and wear to the blade edge, can be recognized, allowing the use of the same tool to be identified over several timbers or within the same structure (Brunning 2010, 16). Non-artifactual wood from prehistoric contexts has occasionally been found still bearing the chew marks of ancient beavers (Coles 2006). The study of wood technology and biology often provides valuable information relating to resource use and procurement, woodland management, and dating through dendrochronology. But despite appearances, waterlogged organics are usually to be found in a highly altered state upon excavation, having become denatured by their long period of burial. The more susceptible portions of the material's structural and chemical makeup will have been removed through processes such as hydrolysis, the breaking down of chemical bonds through the addition of water. This is partly driven by low levels of bacterial activity that is able to tolerate the toxic anaerobic conditions. Wood will lose its cellulose component leaving only the lignin skeleton, but enough of the macrofossil structure will often remain to permit identification (Kenward et al. 2008). Leather survives only because the tanning process has rendered the collagen fibers resistant to hydrolysis. Only textiles of animal fiber origin (hair, wool) are normally found, since keratin is similarly resistant. Other chemical factors in the burial medium may also have an effect on survival. Peat bogs can be strongly acidic, causing some materials, such as bone, to be destroyed. But peat bogs are also extremely tannin-rich meaning that skin products other than pre-tanned leather will become preserved. This accounts for the survival of "bog burials" where the human skin and some internal organs are well preserved, but the skeletal material has all but disappeared (Stead et al. 1986).

Such denatured organic materials are often structurally very weak and their surfaces in particular extremely soft and fragile, their shape only being maintained by the water that they contain. They are therefore very susceptible to drying from the moment of exposure onward, any loss of water content causing irreparable damage to both surface detail and whole objects due to shrinkage and structural collapse. Controlled archaeological excavations of waterlogged sites require special management and resourcing as the working conditions and anticipated results will be so different from a normal dry site. Special techniques and procedures will be required for uncovering waterlogged structures and artifacts, with specialist skills and knowledge available to undertake recording, sampling, and field stabilization and conservation (Brunning 2010). Advance plans need to be made for the safe packaging and temporary storage of recovered materials and arrangements made with suitable laboratories for longer-term storage and treatment. The preservation treatment of waterlogged materials can be costly and complex, especially for larger items, and the decision to excavate and lift waterlogged structures and assemblages can only be presaged on the ability to undertake such

preservation (Hoffman in press). The possibility of reburial or "preservation in situ" has, it seems, only become a viable alternative in exceptional cases (Coles 1987; Spriggs 1987). Current research into these topics is reported to the triennial international meetings of the Waterlogged Organic Archaeological Materials (WOAM) Group of the ICOM Conservation Committee (e.g., Straetkvern & Williams 2012).

The main threat to wetlands and other types of waterlogged deposits is from lowering of the water table, with consequent drying out, wastage, ingress of air, and the rapid onset of the normal processes of biodeterioration. In cities such as York and Bergen, evidence for dewatering can be linked directly to the construction of buildings with underground basement levels which serve as sumps for water from the surrounding cultural levels which start to dry out as a consequence. Rural wetland sites are under continual threat from activities such as sand and gravel quarrying, peat extraction, and field drainage for agriculture. Waterlogged structures are seldom anticipated or detectable in advance of these activities, and major finds are not uncommon and have to be recovered by archaeologists under "rescue" conditions. Efforts at site protection are often most likely to succeed when in concert with other organizations with common interests such as nature conservation bodies and wildlife agencies. Legal protection is sometimes possible where cultural significance can be established, and interest from other stakeholders, such as tourism and education, can also be valuable. But in most cases, some form of physical intervention will also be necessary to maintain or elevate the local water table. Where extensive structures, such as prehistoric trackways and lakeshore villages, are known to exist, various forms of environmental intervention to protect surviving portions have been used by, for example, constructing clay bunds around the area to be protected, which is then backfilled and artificially flooded (Coles 1987). These attempts at protection are usually costly and require continuous monitoring and long-term regular maintenance, if they are to be successful.

Research into new methods and strategies for site protection techniques is reported at regular intervals at the Preservation of Archaeological Remains In Situ (PARIS) International Conferences (e.g., Gregory & Mathieson 2012). Important here is the development of techniques and equipment for inground monitoring to measure the rate of change in waterlogged soils and the effectiveness of remedial action taken (Smit et al. 2006). A number of site-specific projects are ongoing to find ways to slow down the deterioration of important waterlogged archaeological and historic structures and sites, such as at Bryggen, Bergen (Mathieson et al. 2008), and in Amsterdam (Klaassen 2005). These projects have led to an increasing awareness of the potentially catastrophic effects that could be caused by ongoing climate change.

Cross-References

- ▶ Conservation and Management of Archaeological Sites
- ▶ Dating Techniques in Archaeological Science
- ▶ Deep-Water Archaeology
- ▶ Field Stabilization of Immovable Heritage
- ▶ Glass: Conservation and Preservation
- ▶ International Council of Museums (ICOM)
- ▶ Leather, Archaeological: Conservation and Preservation
- ▶ Metals: Preservation and Conservation
- ▶ Paleoentomology: Insects and Other Arthropods in Environmental Archaeology
- ▶ Underwater Sites in Archaeological Conservation and Preservation
- ▶ Waterlogged Finds: Conservation
- ▶ Wood: Conservation and Preservation

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Analogy in Archaeological Theory

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Introduction and Definition

An analogy is a cognitive process by which new phenomena are comprehended from known experiences, using the latter heuristically in building explanatory models and in directing future research. Analogies perform an important role in theory building and in suggesting new lines of research. An orthodox position in the philosophy of science posits that analogies are not indispensable in systematic scientific explanations (deductive-nomological model) and thus are not part of the process of theoretical justification (hypothetic-deductive model), that is, analogies are significant in the process of discovery but not when scientific justification is at stake because they function in the inductive confirmation of a given theoretical proposition. However, analogical reasoning can perform a clue role in the justification of hypothesis and theories, especially if we accept that scientific practice ultimately rests on analogical extensions of paradigmatic models. An analogical argument allows setting forth conclusions based on similarities between two or more entities that share relevant structural properties (analogues). Yet, an analogical argument is not exclusively based on similarities and coherences between analogues but on ideas, generalizations, and principles that make the analogical movement feasible and open to epistemic consideration (Shaw & Ashley 1983).

Key Issues/Current Debates

In the history of archaeological thinking, the epistemological role of analogical inferences, in general, and of ethnographic analogies, in particular, has been central in the ontological debate that has taken place in the last decades about the status of archaeological theory in the social sciences field. In epistemological terms, archaeological knowledge has always used analogies drawn from other fields, such as history (analogies about changes over long periods), paleontology (materialist analogies about the classification of evidences), biology (analogies about the interconnectedness of different types of natural phenomena), and, in particular, anthropology (analogies about cultural behavior) (Murray & Walker 1988).

Ethnographic analogies were foundational in prehistoric archaeology since the sixteenth century, when the contact with "contemporary savages" made possible in Europe widening interpretative perspectives about ancient human artifacts, traditionally understood from a mythical or magical standpoint (Wylie 1985). The interpretations of antiquarians were configured as primitive analogies, that is, they were based on simple identifications and projections of certain empirical properties between two or more analogues, without even considering a relevant structural connection (Shaw & Ashley 1983).

The use of ethnographic analogies increased in the nineteenth century as attention was given to theoretical explanations of cultural development. If until the eighteenth century the antiquarian's perspective established a direct equivalence between "prehistoric primitives and moderns," for classical evolutionism contemporary cultures were composed of different degrees of cultural complexity that were projected into the past as stages of a determined course of historical development. This first systematic use of analogies in archaeological interpretation posited that the most primitive contemporary cultures were presumably comparable to most ancient forms of prehistoric savagery. Such an idea took for granted an evolutionary starting point in a developmental sequence of technological, economic, and political stages leading to industrial civilization (Wylie 1985). Ethnographic analogies in classic evolutionary thinking were a direct reading of the past from the present. They were standard analogies in that the identification and projection of certain empirical properties between two or more analogues were constituted from conditions of relevance established by the very principles and theoretical structure that set them forth in the first place (Shaw & Ashley 1983). This kind of analogical inference is based on uniformitarian premises, making it impossible to prove its truth. Besides, they are prone to error and are a part of an ethnocentric, biased vision of the past (Wylie 1985; Trigger 1992).

A first reaction against the abuses of classical evolutionism stemmed from the rejection by culture-historical archaeology of ethnographic analogies as interpretative inferences about past human behavior. At the beginning of the twentieth century, the emphasis on establishing cultural typologies and chronologies championed by culture history led to a renewed appraisal of analogies based on the direct historical approach. In American archaeology, the proximity with anthropology made it possible to trace direct relationships between the prehistoric past and historical events documented in written sources. This was achieved by archaeological investigations in sites with contemporary occupations. As a result, archaeological contexts and styles from a given area were identified with groups that were recognizable in ethnohistorical sources. The analogical argument involved was based on continuous models of interpretation which imply that the sources of analogies presuppose a genetic connection between ascendant and descendant, in clear opposition with the purely functional connections so cherished by evolutionism. The direct historical analogies of the 1930s and 1940s implied archaeological tests that could correct or confirm hypotheses derived from ethnographic or ethnohistorical data. Archaeological tests helped to control analogies, and ethnographic data helped to stimulate and direct archaeological research (Wylie 1985; Trigger 1992; Willey & Sabloff 1996).

Given that most prehistoric phenomena do not have likely evolutionary descendants and that

many documented ethnographic phenomena do not have any obvious archaeological ancestor, in the 1950s American archaeology began to search for new parameters for establishing general analogies based on discontinuous models of interpretation. Comparisons between the present and the past were filtered out by theoretical inferences derived from cultural ecology and multilinear evolutionism. Important in that regard was the notion that functional convergences between past and present cultures are mediated by similar environmental characteristics and similar levels of technological sophistication (Wylie 1985; O'Brien et al. 2005). They were, inferentially speaking, analogies with presumed structure, that is, analogies in which the connection between analogues is established by relevance, linking structure and properties (Shaw & Ashley 1983).

At that time, it was held that the problem with ethnographic analogies was mostly related to the limitations of the sources. In order to overcome such limitations, archaeologists should pursue their own ethnographic projects about continuous cultural change, by which living communities create, use, recycle, and discard the material culture that will eventually form the archaeological record (Wylie 1985). Although there was no methodological consensus about the role of analogies in archaeological interpretations, the term ethnoarchaeology began to be used from then on to define the research procedures of this "new analogy," placing emphasis on the study of subsistence and settlement patterns, production and use of material culture, and formation of the archaeological record. Experimental studies can also be included in this perspective because they were developed to document contemporary patterns of tool manufacture and the effects of natural processes in the formation of the archaeological record (David & Kramer 2001).

In the last three decades, the debate between processualism and postprocessualism regarding the role of analogies in archaeological interpretations reflects a wider epistemological discussion. The New Archaeology of the 1970s adopted a radical posture regarding ethnographic analogies. Such a posture stemmed from its explicit adoption of neopositivism, which rejects analogies as explanatory components of hypothetic-deductive methods. The New Archaeology strove to eliminate the dependence in analogies or any other form of inductive inferences leading to uncertain conclusions in hypotheses testing. They were treated as tautological inferences doomed to the fallacy of affirming the consequent. Such an objection was premised upon the limitations of amplitude and quality attributed to the empirical data used as referents of contemporary analogues, incapable of accounting for the diversity of past human behavior. The idea was that interpretative hypotheses must be deducted from nomothetic propositions based on well-established uniformitarian principles, such as those derived from natural sciences, projecting into the past human behavior regularities, limited to their biological and physical dimensions (Gould 1980; Gould & Watson 1982; Wylie 1985; David & Kramer 2001; O'Brien et al. 2005).

In the 1980s, the critique of the "safe yet limited" interpretations championed by processualism and of the role of analogies in archaeological practice led to the reassessment of the relationship between inductive methodologies and archaeological theory. If analogies are inductive but also ampliative, the conclusions they allow have more information than premises and initial data. The relevance of an analogy is assessed by analyzing the connecting principles between analogues that posit the simple presence or absence of given properties (formal analogies), emphasizing the importance of structural relationships between them (relational analogies). Relational analogies imply that causal mechanisms are behind similarities between analogues, determining the presence and interrelationship between properties. It is from this kind of analogical reasoning that established theories can expand to new analytical realms, given that such a reasoning is explanatory: the projection of new properties not only implies structural connections between the properties of the analogues but also explains their coherence (Hodder 1982; Shaw & Ashley 1983; Wylie 1985; O'Brien et al. 2005).

The analysis of the relational character of analogies between the present and the past in building archaeological theory is linked to the processualist revision of the guiding ontological principles of

the discipline through middle-range theory and behavioral archaeology. Middle-range theory posited relationships between the static and the dynamic through inductive methodologies, while general theories would be devoted, instead, to understanding those processes involved in changes and diversifications of the organizational principles of living systems. For middle-range theory, all interpretative principles about past dynamics cannot be tested in the archaeological record, for it is static and contemporary. Inferences about the past can only be tested in actualistic studies, in which the formation of the archaeological record can be examined experientially and directly. Such an approach is also based on uniformitarian principles: the causes of current events leading to the formation of the static archaeological record are the same obtained in the past. An analogy allows setting forth propositions about the past to be tested in the archaeological record. Consequently, ethnoarchaeology became a source for formulating and testing hypotheses about the relationship between cultural and material phenomena, making it possible to offer models of past societies based on contextual studies of the archaeological record (Binford 1977, 1981). To this analogical equation, behavioral archaeology adds noncultural processes that contribute to the formation of the archaeological record. It is argued that the understanding of the depositional and postdepositional processes responsible for the formation of the archaeological record is a means for refining analogical arguments linking past and present behaviors, as they are reflected in archaeological contexts (Schiffer 1995, 1996).

To the discussion on the limits of a neopositivist approach in archaeology, in the 1980s postprocessual archaeology added a wider openness towards social sciences. The paradigmatic tensions between processual and postprocessual approaches at the end of the twentieth century are a part of a wider debate in human sciences about universalistic and particularistic perspectives, opposing materialist and symbolic visions of cultural phenomena. Postprocessualism, drawing from eclectic theoretical approaches, emphasizes the symbolic nature of material culture and its active role in the relationship among human beings and between them and the environment. It champions the importance of linking social practices to history, and by doing so, it aims to capture the gradual and cumulative processes of cultural maintenance and transformation. While processual analogies between the past and the present would entail external, nonparticipant visions in the study of human behavior (etic perspective), postprocessualism, by positing culture as a fabric of historically constituted meanings, seeks to understand the meanings of material culture by contextualizing it in particular symbolic environments (emic perspective). This led to a renewed discussion about the role of analogies in building continuous and discontinuous interpretative models about the past (Hodder 1986).

Future Directions

In current archaeological theory, these dichotomies have been relativized by understanding that the knowledge about the past is contingent to a network of dialectical relationships between the whole and the parts, the universal and the particular, the structure and the event, and the material and the symbolic. The role of analogies in processual and postprocessual ethnoarchaeological approaches shares the common goal of building, from ethnographic experiences directed by an "archaeological gaze," interpretative models about the relationship between practice and symbolism in the action of human beings upon the material world. Likewise, relational analogical thinking keeps feeding the development of ethnoarchaeological approaches strongly aligned with processualist premises, such as those arising from performance theory, and it also contributes to a dialogue with natural sciences through behavioral ecology and Darwinian archaeology (David & Kramer 2001; O'Brien et al. 2005).

Cross-References

▶ Ethnoarchaeology
▶ Ethnoarchaeology: Building Frames of Reference for Research

- ▶ Hypothesis Testing in Archaeological Theory
- ▶ Middle-Range Theory in Archaeology
- ▶ New Archaeology, Development of
- ▶ Post-Processualism, Development of
- ▶ Processualism in Archaeological Theory

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Ancestry Assessment

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Introduction

The assessment of ancestry forms part of the suite of analyses undertaken by forensic anthropologists and bioarchaeologists to develop a biological profile. Regardless of the methods used, it is not an easy task to assess a person's biological ancestry. It is usually not possible to be confident about an assessment unless a person's ancestry lies within one of the four major geographical regions of the Euro-Mediterranean, sub-Saharan Africa, eastern Asia, or Australia/Melanesia. The reason for lack of confidence is that areas between these four regions contain people whose biological properties tend to be blended.

Definition

Ancestry in this context means where a person's ancestors originated before the mass voluntary and forced migrations of peoples that started around the world in the fifteenth century CE.

Key Issues

Why Assess Ancestry?

There are various reasons for wanting to assess ancestry from skeletal remains. These may include answering archaeological questions, such as the identification of persons of African ancestry in Romano British York (Leach et al. 2009). A major question in archaeology is whether the spread of agriculture into Europe was caused by the migration of farming people from Southwest Asia or by the diffusion of cultural practices (Pinhasi & Von Cramon-Taubadel 2009). More remote in time, there are questions such as whether the late Pleistocene Upper Cave skull 110 from Zhoukoudian, in China, is a morphological candidate for being an ancestor of modern people in eastern Asia (Wright 1995).

The process of repatriation raises questions about whether particular skeletal remains are biologically related to the groups to which they are to be repatriated, or whether there has been some confusion of labeling over the decades since they were collected.

In the forensic field, an assessment of an individual's ancestry from analysis of the skeletal remains may help in the search for missing persons. If ancestry has been assessed from skeletal remains, then information about an individual's soft tissue, and the hair color and form, will be more accurate. So assessment of ancestry, when no soft tissue is available, may help in facial reconstruction.

In summary, anthropological evaluation of ancestry offers a quick estimation, which may later be backed up or refuted by analysis of DNA. However, the ability to use DNA cannot be taken for granted. In many non-forensic cases, there are no funds to use DNA to compare results with anthropological assessment of ancestry. There may also be no viable DNA recoverable from archaeological bones. So a need persists for the anthropological analysis of ancestry, using the appearance of the bones themselves.

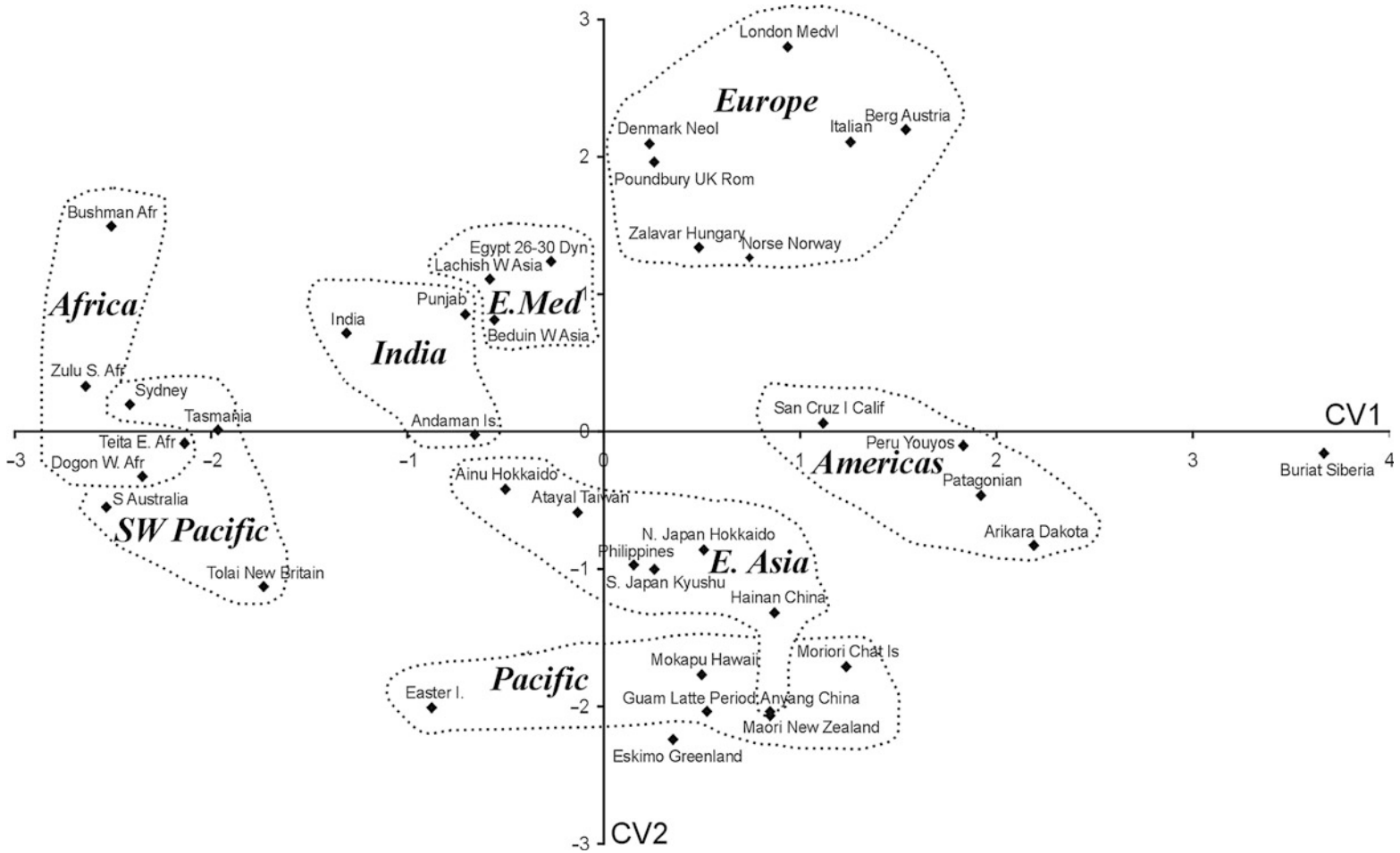
Assumptions Underlying Assessment of Ancestry

Most assessments of ancestry depend on the skull, because of its high information content available for both observation and measurement. All anthropological methods for determining ancestry are based on the critical assumption that there is systematic geographical patterning of cranial variation (Howells 1989). This assumption of patterning is justified on a worldwide scale (Fig. 1). This scattergram is derived from a metrical analysis of 29 measurements on each of 3,163 skulls in the CRANID database (Wright 2008). Though the provenance of each skull is known, the analytical program that produced the chart contained no information about geographical origin. Analysis considered merely likeness and unlikeness, in size and shape, of the skulls. The results are consolidated for plotting as points on the chart, which represents samples in the space of what are known as the first two canonical variates.

If geographical origins are then superimposed onto the purely craniometric chart, it is possible to see that there is a high correlation between cranial form and world geography. The craniometric results produce an approximate map of the world. Therefore, placing an unknown skull on such a map, using its measurements, helps in an assessment of ancestry. An additional working hypothesis is that this patterning is very much due to inherited variation, though there is likely to be some interference from such environmental factors as diet and climate.

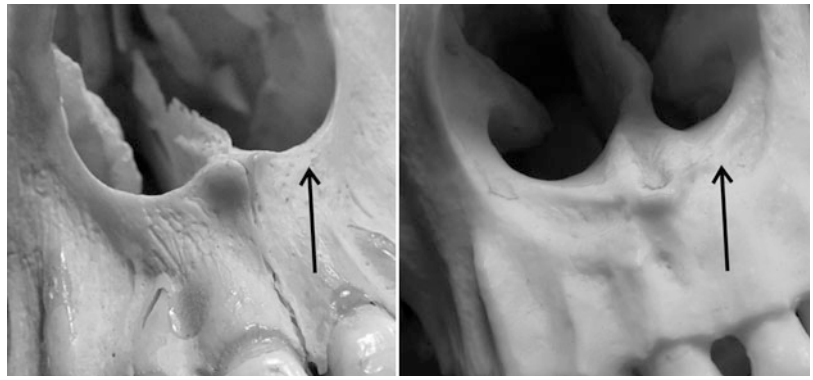
How Is Ancestry Assessed?

Early attempts to determine ancestry were hampered by lack of computers. For many decades anthropologists used the two variables of cranial length and breadth, from which they calculated, by hand, the so-called cranial index. Results for this index ranged from dolichocephalic (long headed) to brachycephalic (short headed).



Ancestry Assessment, Fig. 1 Samples of skulls analyzed by CRANID and plotted in the space of the first two canonical variates following multivariate analysis. No geographical information was available to the program, only cranial measurements. Nevertheless, there is a clear geographical patterning of samples, showing that there is good correlation between geography and cranial form. This correlation is the assumption that underlies methods of assessing ancestry

A



Ancestry Assessment, Fig. 2 Two extreme forms of the anterior margin of the base of the nasal aperture. The sharp sill on the left is characteristic of people with European and east Asian ancestry. The smooth form on the right is characteristic of people with sub-Saharan African and Australian/Melanesian ancestry

Though much effort was published in this field, the results had fundamental flaws when applied worldwide to an understanding of ancestry. For example, in their cranial index medieval Norwegian skulls are more like Tasmanian Aboriginal skulls than they are like medieval skulls from European Austria – an ancestral implication that is negated by all other indications of ancestry and history.

More durable in their usefulness have been various illustrations of skulls that characterize the properties of skulls from various geographical regions. Use of these illustrations depends on the undoubted ability of the human mind to visually evaluate similarities and dissimilarities between images. Widely used illustrations are those of Rhine (1993). These illustrations have been reproduced elsewhere, and are presented with full annotations in Klepinger (2006). While such illustrations are easy to use by workers with no prior knowledge of worldwide cranial variation, they tend to be limited by being caricatures of geographical extremes. In other words, they do not take account of variation within groups and overlap between groups.

Furthermore, it happens that determination of geographical origin is easiest in the case of adult males, who best manifest the extremes seen in the illustrations. The skulls of females and subadults tend toward the undifferentiated general human form of cranial appearance and, because of much overlap in morphology, their ancestry is more difficult to assess by whatever method is used.

One advantage of such illustrations, compared with the craniometric approach, is that they can readily illustrate such simple but important discriminating properties such as the shape of the anterior margin of the base of the nasal aperture (Fig. 2). Although not a universal panacea for assessing ancestry, this tiny area of the face shows a sharp transverse ridge in people of European and eastern Asian ancestry. This ridge is not seen in people of sub-Saharan African or Australian Aboriginal and Melanesian ancestry where the sill appears smooth.

Multivariate Methods

The development of computers led to multivariate methods of assessing ancestry. Most of these efforts have used measurements of crania, though some have applied multivariate methods to the worldwide distribution of epigenetic traits (Hanihara et al. 2003). An early multivariate aid was supplied by Giles & Elliot (1962). Giles used linear discriminant analysis of eight measurements on American Whites, American Blacks, and Indigenous Americans. To take advantage of this work, the user substitutes measurements from an unknown skull into equations and thereby determines which of the three groups the unknown skull is most alike (Wright 1995).

The method of Giles and colleagues was helpful, but restricted in terms of its worldwide coverage. In 1973, the anthropologist W.W. Howells made available the results of his lifetime study of cranial variation in the human species around the world (Howells 1973). This work was followed up by the general release of the actual

measurements on the skulls (Howells 1996). His work is distinguished by a worldwide approach, and the notion of geographical mapping of cranial variation rather than the sterile, and to some provocative, attempt to define the concept of race and races.

The release of Howells's database led to the development of "turnkey" computerized packages for the determination of ancestry, such as Fordisc (Jantz & Ousley 2005) and CRANID (Wright 2008). Both packages use multivariate methods of discriminant analysis. Fordisc has additional forensic samples from America, and CRANID has additional samples from parts of the world not covered by Howells, for example, the Indian subcontinent and Patagonia.

Compared with the simplicity of comparing a skull with illustrations, the multivariate approach means that the user must first get thoroughly competent in taking a series of defined measurements. An advantage of the multivariate approach is that it offers numerical results. These reflect the differing probabilities of an unknown skull coming from particular samples from around the world.

Future Directions

Possible Advances

It seems unlikely that there will be significant advances in multivariate method and theory for use on craniometric data. The algorithms for discriminant analysis were developed in the 1930s. They have advanced little since then, though their use is now widespread with the availability of computer packages. A useful advance, aiming to improve the accuracy of determining ancestry, would undoubtedly come from increasing the worldwide coverage of samples of skulls that can be incorporated into discriminant analysis.

New techniques to take measures have been developed, for example, 3D landmark geometric approaches (Ross et al. 1999) as opposed to measurements by calipers. However, it is difficult to see such methods eclipsing the traditional approaches to worldwide assessment of ancestry, used in Fordisc and CRANID. This doubt exists because there seems little prospect of anybody building up a new worldwide reference collection that matches the comprehensiveness of Fordisc and CRANID. Skeletal collections from many parts of the world are now off limits when it comes to research.

Cross-References

- ▶ Age Estimation
- ▶ Biological Distance in Bioarchaeology and Human Osteology
- ▶ Children in Bioarchaeology and Forensic Anthropology
- ▶ Demographic Transitions
- ▶ Dental Anthropology
- ▶ Osteology: Definition
- ▶ Sex Assessment
- ▶ Skeletal Biology: Definition

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Andah, Bassey Wai

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Basic Biographical Information

An outstanding scholar and teacher, Bassey Wai Andah was born on January 6, 1942. He had his first degree in history at the then University College Ibadan, graduating in 1964. Bassey Andah's keen interest in archaeology was fired by series of open lectures delivered then by Professor Thurstan Shaw. By that time, he was a final-year history student and a member of the audience.

Shortly after graduation, Andah rejected a job offer by the Nigerian Department of Antiquities to take up a postgraduate program at the Institute of Archaeology, London, through a Nigerian Federal Government Scholarship. He completed his M. Phil. degree in July 1967 at the institute and thereafter proceeded to the University of California for a Ph.D. under the renowned Professor Desmond Clark.

Five years after securing his M. Phil. degree, Bassey Wai Andah gained his Ph.D. in 1973 with his thesis on archaeological reconnaissance in Upper Volta, 1970–1972. He became a faculty member at the Department of Archaeology at the University of Ibadan almost immediately after a successful defense of his work.

In 1978, Bassey Andah was promoted to the rank of a professor at the relatively young age of 36 and was also appointed as head of the Department of Archaeology.

Professor Andah who played very active roles in the formation and stabilization of the World Archaeological Congress (WAC) became the first African/third president of the World Archaeological body having been elected in Delhi, India, in 1994. He had earlier served WAC in various capacities including being the senior representative for the West African Region.

Professor Bassey Wai Andah was president of WAC till his last breath on December 22, 1997. Few months before then, precisely March 1997, he was elected as deputy vice-chancellor (Administration), University of Ibadan.

Major Accomplishments

Professor Bassey Wai Eteyen Andah's distinguished career in African archaeology was hinged on a proper channelling of "expert" curiosity, energy, and experience into the effective analysis of West African cultural patterns. Andah believed that many of the early scholars in West Africa were too uncritical especially in the approaches adopted for the story of man's broad cultural history in the region. Consequently, concepts and misconcepts coined from other places were utilized wholesale and indiscriminately in the analysis and interpretation of cultural life patterns in West Africa. He promoted the development of cultural resources management which he regarded as a means of linking the past with the present.

Andah carried out extensive fieldwork in various parts of West Africa and lectured in Ghana, United States, Sweden, and Nigeria.

Professor Andah was prolific as a teacher and a scholar. He wrote over 70 journal articles, authored four books, and coauthored six books on African archaeology. Having succeeded Professor Thurstan Shaw as the editor of *West African Journal of Archaeology* in 1978, Andah edited the journal till his death in 1997. He was a teacher of teachers as over 70 % of the current academics in the Department of Archaeology and

Anthropology, University of Ibadan, were his students. In fact, most of the archaeology teachers in other Nigerian universities were also his students, while many of his former students are today archaeologists, ethnographers, cultural officers, and museum professionals in different parts of Nigeria.

Bassey Andah was the longest serving head of the Department of Archaeology and Anthropology, University of Ibadan, having been head from 1978 to 1985 and from 1989 to 1991. It was at his initiative that courses in cultural anthropology were introduced and the first set of graduates with honors in cultural anthropology graduated during the 1982/1983 academic session. In the 1986/1987 academic session, the name of the department was changed to reflect the introduction of degree courses in anthropology.

The first Nigerian professor of archaeology laid the foundation for the active participation of Nigerians in the activities of the World Archaeological Congress. Today, Nigeria has two of her scholars in the executive of WAC, while the country has the highest number of members on WAC membership list in the West African Region.

During his lifetime, Professor Andah received a plethora of academic awards including the Fulbright Senior Scholars Fellowship award in 1984 and the CODESRIA/Rockefeller Senior Scholars Fellowship Award in 1991/1992. In 1993, he received the Distinguished Historian Award for APEX Museum, Atlanta Georgia, USA, and secured the Australian University's Merit Award in 1995.

In recognition of his academic brilliance and numerous contributions to African archaeology, a memorial lecture was instituted in his honor, while the library of the Department of Archaeology and Anthropology, University of Ibadan, was named after him.

Cross-References

- ▶ Archaeology and Anthropology
- ▶ Cultural Heritage Management and Armed Conflict
- ▶ World Archaeological Congress (WAC)

Further Reading

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Andarayan: Agriculture

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Introduction

The archaeological site of Andarayan is located close to the Cagayan River, in the Cagayan Valley, just east of the modern town of Solana, northern Luzon, Philippines. Richard Shutler Jr. conducted limited test excavations at the site in 1978 (Snow et al. 1986). Within the alluvial deposits, Shutler recovered a large assemblage of red-slipped pottery, clay earrings and spindle whorls, and fragments of ground stone tools. Some of the pottery had been produced using an organic temper of rice chaff and broken stem segments to aid in the bonding of the clay during firing. The general shape of the glume imprints identified in the pottery indicated that the impressions were from rice *Oryza* and intermediate between the common cultigen *O. sativa* and its wild progenitors. A single AMS date of 3400 ± 125 years BP or 4000–3350 cal. BP (no code) confirmed that the pottery was

produced during the early–mid second millennium BCE. From this evidence Snow et al. (1986) argued that this represented the earliest evidence for the cultivation of rice in the Philippines and across most of Island Southeast Asia (The earliest known rice temper in Island Southeast Asia is from the cave site of Gua Sireh, Sarawak, Malaysian Borneo, and is dated to c. 4,200 years ago. Rice has also been identified to the north of the Philippines at late Dabenkeng sites such as Nanguanli in Taiwan dated to c. 4,700–4,200 years ago).

Key Issues

Andarayan is by no means a unique archaeological site for northern Luzon but rather one of many such sites found within the Cagayan River Valley that have produced a similar suite of material culture. These include Magapit, Nagsabaran, Conciso, and Irigayan, and there are sites of a similar date to the north in the Batanes Islands (Mijares 2007). But the lower Cagayan Valley sites are unique in that many of them are very large shell middens, dating from Neolithic and Iron Age times and possibly even pre-Neolithic as well (more research is needed on chronology). The earliest occurrence of many of these Neolithic artifact types and technologies in the Philippines, like pottery and ground stone tools, is at these sites in the Cagayan Valley. Many such artifacts have strong similarities to the types of material culture identified in Taiwanese Neolithic sites dating to a similar period. For example, the red-slipped pottery found in southeastern Taiwan and northeastern Luzon has great affinities in form, surface finish, and decoration. The spindle whorls are very similar in morphology to those found at sites such as Fengpitou in southwestern Taiwan.

Although it has been argued that these Neolithic peoples were sedentary agriculturalists who brought rice agriculture with them, the evidence for intensive cultivation has yet to be identified, and Andarayan remains the only site of this date to have produced any evidence for the presence of rice in the region (Andarayan is unusual in that it is the only site in the Cagayan Valley to have produced red-slipped pottery with an organic temper. The pottery from all other sites in the region has either fine- or coarse-grained inorganic tempers). There is, however, evidence to suggest that, along with new types of material culture, domestic pigs were introduced to the Philippines by c. 4,000 cal. BP.

Collectively, Andarayan and these Cagayan River Valley sites are considered to reflect one of the earliest arrivals of the Austronesian-speaking peoples from Taiwan into Luzon around 4,000 years ago. The settlement of the northern Philippines from Taiwan represented the initial step in a process of migration and colonization by the Austronesian-speaking populations that would eventually encompass two thirds of the globe from Madagascar in the west to New Zealand and Easter Island in the east and is considered the most extensive movement of human populations recorded in prehistory (Bellwood 1997).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Farming-Language Dispersals: A Worldwide Survey
- ▶ Farming-Language Dispersals: Principles
- ▶ Island Southeast Asia: Neolithic
- ▶ Pig: Domestication
- ▶ Rice: Origins and Development

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Andernach-Martinsberg (Magdalenian): Geography and Culture

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Introduction

Andernach-Martinsberg is, together with the site of Gönnersdorf, one of two major Magdalenian settlements in the German Central Rhineland. Burial under Late Glacial ash deposits of the Laacher See volcano protected the site from destruction, making possible detailed insights into many aspects of human life during the Magdalenian. A broad range of analyses informs on technology and subsistence strategies, spatial organization of living space, mobility of people in the landscape, and socio-cultural behavior represented by ornament and artistic expression.

Definition

Much knowledge of certain periods of the Paleolithic is defined by a few exceptional sites, which for reasons of function or duration of occupation, but crucially also due to favorable conditions for their survival, preserve a range of information rarely available in the case of most archaeological sites of this age. In the case of the late Paleolithic, Andernach-Martinsberg is such a rare site.

Key Issues/Current Debates/Future Directions/Examples

Research History

The Andernach Paleolithic site lies on the Martinsberg, a middle Pleistocene lava flow which forms a slope extending toward but not reaching the River Rhine, a few hundred meters to the north. The site is secure from flooding and sheltered by the local topography and close to where the river flows northwestwards from the low-lying Neuwied Basin into the narrow channel of the Rhine Gorge. The comparable Magdalenian site of Gönnersdorf lies only 2 km away, to the north of the Rhine in view of the Martinsberg.

The Martinsberg site was originally discovered in 1883 and excavated and subsequently published by Hermann Schaaffhausen (1888). The anatomist and antiquary from Bonn, an advocate for the presence of "Diluvial Man" in the Rhineland, saw the site as a vindication of his views.

A reanalysis of the 1883 Andernach lithic and faunal assemblages was carried out following the discovery of the neighboring Gönnersdorf Magdalenian site in 1968 (Bosinski & Hahn 1972). The location of the Martinsberg site was then rediscovered during earthmoving in 1978. Excavations between 1979 and 1983 (Veil 1982; Street 1995) and from 1992 to 1994 (Holzkämper 2006) showed the presence not just of the expected Magdalenian horizon but also a younger late Paleolithic horizon assigned to the "Federmessergruppen" (Penknife Point groups).

The excavations from 1979 to 1983 investigated something over 100 m^2, uncovering three distinct concentrations of Magdalenian lithic and faunal material (C 1, C 2, and C 3). The investigation of a similar area from 1994 to 1996 discovered a fourth Magdalenian concentration (C 4) 15 m to the south.

Chronology and Environment

The age of the Magdalenian settlement of the Martinsberg is known quite accurately due to series of radiocarbon dates on the bones of hunted animals, which fall around 13,000 BP, equating to approximately 13,800 calibrated years BCE. This was near the end of a cold and very dry climatic event and some 1,000 years before the onset of the Late Glacial Greenland interstadial (Street et al. 2006). The species hunted during the Magdalenian occupation at Andernach are typical for steppe-tundra conditions – horse, reindeer, arctic fox, and varying hare – whereas woodland species are absent.

Settlement Features

That concentrations C 1 and C 3 had been dug into by the 1883 excavation is shown by conjoined lithic material recovered a century apart, and C 1 is also truncated by the foundations of a house built later. C 4 was also truncated by recent disturbances. After the deposition of the Magdalenian archaeological horizon, some areas of C 2 and C 3 were heavily disturbed by erosion into fissures in the underlying basalt. This clearly took place before burial by Laacher See volcanic ash. Before this happened some material from both the Magdalenian and Federmessergruppen phases was vertically displaced and mixed by frost heaving and/or bioturbation.

Features C 1, C 3, and C 4 are characterized by areas of denser (C 1, C 3) to diffuse (C 4) paving formed of sometimes very large slabs of slate, quartzite, and other types of rock, sometimes stained by red ochre and by concentrations of lithic artifacts, faunal remains, and other items. The concentrations are associated with complexes of pits and are interpreted as stable, enclosed dwelling structures. They clearly represent complex and dynamic settlement activities over an appreciable length of time, perhaps during repeated occupations over several years.

C 2 is defined by a discrete scatter of blanks, tools, and waste of flint and numerous ivory fragments around and within a natural fissure open to a depth of perhaps 2 m at the time of the settlement. The surrounding material was subsequently eroded into the fissure, truncating the higher-lying archaeological horizon and redepositing finds at various depths. Shallow patches of red ochre-stained sediment on the truncated surface suggest that any pits originally present were largely destroyed. Patches of red stained sediment in the fissure fill may represent the fills of these pits or merely sediment blocks transported by erosion. Activities at C 2 included the production and repeated sharpening of flint burins and probably the working of ivory. Refitted artifacts show a connection to C 4, and it is possible that C 2 was a specialized satellite activity area linked to the dwelling structure.

Indications for the use of fire are limited to traces of thermal reddening of slabs and cobbles of schist and quartzite and quantities of fire-cracked quartz cobbles (pot boilers). Bones from the Magdalenian horizon show almost no traces of burning and very few burnt lithic artifacts are present. Rocks with concave surfaces (geodes, conglomerate) are found and would have been suitable for use as lamps fueled with animal fat, which may have provided light and some heat within the dwelling structures. However, since the many fire-reddened slabs and fire-cracked cobbles suggest that fires were lit in contact with the paved surface, it is possible that contents of hearths (ash, charcoal, and burnt objects) were methodically cleared away and possibly dumped outside the excavated area.

Artifacts

Analyses of the lithic artifact assemblage (Floss & Terberger 2002; Holzkämper 2006) include studies of raw materials, technology and typology, conjoining and plotting knapping sequences, and examination of assemblage variability. Samples were also studied for trace wear.

It is difficult to quantify the lithic material from the 1883 excavation, now divided between a number of museums, but almost 1,000 finds can still be located and seem to be representative of the better analyzed samples from the more recent excavations. Between them, C 1–C 3 produced more than 23,000 Magdalenian artifacts of which >5,300 were larger cores, flakes, blades, or bladelets. The most recently recovered Magdalenian assemblage (C 4) yielded almost 20,000 artifacts, over 600 of which were blades and bladelets.

Artifacts recovered from C 1 and C 3 are predominantly made of limnic quartzite and show a balanced mix of tool forms typical of the Magdalenian. C 2 is characterized by the manufacture and re-sharpening of burins associated with waste from ivory working. In C 4 the importance of activities involving burins is shown by 129 of these forms, almost 50 % of the tool inventory, and more than 700 recovered burin spalls.

A wide range of non-cryptocrystalline rocks brought to the site were modified as artifacts in several ways (Eickhoff 1995). Various types of

pebbles obtained from river gravels, some of them quite standardized, were used as hammer stones or retouchers for the manufacture of lithic artifacts, while larger cobbles were probably used for processing a range of other inorganic or organic materials.

Many of the rocks used as constructional material show complex patterns of modification, such as splitting and notching of the edges of blocks and slabs. Some of the notches may have been created to accommodate perishable wooden posts or stakes.

Numerous artifacts of bone, reindeer antler, and mammoth ivory typical for the later Magdalenian include eyed needles of bone, spalls and projectile points of antler and ivory, antler batons percés, and baguettes demi-rondes (Tinnes 1994). Waste debitage shows the manufacture of such items at the site.

Subsistence

The fauna comprises mainly larger and smaller mammal species, with some evidence for birds and fishes (Poplin 1972; Street 1993). In terms of food value, the most important species is the horse. Together C 1, C 2, and C 3 yielded the remains of at least 12 horses, and at least three individuals are present in C 4. Analysis of the age patterning of the animals killed suggests prey selection, with Magdalenian hunters targeting family groups of mares and young animals. Since almost all parts of the horse skeleton are present, albeit in varying proportions, at least some kill sites must have been close enough to the Martinsberg to enable utilization of entire horse carcasses, probably after dismembering into transportable portions. Standardized butchering processes, such as disarticulation and filleting of the carcass, are revealed by regular patterns of cut marks on bones. Intensive fracturing of bones for the extraction of marrow and grease is also well documented.

Other species play a far less significant role in the diet. Reindeer is represented in C 1, C 2, and C 3 by no more than three individuals interpreted as food remains and is also present in C 4 where it was not possible to calculate the number of individuals. By contrast, antler is very common in the form of modified tools or waste from their manufacture and in some cases demonstrably comes from collected shed antlers.

Of the smaller taxa, arctic fox is mainly found in the large paved structure C 1, with appreciably less material from C 2 and C 3. At least five or seven individuals are represented, calculated on the postcranial skeleton and dentition, respectively. Only a single tooth fragment was recovered from a pit in C 4. Only 24 specimens from the 1979–1983 excavation are identified as varying hare, most of them from C 2, with at least two individuals represented. Several vertebrae from a pit in C 4 probably deposited in articulation may underline the connection between this area and C 2.

Bird species found in C 1 and C 3 include ptarmigan (single bones), swan, and goose. The avifauna from C 2 comprises only ptarmigan and raven, each represented by at least two individuals. Bird wing and foot bones may primarily derive from use of ornamental feathers and claws and not represent food remains. The few fish remains recovered from the paved structures C 1 and C 3 include salmon or sea trout, while C 2 has these species and a single find identified as grayling.

Mammoth is represented only by ivory. C 1 contained three female figurines, some ivory projectile points, and a unique core on a tusk segment, and the small area of C 3 also produced some ivory. C 2 has been mentioned as an area perhaps specialized in ivory working and several figurines were recovered here, while a single female figurine and three ivory fragments are all that was found in C 4.

Season and Duration of Occupation

Seasonal information from the analysis of faunal remains suggests that Andernach was occupied over an extended period of the year.

Tooth eruption data for horse and reindeer suggest an autumn/winter occupation for Andernach C 1 and C 3, and the importance of arctic fox in C 1 can perhaps be interpreted as an indication of winter trapping of animals for pelts (which might also apply to varying hare). The presence of migratory birds (geese and swan) could equally suggest autumn/winter occupation if these species had similar patterns of migration to that of today.

Vertebrae of large adult salmonids (up to 1-m length and more) at Andernach clearly represent anadromous fish and could be from individuals caught in spring/summer when ascending the river to spawn. The majority of specimens are from C 2, but two vertebrae of a very large salmonid were found in a pit of C 1 which also contains horse teeth of a young horse killed in autumn. It is therefore probable that site history is complex, with settlement probably extending over longer periods of time and at different and/or overlapping seasons.

Mobility and Social Networks?

A range of exogenous lithic raw materials were imported to the Central Rhineland by Magdalenian people (Floss 1994). They are seen as proxies for the mobility of groups within the landscape, providing information on their movements over middle- and long-range distances and contacts to other regions. Several varieties of fine-grained Tertiary limnic quartzite available at distances of up to 30 km are generally of very high quality and suitable for the production of large blade blanks.

Lithic resources located much further (> 90 km) from the Central Rhineland include high-quality Cretaceous flint from primary outcrops in chalk formations some 120–130 km to the northwest, in the region of the German-Dutch-Belgian border, which possibly indicates contact or identity with Magdalenian groups at the northern edge of the loess belt. Cretaceous flint was also collected from glacial moraines some 100 km north and northeast of the Central Rhineland. A small number of artifacts made of chalcedony were probably obtained from the lower Main Valley some 80–100 km to the southeast.

The exact relationship between the different regions represented by these raw materials of disparate origin is unknown. Possibly distinct Magdalenian groups exploiting the different regions met at Andernach, which would then have the character of an "aggregation camp." Alternatively, a single larger group occupying the Central Rhineland for much of the year may have dispersed into the different regions during specific seasons.

Other categories of finds at Andernach show the movement of objects and, thus in some manner, of people, over much greater distances. Marine mollusk shells (*Homalopoma sanguineum, Dentalium*) show contact between the Central Rhineland and the southern French Atlantic or even Mediterranean coast, a distance of some 800–1,000 km. Possibly contact was along the axis provided by the Rhine-Rhône river systems; alternatively, movement could have been along the northern edge of the upland zone, traversing the region of origin of some of the Cretaceous flint. A few specimens of *Tympanotonos* and *Pirenella plicata* from C 1 and C 4 identified as fossils from Lower Miocene deposits in the Mainz Basin suggest contact between both these concentrations and the south.

Apart from the modified marine shells, the teeth of several mammal species transformed into ornament were found at Andernach. Reindeer incisor teeth from C 1, C 2, and C 3 were cut as articulated series from the mandible by removal of their roots for use as adornment. They must have come from at least eight individuals; more than are demonstrated by material believed to derive from hunting episodes during the occupation of the site; however, the presence of removed roots shows that some specimens were certainly modified at the site. C 3 yielded three similarly modified incisor teeth of a large bovine, a taxon not otherwise present in the area of the 1979–1983 excavation, although postcranial bones of a large bovine found in C 4 suggest that these animals were sometimes hunted locally. Two perforated canine teeth (*Hirschgrandeln*) of red deer stags from C 1 may not have been produced at the site but imported from elsewhere. By contrast, many or perhaps most of the perforated canine, incisor, and premolar teeth of arctic fox were certainly manufactured at Andernach.

Whether the very long-range transport of some of the marine shell ornament reflects mobility of individual persons/human groups or exchange systems between groups is unknown. Clearer evidence for the mobility of individual persons is provided by a detailed engraving on a slate plaque which shows that the artists were as familiar with these animals as with species hunted in the Central Rhineland. It is unlikely that seals migrated up the

Rhine as far as the Neuwied Basin in view of the far greater distance from the Late Glacial coast to the Central Rhineland since no seal remains are known from the faunal assemblage. It is more probable that the animals were observed at the coast, which implies that at least some people present in the Neuwied Basin must have previously spent time there. Engravings of seals are very uncommon in the Rhineland Magdalenian and the most commonly depicted animal species are horse and mammoth, with several of the other hunted species also represented by engravings (Bosinski 1996). Rare representations of woolly rhinoceros show that both mammoth and rhinoceros were well known to the artists, but, as in the case of seals, they may have encountered or observed these megafaunal species not in the Central Rhineland, but elsewhere.

In contrast to the realistic representations of animals, the many depictions of women are executed in a very schematic fashion (Bosinski 1992; Höck 1995). The figures, without head and feet and with pronounced buttocks, are often arranged as pairs or in groups to form scenes interpreted as dancing. Female figurines, normally carved of ivory, are fashioned in the same style. In addition to the representations of animals and women are many engravings of abstract symbols, and together this rich corpus of art forms an open-site equivalent to body of artistic expression from western European Magdalenian cave sites and reflects the complex social activities which occurred at Andernach.

Conclusions

The site of Andernach must be seen as forming only one location in the extensively oriented land-use occupation strategy of highly mobile Magdalenian people. That they were in a position to occupy specific localities intensively is shown by the large amounts of diverse materials accumulated at favored locations in the landscape. The intensity of settlement probably represents a palimpsest of occupations over an appreciable length of time (several weeks to several months) due to repeated visits separated by periods of absence lasting a season or even longer.

It is possible that northern Magdalenian groups spent the shortest days and coldest part of the year in sheltered locations, such as the Central Rhine valley, with a period centered around winter the time when the "temporary sedentism" seen at Andernach would be the most appropriate survival strategy. Conversely, the probable time of their absence from the site perhaps involving social contact with other groups by traveling to other regions (as suggested by a range of exogenous materials at the site) would have been the warmest season with the longest hours of daylight, the summer. This scenario can be broadly suggested for Andernach and is supported by better seasonal evidence at the neighboring and similar site of Gönnersdorf. An alternative interpretation of the role of Andernach would see distinct groups of people inhabiting different regions traveling to the Central Rhineland, giving the site the character of an "aggregation camp." With no clear indications for the social identity of the people occupying the different Magdalenian concentrations, it may be impossible to decide which model is more plausible.

Cross-References

- ▶ Art, Paleolithic
- ▶ Bone Tools, Paleolithic
- ▶ Gönnersdorf (Magdalenian): Geography and Culture
- ▶ Lithic Technology, Paleolithic

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Andersson, Johan Gunnar

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Basic Biographical Information

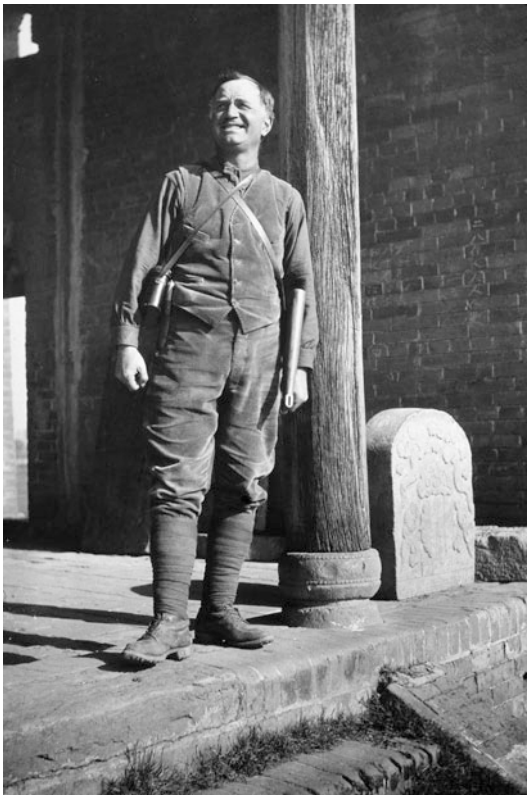
Johan Gunnar Andersson (1874–1960) was born in rural Sweden, and as he himself recounts in several riveting autobiographical books (1932, most famously), he became interested in science and nature already as a young boy. He read geology and paleontology at Uppsala University and received a doctoral degree in 1901 for his dissertation on the geology of Bear Island in the North Atlantic. Andersson participated in several other Arctic and Antarctic expeditions. In 1906 he became director of Sweden's Geological Survey and hosted the International Geological Congress in Stockholm in 1910. In 1914 he accepted an invitation to work at China's newly organized National Geological Survey (NGS) as a "mining adviser to the Chinese Government" of the young Republic founded 1911 (Fig. 1).

From 1914 to 1925, Andersson was based in Beijing (Peking). There, he trained geologists, surveyed mining ores, and helped modernize Chinese mining. He also engaged in paleontological investigations across Northern China. Then, beginning in 1920–1921 with his sensational archaeological discoveries of China's previously unknown Neolithic, Andersson shifted decisively to archaeological field research during his last four years in China.

He dedicated the rest of his life to publishing the results of his Chinese research and also to the new Museum of Far Eastern Antiquities, in Stockholm, Sweden, which he opened in 1929 based on the first collections from Chinese Neolithic archaeology, which had been partaged between Sweden and China. He served as the museum's first director and continued his work there after retiring in 1938. He kept writing and publishing into the 1950s, ultimately returning to his native rural home area.

Major Accomplishments

In 1920, following on years of geological and paleontological survey work, Andersson and his Chinese co-workers came across painted ceramics protruding from gulleys at Yangshao, Henan Province. Based on his knowledge of geology and stratigraphy, Andersson confirmed that they were Neolithic. Excavations were carried out the next year, with Yuan Fuli (1893–1987),



Andersson, Johan Gunnar, Fig. 1 Johan Gunnar Andersson in the field in China, 1918 (Andersson's photographic collection, Museum of Far Eastern Antiquities, Stockholm)

another pioneer geologist-turned-archaeologist, and others (Andersson 1923). This was a sensational breakthrough, since Neolithic materials had not previously been systematically studied in a stratigraphic context in China. Yangshao later gave name to an entire period of prehistoric archaeology and sparked debate over the relationship between the previously unknown people who had created these materials and later Chinese civilizations.

Until recently, it was widely believed that the breakthrough was accidental, but recent archival research (Chen & Fiskesjö 2003) has shown that Andersson knew the time was ripe for the archaeological discovery of Chinese prehistory. He had been encouraged to pursue it by the famous archaeologist Oscar Montelius (1843–1921), who argued that China's unknown prehistory was obscured by the burden of known history, just like that of Egypt or Greece had once been.

In light of the then-current theory concerning transcontinental linkages between prehistoric cultures in Eastern and Central or Western Eurasia and bolstered by the apparent similarities of Yangshao to Anau, Tripolje, and other comparable Eurasian sites further West, Andersson developed a major NGS-supported and Swedish-financed campaign of more excavations further West. His closest Chinese colleague and superior, the British-trained geologist, polymath, and politician Ding Wenjiang (1887–1936) who was founder-director of the National Geological Survey, strongly encouraged this research and was as enthusiastic about it as "An Tesheng" (Andersson's Chinese name) himself.

His campaign in the provinces of Gansu and Qinghai was carried out during 1923–1924; the resulting wealth of ceramics and other prehistoric materials found forced Andersson to focus on their recovery and care. Hundreds of painted vessels and other artifacts were shipped on rafts down the Yellow River. In 1925, a Swedish-Chinese partaging agreement was made between the NGS and the China Committee now chaired by Sweden's Crown Prince (later King Gustaf VI Adolf; reigned 1950–1973), himself an archaeologist and scholar. Andersson would ship everything to Sweden, describe it, and return half to China (which he did, in seven shipments, 1927–1936). Andersson was appointed Professor of East Asian archaeology and used the Swedish half to found the Museum of Far Eastern Antiquities, which opened in Stockholm in 1929 (see Fiskesjö & Chen 2004 for a full account).

Because of his museum commitments, as well as the Japanese invasion of China, Andersson could not continue his field research program in China as he had hoped. On his last trip to Asia, in 1936–1938, he conducted surveys and excavations in Sichuan, Western China; Hong Kong; and Vietnam (Andersson 1938, 1939). In retirement, Andersson focused on writing up his research, in large part published in the *Bulletin of the Museum of Far Eastern Antiquities BMFEA*

since 1929 (Andersson 1943; also *BMFEA* volumes 17, 18, 19, and more) and with parts of this work delegated to others (e.g., Palmgren 1934; Sommarström 1956).

Later, the returned Chinese materials were lost, probably in the war (including priceless human ceramic figures that remain unparalleled despite the phenomenal development of Chinese archaeology since Andersson's time)—as were the Peking Man (*Homo erectus*) fossils excavated from 1921 onwards at the Zhoukoudian site, near Beijing, the potential value of which had been pinpointed by Andersson. Strangely, their disappearance has attracted much more attention than the loss of the Neolithic treasures.

Today, the Museum of Far Eastern Antiquities contains vast unstudied materials. While Andersson originally envisioned it as an international center for East Asian archaeology, the prehistoric materials were increasingly marginalized in favor of later-period arts. Even Andersson, who had lamented the destructive effect of looting for artifacts in the wake of his own field research, became increasingly entangled with collectors and dealers (Johansson 2012). The reasons for this shift include China's isolation under Mao and also an absence of disciples to pursue Andersson's path. Most notably, Andersson recommended the talented Folke Bergman (1902–1946) as a field archaeologist to the expeditions of the Swedish geographer and explorer Sven Hedin (1865–1952), but Bergman died prematurely, and Hedin's expeditions were also interrupted by war, and other factors.

Johan Gunnar Andersson's pioneer role in Chinese archaeology was made possible by his insights and skills from geology and paleontology, just as archaeology itself once emerged on this same trajectory. Andersson's genius and main accomplishments were in the spirited and creative application of these insights to the trailblazing discoveries of the prehistory of East Asia, accomplished in collaboration with his Chinese colleagues. Andersson is famous above all as a key pioneer of (Neolithic) Chinese archaeology, as the founder of Sweden's Museum of Far Eastern Antiquities, and also as a prominent geologist, paleontologist, polar explorer, and writer. Less well known is the fact that apart from his numerous scientific papers and books in all these fields, he also, in his last years, published a 1,200-page history of exploration, denouncing the harm done to indigenous peoples through European colonialism and conquest (Andersson 1953).

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- ▶ East Asia: Early *Homo* Fossil Records
- ▶ East Asia: Paleolithic
- ▶ Peking Man

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Andes: High-Altitude Archaeological Sites as Cultural Heritage

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Introduction

Archaeological remains, predating the Spanish conquest of 1532 CE, have been found on numerous mountain summits in the Andes, including more than 100 sites above 5,200 m, with some ranging as high as 6,700 m. This is only one of the many achievements associated with the culture of the Incas – but it is unique (D'Atroy 2002). In less than a 100 years (c. 1470–1532 CE), they constructed well-built stone structures in mountains over a vast area of the Andes, encompassing the countries of Chile, Argentina, Bolivia, and Peru (Beorchia 1985 and 2001) (Fig. 1). Nowhere else on earth have archaeological remains been found at such altitudes. Indeed, the heights of some structures were not even *reached* again for four centuries, and taken together, this constitutes one of the most awesome accomplishments known to us from ancient times.

The sites generally consist of stone buildings with low walls, artificial raised platforms, and simple structures that served for protection from the elements. At the base of some mountains, fairly large complexes – some with hundreds of structures – have been found that provided storage and housing facilities for participants in ceremonies carried out on the summits. The summit structures are often not impressive in size, and it is the ritual offerings, such as statues, precious textiles, foodstuffs, and in rare cases human sacrifices, which have been found in the structures that make them of such value to us today.

Extraordinarily preserved in the cold environment of the high Andes, the mummified remains of the sacrificial victims and their associated funerary offerings provide invaluable evidence for the study of the ceremonial life of the Inca civilization. They are among the few pieces of material evidence of Inca religion that have survived the Spanish conquest and have been found in their original contexts. Unfortunately, during the last 100 years, many of the mountaintop shrines of the Incas have been destroyed by looters, and the scientific study of these sites only began in the past few decades.

Definition

The term "high altitude" has often been used by archaeologists to refer to sites found above 5,200 m. This has been a convenient way to distinguish them from lower-lying ruins with which they may, nonetheless, share many characteristics. It is also understood that ruins on a mountain only 2,000 m in altitude could still be considered "high" relative to people living over 1,000 m below.

Nonetheless, it is the high altitude of so many ruins that has captured attention, not least of all because of the great amount of energy, organization, and in some cases specialized techniques necessary for constructing and maintaining structures at such heights. Commonly, even people who have lived all their lives at c. 4,000 m (the highest that permanent villages are normally found) have difficulty in reaching, let alone working at, altitudes over 5,200 m.

A mummy can be defined as a human corpse that has had its skin preserved over its skeleton,

Andes: High-Altitude Archaeological Sites as Cultural Heritage, Fig. 1 Map of the central Andes with selected Inca high-altitude archaeological sites marked (Courtesy of the National Geographic Society)

either through natural or artificial processes. One of the things that makes Andean frozen mummies unique is their *natural* preservation. Egyptian mummies are renowned and some date back over three millennia before the Incas. However, these are usually desiccated bodies that have had their intestinal organs removed and embalming techniques utilized to help the mummification process. As rare as these ancient mummies may be, those mummies that have been naturally frozen are far more so. Thanks to their better-preserved body tissues and organs, they provide a wealth of human biological information otherwise unobtainable and enable scientists to undertake far more comprehensive studies.

Historical Background

The Spanish chroniclers described Inca offerings to the gods as including statues made of precious metals, finely woven textiles, and ceramics of distinctive Inca style, along with coca leaves, incense, food items, and alcoholic beverages. Although they also noted that offerings could involve human sacrifices, it was not until 1954 that scientists began paying serious attention to such sacrifices having taken place on mountains. That year, looters in Chile discovered the body of an Inca boy on the summit of El Plomo at c. 5,200 m. After it was recovered by archaeologists, the study of the mummy and its associated artifacts led to a collection of articles by specialists from several scientific disciplines (Mostny 1957). In 1964, the frozen body of an adult male was found by mountain climbers at 6,000 m on Mount El Toro, and in 1985, the frozen body of a seven-year-old boy was recovered from an Inca site at 5,300 m on the slopes of Aconcagua in Argentina (Schobinger 1966, 2001). The resulting studies of these mummies laid the foundation for the development of longer-term scientific excavations to be undertaken on the summits themselves during the 1990s, and this resulted in the discovery of four exceptionally preserved Inca mummies on the mountains of Ampato and Llullaillaco in Peru and Argentina, respectively (Reinhard 2005; Reinhard & Ceruti 2010) (Fig. 2).

Andes: High-Altitude Archaeological Sites as Cultural Heritage, Fig. 2 An overview of the Inca ceremonial site on Mt. Llullaillaco's summit at 6,700m (Photo: Johan Reinhard)

Key Issues/Current Debates

The Andean mountain-top mummies are unusual even among the world's few "ice mummies." This is because the human sacrificial victims often would have become frozen at the time of their deaths – not after time had passed and the bodies begun undergoing decomposition. Indeed, several chroniclers described many of them as having been buried while they were still alive. On snow-laden mountains, this has allowed for an unprecedented scientific treasure – a body

Andes: High-Altitude Archaeological Sites as Cultural Heritage, Fig. 3 An Inca female frozen mummy recovered from the summit of Mt. Llullaillaco (Photo: Johan Reinhard)

could be frozen with little decomposition having occurred even after the passage of five centuries (Fig. 3).

There are several reasons for their excellent preservation, but the main one would have been the continuity of below-freezing temperatures at the high altitudes of Andean peaks. Scientists have noted that some humidity is necessary because the absolute absence of water causes shrinkage and embrittlement of organic materials by water loss. As Cronyn (1990: 24) noted, "the best condition for preservation is that of extreme cold – for here, since all water is turned to ice, it is inactivated without being lost and so both inorganic and organic materials are unaffected."

If volcanic ash surrounds the mummies, such as has occurred in some cases in the Andes, this also helps to inhibit the growth of bacteria, while maintaining moisture. And the rapid burial and freezing of the soil can result in a vapor barrier being created, further impeding decomposition. This unique combination of factors makes the high Andean summits excellent places for the preservation or organic material. Frozen mummies have even been recovered with their DNA perfectly intact.

At present, these high Andean sites cannot be protected and they will – sooner or later – be looted. That is a fact, one underlined by the looting that already has taken place at many of them, not to mention at thousands of tombs throughout the coastal region and highlands of western South America (Atwood 2004). Of the several dozen high-altitude sites I have seen, only a few have not been at least partially looted *already* – in the sense of items having been taken from the surface and holes dug. It is impossible to post guards on the summits or even around the mountains, which are, after all, several miles in circumference. Furthermore, mountains can be climbed from many sides, and, if situated on a border between countries, they are even harder to protect.

Several factors have combined in recent years to increase the likelihood of the sites being looted. Access has become easier as roads have penetrated throughout the Andes,

in large part due to mining. Poverty and the displacement of people has increased, while at the same time the amount of money being paid on the black market for artifacts has multiplied. The number of mountain climbers has increased, gear (and its availability) has improved, and guidebooks now provide descriptions of routes up most of the mountains. It is not a matter of *if* the mountain sites will be looted, but *when*. As for the ease of destroying one of them, a single person with a stick of dynamite could be on and off the summit in less than an hour.

All of this is also taking place within the larger context of climate change. Throughout the Andes, the permanent snowline is receding, exposing ruins previously hidden from sight. This not only makes the organic materials more susceptible to decomposition, it also makes them more likely to be discovered and looted.

International Perspectives and Future Directions

Whether in a museum, in a laboratory, or in the field, research on the ritual offerings made on mountain summits continues to add to scientific knowledge while at the same time helping protect the cultural patrimony of Andean peoples. Mummies and their associated artifacts also serve as means to help the economies of local communities through avenues such as arts and crafts, museum exhibitions, and focusing government attention on their needs.

Mummies provide information that can be used to educate the world about the unique history of a remarkable ancient civilization – and point the way to others. In the imaginations of many children, mummies are second in interest only to dinosaurs, and their educational potential appears to be unlimited. A mummy is a magnet and can be used as a teaching tool on many subjects, including archaeology, geography, human biology, conservation, and the environment.

True time capsules, these frozen bodies allow a view into the past that cannot be obtained through any other means, including that of the best-preserved mummies found in other climates, such as in the deserts of Egypt (Bahn 2003). Due to their excellent preservation, finds made at high altitudes enable unique opportunities for studies ranging from the biological to the archaeological (extremely rare artifacts and among the few remaining Inca ceremonial sites which have offerings in situ). Because of the Incas' practice of making human sacrifices at sites on high mountains, the Andes region is the only one in the world with a good chance of finding frozen mummies – assuming systematic work is conducted before they are destroyed and lost to mankind forever.

In recent years, it has become clear that a frozen mummy is one of the most valuable objects to reach us from the distant past. Such mummies will *never* stop adding to our knowledge, since technology is constantly evolving and they contain information that cuts across a wide variety of scientific disciplines, including ones as diverse as ornithology, pollen analysis, parasitology, DNA analysis, microbiology, paleopathology, odontology, prehistoric diet, and textile and pottery analysis. New information will be obtained years from now and likely to continue to be so for as long as mankind exists. Thanks to extraordinary cell preservation and advances in technology that have resulted in the reanimation of frozen cells, one day frozen mummies may no longer just be like time machines, they may *become* time machines, enabling us to recover living information from the past. It is difficult to imagine anything, however rare, that can compare with the uniqueness, complexity, and the unlimited knowledge provided by a frozen mummy.

The documentation of the mountain-top shrines and the finds made at them has combined with the development of interdisciplinary studies on frozen mummies and other organic materials to add insights into fundamental aspects of Inca ceremonial life. They have therefore not only helped deepen our knowledge of Inca civilization, but contributed to the preservation of an invaluable heritage for future generations.

Cross-References

- ▶ Altitude Environments in Archaeology
- ▶ Andes: Prehistoric Period
- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Objects and their Contexts
- ▶ Heritage Museums and the Public
- ▶ Human Remains in Museums
- ▶ Human Remains Recovery: Archaeological and Forensic Perspectives
- ▶ Inca State and Empire Formation
- ▶ Landscape Archaeology
- ▶ Looting and Vandalism (Cultural Heritage Management)
- ▶ Permafrost Digging
- ▶ Sacred Site Conservation and Preservation

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Andes: Origins and Development of Agriculture

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Introduction

Terminal Pleistocene horticultural societies such as the Natufian complex of the Near East that domesticated wheat at c. 14,000 BCE were not alone in the world at that time. Recent interdisciplinary research show that past tropical Andean societies began to experiment with cultigens approximately 12,000 BCE i.e., somewhat coeval with other pristine cultures around the world.

Two main effects resulted from this early plant manipulation process. The first one was the increscendo guarantee of stocking staples, which ensured quasi-permanent food among ancient Andean societies. The second effect was the resulting decrease in mobility of plant manipulators, who learned to plant seeds near camps and dwelling structures, thus providing food in one place, and therefore the preference of establishing in the same place.

Andean civilizations learned not only to domesticate since the Terminal Pleistocene, but completed domestication prior to the emergence of complex societies in the third millennia BCE; so from that time, only a few "new" plants were incorporated into the Andean diet. Once the principal Andean cultigens were controlled, they were massively produced, not only during the Preceramic but also CE times, even until the Incas, who produced maize in impressive quantities and made this plant the main staple of the Imperium.

Definition

Agriculture in the Andes is a common denominator among all cultural developments throughout this territory, from the Pacific Ocean to the

humid eastern Amazonian boundary. From the earliest times, hunter-gatherers in the Andes learned to adapt to the complex Andean region, not only by hunting, gathering and fishing strategies, but also by experimenting with plants, i.e., horticultural assays. The in-crescendo agriculture techniques during Andean cultural developments led to Andean societies where plant economies were crucial for the sustenance of whole cultures and even to the Imperium of the Incas.

Among the pre-Columbian Andean plants are lowland roots and tubers such as achira (*Canna edulis*), manioc (*Manihot esculenta*), and sweet potato (*Ipomoea batatas*). These provide huge proportions of charbohydrates. Further root and tubers were also domesticated in the Andes, such as for instance, oca (*Oxalis tuberosa*), mashwa (*Tropaelum tuberosum*), and ullucu (*Ullucus tuberosus*), including probably the most popular: potato (*Solanum tuberosum*). These four high altitude plants were domesticated in southern Peru and Bolivia and display exceptionally rich values in proteins. In the Andes, pseudocereals such as quinoa (Chenopodium quinoa) and maize (Zea mays), and also legumes such as peanut (*Arachis hypogaea*), common bean (*Phaseolus vulgaris*), and lima bean (*Phaseolus lunatus*) were domesticated and became important sources of proteins, carbohydrates and vitamins. Additional important native plants were chili-peppers (*Capsicum* sp) and coca (*Erythroxylon coca, E. novogranatense*) (Pearsall 2008).

Ancient Andean agriculture restricts its evidence mostly to macro-remains. These are found in places where organic preservation occurs. For instance, ideal organic preservation conditions on both the Peruvian and Chilean Coast (south of 4ºS) allow for detailed examination of ancient Andean plants, in order to determine both taxonomy and state of specimens (wild or domesticate). Other research avenues such as phytoliths and biochemical traces in bones help to recover data on paleodiet based on plants (Piperno & Pearsall 1998).

The world of pre-Columbian agriculture should also cover derivative evidence, such as the native knowledge of conservation techniques to generate permanent staples and improve biochemical properties (as in the case of dried maize or chuño–dried potatoes), or even the development of artificial irrigation techniques dating to 5600 BCE, such as those irrigation channels found in the valley of Zaña, which could be considered the oldest probable evidence of agricultural irrigation systems (Dillehay 2011).

When they realized that some cultivars yield higher productive resources when planted in combination, this aboriginal knowledge allowed ancient Andean people to profit from agricultural resources. This was the case for maize, common beans and squashes, when these three plants were cultivated together. While maize grows upwards in the middle of the field, common beans profit from the wet and shady environment, and squashes flank both plants as a protection wall. Such combination was already mentioned by Vavilov, and was used in the Andes from the very beginnings of the agriculture. Apparently, there are other combinations with positive effects among other plants, such as high altitude tubers and rhizomes.

The very early peopling of the Andes seems to be almost coeval with the discovery of plant manipulation and horticultural practices that finally led to agriculture in the Andes. Calibrated radiocarbon dates of Ecuadorian phytoliths of both domesticated squashes (*Cucurbita* sp) and gourds (*Lagenaria* sp) push back them to approximately 10,000 BCE (Piperno & Stothert 2003). In Peru, pristine cultivars are found in the cave of El Guitarrero, a site located in the Callejon de Huaylas, an interandean and mesothermic valley at 2,850 masl in the Central Andes. At that site, Tom Lynch (1980) reported a layer containing macro-remains of the already domesticated common bean (*Phaseolus vulgaris*), oca (*Oxalis tuberosum*), and chili pepper (*Capsicum* sp) dating c. 9600 BCE. All of these finds imply that plant manipulation began around 10,000 or even 11,000 BCE, i.e., within the Younger Dryas, virtually the last ice age.

Recent archaeological research conducted by Tom Dillehay on the Northern Coast of Peru (Zaña valley) shed light onto very early agriculture

in the Central Andes. By using interdisciplinary analysis, wild peanut (*Arachis* sp) macro-remains and starch were discovered in situ and dated to approximately 7000 BCE. Sweet potato (*Ipomoea batatas*), also an important tuber among the ancient Andean people, was domesticated around 8000 BCE, but was introduced to the Andes and later became one of the most important food sources. A wild ancestor (*Manihot flavelifolia*) of the sweet potato (*Manihot esculenta*) was likely domesticated in the Cerrado region (Southern Brasil), and then imported into the Andean area (Piperno & Pearsall 1998).

However, two plants are most representative of the Andes: potatoes and maize. The earliest potato remains were found in a site called Huaynuna, located on the Central Coast of Peru and dated to approximately 2800 BCE (Ugent et al 1983). However Don Ugent, the botanist who examined the specimens, was able to find out based on starch analysis that the domestication of potatoes likely began two (or more) millennia before, i.e., around 5000 BCE. According to experts, the domestication centers could have been located principally in Northern Bolivia, Southern Peru and Chile.

Maize was also a key domesticated plant in the Andes. Conversely to what was believed for a long time, maize of the Andes does not come from Mesoamerica or Mexico, but rather from the same Andean region. Indeed, once wild maize seeds landed in the Andes (probably by means of birds migration), people learned to manipulate and then domesticate this plant. Independent lines of evidence support the thesis of an Andean domestication that seems to be approximately coeval with its domestication in Central America (e.g. Oaxaca, Guila Naquitz). In fact, calibrated radiocarbon dates of archaeological sites such as Cerro Julia, Cerro Negro (Casma Valley), Rosamachay (Ayacucho), the (above-mentioned) Guitarrero cave, and the recently excavated Huaca Prieta on the North Coast yield approximately 5600–4000 BCE. In this last mentioned site, Grobman, Dillehay and Bonavia (2012) discovered native maize races than belong exclusively to the Central Andes. In general terms, the existence of three Preceramic races of maize, older dates, the difference among the chromosomal knots, the absence of hybridization with teosinte and the high variety of Andean maize are the basis to affirm that there was a native Andean domesticated maize.

Some high altitude plants, such as quinoa (Chenopodium quinoa), an important crop found at the site of Jiskaurimoko in the southern Andean plateau (Lake Titicaca environment), were already domesticated and dated to c. 2000 BCE. However, wild Chenopodium has been found in excavations in some caves of the Central Andean plateau dating back to approximately 7000 BCE.

Historical Background

The scientific interest in pre-Columbian agriculture in the Andes goes back at least to the end of the nineteenth and beginning of the twentieth century, with the pioneer ethnobotanical research of W. Safford, who was able to examine some botanical remains from the early archaeological field research in Peru. Also, John Harschberger analyzed botanical remains from sites like Pachacamac and proposed, based on both starch and plant morphologies, that the evolution and domestication process took place within the Andean region.

In the first half of the twentieth century, works like those of Eugenio Yacovleff and Fortunato Herrera were veritable efforts in capturing all available data related to plant remains and agriculture from ancient Peru.

Richard MacNeish took another step with his ethnobotanical project in the Ayacucho basin. He intended to record all possible plant remains from Preceramic times, from a series of caves and sites in the central Andes. From that time on, in-crescendo interests in recording this kind of data have been present, and therefore projects usually incorporate this typeof approach in order to document plant occurrences and development of ancient Andean agriculture. Extensive reports, such as that on "Los Gavilanes," a Preceramic site where huge maize storage holes were found by Duccio Bonavia (1982), are clear efforts towards a reconstruction of ancient plant management in the Central Andes.

On the other hand, archaeologists and other researchers discovered some key technologies that contributed to provide stable and regular

food resources to the past Andean societies from the earliest times. From the Middle Holocene to the Inca time, people built, for example, complex systems of irrigation, aqueducts and raised fields, especially in Ecuador, Peru and Bolivia (Farrington 1980; Denevan et al 1987; Donkin 1979; Erickson 2000; Lane 2009). High complex civilizations such as Chimu or Tiahuanaco were able to develop practical and efficient artificial systems to improve water sourcing and management. Puquios (holes to extract water from the underground) even made it possible to live in the desert, as did the Nazca some 1,500 years ago (Schreiber & Lanchom 2006). Recent approaches towards an integral understanding of ancient agriculture in the Andes involve, for instance, genetic analysis (Zeder et al 2006) that uses phyto tracers to track plant origins. This and other approaches promise increasing data, leading to a better understanding of Pre-Columbian Andean agriculture.

Key Issues/Current Debates

Key issues and debates around Andean domestication are quite rich and numerous. There is discussion about the character and particularity of the plant domestication process in the Andes, the link between paleoclimatology and pre-Columbian agriculture, the timing of the Early Holocene gardening, the human manipulation of plants since the very begin of the Holocene, the phytogenetic relations among Andean plants, the biochemical properties of Andean plants, and the characterization of the agriculture technology (including channels, dams, artificial irrigation, raised fields, etc).

International Perspectives

Ancient Andean agriculture is relevant because of its exclusivity. In fact, potatoes, maize, quinoa and other important food plants were domesticated and cultivated in the Andes once early people settled this territory, with no other contacts such as in Eurasia. These plants were therefore exclusive to the Andes, and once this area was conquered, they were exported to the world. Therefore, research is to be conducted on some key topics that will contribute to the study of worldwide parallel plant domestication processes, genetic markers (phytogenetic), and biochemical properties of the principal plants of the Andes.

Also, the precocious character of Andean domestication of plants should be radiometrically updated in order to assess the actual time depth in comparison to other worldwide histories. This implicates not only overseas interests, but also the Andean community, as the Andes are shared by six countries.

Future Directions

There are many number of difficulties regarding the destiny of ancient agriculture in the Andes, especially in moving towards a holistic view and incorporating them into current life. Probably the most important is the role of plant diversity in the Andes as a potential bio-resource, not only for the Andes, but also for the whole world. Ancient Andean people were able to domesticate and profit from the high potential botanical diversity. Hence, it could be a matter of research to learn about opportunities from the past and use them in the present. High protein-content tubers and grains once cultivated in the high Andes are virtually the feed reserve for the future. Another issue for future direction is the recovery of ancient efficient agricultural technologies that were developed in the Andes in the past. There are a number of studies showing the outstanding productivity and harmless effects in applying this native technology to agricultural issues. Finally, plants played a key role from the earliest time in the Central Andes, within the early process of the rise of the Andean civilization in the Middle Holocene some 7 millennia before. Plants were not only food, but also became a crucial part of ancient beliefs, myths, and legends. People of today who taste Andean food should realize that this ample assortment of plants has a very ancient history that belongs to the national identity; this is especially important during this time when gastronomy is experiencing a “boom.” The correct link will fuse both issues, benefitting both the Andean past and current nations.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Beans: Origins and Development
- ▶ Capsicums/Chiles: Origins and Development
- ▶ Paleoethnobotany
- ▶ Phytolith Studies in Archaeology
- ▶ Potato: Origins and Development
- ▶ Quinoa: Origins and Development
- ▶ Squash: Origins and Development
- ▶ Sweet Potato: Origins and Development
- ▶ Waynuna: Agriculture and Domestication

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Andes: Prehistoric Art

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Introduction

Worldviews among Andean people go back to the very first inhabitants that once entered this vast and complex territory. Early on, people figured out a way to capture the inaccessible by means of material representations. From the Andean hunters, i.e., artists representing a dancing

shaman and running camelids in caves, invoking natural powers; to the Inca "tokapus" (textiles containing different signs and colors) exhibited by the elite, sacred art was a link to power and control of human and natural resources.

Early in time, Andean artists were able to find a variety of raw materials to accomplish these handcrafts. Clay, metal, wood, textiles, bones, and even stone were employed and transformed into art. With a few exceptions, almost all objects of nature were represented, both without modification and modified into unreal subjects. Therefore, it is usual to find, for example, plants or animals transformed into humans, and also human beings with bird attributes, etc. From the universal worldview, pre-Columbian ritual art is a common denominator of the Andean region from Colombia to Argentina, and from the early hunter gatherers to the arrival of the Spaniards, and even thereafter.

Definition

The prehistoric art of the Andes could be defined as all artistic expressions made of materials such as stone, clay, metals, textiles, wood, and bones, among others, with the purpose of capturing an image from the outside environment or even from the mind-self of the creator. Hence, there is a transfer of the subject from reality to a "captured" image contained in a space or even in an object. "Captured" or represented images played a number of roles in pre-Columbian times, from the animist goal (no complex societies) to power and propaganda issues (complex and aggregated societies).

Archaeologists usually divided pre-Columbian art objects into two categories, namely: non-portable art and portable art. While the first one involves murals for example, cave paintings and even rock art, the second comprises portable objects made of a number of raw materials, in most cases little (to medium) in size and weighing less than the non-portable art pieces.

Although there are some particularities among pre-Columbian Andean art expressions, especially in regard to the multiple micro-environmental conditions of the whole Andean region, one can perceive some common traits, such as the constant intention of representing animals typical of the Andes (e.g., pumas, condors, snakes, frogs) and also plants (Andean crops and tubers), human beings and even scenes of life, such as the very famous Mochica iconography found in pottery or Colombian metal art.

From a chronological point of view, the wealth of artistic representations of pre-Columbian art in the Andes can be divided into two main groups. The first one was an early art that displayed images that reflect both the elements of the surrounding environments and individual-common internal "imagination". This kind of art usually belonged to the times of the hunter-gatherer-fisher, i.e., "non-complex" societies. However, it does not imply that "realistic" art occurs later in pre-Columbian times. In fact, human beings associated with animals are usually represented in caves and interpreted as hunting scenes. But, in some similar cases, the same image is accompanied by points and symbols that are part of the composition and complicated to interpret. That means non-complex and complex representations are associated from the earliest times.

As time went by, artistic expressions underwent complex transformations in response to their sources and intentions, usually within a state and civic frame as established components and official propaganda. Thus, archaeologists see the birth of complex scenes and symbols that became local and/or regional recurrences throughout the Andes, implying consensus and territorial domains. Indeed, it was the time of the second "later" art in the Andes. Examples for such an art could be the Inca human figurines found in some fertility rites, such as the "capacocha" in the high mountains of the Andes, and also textile flags of banners representing jaguar-snake-human being gods of the Chavin culture some 2,500 years ago.

Once the Europeans landed in the Andes, pre-Columbian art persisted, despite the occidental rules against all native artistic expressions as a part of the conquerors' domination plan. A very interesting example is the continuity in rock art paintings of Lachay (Near Lima, Peru),

where one can see pre-Columbian designs in association with images of Jesus Christ on the same wall cave (Bonavia 1999).

Historical Background

Let us now mention some relevant passages of pre-Columbian art of the Andes. Once they arrived in the Andes, non-complex civilizations began to paint and engrave rocks and caves. In fact, the need to create art goes back to the earliest times, i.e., the Paleoindian period. Parenti (1996), for instance, found two red parallel lines in association with a hearth in Boqueirao da Pedra Furada (Piaui, Brazil) dated to 17 kyr BP. Later, Jean Guffroy (1999), in a synthesis of the Central Andean rock paintings and engravings proposed that indeed this is a particular Andean tradition than belongs to the Central Andean region, including southern Peru and probably northern Chile and NW Argentina.

Early rock art usually displays hunting scenes, but there are also some other "common denominators", such as the "negative hands," a tradition shared by a number of regions as Peru, Argentina, Bolivia and Chile. These are quite similar to those made in Europe by Solutreans some 20 kyr ago. The "negative hands" are prints of hand silhouettes, usually in red or black colors, possibly representing children initiation rituals. Later, rupestrian art was also practiced by cultures as the Cupisnique (100 BCE–1 CE) or even the Recuay (100–700 CE) in Central Peru.

Cave paintings were made throughout the Andes. In Northern Chile, for example, research around this art has been recently updated and summarized by Sepúlveda et al. (2010). They point out that most of the representations in an initial time span, c. 2000 BCE–1 CE, address themes related to hunter-gatherer activities, and in a second time span, caravans of camelids, a typical symbol of the Southern Andes that implies commerce and trade.

As explained above, Andean people such as the Chinchorrro from the Northern Chilean desert manufactured grave goods; shell and bone necklaces and pendants dating back 5,000 years. Among these remains, archaeologist were able to find colored pigments and small vegetable brushes that were probably used to paint their bodies (Arriaza et al. 2008). Grave goods representing ornaments destined to be a companion of the death person are typical, even from the Middle Holocene.

One of the mobile arts typical of the Andean cultures is the decorated pottery. From the very beginning, Andean people learned to paint, engrave and model clay. Very early decorated bowls (c. 3800 BCE) were manufactured by the Valdivia Culture, which was located in the southwest of Ecuador. These vessels were usually finished with a burnished red slip and decorated on their exterior surfaces with incised geometric motifs. The Valdivia potters also made figurines representing male and female individuals for ritualistic purposes (Raymond 2008). In Peru, for example, in some very early archaeological sites such as Caral, Chupacigarro and Áspero, dating from c. 3500 BCE, archaeologists found miniature idols made of clay that are believed to have relationships with rituals.

Metal handcrafts also occurred relatively early in the Andes. At Jiskairumoko on the Southern Altiplano, a necklace composed of gold beads has been found in a context dating to c. 2200 BCE (Aldenderfer 2008). Later in time, gold ornaments, such as from the Kunturwasi, were made exclusively to accompany priests and elite persons. But later cultures, mostly from the beginning of our era, achieved quite impressive metals pieces, not only from Peru, but especially from Colombia, among such cultures as Nariño, Tairona, Muiscas, etc. Pre-Columbian metal workers learned to work mostly gold, silver and copper. They were not able to discover iron.

Textiles and fabrics are also one of the most impressive and finest manifestations of Andean pre-Columbian art. This type of organic remains is almost perfectly preserved along the coastal desert because the dry climatic conditions. Textile handcrafts have their origins in Early Holocene basketry; techniques learned from that time later applied to weaving. For example, on the northern Coast of Peru in a site called Huaca Prieta, a c. 3000 BCE cotton-textile was found.

As with other materials, textiles were conceived not only for practical and dressing purposes, but also for beliefs and religion. Textiles of Huaca Prieta display, for example, a design of a condor and a snake within its belt, two of the most represented animals among the Andean iconography. Because their sophisticated techniques and bright colors, the Paracas have some of the most impressive textile art. Thousand of mantles, dresses and embroideries are wonderfully preserved within the Desert of Ica, immediately south of Lima. These "master pieces" are believed to cover and wrap mummies in a way that bundles and contains these human remains and offerings of various types and raw materials. Archaeologists interpret the "excessive time" invested in their elaboration as the result of ancestor worship in the past.

Another important raw material is stone, so for example, lithic sculptures are also a particularly developed art by Ancient Andean people. From north to south, we can mention some outstanding examples, such as the stellae made by the San Agustin Culture in Colombia (representing priests or shamans and dating CE 1–1200), the Chavin (1000–100 BCE) stone sculptures (representing zoomorphic and phytomorphic beings, including anthropomorphic human beings), the Recuay (100–800 CE) mourning lapidae; the impressive Pucara (1000–100 BCE) and Tiahuanaco (100 BCE–1200 CE) monoliths undoubtedly associated with ancient gods and beliefs. Among these, we can mention the Bennett´s monolith, currently a symbol of the Tiahuanaco Culture. Not considered art, but no less impressive are the sculpted wall stones of Inca buildings, e.g., Sacsayhuaman (Cuzco). The perfect fit of their outlines, used as "block-puzzles" to erect walls, led archaeologists to think Incas were aware of masonry techniques and used sophisticated procedures to transform stone forms to some degree.

Finally, idols and other modelled artistic items of wood and bone were also created by a number of cultures of the Andes. This is the case for the figurines of the Peruvian North Coast cultures, or the beautiful Inca beakers of wood called "Kero," which were decorated with rhombic designs and flowers that were actually Inca patterns, indicating regional domination.

Key Issues/Current Debates

Among the most fascinating debates on pre-Columbian art in the Andes, there is discussion on the exclusively "unique" character of some selected pieces. Indeed, all Andean pieces share common traits, such as modular bodies of anthropomorphic representations or shamanic personages, but in some cases there are distinctive pieces that distinguish themselves from the others. Stone sculptures such as the "Estela Raimondi" (Chavin Culture, c. 400 BCE) or the Bennett monolith (c. 200–500 CE) are unique pre-Columbian legacies to Peru and Bolivia respectively. Hence, pre-Columbian art could also be considered national symbols in Andean countries.

Another key issue in pre-Columbian Andean art is the techniques that were employed. Tiny metal filigrees, helicoidally made wooden sticks, highly elaborated textiles, or stones that seem to have been "smelted" still remain enigmatic from the technical point of view. Archaeologists, aided by other colleagues from a variety of research fields try to reconstruct some *chaine operatoires* that lead to this kind of superb technical-artistic results.

We know that in the Andes, there were no writing systems, and yet there were accounting devices and possible ideograms. So, are we able to recognize one artist or a family/group of them when assessing an artistic work? Chris Donnan proposed that among the Mochica potters, there were actual artists who were painters and exclusively devoted their time to the fine painting of ritual pottery. However, we lack further data and studies of other cultures to test if this was a regular trait of ancient Cultures of the Andes.

Pre-Columbian Andean art of complex civilizations is usually conceived to enhance power and legitimacy of some cultures "above" others. Yet the conceptual relationship of "art-power" in the Andes as an establishment is in some cases

a matter of debate when chemical-physical sciences are applied, so that, for instance, some highly decorated Nasca vessels (CE 1–650) from Ica (south of Lima) were also used for food purposes and not only as grave goods.

But were archaeologists able to find the ancient artistic workshops that were agglomerated by these creative minds? The answer is "unfortunately no." Most research addresses graves, simply because the luxurious contents attract media and people, which helps to maintain and improve research budgets. As seen, archaeologists need to apply a rather holistic approach in order to get a more complete overview from the past art in the Andes.

International Perspectives

Indeed, there is great potential in ancient Andean art, because of its uniqueness, palette-rich expressions, high technical quality, outstanding manufacture and combined colors. Its abstract and lineal modulation, in contrast to other world ancient arts such as the Roman Empire or even Attica, are typical of the Andes. Furthermore, the nature and special combination of structure and colors, for instance gold-cinnabar-turquoise, make such a visual impact, surely in ancient and even in modern times. However, technical and contextual data are still lacking.

Future Directions

A post-processual perspective is needed within this fascinating issue of pre-Columbian Andean art in order to improve our knowledge on this issue. Round tables with interdisciplinary participation would highly benefit our understanding of the how, reasons why, and role of ancient Andean art among not only elite, but also common populations.

Cross-References

- ▶ Andes: Prehistoric Art
- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Cueva de las Manos, Río Pinturas Cave Art
- ▶ South American Rock Art

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Andes: Prehistoric Period

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Introduction

After the Last Glacial Maximum (LGM), immigrants from Asia and probably other parts of the world entered the American continent. Once established in this ample territory, some settled in North America, while others peopled the Pacific shore, intra-mountain areas and

Amazonia of South America. Some people remained on the western side of South America, a territory whose common denominator is the Andean Chain. Although it is difficult to say why Ice Age people decided to stay in the Andes, one possible reason is (and was) its extremely diverse and rich ecological environment (Lavallée 1999). From west to east, the tropical warm waters, temperate and microthermal Interandean chain, and the evergreen Amazonia certainly provided a number of resources for food and raw materials, depending on seasonal productivity. Besides, a combination of natural rivers resulted in a cool and extremely rich ocean stream (the Peruvian or Humboldt Stream). Upwelling waters have made a huge number of fishes and mollusks constantly available to humans living along the Peruvian and Chilean Coast, especially from about 5,000 BP. Some archaeologists believe these were the basis of the Andean civilization (Dillehay 2000).

From a global perspective, Andean prehistory seems to have some constants, such as extreme internal cohesion among ethnic groups, strong interchange links, reciprocity, communal labor and sense, authority and vertical power, fixed traditions, deep beliefs, and a special commotion in front of natural events. These are key in assessing material culture in response to ancient Andean behaviors.

Definition

By convention, the prehistory of the Andes lasted from the very early peopling of this region at about 16,000 BP, until the arrival of the Spaniards at the beginning of the sixteenth century. From the start, early human settlers who entered the Andes inhabited a number of ecotones, from the Ocean Pacific shores of South America's western flank to above 4,000 m above sea level (masl), high in the Andes Mountains. Archaeologists believe that by that time, the Amazonian region bordering the Andes was also inhabited.

The development of different cultural complexes within the Andean region occurred under a scenario of changing environmental conditions. The initial population was coeval with the time span after the LGM that is marked by glacial advances and inversions, until the Younger Dryas (YD) event approximately 13,000 BP (León 2007). People were hunters, gatherers, fishers, and scavengers and lived in both camps and caves. From that time, some locations of the Central Andean region experienced a socioeconomic boom due to two key events. The first event was the premature invention of horticulture, especially based on squashes and likely a short time after the YD. Next, among other important plants, chilies (*Capsicum* sp), peanuts (*Arachis hypogaea*), and beans (*P. vulgaris, P. lunatus*) were domesticated from the time of the glacial-Holocene transition at 12,000 BP. The second key event (as a consequence) is that some groups became less mobile after the Early Holocene, and thus the sedentary process that finally led to the rise of Andean civilization was triggered (Bonavia 1991; Lavallée 1999; Dillehay 2000).

Socioeconomic developments within the Andes were not coeval. The rise of complex societies within this broad area seems to have occurred earlier, and originated in the Central region, especially from the coast of Ecuador and Northern–Central Peru.

The whole Central Andean development, founded on very early agriculture, camelid domestication, and quasi-permanent seafood resources, probably lead to internal social aggregation, differentiation and discrete hierarchies at around 6,000 BP. Emergent complex societies generated ritual paraphernalia and a "sacred world" that commanded a series of socioeconomic developments. Therefore, ornaments decorated with a typical Andean iconography were manufactured in response to the different gods that were worshipped.

The reorganization and establishment of the cool sea of the Peruvian stream region resulted in both a quasi-permanent and invariable climate and richness in seafood resources (including fish and mollusks) that complemented the horticulture already being practiced. This time span corresponds to the Maximum Holocene, when climate was warm and wet. Soon after

6,000 BP, people were able to build monuments devoted to ritual activities, probably linked to economic endeavors. Whereas pottery occurred in Peru around 4,600 BP, it dates to 7,000 BP in Ecuador. Monumental architecture experienced a singular emergence after that time. Archaeologists were able to identify at least three architectonical traditions. The first consisted of truncated platforms, stairways and ramps; the second displayed courtyards, rooms and a subterranean ventilation duct for fire offerings; and the last one was composed of a u-shaped building typical for the Central Coast of the Peruvian Andes.

"Periphery" regions to the Central Andes region underwent cultural changes to become complex societies somewhat later. However, the premature techniques discovered in some circumstances appear to be extremely early. For example, this is the case for the mummies of the Chinchorro culture located on the coast of Northern Chile and Southern Peru and dating to approximately 7,000 BP. Even within the Middle Holocene, people of this culture were able to recognize that organic remains were perfectly preserved when exposed to very dry conditions of the Atacama Desert. Non-central Andean societies also contributed with some key food resources, such as the potatoes, sweet potatoes or peanuts, that, once introduced among complex civilizations, became a key factor in their development. These are undoubtedly plants that were domesticated in the Oriental Andes or even in the Amazonian region and then introduced to the Andes.

Central Andean prehistory is one of the most attractive research issues, both to national and international archaeologists. This is not due to the former occurrence of the greatest empire of the southern hemisphere, by the Incas, but to the outstanding preservation of organic remains from the very earliest human presence in this region.

Some 3,500 years ago, the Andean landscape witnessed the rise of the first civilization known as Chavin; this name was chosen from the Chavin de Huantar site in the Central Highland of Peru. Some archaeologists consider this cultural occurrence as the very first Horizon, based on the spread of icons such as jaguars, condors and snakes, always altered and mixed with traits of human beings. This iconography is found from northern to southern Peru, covering more than 500 km, thus implying all regions within this radius were part of the Chavin Culture, i.e. First Horizon of the Central Andes. However, it must be kept in mind that almost all "Chavin traits" are not local, but rather imported. The Archaic or Late Preceramic public buildings addressed above came from both the Coast and Highland and are present in Chavin de Huantar. Also, some Amazonian animals such as caimans are key icons within the Chavin iconography. The probable pilgrimage into the cult center included paraphernalia and even inhalation of hallucinogens by priests. This time was based on religious beliefs in Chavin, and thus archaeologists propose that people were differentiated between the elite, composed of administrators and priests, and common people and servants.

The CE opening time span is coeval with the dissolution of the Chavin Cult and occurrence of a series of regional cultures on both the Coast and Highland regions of the Central Andes. At that time, experts consider that states were established and an "essor" of development of complex societies took place. It was also the time of magnificent development of art in a number of raw materials; from pottery to textiles to metals such as gold, silver and copper. In general terms, ornaments were conceived as representations of the ritualistic worship of the Andean god. Cultures of the Vicus, Mochica, Nasca, Recuay, and Cajamarca are representative of the time from 100 BCE to 600 CE. Sites display a series of forms from simple dwelling structures to ritual temples. One interesting difference is that northern buildings are usually huge and monumental, in contrast with the Southern Coast structures that are smaller.

The next period lasting from CE 600 to 1000 witnessed a new cultural fusion, again by means of a belief in a god. This god seems to be a human being, holding a trophy head in one hand and a (sacrificial) knife in the other. Its representation spread throughout the Central Andean region, similar to the Chavin cult. Archaeologists have labeled this time span as the Middle Horizon, or (by most experts) the Huari Empire. There are discrete differences when comparing the Huari

God with the one of the Tiahuanaco Culture (Bolivia), so there might have been some interaction between these two coeval cultures. The Huari Empire developed a complex road system that covered key places from the highest Andean mountains to the coastal shores facing the Pacific Ocean. These were further improved by the Inca Empire some millennium later. The Huari were also able to plan and construct actual orthogonal "cities," organized by administrative centers, public buildings, fortifications, ceremonial temples and even domestic villages. Lama caravans were also a dynamic means of communication and wares interchange with other populations across the Andes.

The internal atomization of the Huari Empire leads again to a regional independence and the reactivation of local societies, not only where former ones existed, but in a number of other localities. For instance, the Chimu Kingdom ruled over the Northern Coast of Peru and was able to build the Americas' biggest "city" of mud and also the most delicate and wonderful metal handcrafts of the Central Andes. At the same time, the Huanca culture inhabited the highest mountains in Central Peru at over 4,000 masl, dominating Andean resources and the side effects of high altitude living. Other cultures from that time achieved high quality in the manufacture of different wares and arts that in most cases were related to sacred purposes.

Finally, the Incas represent the crown of c. 14,000 Andean prehistoric development. According to historical sources, Imperial Inca development lasted only about 70 years. However, radiocarbon data seems to indicate that the Inca origins date back to at least the fourteenth century CE. Spreading from Cuzco, they reached quite far, from Colombia to Chile and Argentina along the Ocean Pacific shore, wherever the Andean mountain chain was present. The Incas based their culture on principals such as the royal panaca (elite family ties), and a dual system of conceptualizing the world. Their paraphernalia were simply expressions of an impressive power. They conquered a series of cultures inhabiting the Andes not only by means of force, but usually also by reciprocity and a smart system of interrelations. They also profited and improved the already implemented connection web throughout the Andes built by the Huari Empire, and introduced some Inca logos, such as the cross-like shape (Chacana) and the trapezoid window typical of the Inca occurrence.

Periphery history is somewhat dissimilar, but important to include here to complete a broad intercontinental panorama on the archaeologies of the Andes. In Northwest Argentina for example, most cultures are recognized by a dependence on agricultural crops such as maize and other tubers and grains, as well as household residential dwellings where people devoted time to economic activities such as agriculture and at times, ritual ceremonies (Leoni & Acuto 2008). Also, in western Ecuador, permanent settlements were established by 3500–3000 BCE with antecedents being low, mobile people from the Las Vegas Culture from 8500 to 4600 BCE (Raymond 2008). From the same country, phytoliths of squashes are dated to 10,000 BCE and maize to 6000 BCE. These, together with the Peruvian botanical remains, are very early evidence of Early to Middle Holocene plant domestication of the Central Andes. Further north in Colombia, a number of cultures also developed, but they are known in some cases by their stonework (e.g. the San Agustin culture with its lithic stellae), and mostly by their wonderful metal art, as in the Muisca, Calima, Tairona or Tumaco cultures.

The southern Altiplano area around the Titicaca Lake deserves special mention. After approximately 3000 BCE, people settled this high altitude region. Pukara and Kaluyu cultures are representative of the first millennium BCE. Archaeologists recognize the importance of the Tiahanaco culture at the end of that time span; it was actually a former state, based on religious beliefs that centered on a human-looking god who held a trophy head and a ceremonial knife in his hands. The Tiahuanaco people were recognized by their stone art and monuments. The Tiahuanaco center is an impressive center with massive stonework in the form of remarkable pyramids and platforms. Lama caravans for transporting goods are also uniquely typical for this culture. Multiproxy studies show that by that time, pilgrimage and immigration into and out of the center was quite frequent (Silverman & Isbell 2008).

Historical Background

The history of archaeological research in the Andes shares four similar and almost coeval periods (Politis & Alberti 2005). The first period goes back to the time after the Spanish arrival, when priests, administrators and other Spaniards gave accounts of the newly conquered territories and ancient heritage. The second period includes reports of the voyagers of the seventeenth and eighteenth centuries, within the context of both the illustration and romantic years ending with the new rising Andean nations. There is a third period when scientific research begins, approximately by the middle of the nineteenth century. In Colombia, for instance, the German Anthropologist Adolph Bastian made a exhaustive list of Colombian archaeological sites published in 1878; this was continued by Vicente Restrepo in 1898. In Ecuador, pioneers such as Jacinto Jijón, Caamano or Federico Gonzáles and Otto von Buchwald also reported the first archaeological studies at the end of the nineteenth century. In Peru, Mariano Eduardo de Rivero was able to make the first archaeological collection, and thus founded the National Museum. Later, Wilhlem Reiss and Adolph Stuebel conducted the first scientific excavations in Ancón by the late nineteenth century. A fourth and final period started around the start of the twentieth century, with scientific research in both field and labor. In Ecuador, for example, George Dorsell, Marsall Saville and Paul Rivet were remarkable during the first decades. One scholar who made a series of seminal contributions not only in Ecuador, but also in Peru and Chile, was the German Max Uhle. This is why some consider him as the father of Peruvian archaeology. Uhle excavated in the Pachacamac Sanctuary, near Lima, Peru, and proposed the very first archaeological sequence for Peruvian archaeology based on the stratigraphy of this sanctuary. Another relevant scholar was Julio Tello, who excavated a number of archaeological sites throughout Peru, thus providing quite important collections that now comprise the National Museum. Other scientific expeditions, especially from the US, conducted research in Peru, laying the groundwork for the next generations. A pivotal sequence was proposed, based on the team of the famous Viru Project in Northern Peru. The sixties witnessed the emergence of interdisciplinary research that opened a new age, allowing important issues, from botanical to palaeoenvironmental in nature, to be addressed. Up to 2012, there are regular projects that include this type of approach and invite not only Andean, but also international archaeologists to contribute to our knowledge of Andean archaeology.

Key Issues/Current Debates

The Andean archaeology of the twenty-first century especially incorporates international debates on inclusive archaeology, gender anthropology, expedient/complex technologies, paleoenvironmental (i.e. past climate change impact on ancient Andean civilizations), effects of archaeometrical contributions, radiocarbon corrections, Andean household archaeology, *chaine operatoire* approaches, and external problems such as public archaeology. All these topics are debated and included in Andean archaeology to improve our knowledge of this subject.

International Perspectives

Andean archaeology contains issues attractive to international research teams. One such issue is the wonderful and almost perfect conservation of organic remains in the Atacama Desert that make possible high resolution reconstructions in different perspectives. Good tissue preservations are also ideal for mummy conservation. The sea as a food provider for ancient people is also quite an interesting issue, especially because of the richness of its waters.

Future Directions

Research on Andean archaeology is a suitable and promising issue in every nation of the Andes, and national and international archaeologists have conducted it (Lane 2012).

It provides not only a partial portion of the history of almost half of the countries in South America, but also a sense of integration, because of the general homogeneity of ancient cultures of the Andes. A good example is the Inca road that links literally the whole Andes. The Inca road system was conceived and constructed over the whole Andean territory for the purpose of communication and ware transport, and is being seen as the main link among modern Andean countries.

On the other side, governments also see the history of the ancient cultures of the Andes as a common denominator for integration. Andean countries share a similar past, and so have an experience of permanent interchange from the earliest times.

Andean archaeology should also see an opening for applying new theoretical frames by relating, for example, the past roles of women, minorities, domestic activities, and landscape archaeology. Every nation has its challenges in this task.

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Caral: The Sacred City
- ▶ Guinea Pig: Domestication
- ▶ Inca State and Empire Formation
- ▶ Machu Picchu: Geography and Culture
- ▶ Maize: Origins and Development
- ▶ Nasca and Pampa Jumana Lines and Geoglyphs
- ▶ Paleoindians
- ▶ Peopling of the Americas
- ▶ South America: Lithic Industries

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Andron

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Introduction

Andron (plural, *androns*) is the name given by modern scholars to rooms excavated at sites from ancient Greece that combine a number of distinctive architectural features. These include a near-square layout with walls approximately 4.5 or 6.5 m in length; an offset doorway; a raised border platform; a central depression floored with plain or colored cement or plaster, or inlaid with pebbles or tiled mosaic; channels or guttering for drainage; and colored plastered walls (Nevett 2010: 47). Archaeological analyses place basic forms of these rooms at sanctuaries during the Archaic period, for example, at Perachora's Heraion and the sanctuary of Apollo Delios on Paros (Bergquist 1990: 38). Later, while continuing to appear at ritual-civic sites, the increasingly elaborate *andron* became commonplace, if not standard, in Classical and Hellenistic houses. Olynthus provides the majority of evidence for the domestic *andron* in the late fifth and fourth centuries BCE, where it has been identified in a third of the excavated houses (see Cahill 2002: 74-146). While the record for smaller domestic units at Delos and in the rural demes of Attica

further emphasizes that the *andron* was non-pervasive and was possibly absent from the majority of households (Trümper 2005: 119; Nevett 2005: 88, 93), the room does appear at Greek settlements across the Mediterranean (Nevett 1999: 80-126, 127, 138, 142, 153). However, sometimes the designation "*andron*" may be debatable. Thus, at the Hellenistic House of the Ptolemaic Coins in New Halos, the raised platform can be indicative of a storage area in the absence of other markers (Haagsma 2003: 68). Then again, distinctive architectural features were dispensable. While a number of houses at Delos contain ornate rooms with mosaic floors and elevated platforms, few of these "*androne*s" are quadrangular and none possess an offset door (Trümper 2007: 330).

Definition

The word *andron* means literally a space belonging to men. Earliest literary attestations from the fifth century BCE make it a generic "men's quarters" and a place for hospitality, including convivial gatherings that display features of the *symposion* (e.g., Aeschylus, *Agamemnon* 244; *Libations Bearers* 712). Of the architecturally distinctive room, the elaborate furnishing, extravagant decoration, and raised platform to accommodate couches, along with the provision of stepped floors and gullies to facilitate cleaning, correspond to this specific usage. However, domestic space was flexible. The *andron*, like other rooms in the Greek house, may have been occupied differently during the day, across seasons, and between owners. Daytime activity is implied, for example, by additional architectural elements. At House II in Eretria (c.400 BCE), upper columns break up an interior *andron* wall. Like external windows, this feature would maximize light and encourage circulation of air (Reber 2007: 284). As drinking was ideally staged in the evening (and those like the younger Alcibiades who reputedly reveled by day were censured for it: Lysias 14.25), this setup would most benefit daytime users engaged in other household occupations. More broadly, the *andron* may have provided a general living area when winter weather made the courtyard uninhabitable, as suggested by Rider (1965: 249) for Hellenistic Delos. Specific finds can also suggest changing usage over time. Thus, the presence of terracotta statues and the selection of tableware in the *andron* of the House of the Comedian at Olynthus leads Cahill (2002: 140-1) to propose that the sympotic room acquired ritual functions during its lifetime, although dual usage is another possibility.

Unfortunately, finds from *androne*s are frequently sparse and inconclusive, with the result that it is often difficult to establish what activities may have taken place on the basis of artifactual evidence. At Olynthus, even sympotic furniture and paraphernalia are rare. However, the best bet for an *andron* in the House of Zoilos did yield a loom weight, an item prevalent in other parts of the house (Cahill 2002: 135). The whole ground floor may have been appropriated for household industry (cf. Nevett, 1999: 71). Then again, in the front room of House AII.6 at Leucas in Acarnania, a large room decorated with painted plaster and boasting a window, a wide range of material was excavated. The presence of cooking ware, storage vessels, and fine pottery suggests that this likely *andron* space was harnessed for the production and storage of food and drink, as well as their consumption. Worktools – chisels, fishhooks, flint instruments, and an axe – were also kept in the room (Fiedler 2005: 107-10). Certainly, to return to hospitality, opportunities for dining beyond the symposion *sensu stricto* might also arise during festivals and on a daily basis. So, when Theban rebels arrive at the home of the governor they plan to assassinate, in Xenophon's *Hellenica* (5.4.7), they find him reclining on a couch with his wife seated by his side after dinner. Presumably, on the basis of this detail, they are in the *andron* (cf. Blazeby 2011: 89 for other convivial occasions involving female family members at home). Wider usage of the *andron* by other members of the household, and not just its menfolk at the symposion, is plausible.

Key Issues and Current Debates

As the place where visitors were accommodated within the house, and as space defined by its male

occupants, the domestic *andron* offers special insights into the relationships between *oikos* and *polis* and between the genders. Nevett's (1999) careful study of the Olynthian record shows that here the *andron* was frequently situated near the entrance to the house, approached through the court, and sometimes through an antechamber (the pattern is replicated at some near-contemporary sites, e.g., at Athens, 1999: 90-1; Thasos, 1999: 93-4; and Halieis, 1999: 98-101). These areas might also be decorated with "coloured plaster walls, terracottas and metal ornaments" (Nevett 1999: 70), effectively marking them as a suite and setting them apart from the remainder of the house. Through their adornment, the *andron* and the areas by which it was accessed made a statement to invited guests of the householder's "social prestige" (Jameson 1990: 189), or such decoration might be a marker of "social distinction" (see Westgate 1997-98: 106). The domestic *andron* may be an indicator of broadening sympotic activity from élite circles to the moderately wealthy, but it still conveys the affluence of the household to visitors. The addition of windows on the exterior walls, however high up, might have carried this message out into the city, at every noise- and scent-filled celebration (Tsakirgis 2010: 576).

If the *andron* communicated ideas about the wealth and prestige of the household to guests, it also provided a separate and enclosed space which kept those visitors focused inwards and away from the rest of the house. For the *symposion*, this enhanced the psychological effects of being together, hot-housing the sensory pleasures of drinking wine, inhaling incense, listening to and making music, conversing and laughing, and sexual desire. For the men who gathered together in the *andron*, relationships might be negotiated through shared endeavor and consolidated via a heightened atmosphere of merriment (*euphrosyne*) and fellow-feeling (*philophrosyne*), the qualities envisaged by sympotic poets Solon of Athens (26 W) and Ion of Chios (27 W) and manifest in parties painted on pottery like the red-figure bell-krater now at Port Sunlight (Lady Lever Art Gallery 5037: see Robertson 1987: 37-8, 96). Produced at Athens in the early fourth century, at the very time *andrones* were becoming visible in the domestic record, this mixing vessel depicts tightly packed, garlanded young men reclining on couches, their heads thrown back in song, as a young boy beats the tympanum and a woman dances (or plays an *aulos*: the instrument is visible below the paint but omitted from the final composition). Presented within the confines of the body of the krater, the scene encapsulates the spirit of camaraderie and shared pleasures encountered within the enclosed space of the *andron*.

Because the men joining in the symposion might be friends or relatives or associates or co-members of a religious organization, the *andron* offers a bridge between the "private" *oikos* and the "public" sphere, as "insiders" and "outsiders" mix within its walls. Furthermore, drinking companions might be fellow citizens or political sympathizers. Connecting the rise in domestic *andrones* in particular to democratic practice and ideology, Ault (2000: 486-8) even suggests that "the domestic *andron* brought the political sphere into the domestic realm and provided a space for small groups of citizens to gather for discussion outside the public assembly, lawcourt, or *agora*" (see also Nevett 2010: 62). For *andrones* outside the domestic record, in civic-ritual sanctuaries from the Archaic period onwards, the dynamic might be reversed, as individuals confirm their social and political relationships and continue their conversations under the rubric of public celebration (Schmitt Pantel 1992). The *andron* thus not only bridges but muddies the relationship between "public" and "private" and in the process sheds light on the dynamics of the Greek city. Social bonds established there between friends might be simultaneously between colleagues in political enterprise, whether symposiasts are citizens dedicated to democratic endeavor or orchestrators of dissent.

While fostering unity among participants in the symposion, the *andron* also articulates a gender divide. This divide was both physical and ideological. Certainly, the room may have been used by different members of the

household for a variety of purposes, possibly including weaving by women in the House of Zoilos (see above). Figured pottery like the Port Sunlight krater also shows women present at the *symposion*. However, such women were hired musicians or dancers, or they were *hetairai*, "female companions" who were sexually available (the two groups need not be mutually exclusive). As the fourth-century lawcourt case involving Neaera shows, a woman attending a drinking party could be branded a *hetaira* and find her status as a wife attacked ([Demosthenes] 59). In Athenian public discourse, female relatives should not be present in the *andron* during the *symposion*. By closing off the space to women in the family at certain moments, their contact with male incomers was controlled and gender relations were prescribed. To Antonaccio (2000: 532), the *gunaikonitis* "was a space where women could retreat when male visitors were present." By default, its male equivalent, the *andron* – or *andronitis* – becomes an exclusively male preserve, a space for men to occupy in the absence of women from the house. This was not a permanent segregation of the sexes, however, but a temporary impermeable division arising from social convention. The *andron* was both a space and an idea.

Cross-References

- ▶ Agora in the Greek World
- ▶ Polis
- ▶ Religion, Greek, Archaeology of
- ▶ Symposion

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Angel, John Lawrence

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Basic Biographical Information

J. Lawrence Angel was born on March 21, 1915, in London, England. His father, John W. Angel, was a British sculptor and his mother, Elizabeth Day Seymour, was an American classicist originating from Connecticut, USA. Angel moved to the United States with his family at the age of 13 and enrolled in the Choate School in Wallingford, Connecticut. In 1932, he entered Harvard where he obtained his A.B. (Artium Baccalaureautus) in 1936 and his Ph.D. in anthropology in 1942. In 1937, Angel married Margaret (Peggy) Seymour Richardson, his wife of 49 years and an invaluable professional as well as personal partner.

His most influential mentors at Harvard were Clyde Kluckhohn (social anthropologist), Carleton S. Coon (physical anthropologist), and Earnest A. Hooton (physical anthropologist). As an undergraduate student, he participated in archaeological fieldwork in New Mexico, Arizona, and Georgia. His first data collection and fieldwork trip to Greece and the Eastern Mediterranean occurred between 1937 and 1939, mainly under the auspices of the American School of Classical Studies at Athens and Harvard University, followed by ten more field trips in the Near East, focusing on Greece, Cyprus, and Turkey (1949, 1954, 1957, 1965, 1967, 1969, 1972, 1975, 1977, 1978).

Angel taught at the University of California at Berkeley (1941–1942), at the University of Minnesota (1942–1943), and at the Daniel Baugh Institute of Anatomy of the Jefferson Medical College in Philadelphia (1943–1962). He was a research associate at the University Museum of the University of Pennsylvania (1946–1962) and a civil consultant in surgical anatomy at the U.S. Naval Hospital in Philadelphia (1957–1962). In 1962, Angel succeeded T. Dale Stewart as the Curator of Physical Anthropology at the Smithsonian Institution, National Museum of Natural History, in Washington D.C., a position he held until his death. Additionally, he was an adjunct professor at George Washington University (1962–1986) and a visiting professor of anatomy at Howard University Medical School (1965–1970).

After joining the Smithsonian, Angel also became actively involved in forensic anthropology and served as a consultant for the Federal Bureau of Investigation (FBI), the US Armed forces, and other law enforcement agencies. He joined the American Academy of Forensic Sciences (AAFS) in 1975; he became a Diplomate of the American Board of Forensic Anthropology in 1978 and served as president (1980–1985). He also taught forensic pathology at John Hopkins School of Public Health (1963–1986).

He served as secretary-treasurer (1952–1956) and as vice president (1959–1960) of the American Association of Physical Anthropologists (AAPA). He was president of the Philadelphia Anthropological Society (1946–1948), the Philadelphia Society of the Archaeological Institute of America (1949–1950), and the Anthropological Society of Washington (1974–1975). He also performed associate editor roles for the *American Anthropologist* (1946–1948), the *American Journal of Physical Anthropology* (1951–1954, 1960–1963), and *Clinical Orthopaedics* (1954–1970).

Angel died at the age of 71 at the George Washington University Hospital on November 3, 1986.

Major Accomplishments

Angel's work shows a remarkable scholarly breadth encompassing human anatomy and osteology, dental anthropology, paleopathology, paleodemography, paleoecology, longevity and biological aging, obesity, stress indicators, behavioral reconstruction, biological distance and genetic mixture, and forensic anthropology. Among these, health and disease as selective micro-evolutionary processes held a central place in his research. His enduring research interest in Greece and the Eastern Mediterranean developed early on in his career, where he literally founded the fields of physical anthropology and paleopathology.

His early work, influenced by Hooton, was typological and emphasized craniometry, as represented in his dissertation aimed at reconstructing the complex interplay of biology, culture, and the environment in the Greek world. In doing so, Angel introduced a highly contextualized approach that he termed *social biology* (Angel 1946). Throughout his career, he promoted problem-oriented, interdisciplinary anthropological research, methodological and theoretical rigor, and new methodologies, thus setting the stage for the more recently developed field of bioarchaeology.

Angel's research on hemolytic anemias and particularly on the history of thalassemia in the Eastern Mediterranean has been a landmark in paleopathology. He coined the term *porotic hyperostosis* (Angel 1966a, 1967), now widely accepted. Angel attributed *porotic* hyperostosis to thalassemia or sicklemia in the Eastern Mediterranean favoring the former due to its endemicity in that part of the world. Based on the classification of these two genetic anemias as balanced polymorphisms maintained by the heterozygote advantage against malaria, he linked the occurrence of porotic hyperostosis in the Eastern Mediterranean to malaria, particularly *falciparum* malaria. In this regard, he developed a thoroughly ecological and regional approach to population health and disease (Angel 1971, 1975), culminated in his monograph on *The People of Lerna*.

Angel was particularly interested in paleodemographic parameters such as longevity, fecundity, and differential fertility. One of his major contributions has been his influential critique of the use of life tables from archaeological skeletal samples, emphasizing the difference between cemetery samples and living populations (Angel 1969). Angel was also a pioneer in the reconstruction of past human behavior and lifestyle through skeletal markers. The identification of the commonly observed elbow osteoarthritis in the Pre-Columbian human remains from Tranquillity (California) with spear-throwing described as "atlatl elbow" was highly influential, especially in linking osteoarthritis to a specific activity (Angel 1966b). His contextualized approach to behavioral reconstruction was further established in his work on the life stresses of slavery for the African American ironworkers at the Catoctin Furnace Cemetery with J. O. Kelley during the last decade of his life.

Angel received the Pomerance Medal of the Archaeological Institute of America (1983), the Physical Anthropology Section award of the AAFS (1984, 1986), and the Distinguished Service Medal of the American Anthropological Association (AAA) (1986). The AAPA organized and published a symposium in his honor (1979). Posthumously (1987), a memorial session was held at the AAA annual meeting, followed by an edited volume (Buikstra 1990). Since 1992, the Wiener Laboratory of the American School of Classical Studies at Athens has regularly awarded the J. Lawrence Angel Fellowship in human skeletal studies.

Cross-References

- ▶ Ancestry Assessment
- ▶ Archaeology: Definition
- ▶ Bioarchaeology: Definition
- ▶ Bone, Trauma in

- ▶ Dental Anthropology
- ▶ Osteology: Definition
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Pathological Conditions and Anomalies in Forensic Contexts
- ▶ Skeletal Biology: Definition

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Animal Domestication and Pastoralism: Socio-Environmental Contexts

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Introduction

The domestication of herding animals and the development of pastoralist societies have played a key role in human economic, ecological, and social history (Dyson-Hudson & Dyson-Hudson 1980). Pastoralism supports substantial human populations in Eurasia, Africa, and South America, and both pastoralists and other farmers still rely predominantly on the few animal species that were domesticated in the early to mid-Holocene. Understanding changing human-animal relations with domestication and the development of pastoralism provides insights into the biodiversity of the animals on which contemporary pastoralists rely, the history of milk-drinking, and the coevolution of humans and domestic animals. Archaeology provides broad perspectives on pastoral societies as complex and flexible social constructs, forms of risk management, and as resilient systems evolved over millennia to help people to cope with aridity, climatic changes, and environmental extremes.

Definition

Conceptual Framework

Collaboration among archaeologists, ecologists, and molecular biologists has resulted in the development of a new conceptual framework for understanding the emergence and multiple dimensions of pastoralism. Pastoralism is defined here as a social and economic system in which people

move domestic animals to pasture and rely on spatial mobility for survival (Dyson-Hudson & Dyson-Hudson 1980; Wendrich & Barnard 2008). Pastoralists also emphasize the social and symbolic role of domestic animals (Marshall & Weissbrod 2011). They thrive in environments where climate and topography constrain agricultural production such as deserts, semiarid plains, mountains, and tundra. Although pastoralists often complement their livestock-based economy with other productive tasks such as cultivation, exchange, trade, fishing, hunting, and gathering, the needs of their herds override other considerations. People's roles as herders and pastoralists are also fundamental to the construction of individual and group identities in pastoral societies. Pastoralism in this sense is more than an economic activity and includes ecological, social, political, and ideological dimensions.

Pastoralists depend on a range of herd animals including sheep (*Ovis aries*), goats (*Capra hircus*), taurine cattle (*Bos taurus*), humped cattle (*Bos indicus*), horses (*Equus caballus*), donkeys (*Equus asinus*), llamas (*Lama glama*), alpacas (*Vicugna pacos*), dromedaries (*Camelus dromedarius*), Bactrian camels (*Camelus bactrianus*), yaks (*Bos grunniens*), or reindeer (*Rangifer tarandus*) that were domesticated between 12,000 and 4,000 years ago. Many of them were domesticated multiple times, and the circumstances in which different taxa were domesticated vary widely. Animal domestication is seen here as a microevolutionary process resulting from long-term coevolutionary relations between people and animals in humanly modified habitats (Zeder 2011). Microevolution in anthropogenic habitats and management of animals lead to selection away from wild genotypes and phenotypes. The degree to which people and animals depended on each other varied greatly. Animal domestication was a slow process, and long-term gene flow often continued between wild and domestic populations.

Animals provide food including meat, milk, blood, and raw materials such as dung, hides, or wool and can also be used for transport and traction. Pastoral families generally employ herding animals with diverse feeding strategies and uses. Pastoral herd sizes range from a few animals to many thousands depending on factors such as wealth, access to labor and land, climate, and disease, as well as political conditions. Herders move animals to grazing, water and salt, guard them from predators and rustlers and monitor their health. Settlements are sited in locations well suited for the needs of domestic stock and revisited over time. Landscape management and cycles of mobility facilitate access to pasture and water, but depend on factors such as seasonality, climate, and local flora, as well as enforcement of institutionalized property rights to pastures. Individuals or whole households move with herds at time scales that range from a few days to seasonal, yearly, decadal, and even centennial intervals, depending on environmental and social factors (Wendrich & Barnard 2008).

Most pastoral societies are characterized by social systems that emphasize rights to diverse terrain, through kin relationships and lineages, clans, or age sets. Families make their own herding decisions, however, and often have considerable autonomy. It has been argued, therefore, that mobility and pastoral subsistence systems lend themselves to the development of complex but relatively egalitarian social systems. However, polygamy is common in pastoral societies in Africa and Asia, and in many regions today, older men wield much of the power. Furthermore, highly stratified pastoral societies have existed in most continents through time. Central Asia is especially well known for ancient pastoral empires (Frachetti 2012), and raiding and warfare have been commonly associated with pastoral societies.

Historical Background

There have been long-term debates in anthropology over the role of mobility in society, domestication, and timing of the development of pastoral societies. One of the big questions has been whether hunter-gatherers domesticated animals or whether pastoral societies developed after settled plant-cultivating communities. In the nineteenth century it was thought that nomadism

preceded settled agricultural villages, but as a result of Darwin's evolutionary research, he and other scholars began to focus on the role of genetic isolation in domestication and to argue that animals were more likely to have been domesticated by settled village-based cultivators than mobile foragers. Despite the long-term success and resilience of pastoralism, western popular culture retains biases against mobile herding ways of life, which can be traced to the difficulty that ancient states faced in controlling mobile peoples, nineteenth-century cultural evolutionism, and historical notions of mobile hunter-gatherers or pastoralists as "primitive." Current anthropological perspectives strongly refute this argument and see the sustainability of pastoral ways of life as one of the long-term success stories of the ancient and modern worlds.

In a different historical twist, scholars studying early cities in Mesopotamia argued that pastoralism developed relatively late as a specialized economic system in response to the establishment of settled urban communities, irrigation systems, and exchange networks in the region. It was proposed that pastoral mobility developed as farmers occupied the best soils and relegated pastoralists to the margins of agricultural areas (Lees & Bates 1974). In the Zagros, however, there has always been an argument for early independent development of pastoral systems (Abdi 2003). The nature of pastoral subsistence has also been much discussed. There are ongoing debates regarding the Secondary Products Revolution or the idea that people's use of animals for milk, hair, and traction was not part of the initial motivation for domestication but led, instead, to elaboration of herding systems and the spread of pastoralists into Europe (Sherratt 1983). There are also discussions regarding independent incidences of animal domestication and development of pastoral ways of life vis-à-vis demic diffusion from discrete points of origin.

Key Issues/Current Debates

Identifying Domestication

Archaeological research on animal domestication relies on information from animal bones discarded at archaeological sites and contextual analyses of faunal remains, spatial organization, architecture, and artifacts found on sites. Size decrease has long been the most widely used marker of animal domestication, but it has become increasingly clear that there is a significant time lag after management before size changes are manifested (Marshall & Weissbrod 2011; Zeder 2011). More sensitive indicators include change in species frequencies, animal age and sex profiles, and pathologies indicating animal use or penning, as well as distribution of animals outside their wild range. Lenses of animal dung resulting from corralling or organic residues indicating milking are also increasingly used to identify early phases of domestication (Outram et al. 2009; Dunne et al. 2012). Genetic studies of extant species and ancient bones are playing a major role in helping to codify the phylogenetic relationships of purported ancestors and domesticates as well helping to ascertain the location, timing, and number of domestication processes involved.

Domestication and Pastoralism: Regional Variability

The histories of domestication reviewed here and incorporation of sheep, goat, and taurine cattle into pastoral societies around the world provide important insights into the development of diverse pastoral trajectories and their relationships with domestication processes.

The Near East

Sheep and Goats Archaeological and genetic data suggest that sheep and goats were domesticated multiple times by hunter-gatherers living in settled village communities in the higher elevation headwaters of the Tigris and Euphrates rivers (Zeder 2011). The wild bezoar (*Capra aegagus*) was the earliest of the herd animals to be domesticated. Goat herds were managed 11,000–10,000 years ago during drier conditions. By 9,500 years they were herded at lower elevations outside of their wild range. Genetic data also document at least six maternal lineages of domestic goats and suggest that herders moved them around the Fertile Crescent. Attempts to manage wild herds of Asiatic mouflon (*Ovis orientalis*) also occurred

11,000 thousand years ago. Culling of young male sheep suggests herd management and domestication in eastern Anatolia and the northwestern Zagros 10,300–9,500 years ago.

Herders relied for a long period on a combination of free-living, managed, and fully domesticated sheep and goats. As a result of long-term gene flow among these populations and variable levels of animal management and herding success, domestication was slow and erratic. Scholars have argued that pastoralism developed out of specialized hunting in mountainous regions (Abdi 2003). However, most excavations have explored settled village sites. The extent to which sheep or goat herding was seasonally specialized or undertaken by pastoral subgroups has not been fully examined. This may be remedied by new isotopic approaches to detecting mobility. The high mountains of Iran and Iraq remain relatively little explored from a pastoral perspective, and smaller open sites that might have been created by early pastoralists have not been systematically investigated. The earliest well-documented evidence for nomadic pastoralism in the Zagros Mountains dates to 9000–4000 BP.

Cattle Domestication of taurine cattle (*Bos taurus*) added a key third animal species to the caprine duo relied on by early herders. Aurochs (*Bos primigenius*) are now extinct, but were domesticated 10,500 to 10,000 years ago by settled farmers in the Middle Euphrates and high Tigris valleys of the Near East (Zeder 2011). Unlike caprines, taurine cattle were domesticated only once. Recent genetic research suggests that relatively few female cattle were ever domesticated and that people from just a few villages might have been involved (Bollongino et al. 2012). Cattle herding spread into western Turkey and southeastern Europe. Lipid residues in ceramic pots date as early as 9,000–6,000 years ago and the genetics of human lactase persistence suggest that milk had an important impact on survival (Gallego Romero et al. 2012).

Development and Spread A mosaic of farming, hunter-gatherer, and pastoral communities lived in the Levant during the PPNB. Pastoral nomadism, it is argued, originated in the Syrian Desert and diffused south (Arikan 2012). In the Negev herders also hunted. In a different pattern, pastoralists living in the increasingly arid environment of Chalcolithic Jordan adopted extensive nomadic pastoral strategies with seasonal cultivation. Land use models suggest this was the most sustainable way to minimize impacts and increase biodiversity in this low rainfall area.

To the west, domesticated cattle, sheep, and goats and annual crops were progressively incorporated into the European Neolithic beginning 8,000 years ago. Mixed farming, herding, and milking are strongly associated with demic diffusion. Specialized pastoralism such as that practiced in the Alps and other mountainous regions of central Europe probably began as recently as 4,000 years ago during the Bronze Age. The specialized management and domestication of reindeer occurred approximately 2,000 years ago and independently in northern Scandinavia and central northern Russia.

South Asia

Cattle, Goats, and Sheep In South Asia there is a different trajectory toward pastoralism than in Western Asia, with domestication of wild South Asian cattle (*Bos namadicus*) in the Indo-Iranian borderlands (Meadow 1996). Just as in Western Asia, little is known about smaller sites, and the bulk of the evidence comes from settled villages. Genetic data suggest that humped zebu cattle (*Bos indicus*) were domesticated in the Indus and perhaps northern India. During the eighth millennium BCE, farmers in Baluchistan cultivated wheat and barley, kept goats, and hunted wild cattle and sheep (Meadow 1996; Fuller 2006). Cattle domestication is documented 7,000 years ago by age profiles and size decreases indicative of management. Herders subsequently spread zebu cattle west across the Iranian plateau. In south India, ash-mound sites document the development of specialized pastoralism between 6,000 and 4,500 years ago and possibly preceding cultivation in the region. Four thousand years ago pastoral systems of the Indian subcontinent incorporated transport animals from other regions

including donkeys, horses, and Bactrian camels to create resilient pastoral systems in arid portions of Southern Asia. Lactase persistence in parts of South Asia attests to the significance of the history of milk-drinking among herding populations (Gallego Romero et al. 2012).

Central Asia

Horses, Bactrian camels, and yaks were domesticated in Central Asia, and these transport and multipurpose animals provided the basis for pastoral systems variously adapted to steppes, deserts, mountains, and high-altitude plateau regions from the Black Sea to China.

Horses Domestication of horses influenced the development of pastoral systems of the Central Asian Bronze Age and transformed scales of mobility and flows of information across Central Asia. Evidence from settlements in northern Kazakhstan, especially the site of Botai, suggests that settled hunters used domestic horses 5,500 years ago to hunt wild horses (*Equus ferus*). Geoarchaeological evidence of corals, bit wear on horse teeth, milk residues, and size decrease, demonstrate domestication (Outram et al. 2009). Initial domestication likely took place elsewhere. Genetic data document multiple maternal horse lineages across Central Asia and suggest gene flow over the long term among wild and domestic populations.

The introduction of domesticates from Western Asia enhanced horse-based pastoralism and triggered later Middle Bronze Age (4,500–3,500 years ago) forms of nomadic pastoralism that incorporated Western Asian cattle and sheep. Horses were used for meat, skins, milk, and transport; associated with the sun god; and used in ritual sacrifice. A recent hypothesis suggests that pastoralism and herding animals could have spread from west to east through the inner-Asian mountain corridor instead of the steppes (Frachetti 2012). Nomadic pastoralists in Mongolia, 2,500 years ago, relied on diverse subsistence strategies including horses, domestic caprines, cattle, hunting, and cultivation (Wright et al. 2009). Furthermore, organized landscapes reflect long-term revisiting of sites best suited for pastoral settlement. In areas such as northern Mongolia, there is also evidence for trade, hierarchy, and semipermanent pastoral habitation.

Bactrian Camels The domestication of two-humped Bactrian camels transformed people's ability to live in the cold deserts of Central Asia and opened up desert trade routes. Bactrian camels are thought to have been first domesticated between China and Mongolia. There is little osteological information, however, on the social context, place, and timing of domestication. Ancient DNA from Iron Age sites and the lack of geographic variability among modern domestic camels from China and Mongolia have led scholars to suggest a single center of domestication. Genetic research has demonstrated, though, that endangered wild Bactrian camel populations are not the ancestor of the domestic two-humped camel. On the basis of early distribution outside their wild range, archaeologists suggest that Bactrian camels were domesticated 6,000–4,000 years ago (Peters & von den Driesch 1997). After domestication the range of domestic Bactrians expanded west to Turkmenistan where clay figures of Bactrian camels pulling carts date to the early third millennium BCE (Meadow 1996). In South Asia two-humped Bactrian camels appear in the late third millennium BC, probably through northern Afghanistan, whereas in northwest China camel bones date to about 3,000 years ago.

Yaks Yaks were domesticated by hunters of the Tibetan borderlands (Rhode et al. 2007). Genetic studies document the presence of two maternal lineages of domestic yaks suggesting two domestication events or gene flow. Yak dung has played an important role as fuel on the Tibetan plateau, and it has been argued that this may have been a motivating factor in domestication. Yaks were used for milk, hair, meat, and as pack animals. They are also spiritually important in the region. Yak-based pastoralism has played an important role in the settlement of the high-altitude regions of Central Asia and the development of trade and interconnections among valleys, plateaus, and

mountain ranges of the region. Yaks were adopted by both herders and mixed farmers from the Himalayas to the Kunlun Mountains and through the Gobi to Mongolia and Siberia.

Arabian Peninsula

Domestication of dromedaries allowed people to survive over the long term as pastoralists and traders in the arid deserts of the Arabian Peninsula and Africa. Recent research indicates that the extinct giant camel *Camelus thomasi* was the wild ancestor of the dromedary or Arabian camel. Large numbers of camel hunting sites on the eastern coast of the Arabian Peninsula suggest that dromedaries were domesticated there 6,000–4,000 years ago (von den Driesch & Obermaier 2007). Pastoralists of this region came to rely heavily on camels for milk and as a result have high frequencies of lactase persistence today. With domestication the ancient range of the dromedary expanded along trade routes to Iran and South Asia. Camels date to 2,000 years ago in Africa and became an increasingly important part of subsistence and trade as deserts expanded. Pastoral societies of the Horn have been shaped by their reliance on camels for milk, meat, and blood. Saharan camel trains are depicted in rock art and associated with the development of specialized gold and salt trade routes. In the Arabian Peninsula and Sahara, camel-based pastoral groups played a role in the development of complex polities.

Africa

Pastoralism was the earliest form of food production on the continent and allowed Africans to cope with the mid-Holocene expansion of the Sahara (Gifford-Gonzalez & Hanotte 2011). Microsatellite and paternal genetic data, and the timing of the appearance of cattle before sheep and goats, suggest that settled hunter-gatherers may have domesticated African cattle in the eastern Sahara (Marshall & Weissbrod 2011). It is also likely that incoming taurine cattle from Asia were interbred with local wild cattle. A thousand years later Near Eastern domestic sheep and goats were integrated into mobile herding, hunting, and gathering systems that spread across Saharan grasslands. These herders also domesticated a desert-adapted animal, the African wild ass (*Equus africanus*). Genetic data documents high diversity in African donkeys and two maternal haplogroups suggesting two African populations played a role in domestication. Cattle, donkeys, sheep, and goat complement each other, increasing resilience by providing herders with animals that have dissimilar lifecycles, feeding habits, and disease susceptibilities. Lipid residues in ancient pots from southern Libya demonstrate that herders were relying on cattle for milk as they moved west from the central Sahara by 7,000 years ago. Milk fats from a range of plants also indicate a seasonal pastoral system in the Acacus, with herders moving between the mountains and the plains (Dunne et al. 2012). As the African humid phase ended, hyperarid conditions developed in the Sahara 6,000 years ago. Herders moved more frequently and relied more on sheep and goats. Monumental cattle burials appear at this time, and abundant pastoral rock art testifies to ritualization of cattle.

Pastoralists ultimately abandoned the Sahara, migrating to the Nile Valley and Sahel. Herders with generalized domestic and wild subsistence bases also moved as far south as East Africa 5,000 years ago. In Southwest Kenya specialized pastoralists relied on domestic stock without hunting abundant large mammals approximately 3,500 years ago. It has been argued that this subsistence choice reflected pastoral identity as people who eat cattle, rather than wild meat (Marshall & Weissbrod 2011). Pearl millet was domesticated 4,000 years ago in West Africa by pastoralists who settled in the Sahel. After this time, seasonal cultivation became part of the repertoire of many pastoralists. Disease threats affected the spread of pastoralism in Africa, but trypanosomiasis-resistant cattle breeds attest to the adaptation of African cattle to the wetter tsetse belt of West Africa (Gifford-Gonzalez & Hanotte 2011).

South America

Pastoralism developed in the Andes between 6,000 and 4,000 years ago with the domestication of llamas and alpacas and the development of

distinctive pastoralist societies (Mengoni-Goñalons 2008). Genetic research has demonstrated that the guanaco (*Lama guanicoe*) is the wild ancestor of the llama and the vicuña (*Vicugna vicugna*) the wild ancestor of the alpaca. Considerable hybridization has also been documented (Wheeler et al. 2006). Recent research suggests that camelid pastoralism developed to buffer against the climatic and environmental unpredictability that characterized the Andean highlands throughout the Holocene. Domestication of Andean camelids now appears a more diverse and dynamic process than previously thought. Growing evidence from southern Peru, northern Chile, northwestern Argentina, and western Bolivia suggests multiple simultaneous instances of domestication outside the Peruvian central highlands. Long archaeological sequences from widespread highland sites document specialized hunting of wild camelids between 10,000 and 6,000 years ago, followed by a period of intensive management and the eventual formation of distinctive herding communities 5,000–3,500 years ago. There is evidence for long-term herding in the highlands and the introduction of domestic camelids to the coast, eastern, and northern Andes as early as 4,500 years ago.

In the Andes, pastoralism was complemented by other subsistence strategies as it developed, and these varied with environmental and social settings. In the Bolivian central Altiplano, Wankarani pastoralists employed camelids in a diverse subsistence strategy that included fishing, cultivating, and use of a range of wild resources. Domestication of llama's secured access to meat, transport, and dung for fuel, but the motivation behind herding alpacas was to produce fine wool with which to make textiles. Pastoralist specialization in some areas resulted in herders depending on specialized wool-producing breeds. Highland farming societies also incorporated domesticated camelids from early on to complement agricultural production. Meat, wool, and pack-based pastoralism allowed denser settlement in high-altitude regions of the Andes and has proven a resilient way of life.

Emerging Patterns

New data and increasing research in Central Asia, Africa, and South America is providing fresh perspectives on domestication and contexts for the development of pastoralism. Two common assertions regarding the timing of the appearance of pastoral systems are that plants were domesticated before animals and that pastoralism developed late and out of settled villages and towns of early states. Thinking about these processes was initially framed in Southwest Asian contexts. Sheep and goat were the earliest herd animals to be domesticated worldwide, and recent syntheses show that they were domesticated in the Fertile Crescent at about the same time as the earliest plants. Similarly, in South America, hunter-gatherers domesticated camelids at the same time as many Andean cultigens. In Africa, however, domestication of donkeys and incorporation of introduced animals and the development of mobile early pastoral societies preceded domestication of African plants by several thousand years. In Central Asia pastoral systems are variable, but there is no indication that cultivation occurred as early as herding. In Baluchistan, however, there are complex patterns of cultivation of introduced wheat and barley prior to the domestication of zebu cattle. However, in South India early cattle pastoralism preceded cultivation. Current data suggest that domestication of South Asian plants occurred after the earliest pastoralism and in regions where pastoralism was never common.

Answers to the related question of whether pastoralism developed late and out of the settled villages and towns of early states are straightforward in some regions and less so in others. There are strong indications that domestication resulted from specialized hunting and widespread modification of the environment starting 12,000 years ago (Zeder 2011). But whether goats and sheep were also incorporated into residentially or seasonally mobile pastoral systems in the Fertile Crescent or whether they were largely integrated into systems of village-based agriculture is unclear. The timing of the earliest pastoralism in Southwest Asia is, therefore, unknown. By contrast, in Africa and the Andes hunter-gatherers or early herders domesticated a range of animals

and pastoral sociopolitical systems developed well prior to the appearance of settled polities. Similarly, the first evidence for reliance on domestic horses is among hunter-gatherers. It is possible, however, that horses were domesticated by people further to the west who kept cattle and cultivated crops. It is clear, however, that the development of pastoralism in Central Asia stimulated the development of complex nomadic societies and states, rather than the other way around. Settled towns and polities played no role in the development of horse pastoralism in Central Asia. Simple statements about the relative timing and spread of farming and pastoral systems obscure complex climatic shifts, and subsistence histories and sociopolitical contacts, that made one system or the other more likely to flourish at any given time. But it is clear that plants were not domesticated earlier than animals as a general rule and that in many cases pastoralism developed before ancient states.

Research carried out during the last 20 years shows that animals were domesticated and pastoralism was developed in widely dispersed areas of Eurasia, Africa, and the Andes. However, there is still tension between the ideas of independent origins and diffusion, and with the exception of relations between Southwest Asia and western Europe, relatively little is known about the nature and timing of regional contacts. Recent research suggests passage of people, animals, and ideas across Iran from the Near East to South Asia. Similarly, it has been argued that horse-based pastoralism spread through long-distance movements from west to east across the Central Asian steppe and the inner-Asian mountain corridor. Current discussions of Central Asia focus less on migrations as mechanisms for social change and more on relatively small-scale pastoral movements, repeated revisiting of the same locales, and extensive interactions among mobile pastoralists during seasonal rounds (Frachetti 2012).

The question of whether herders started to milk animals early or whether milking and use of animals for hair, and traction, was part of later pastoral development and spread is another issue that has been much discussed (Sherratt 1983). Recent research demonstrates, though, that in Turkey milk residues on pots date to as early as 9,000 years ago (Dunne et al. 2012). Pastoralists moving into southeastern Europe 8,000 years ago also relied on milk (Gallego Romero et al. 2012). The same is true of the earliest cattle pastoralists moving west across the central Sahara 7,000 years ago. Horses were also milked in the earliest phases of domestication by herder-hunters in northern Kazakhstan about 6,000–4,500 years ago (Outram et al. 2009). As a result, scholars now suggest that secondary products may have been part of the early motivation for people to manage herd animals. Drinking milk conferred such a survival advantage on pastoralists that different genetic pathways for lactase persistence developed in Europe and Africa. Lactase persistence is a pastoral legacy and geographically concentrated at high frequencies today in northwestern Europe, parts of Africa, Southwest Asia, the Arabian Peninsula, and Mongolia.

Future Directions

Well-known pastoral regions of the world such as the Andes, Africa, and Central Asia have seen far less research than areas that have long been under intensive cultivation such as Western Asia, Western Europe, Eastern China, or North America. Ongoing research is addressing these imbalances. Furthermore, pastoral sites are by definition ephemeral, and there is a need for more highly trained pastoral archaeologists. Global geopolitics as well as applied issues such as the need for sustainable food production and mobile responses to climate change are, however, expanding the scope and relevance of pastoral research. New methods of detection of pastoral sites and early stages of animal management such as micromorphology and soil chemistry, as well as breakthroughs in the study of isotopes and ancient and modern biomolecules, are also making it possible to conduct much more systematic and fine-grained archaeological research on domestication and mobile pastoral societies.

Future research is needed on regional variability in pathways to pastoralism at a range of scales. There is evidence for different pathways to pastoralism in South America, Africa, and Central Asia,

for example. There is much less information, however, on smaller scale variability in patterns of camelid domestication or breed development within regions – such as the Peruvian or Bolivian Andes. Similarly, little is known about differences in the way that Bactrian camels and dromedaries were domesticated. It has also been suggested that there are resemblances between the development of cattle-based pastoralism and late cultivation of crops by early herders in northeast Africa and South India, but multisited research projects have not attempted systematic data collection and comparison between continents.

Ethnohistoric research in Africa and the archaeology of Cyprus also make it clear that small groups of people and their animals suffered periodic reverses with pastoralists becoming hunter-gatherers, animals becoming feral, or local populations of cattle or other livestock being decimated. Research on these and other small-scale processes that are critical to domestication and breed formation will be greatly enhanced by long-term regional archaeological studies that integrate fine-grained research on zooarchaeology, soils, chemistry, genetics, local environments, and human social practice.

Cross-References

- ▶ Alpaca and Llama: Domestication
- ▶ Asses/Donkeys: Domestication
- ▶ Camels: Domestication
- ▶ Cattle: Domestication
- ▶ Domestication: Definition and Overview
- ▶ Goat: Domestication
- ▶ Horses: Domestication
- ▶ Sheep: Domestication
- ▶ Yak: Domestication

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Animal Paleopathology

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Introduction

A relationship is a two-way entity. The different partners within it influence each other to a greater or lesser extent. So it is true for the long history of human-animal relationships (Fig. 1): each has affected the individual lives, and also the historical trajectories of whole populations, of the other. It is these stories that animal paleopathology can elucidate. The domestication of animals, for example, changed the course of development of human society and economy and in doing so affected human health and disease. Bringing animals together in larger, denser herds, in close association with human communities, would have changed the ecology of infectious diseases for both parties.

Definition

Animal paleopathology is the study of health, disease, and injury in past animal populations from the analysis of preserved hard and soft tissues. It is concerned primarily with the bones and teeth routinely recovered from archaeological sites, but can also include studies of soft tissues (mummified remains, bog bodies), and articulates with a range of related research areas, such as paleoparasitology, paleodiets, molecular biology, veterinary medicine, and human paleopathology. Through studies of skeletal abnormalities and alterations related to disease and injury, a range of interpretations can be formed and forwarded relating to past economies and societies, environments and living conditions, animal husbandry techniques, and disease ecology.

Key Issues/Current Debates/Future Directions/Examples

The current state of the discipline of animal paleopathology and several of the key issues under debate (in particular those relating to methodology) are perhaps best viewed and understood through a brief retrospective on the discipline.

Methodological Problems and Biases

In considerations of the state of the discipline, parallels are often drawn with its close relative, human paleopathology (O'Connor 2000: 98; Thomas & Mainland 2005). Human paleopathology is a discipline reaching back into the nineteenth century. It is a mature subject, with well-established and consistently applied protocols and methodologies. Animals were included in paleopathological reviews in the earlier twentieth century, but it was only from the 1960s, with the work of such specialists as R.A. Harcourt and D.R. Brothwell, that the foundations of animal paleopathology really began to take off. The publication in 1980 of a general textbook on the subject by Baker and Brothwell (1980) is widely recognized as a seminal moment for animal paleopathology. This volume, a collaborative

Animal Paleopathology, Fig. 1 Example of a human-animal relationship: a man traveling by donkey (modern Greece) (Photo: R. Bendrey)

work between a veterinary pathologist and a zooarchaeologist, reviewed the potentials of the discipline and the abnormalities that might be identifiable within zooarchaeological assemblages. In the subsequent decades, animal paleopathology has developed slowly and rather erratically, and in comparison to human paleopathology, methodologies have unfortunately not been applied consistently to studied material (Thomas & Mainland 2005; Upex & Dobney 2012).

The discipline developed into a situation where common practice was to publish "interesting specimens" (Upex & Dobney 2012). On the one hand, these publications can be useful as they raise the profile of certain recognizable disorders to the wider zooarchaeological community, hopefully encouraging their future recognition; on the other, the absence of proper articulation with their full context, and other forms of archaeological evidence, limit their broader importance. This general approach has been linked with relatively limited publication of prevalence rates (the number of cases of disease or infection in relation to the unit of population in which they occur). It is important to synthesize and compare data to understand geographical and chronological variability. To this end, prevalence rates should be routinely calculated and published. The lack of standardization has led to a situation where studies are not often comparable; even more problematic is the fact that pathology is not always recorded or reported.

This lack of methodological refinement and systematic application has been attributed to several factors (Thomas & Mainland 2005). Most zooarchaeological assemblages consist of disarticulated and fragmented skeletal elements, and complex taphonomic processes (differential destructive processes associated with slaughter, butchery, cooking, consumption, and discard behaviors) further bias the recoverable data (Bartosiewicz 2008). These factors, often resulting in pathological bones being separated from the context of the whole individual, mean that there are often multiple etiologies for a single pathological lesion type. Linked to taphonomy, it is the case that some pathologies are more likely to survive than others.

Full understanding of pathologies is not supported by control studies in modern populations. There are further methodological problems related to the identification, recording, and interpretation of pathologies. One key problem, for instance, is determining what should be considered "normal" (O'Connor 2000: 107).

As the premise of paleopathology rests upon identifying, quantifying, and interpreting abnormal alteration from a healthy state, we need to understand the full range of normal variation that might occur. Modern comparative studies of known life-history populations will help in the assessment of what is "normal" and what is pathological and will be able to improve knowledge on conditions that remain poorly understood (O'Connor 2000; Thomas & Mainland 2005).

The inconsistent application of paleopathological research may perhaps be viewed in the context of the variability in methodologies applied in zooarchaeological research more generally (due to differing research agendas, project aims, personal research interests, publication space, and financial/time constraints). Pathologies tend to be an infrequent occurrence in zooarchaeological assemblages and may not be prioritized for research. Problems may also stem from a lack of familiarity with veterinary medicine research and also with the archaeological relevance of the diversity of pathological lesions. In many senses, the discipline has been a story of unrealized potential to date, and studies have been somewhat sidelined, although they can contribute key information in relation to the human past (discussed below).

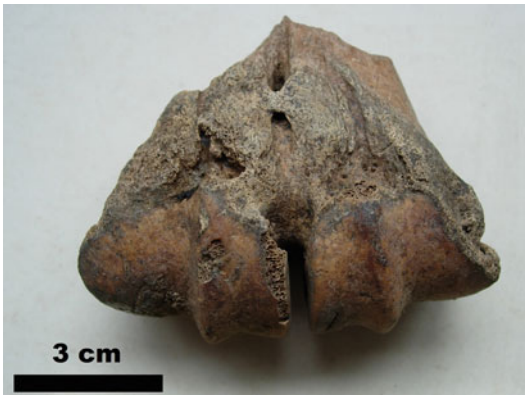
The discipline, however, has seen significant advances in the last 15 years or so, in the development and application of methodology, occurring alongside a number of developments promoting animal paleopathological research and publication. Established in 1999, the *Animal Palaeopathology Working Group* of the *International Council for Archaeozoology* was founded to address the problems discussed above, especially the integration of paleopathological data with other forms of evidence, improvement in recording practices and their systematic application, and improvement in the knowledge of the underlying biological processes and consequences of disease and injury. Further, 2011 saw the launch of the *International Journal of Paleopathology*, a journal dedicated to the publication of both human and animal diseases.

The Functioning of Economies and Societies

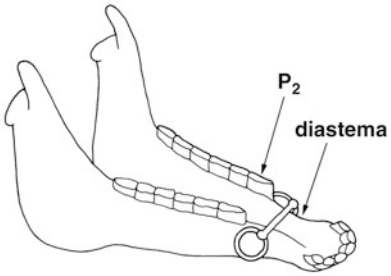
Animals have been, and are, a central part of human existence: they are part of our economies – providing dietary staples and physical work; we form emotional attachments to them; through our close associations, we share diseases with them. Animal paleopathological research can inform on all of these broad themes.

Until the mechanization of wheeled vehicles, animal power played an essential role in land transport, agricultural production, and warfare. Their use thus had major repercussions on human society and economy with cattle plowing, for example, allowing the intensification of agriculture, and horse riding bringing into human use an animal that revolutionized how people could travel, communicate, and fight each other. Pathological changes occurring in the skeletons of animals used for transport and work can provide evidence of these past uses.

Bone skeletal elements undergo adaptive remodeling in response to increased functional strain – essentially bone deposition is stimulated by extra forces acting on the skeletons (Fig. 1). This can produce joint arthropathies in animals used for work (Fig. 2), although it is the case that such morphological changes also develop as a function of other factors, such as age, sex, body weight, living conditions, and genetic predisposition (Bartosiewicz et al. 1997; O'Connor 2000: 99-101). It is only through the study of collections of modern skeletons with known life history that it will be possible to understand the different influences of the separate factors. Study of such comparative, control populations has contributed to the development of criteria usable to explore the identification of the human use of animals for work in the past, such as the use of cattle for traction (e.g., Bartosiewicz et al. 1997) and the horse for transportation (e.g., Bendrey 2007: Fig. 3). These criteria need to be robustly tested and revisited with reference to new and more diverse control collections to assess their validity, for example, current debates over the reliability of different methods for identifying bitting damage in horses



Animal Paleopathology, Fig. 2 Cattle metacarpal from Roman Canterbury (England) displaying degenerative changes to the distal epiphysis, with splayed distal condyles and peripheral exostoses (Photo: R. Bendrey)



Animal Paleopathology, Fig. 3 Identifying horses used for transport: above – the position of the bit relative to the mandible in the horse's mouth; below – both reactive new bone deposition and bone destruction on left and right mandibular diastemata of a horse from Iron Age Danebury (England) interpreted as a bit-induced pathology (Photo: R. Bendrey)

Animal Paleopathology, Fig. 4 Photograph (*left*) and x-ray (*right*) of a healed double fracture of a Roman right dog radius and ulna from Tiel Passewaaij (the Netherlands) (Photo: Courtesy of Dr. Maaike Groot)

(Bendrey 2007) will hopefully continue as methods are improved and refined.

Again, a further complicating problem with such studies is that as most zooarchaeological material recovered is both disarticulated and fragmentary, it is difficult to assign specific ages or sexes to pathologies in such material, making it harder to assess the separate possible factors influencing individual cases. Complete skeletons can often give more detailed, nuanced assessments.

Cultural attitudes toward animals can also be revealed through the study of pathologies (MacKinnon 2010). Traumatic injuries, for example, can give insights into possible cases of accident, abuse, "occupational" injury, care, and treatment of "pets." Dogs, for example, may be susceptible to both abusive injury by humans and "occupational" injuries received during hunting or herding (Fig. 4). In such studies, recorded fracture prevalence rates will be an underestimate of the true prevalence, and it is also difficult to

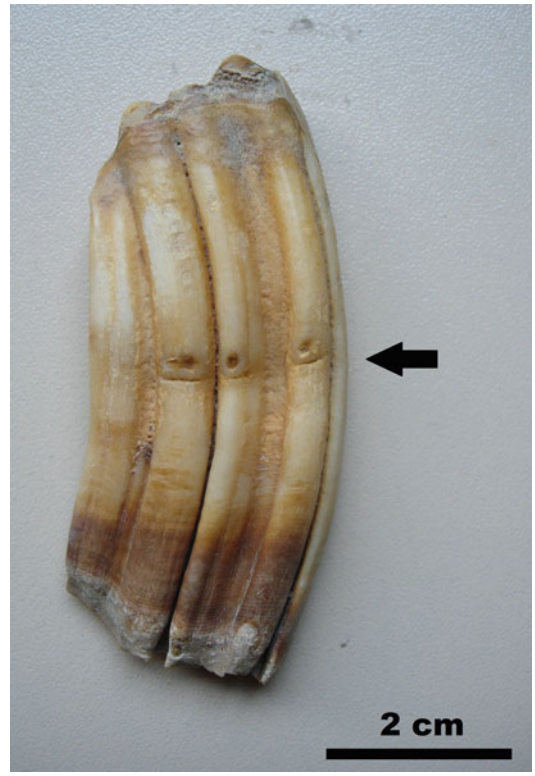
distinguish between accidental and deliberate injuries (which is most reliably assessed through cases where traumata distributions are studied in complete skeletons) (Groot 2008). Again, to interpret archaeological data, it would be useful to have modern control data for known populations, such as the prevalence of fracture rates in working populations of dogs (Thomas & Mainland 2005).

Environments and Living Conditions

Knowledge of past animal health and disease articulates with, and informs on, that of broader ecology and environment. This can encompass the broader regional environmental context of the animals (e.g., climate and ecology) and also "local" context (e.g., housing, penning). Diet, a key aspect of animal ecology, directly affects skeletal development.

In recent years, a considerable research focus has been directed at recording and interpreting finds of enamel hypoplasia – an interruption or disturbance in the formation of enamel (Fig. 5). This developmental defect is associated with physiological stress during the growth of the tooth crown. Research has shown that it can be due to a range of factors causing stress on the animal, especially developmental (e.g., weaning), nutritional (e.g., seasonal malnutrition), and disease (e.g., parasite load). In zooarchaeology, most work has been undertaken on the low-crowned teeth of pigs; however, recent work has begun to address the study of enamel hypoplasia on high-crowned species, such as caprines (sheep and goats) (Upex & Dobney 2012). The prevalence of enamel hypoplasia, for example, has been shown to vary according to climatic and ecological factors in a study comparing modern caprine teeth between a semiarid and a (moister) mesic environment in Kenya (Balasse et al. 2010).

Studies of enamel hypoplasia can also inform on animal husbandry. In the study of pig remains covering some two millennia at Neolithic Çayönü Tepesi, in southeast Turkey, Ervynck et al. (2002) identified a gradual increase in enamel hypoplasia through time, along with a trend toward younger animals at death and smaller body size. They interpreted this as a gradual increase in physiological stress in pig populations due to the domestication process and animal husbandry pressures.



Animal Paleopathology, Fig. 5 Linear and pitlike enamel hypoplasia on an Iron Age horse lower third molar (M_3) from Tsengel Khairkhan (Mongolian Altai) (Photo: R. Bendrey)

Markers indicative of the animals' physical environment may be preserved on the bones. The condition known as "penning elbow" – consisting of new bone (osteophyte) deposition on the lateral side of sheep humero-radial joints – is so called as it is often considered to be a result of trauma to the outside of the joint from husbandry practices such as penning or handling (Baker & Brothwell 1980: 127; Upex & Dobney 2012: 202-3). However, recent work on comparative modern sheep populations from North Ronaldsay (Scotland) indicates that the incidence of these lesions may not be related exclusively to husbandry practices but also to environment, joint morphology, and possibly age (Clark 2009). This study, of sheep

from two contrasting environments on the island, indicated that the lesion may also be related to the environment and that repeated minor shocks, as might be expected from movements over rocky ground, may produce the lesion.

Animal Breeding and Husbandry

Animal management and husbandry techniques lie at the intersection of economic and cultural decisions, domestic animal physiology and behavior, and local (and wider) environmental contexts. Evidence for these practices, as discussed above, can leave various traces in animal skeletons linked to both individual lifetime events (e.g., weaning) and habitual lifestyle and behavior (e.g., grazing terrain). Other conditions may potentially contribute to understanding of the housing and feeding of animals, such as evidence for rickets or malnutrition (Baker & Brothwell 1980: 43-52). At the population level, selective breeding for certain desired traits can have negative effects by the unconscious concomitant selection of other detrimental congenital traits which can be identifiable in skeletal remains (Baker & Brothwell 1980: 40-2; Upex & Dobney 2012: 204-5).

Infectious Diseases and Disease Ecology

Changes in disease ecology and the incidence of infectious diseases affecting humans and animals will have been important consequences of changing human-animal relationships through time. A range of cultural, social, biological, and environmental variables will have impacted upon the epidemiology of infectious diseases in the past. Examples of the significant effects of the transmission of infectious organisms between contiguous animal and human communities are well known, as in the medieval plague epidemics in Europe caused by the bacterium *Yersinia pestis*.

Animals are, and have been, an important vector for the transmission of infectious diseases to humans, and the study of animal paleopathology can therefore inform our understanding of the disease ecology of past human communities. Domestication events can be seen as pivotal moments in these stories, for example, the number of shared diseases between humans and domestic animals increases in relation to the length of time since domestication (Horwitz & Smith 2000). The intensification of human-animal relationships through the domestication processes provided the routes for disease transmissions. The health implications of infectious diseases for past animals may also potentially provide valuable insights into past economies (e.g., losses associated with illness and death among domestic animal populations) and environments and living conditions (e.g., contact among and between various domestic and wild animal species).

Our ability to explore these relationships is limited by what is identifiable from the archaeological record. For example, a case of tuberculosis (caused by infection by one of the members of the mycobacterial tuberculosis complex) may cause bony changes to the skeleton of an animal, whereas one of anthrax (caused by the organism *Bacillus anthracis*) would not. Further, only a small proportion of animals infected by an infectious organism might show evidence of bony changes (when these do occur – as in the case of tuberculosis), suggesting that what is visible in the archaeological record underrepresents the true prevalence rate (Upex & Dobney 2012: 196). As mentioned above, the taphonomic histories of most animal bone assemblages mitigate against the identification of diseases (Bartosiewicz 2008). However, in some cases, we have complete, well-preserved animal skeletons with lesions preserved suggestive of infectious disease. Even then, it is often the case that gross morphological analysis can often only indicate nonspecific infections, as identifying the causative agent based on structural changes within bone alone is problematic given the lack of specificity of these changes for the various pathogens (Bendrey et al. 2008). Beyond this, it may only be with the application of DNA analyses that a specific agent may be positively identified (Spigelman et al. 2012).

Future Directions

Although still a relatively young discipline, animal paleopathology is capable of delivering

valuable and unique insights into a range of past human-animal-environment interactions. Studies are most powerful and effective when linked into the broader archaeological context and integrated with other methods. The foundation for the future of animal paleopathology will be built on a few key practices: an emphasis on the description of lesions (not just diagnoses) in publications, in a quantifiable manner, and the routine calculation of prevalence rates. Ideally, recorded conditions should be analyzed within the background of the normal elements and in relation to the other recognized osteological anomalies in that species in the analyzed assemblage (Clark 2009).

It is the identification of variation in gross morphology of bones and teeth that is the core method in the study of animal paleopathology, but increasingly the application of multiple techniques to specimens, including radiology, microscopy, histology, and genetic analyses, will help to produce robust differential diagnoses. Microscopic study of bone microarchitecture can contribute important perspectives on the nature and timescale of pathological manifestations. Undoubtedly, recent and future advances in ancient DNA research will contribute significant results to the study of ancient diseases and their ecology, although there is continued debate over both methods and results (Spigelman et al. 2012). Further understanding of skeletal abnormalities must be based on the distribution and expression of such conditions in modern control populations (e.g., Bartosiewicz et al. 1997; Bendrey 2007); otherwise, interpretation of lesions in the archaeological record risks being nothing more than speculation. The discipline must continue to test and refine methodologies and assess and compare the expression of abnormalities in different archaeological as well as modern populations.

Cross-References

- ▶ Agricultural Practice: Transformation Through Time
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Bone Chemistry and Ancient Diet
- ▶ Bone, Trauma in
- ▶ DNA and Skeletal Analysis in Bioarchaeology and Human Osteology
- ▶ Pathological Conditions and Anomalies in Archaeological Investigations
- ▶ Social Zooarchaeology
- ▶ Taphonomy in Bioarchaeology and Human Osteology
- ▶ Zooarchaeology

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Annapolis: Historical Archaeology

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Brief Definition of the Topic

Annapolis, first settled in 1649, is located on the Chesapeake Bay and is the current capital of the state of Maryland. Initially centered on the Chesapeake tobacco economy, Annapolis is known today for its maritime and heritage tourism industries. The city served as the short-lived capital of the United States from 1783 to 1784 and has been the home of the US Naval Academy since 1845. Annapolis has become a tourist destination due to its seventeenth century town plan, and surviving impressive eighteenth century and vernacular nineteenth century buildings. A formal archaeological program, Archaeology in Annapolis, began in 1981 through collaboration with University of Maryland, College Park, Historic Annapolis Foundation, and City of Annapolis. Since that time, Archaeology in Annapolis has excavated sites ranging from elite colonial houses and gardens to early twentieth century houses of middle and working class people from different racial backgrounds. Through archaeological interpretation, the history of enslaved and free African-American life became a more publicly understood part of the City's official histories.

Despite the diversity of the excavations themselves, the project seeks to understand the City as a whole, interpreting its history over time and across space and social locations. Early work focused on the ability of archaeology to understand the development of the culture of capitalism. This work is exemplified by Mark Leone's study of the William Paca Garden, Leone and Paul Shackel's

examination of individuation and standardization of material culture, and Barbara Little's study of the Jonas and Anne Catherine Green Print Shop. As the early goals were to democratize archaeology and challenge a world created by capitalism, through the work of Parker Potter, Archaeology in Annapolis also became an experiment in public archaeology. Using museum exhibits, newspapers, local television, and community education, the project sought to integrate critical theory with the aim of politicizing and making change in the present.

During the early 1990s, the project began to excavate the homes of the City's free African-American community and those of middle and working class residents of European descent. Guided by community-based anthropology, much research was carried out in consultation with minority communities and other constituencies. Working especially with politically or socially disfranchised groups, the hope was to subvert modern ideologies as well as present alternatives to official historic narratives. This work is exemplified by Paul Mullins' and Mark Warner's studies of the 1847 Maynard Burgess house, the home of a middle-class African-American family, where they examined the intersections between racial discourse, labor structure, and class in material consumption. Also illuminating a history of Annapolis not readily apparent today, Christopher Matthews has explored the ways in which the City's current appearance with the construction and reconstruction of landscapes is tied to the nineteenth and twentieth century commodification of the City's history through historic preservation.

Overall, archaeology has sought to understand how material culture is tied to power relations, class formation, and identity construction within the context of a single city. This has included the study of the transition to a capitalist economy, negotiations of racism, and examination of the City's historic preservation industry.

Cross-References

- ▶ Colonial Encounters, Archaeology of
- ▶ Colonial Williamsburg Foundation (CWF): Historical Archaeology
- ▶ Critical Historical Archaeology
- ▶ Historic Jamestowne
- ▶ Leone, Mark P. (Historical Archaeology)
- ▶ Modern World: Historical Archaeology

Further Reading

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Anozie, Fred

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Basic Biographical Information

Information on Prof. Fred A. Anozie is extremely scarce. Prof. Anozie, as he was popularly called, was an astute Nigerian archaeologist whose name rang (still rings) bells within the archaeology space in and outside Nigeria. There is, as yet, virtually no information about his early years. But it is known that as early as 1977, Anozie had published a preliminary report of excavations in Aguleri, a village in Southeastern Nigeria (Nzewunwa 1983).

Between 1978 and the 1980s, Prof. Anozie conducted extension research in Igboland and quickly became recognized as a notable archaeology scholar in Nigeria and West Africa. Most

of his research sites were based in eastern Nigeria with some of the most popular being the Ezi-Ukwu rockshelter near Afikpo, the iron-smelting sites of Umundu and Lejja, and Ugwuele in Uturu Okigwe local government area in Imo State, Nigeria (Nzewunwa 1983).

Major Accomplishments

Like Dr. N. Nzewunwa, the fact that he worked with Prof E.J. Alagoa for many years and coauthored the book: *The early history of the Niger delta* is a testimony of his competence in the field. In addition, he and Prof. Chikwendu V.E. took over the mantle of leadership for the direction of archaeological research in Eastern Nigeria with the exit of Prof. D.D. Hartle who worked extensively in Igboland in the mid-twentieth century.

He was a prominent member of the Archaeological Association of Nigeria (AAN) until his unfortunate death in 2006.

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▶ West and Central Africa: Historical Archaeology

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Anquandah, James

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Basic Biographical Information

Professor James Kwesi Anquandah is one of the earliest and longest serving Ghanaian archaeologists. He was born on April 10, 1938 and obtained a Cambridge School Certificate from the Achimota School in Accra, Ghana, in 1957 and Cambridge Higher School Certificate in 1959. Prior to obtaining a diploma certificate in Archaeology from the University of Ghana, Legon, in 1965, Professor Anquandah had earned a Bachelor of Arts (B.A.) degree in history at the same university in 1963. In 1967, he received a Master of Letters (M.Litt.) from the University of Oxford, UK, and worked as a Research Assistant at the Pitt-Rivers Museum, University of Oxford, between 1966 and 1967.

Before joining the academia, Professor Anquandah had worked at the state-owned Ghana Broadcasting Service (GBC) as Programs Officer (1959–1960) and later as Senior Producer (1972–1973) of programs pertaining to the history, culture, and heritage of Ghana. He began his career at the University of Ghana as a Research Fellow in African Studies and Archaeology (1973–1975), then as Lecturer at the Department of Archaeology (1975–1978). He was promoted to the positions of Senior Lecturer in 1978, Associate Professor in 1988, and Professor in 1994. Professor Anquandah has a wide array of experience in teaching and researching African Archaeology and has about fifty (50) publications. His areas of specialization include Archaeology of Ghana and West Africa, Archaeology of the Nile Valley, Art History of Ghana, and Paleo-Historical Demography.

At the University of Ghana, Professor Anquandah held several positions including Head of the Department of Archaeology (1976–1977; 1981–1993) and Dean, Faculty of Social Studies (1991–1997). He also acted briefly as Pro-Vice Chancellor of the University from January 1996 to February 1996. He served on various boards and committees of the university, including Academic Board, Faculty Board, and Executive Committee. He was the curator of the Museum of Archaeology, University of Ghana, Legon, from 1974 to 1998, and served as member of Ghana Museums and Monuments Board (GMMB) from 1995 to 1999 and 2010–2012.

He was a Visiting Professor at the University of Pisa, Italy, in 2002, and has been a Visiting Professor of Art History at the Ghana Campus of the New York University since 2008. He is currently an External Examiner for Ph.D. theses from the College of Art, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana, a position he has held since 2006. Professor James Anquandah is currently lecturing part time at the Department of Archaeology and Heritage Studies, University of Ghana, after serving 10 years (1998–2008) post-retirement contract at the same department.

Major Accomplishments

Professor Anquandah has been instrumental in the training of most of the current generation of Ghanaian archaeologists at the University of Ghana. He has played a vital role in the survival of the Department of Archaeology by resisting attempts by university authorities to scrap the department in the 1990s following restructuring exercises embarked on by the university.

Professor Anquandah became the first Ghanaian to head the Department of Archaeology at the University of Ghana, after working with expatriates such as Peter Shinnie, Oliver Davies, and Merrick Posnansky. His commitment to research and publication aimed at deepening knowledge about the prehistory, historical archaeology, and art history of Ghana remains one of his greatest achievements. His pioneering works (Anquandah 1981, 1987, 1998, 1999, 2003, 2012) are good insider's contribution to Ghanaian Archaeology and African Archaeology at large. He has won the Ghana Book Development Council award in 1983 for the publication of his book (Anquandah 1982) titled *Rediscovering Ghana's Past*. In 1987, he successfully mounted an exhibition on Ghana's Arts at Porte de Versailles in Paris.

Between 1994 and 2001, Professor Anquandah served as the Coordinator of the Management Committee of the Ministry of Education Secretariat Universities of Ghana Research Fund. As the Chairman of the Scientific Committee, National Commission on Culture (2004–2008), he among other things ensured the creation and maintenance of a website for the commission; a good reference point for the understanding of certain aspects of Ghana's culture and cultural institutions.

He has also worked as Chairman of the research unit of Ghana's National Slave Route Project at the Ministry of Tourism from 1999 to date. The unit's efforts culminated in the publication of one of the most comprehensive books (Anquandah et al. 2007) on the Transatlantic Slave Trade in Ghana.

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Antarctica: Historical Archaeology

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Introduction

Historical archaeology in Antarctica has been largely driven by the needs of heritage resource management. Polar heritage sites can be defined by, or have their significance enhanced by, archaeological remains, and the archaeological study of aboveground evidence and buried deposits has long been used in researching and conserving such sites in Antarctica.

In Antarctica, archaeological sites are rare commodities. Human presence on the continent and its surrounding islands has been relatively recent, brief, infrequent, and widely scattered. The range of human activities – exploration, sealing, whaling, and scientific research – has been very limited, and sites often relate to a single use at a single point in time. These sites have immense archaeological potential and, at the same time, are unique elements of the world's cultural heritage. They are also very expensive to study, given their isolated location and difficult access, severe climatic conditions, and the difficulties in excavating frozen deposits. These considerations dictate that the benefits of archaeological programs in Antarctica have to be clearly demonstrated in order to gain support, and to date, most funding has been associated with broader heritage conservation or environmental remediation efforts.

Professional historical archaeology has been practiced in Antarctica and the sub-Antarctic islands since the late 1970s. Archaeologists from Argentina, Australia, Brazil, Chile, France, New Zealand, South Africa, the United Kingdom, and the United States of America have participated in archaeological programs of survey, recording, or excavation. The objective of this work has primarily been the identification and conservation of historic sites, and in particular historic buildings, with less emphasis given in the past to academic research-driven projects (for a short history of archaeology in Antarctica see Pearson 2011a).

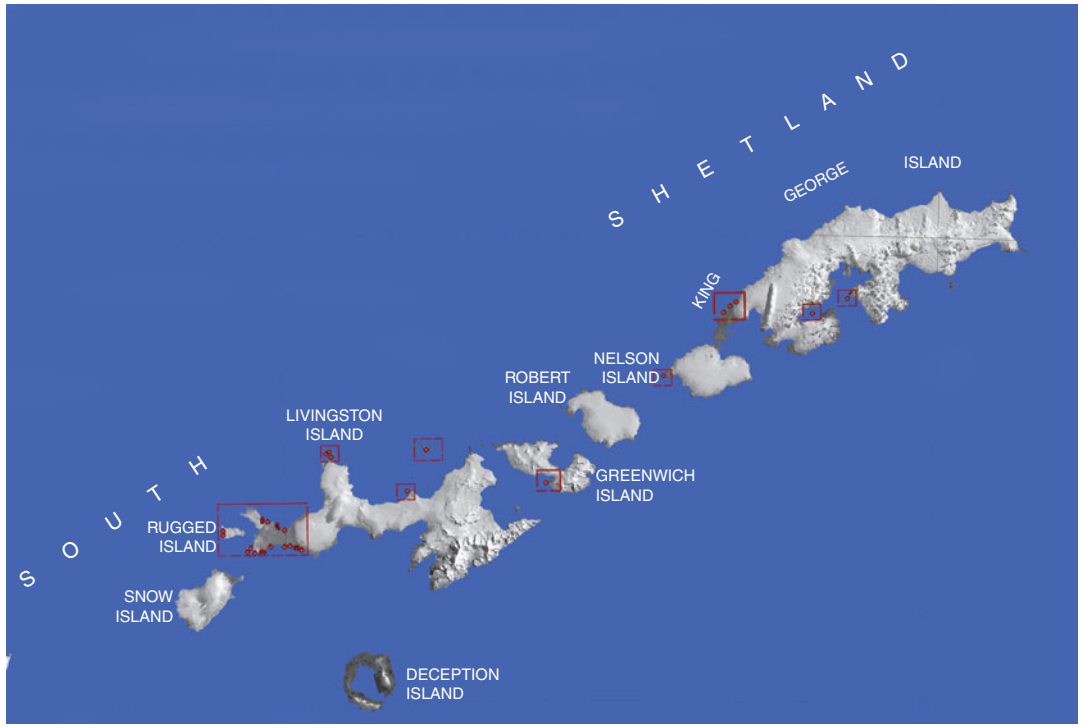
Definition

"Antarctica" is defined as being the area south of 60° south latitude (the area encompassed by the Antarctic Treaty), and for the purposes of archaeological research, the isolated peri- and sub-Antarctic islands of the Southern Ocean are included. All archaeology on the Antarctica continent and immediate peri-Antarctic islands is historical archaeology, as there is no evidence of any prehistoric contact with the continent. There is, however, recent evidence of prehistoric Polynesian visitation or settlement on the sub-Antarctic Auckland Island, south of New Zealand, and Campbell Island in the same region remains to be investigated (Dingwall et al. 2009).

Key Issues/Current Debates/Future Directions/Examples

The vast bulk of the archaeological work in Antarctica has been undertaken in relation to the removal of ice from inside and around historic huts, and the excavation, often through ice, of accumulated material inside huts and of stores boxes and caches outside huts. Despite being targeted at practical conservation works, this research has produced an accumulated record of the activities and material culture of, particularly, Heroic Era exploration parties (1897–1922).

In the case of sealing and whaling sites on the sub-Antarctic islands and the peri-Antarctic South Shetland Islands, the focus has been on



Antarctica: Historical Archaeology, Fig. 1 Map of South Shetland Islands showing the location of archaeological sites of sealers and whalers occupation in the nineteenth century

establishing the presence and form of shelters and work areas, again largely related to the long-term conservation of this heritage resource, but often providing information about sealer's and whaler's domestic subsistence and work activities not available in the usually scant documentary sources (Figs. 1 and 2). The work of Senatore and Zarankin in the South Shetland Islands has moved archaeology into more theory-driven research questions (e.g., Senatore & Zarankin 1999; Zarankin & Senatore 2005, 2007; Zarankin et al. 2007).

The range of conservation-related archaeological work has included:

- The retrieval of artifacts related to known historical parties
- The direct understanding of the construction of buildings and sites, their historical sequencing and use
- The understanding of sites in the context of other, like, sites
- Ascertaining the survival and research value of artifacts in the light of Antarctic risks such as "wallowing" by elephant seals (e.g., Townrow 1989) and erosion caused by penguin rookeries and extreme weather events (Pearson et al. 2008)
- For nonstructural sites, such as sealing sites, better understanding their characteristics so other sites can be identified (e.g., determining if artifact types differ from inside and outside now-collapsed shelters, so former shelter locations can be identified from artifact scatter patterns)
- Isolating the factors influencing the deterioration of archaeological sites over time

Work asking broader research questions has included:

- Determining if the archaeological remains provide substantive evidence of heritage significance not available from other sources (such as the lifestyle and experiences of

Antarctica: Historical Archaeology, Fig. 2 Sealer/whaler archaeological site in Livingston Island, South Shetland

nineteenth-century sealers, e.g., Lazer & McGowan 1990: 15)
- Determining the ethnic origin of sealers (e.g., McGowan 2000: 69)
- Using evidence to see if sites found in different locations originated from the same sealers (e.g., Hughes & Lazer 2000: 73)
- The relationship of sealing to global industrial developments and economic networks (Senatore & Zarankin 1999; Zarankin & Senatore 2005, 2007)

In the Antarctic regions, the documentary evidence of human activities is sometimes far less helpful in understanding the past than it can be in more temperate climates. The Heroic Era exploration sites are usually well supported by journals, diaries, inventories of gear, and even photographs. There are, however, few surviving sealing logs and journals, and there are few detailed inventories of sealer's gear and stores, nor are there many instances where a specific site can be related to a specific historically documented party. The life experience of individual sealers is little recorded. The interpretation of the aboveground sites and excavated finds and data can provide "physical history" to augment a scant documentary history of this important period of human interaction with the continent, quite apart from archaeology's potential to address broader research questions.

Archaeological excavation destroys, at least in part, the sites it studies, and human occupation sites in Antarctica are rare. They are of high research value, of high heritage value, are vulnerable to human (including archaeological) and natural disturbance, and are very difficult and expensive to study. It is therefore imperative that archaeologists understand the multiple values of the sites they wish to study and formulate research strategies that maximize the benefits of their work in the unusual Antarctic context.

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Anthropogenic Environments, Archaeology of

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Introduction

The term "anthropogenic environment" suggests, in its etymology, an environment that is created by humans, but the archaeological study of anthropogenic environments is primarily concerned with the coevolution of human communities and their landscapes, the dialectic between ecology and society.

As the intersection between culture and ecology, anthropogenic environments provide a critical record of past human impacts on the environment, an aspect of archaeology that is critical for contextualizing current environmental problems. From an ecological perspective, human modifications to the environment can be both positive and negative, leading to increases in biodiversity as well as decreases. The archaeology and anthropology of anthropogenic environments have led to the recognition of traditional landscape management practices as important to the development and maintenance of ecological diversity in many regions worldwide. Anthropogenic environments also preserve records of past societies; diet, subsistence practices, labor organization, social organization, settlement patterns, and beliefs are all part of the relationship between people and their environments and therefore leave some archaeological trace on the landscape.

Zooarchaeology, archaeobotany, and geoarchaeology are the methodological subfields most commonly used in the study of anthropogenic environments. These are the fields best suited to the study of human/environmental interactions as seen through the impacts human communities have had on animals, plants, and soils or landforms.

Anthropogenic Environments, Archaeology of, Fig. 1 A terraced agricultural landscape, along the Douro River, Portugal

Definition

Anthropogenic environments are also called culturally modified environments or human-modified landscapes. Modifications of the environment, whether minor or profound, are ubiquitous wherever human communities are found. In the modern world, therefore, essentially all environments are anthropogenic, to the extent that they have been altered by human occupation. In practice, however, archaeologists usually define anthropogenic environments as those that show measurable changes in ecological dimensions, such as plant and animal diversity or soil fertility, that can be attributed to human modifications.

The tendency of Western societies to see the environment and human societies as categorically separate (the nature/culture dichotomy) makes anthropogenic environments difficult to define. The English language and Western philosophy define humans as distinct from their ecological context, but the study of anthropogenic environments demands a recognition of humans as part of the environment, one important component within the ecosystem. Anthropogenic environments are the result of the dialectic between human communities and their context, a physical manifestation of the enveloping web of relationships between humans, their landscape, and other animal and plant species.

The archaeological study of anthropogenic environments focuses on three common types of human interactions with the environment: impacts on plants, impacts on nonhuman animals, and the modification of soils or landforms.

The modification of soils or landforms can take many forms, often (and most spectacularly) related to agriculture, but certainly not limited to agricultural societies (Fig. 1). Terracing, irrigation, soil amelioration (including the creation of dark earth), damming, and other modifications of the landscape are frequently associated with the cultivation of domestic or wild plants but can have a strong effect on the composition and growth of all members of the local plant community, including weedy annuals and tree growth. The creation of roads, paths, fields, houses, burial mounds, or villages can also affect plant and animal species by changing water runoff patterns

and soil compaction and creating edge effects that increase diversity. These deliberate modifications of the landscape have both intentional and unintended effects on species composition. Additionally, use of the landscape can have disastrous effects on soils and productivity, through salinization or erosion.

Human impacts on plant species and communities include domestication, transplantation, the extension of normal range (for either domestic or wild plants), cultivation of wild or semidomesticated plants, clear-cutting of forests, burning of forests or grasslands, and the preferential destruction or encouragement of certain species. Less direct, but often just as significant, are human-caused changes to habitats or growing conditions, whether or not such changes were intended to impact plant species. These include most of the modifications of soil and landforms mentioned above. For example, irrigation, soil amelioration, and terracing have a profound effect on plant growth, as can clearing vegetation for a field or trampling soil for a path. These effects can be wide-reaching and impact not just the specific species that may have been targeted (if any) but also weedy annuals that may take advantage of these anthropogenic niches. Agricultural systems, such as monocropping or multicropping, can also impact the diversity and density of regional plant communities (Fig. 2).

Similarly, human societies and communities impact animal species through domestication, transplantation (of wild or domestic animals), range extension, overhunting, and the targeting of particular age/sex classes of prey. Human impacts on plant species, like those discussed above, can also have a profound effect on animal communities, through changes to habitat and food supply. Burning is commonly used to increase the range and abundance of grazing animals, for example, but irrigation, terracing, and other modifications that lead to denser or more diverse plant cover can also increase the abundance and diversity of animal communities. Clear-cutting of forests, damming of rivers, and wide-scale pollution can also lead to the local extinction of some species. Livestock can also impact landforms and plant communities through over-grazing, a common cause of erosion and changes in seed distribution and plant survivorship.

Anthropogenic Environments, Archaeology of, Fig. 2 Agave growing in rock mulch gathered from the desert floor, Arizona, USA

While anthropogenic environments are, in a sense, human "created," the relationship between people and their environments is more complex and nuanced than this implies. Anthropogenic environments are, in essence, contingent landscapes; landscapes reflect past histories of use and modification, and current uses and modifications are dependent on the choices made in previous generations. A fundamental recognition that all people live in contingent landscapes is fundamental for an understanding of modern environmental problems.

Historical Background

The history of the archaeological study of anthropogenic environments mirrors changes in popular conceptions of the environment and how it relates to human societies and also to the development of theoretical perspectives on the environment in the fields of ecology, anthropology, and geography, which have strongly influenced, and been influenced by, archaeology.

The Western concept of nature/culture dichotomy has roots as deep as ancient Greek philosophy and continues to be enshrined in popular and scholarly culture. The tendency for Western

scientists and philosophers to see non-Western people as part of nature – a tendency fueled by the unwillingness of colonial powers to recognize the accomplishments of indigenous people and the land claims that went with them – initially made it difficult for Western archaeologists to recognize the extent of anthropogenic landscapes around the world.

Early understandings of human/environmental interactions in the social sciences often took the form of extreme determinism. As a backlash against these simplistic views, environmental arguments were avoided during the early development of archaeological theory. A culture's environmental setting was considered little more than an enabler or (more frequently) limiter of human behavior. After World War II, however, popular recognition of the environmental effects of human population growth, pollution, and consumption increased. Archaeologists working with ancient states were some of the first to apply this recognition to the past, with the documentation of human-created environmental disasters that led to abandonment of settlements or collapse of civilizations (e.g., Jacobsen & Adams 1958). While large-scale societies were considered to have significantly depleted their environments, the ecological impact of small-scale societies, whether positive or negative, was not widely studied (but see Day 1953).

The first ecologically inspired theoretical perspective to gain wide purchase within anthropology was Julian Steward's. His 1955 *Theory of Culture Change* was the foundation for the school of Cultural Ecology, which saw social and subsistence organizations as adaptations to the environment. Steward's work focused heavily on subsistence and the technological adaptations adopted to implement a particular subsistence regime within a particular environmental context. Although Steward's approach was far better suited to the study of small-scale societies than earlier approaches to human/environmental interactions, his primary focus was on the impact that the environment had on people, rather than on a recognition of the diversity of impacts people could have on the environment.

Popular and scientific understanding of the environment, and particularly environmental problems, was revolutionized by the 1962 publication of Rachel Carson's classic *Silent Spring*. Carson documented the degree to which the catastrophic effects of human actions could be both widespread and subtle. Overtly destructive actions, such as logging or strip-mining, were not the only environmental threats, nor could protecting national parks and wilderness from development solve the problems of invisible poisons in the air, soil, and water. Carson showed that urban, agricultural, and rural landscapes, as well as our own health, had to be protected from the effects of pollution. Population pressure, and the threat of population growth to the environment, was another important scientific and popular theme of the 1960s, with the publication of Paul Ehrlich's 1968 best seller, *The Population Bomb*.

Although the focus of public discourse was on the destructive impacts of human actions on the environment, within anthropology and archaeology there was increasing recognition of the coevolutionary aspects of human/environment interactions. Anthropologists of the 1960s were strongly influenced by equilibrium models of ecosystems. In these models, disturbance – including positive and negative feedback from cultural or non-cultural sources – was thought to pull the ecosystem away from a "natural" vegetation regime. When disturbance ended or was minimized, the ecosystem would return to this "baseline environment." Under these models, small-scale communities could be seen as inherent environmentalists, living within the equilibrium of their environment. This was an idea supported by the work of Roy Rappaport (1968) who argued that complex cultural adaptations maintained ecological balance. Similarly, while Ehrlich (1968) had warned of the negative consequences of unchecked population growth, within archaeology, the late 1960s saw the emergence of models suggesting that population pressure drove social and technological change in human societies. The shift to Mesolithic/Archaic ways of life, the development of agriculture, and the rise of urbanization were all

attributed, at least in part, to population growth (Boserup 1965; Binford 1968; Flannery 1969; Athens 1977).

Anthropological awareness of human impacts on the environment broadened as the issue gained increased public recognition. Vayda and Rappaport's (1968) seminal paper "Ecology, Cultural and Non-Cultural" became a critical theoretical underpinning of the study of human/environmental interactions and particularly anthropogenic environments. This interest moved beyond a focus on complex societies, as a growing interest in the origins and effects of agriculture and agricultural intensification led to a focus on the impact of small-scale farming societies on ecosystems (e.g., Netting 1968). Foraging societies were also recognized as having a significant impact on their environments at this time, with Martin and Wright's 1967 publication of *Pleistocene Extinctions: The Search for a Cause*, one of the first attempts to systematically explore the possibility that small-scale hunting and gathering societies may have caused wide-scale prey extinctions.

While Cultural Ecology remained the dominant theoretical perspective on human/environmental interactions through the 1970s, the 1970s and 1980s saw the diversification of theoretical approaches, particularly the development of Human Behavioral Ecology, which focuses on the use of optimality models for explaining human behavior (Winterhalder & Smith 2000). Optimality models have their base in ecology, particularly Charnov's (1976) "Optimal Foraging: The Marginal Value Theorem," but are also developed from rational choice models popular in economics. While classic works of Cultural Ecology sought to explain human behaviors as adaptations to maintain ecosystem balance, Human Behavioral Ecologists argued for short-term and self-serving behavior by individuals seeking to maximize individual fitness. Although the behaviors best suited to survival might involve conservation of local landscapes, Human Behavioral Ecology did not assume that such conservation was necessary or desirable to the actors involved. From the perspective of evolutionary theory, Human Behavioral Ecology is more defensible in its focus on individual fitness than Cultural Ecology, since the latter's theoretical approach can rely on an assumption of group selection. Human Behavioral Ecology, however, did not significantly improve archaeological understanding of anthropogenic environments, since the focus on individual actions meant that Human Behavioral Ecologists tended to see human impacts on the environment as inherently negative (or absent) rather than part of a feedback loop (as with Cultural Ecology) or as a dialectic with the local landscape that could be both positive and negative for environmental health.

The 1980s brought a better understanding of the dynamic relationship between human communities and their landscapes, as equilibrium models of ecosystem dynamics were abandoned in favor of non-equilibrium models that rejected the idea of "natural" baseline environment that was maintained through a series of feedback loops. Instead, ecosystems were seen as highly dynamic, influx, and contingent, with disturbance part of the system, rather than inherently negative. Non-equilibrium models challenged the view of humans as either destroying the "natural" vegetation regime or adapting to an existing ecological balance. Rather, people were situated squarely within the ecosystem, as just one more source of dynamic and historical change.

The use of non-equilibrium models is most strongly associated with the development of Historical Ecology, which emerged in the last decade of the twentieth century (Baleé 2006). Historical Ecology's focus on non-equilibrium models, and particularly the recognition of contingent landscape development, makes this the natural theoretical perspective for fully exploring the role that humans have played in shaping environments over millennia. Historical Ecology is particularly suited for the study of small-scale agricultural societies and the many subtle and profound ways that such societies manipulated their environment, creating whole landscapes shaped by human actions. Early works on the landscape management of small-scale agricultural societies, such as Posey's (1985) "Indigenous Management of Tropical Forest Ecosystems: The Case of the Kayapó Indians

of the Brazilian Amazon," were instrumental in recognizing the scope of anthropogenic environments.

Throughout the 1990s, anthropological research continued to refute the idea that the indigenous people of any continent had failed to change their local and even regional landscapes. Influential articles, such as Redford's (1991) "The Ecologically Noble Savage" and Denevan's (1992) "The Pristine Myth," were published just before the UN Conference on the Environment and Development in Rio, which brought to the forefront the environmental problems of traditional and developing nations. The rejection of the view of small-scale societies as inherent conservationists was founded on strong ethnographic and archaeological data. Some of this data, however, had been present since the 1950s or earlier. The increasing acceptance of this perspective had as much to do with changing paradigms as with new data. The growth of postcolonial and indigenous archaeologies helped to refute older theoretical perspectives on small-scale societies that had deep roots in archaeology's colonial past.

Key Issues/Current Debates

The study of anthropogenic environments is tied to the increasing importance of applied archaeology as it relates to modern environmental policy and conservation efforts. An understanding of how people have changed their environments in the past can be used to improve modern environmental policy. This includes the use of archaeological and historical data to guide the reconstruction of damaged ecosystems as well as the use of archaeological knowledge of past technology (e.g., agricultural technology) to improve modern landscape modification practices.

The concept of environmental reconstruction assumes a "baseline environment" that can be reconstructed. As discussed above, however, current theoretical perspectives recognize the inherent dynamism of ecosystems. The focus on anthropogenic landscapes allows for a better understanding of the complexity of environmental reconstruction, a process that does not necessarily involve minimizing disturbance and human impact. If all environments are anthropogenic – and in fact many degraded modern environments are degraded from a healthy diversity that was created through human manipulation – then the purpose of reconstruction must be something other than to return the environment to a pre-manipulation state. Specific goals, such as increasing diversity or decreasing erosion, must be identified, and the recognition made that such goals may be best gained through active cultural manipulation of vegetation and landforms.

The archaeology of anthropogenic environments can provide data on the species of plants and animals present in past environments, the past landscape manipulations that created the environment, and the cultural behaviors that improved environmental health. Archaeologists are also increasingly applying lessons from past societies to help local communities improve quality of human life as well as improve or protect environmental diversity. For example, archaeological studies of Amazonian dark earth (terra preta soils) may help protect the Amazon rainforest by reviving prehistoric soil amelioration practices that allow farmers to use the same plot of land for longer, rather than expanding into nearby forested regions when fields lose fertility (Lehmann et al. 2004).

International Perspectives

The understanding of anthropogenic environments has a peculiar history within the Americas, which makes their importance (politically, economically, and socially) far different from Eurasia or Africa. Concepts of the "ecologically noble savage," which only recognized European-style agriculture, architecture, and landscape modification as "cultural," were the result of blindness to the accomplishments of indigenous people and were also part of the colonial justification for land acquisition. When native land transformations, and the indigenous people

themselves, were seen as "natural," then their land could be considered "unimproved." This was used as justification for European appropriation.

Although there is now a much greater understanding of the impact indigenous people had on the landscapes of the Americas, the colonial history of this topic, as well as the colonial history of archaeology itself in the Americas, continues to impact scientific and popular understanding of environmental transformations. The modern landscapes of the Americas are a part of the cultural patrimony of groups of people who were historically only a peripheral part of archaeological discussions.

Future Directions

Archaeologists interested in anthropogenic environments are increasingly engaged in applied research, both through engagement with environmental policy makers and through the application of archaeological knowledge to change or modify present behaviors that could harm the environment or human health. As the destruction of ecosystems intensifies and greater interest is paid to environmental problems, an understanding of past human/environment interactions will become more critical for understanding how environmental problems can be solved and predicted.

Cross-References

- ▶ Agrarian Landscapes of the Historic Period
- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Cultural Ecology in Archaeology
- ▶ Environmental Archaeology and Conservation
- ▶ Environmental Reconstruction in Archaeological Science
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ Human Impacts on Ancient Marine Ecosystems
- ▶ Landscape Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Sustainability and Cultural Heritage
- ▶ Urban Landscapes: Environmental Archaeology

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Anthropogenic Sediments and Soils: Geoarchaeology

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Introduction

Archaeology has gradually but consistently increased its interest in the study of soils and sediments over the last decades. As a result of this emphasis, the discipline has not only sought to characterize the terrigenous matrix within which the great majority of archaeological materials are found but, increasingly, to also understand soils and sediments in their double dimension: as archives of archaeological and environmental data and as *sui generis* artifacts (Butzer 1982; Waters 1992; French 2003; Holliday 2004; Goldberg & Macphail 2006; Walkington 2010). This salience notwithstanding, a tendency to conflate the meaning of sediments and soils continues to exist within the discipline. In some cases, this owes much to the nature of archaeological findings and their context; artifacts are found in sediment deposits that have stratigraphy and which, generally speaking, are sufficiently close to the surface to be affected by soil-forming processes. Be that as it may, it is useful to draw a contrast between "anthropogenic sediments" and "anthropogenic soils" (and indeed between sediments and soils) because the distinction highlights different earthly processes that can affect the formation of this type of archaeological evidence. Put another way, both anthropogenic sediments and anthropogenic soils imply terrigenous material with distinctive characteristics resulting from the strong and enduring influence of past human activity. However, each concept emphasizes a different aspect of the life history of the landscape, that demands the separate attention of archaeological research, especially the subdiscipline of geoarchaeology.

Definition

Sediment is non-lithified material made up, most of the time, of mineral particles of different composition, shape, and size. Sediment is subject to alteration through weathering and can be transported by different agents, which can select different particle sizes as a function of overall energy. Sediment is generally studied by archaeology in deposits that have stratigraphy: the composition of particles, their distribution in terms of size classes, and the sedimentary structures at

various scales of observation both inform about the history of a deposit and provide crucial information about preservation factors (Goldberg & Berna 2010). Anthropogenic sediments are those sediments whose distinctive characteristics are a result of the strong and enduring influence of past human activity. Their geoarchaeological study focuses on their composition, history of deposition, and post-deposition alteration, taking into account the significant material effects of human agency. A more intuitive starting point is that most human activity takes place on land surfaces and that land surfaces are subjected to different actions that modify their characteristics over time. Modifications resulting from the activity of people produce a specific range of changes and inputs that lead to detectable differences when preserved: even fairly simple human activities can produce a variety of debris, e.g., charcoal, ash, bones, pottery, plaster, lithics, phytoliths, and slag; one might also consider here other human activities such as excavating, heaping, and winnowing of sediments for different purposes. The archaeological correlates of these inputs and activities are detected through specific material signatures that endure over time and alter the measurable properties of sediments. It is important to underscore that anthropogenic sediments do not only include sediments enriched by anthropic debris or depleted by associated chemical alteration. Unaltered sediments that have been relocated by humans (for instance, those used in platforms, agricultural raised fields, as well as sand or clay mined from quarries and transported to other locales), and sediments that have been modified by humans as raw materials for the manufacture of objects (e.g., clay deposits for making pottery, adobe, and mudbrick), among others, also deserve to be considered as anthropogenic sediments. Human impact on the stability of sedimentary deposits (for instance, through vegetation clearance and burning) are also known to contribute to higher mobility of sediments (e.g., via erosion), but the concept of anthropogenic sediments is probably best reserved for those sediments so mobilized that show the enduring and telltale material signatures of human activity, e.g., re-deposited anthropogenic sediments and soils.

A measure of the importance of distinguishing between anthropogenic sediments and anthropogenic soils is gained by examining what the notion of soil embodies and, consequently, how we can understand the notion of anthropogenic soils. Soil constitutes a complex and open system, a material continuum that drapes the entire planet. It is an assortment of organic and mineral material resulting from the interaction between geomorphological and biotic processes as they affect, and modify the properties of, surface sediments. Collectively, these processes are known as soil-forming or pedogenetic processes and lead to the formation of distinctively patterned layers known as soil horizons (Phillips & Lorz 2008). While key characteristics of soil horizons are determined by the parent material of soil, in other words by the actual composition of the sediments upon which soils have formed, the differences that can be observed between horizons are often the result of the decay, mixing, and depositional action of soil, the mobilization of non-consolidated or dissolved mineral and organic material through the existing pore structure (much of which results from the action of soil biota), and other forms of chemical modification. Horizontal variation in soil characteristics along a land form – a soil catena – subsumes contrasts in parent material as well as variation in slope, drainage, vegetation cover, etc. Anthropogenic soils, in turn, are those whose formation and characteristics have been enduringly influenced by the material effects of human action. Their geoarchaeological study emphasizes an interpretation of the properties of soil horizons as a partial outcome of past human modification. Examples are as varied as they are intriguing: they include soils which were deliberately enhanced through the addition of materials in the past (often to increase fertility, including here compost heaps, home gardens, and agricultural fields) inasmuch as the mineral and even organic components are resistant to degradation; they also include soil horizons formed on human-transported or human-manufactured anthropogenic sediments (e.g., landforms created or altered by humans, including raised fields, soils formed on disturbed materials associated with mining); soils formed

in situ on abandoned habitation areas; and soils whose surface horizon has been modified by topsoil disturbance and/or irrigation associated with different types of agriculture (e.g., slash and burn soils, paddy soils), among others (Limbrey 1975; Woods 2003; Dudal 2005).

Anthropogenic sediments and soils exist at variable spatial and temporal scales, from sand piles, pit fills, and compost heaps ephemerally accumulated in the vicinity of houses to entire landscapes blanketed by sediments dislodged by clearance and modified through millennia of continued agriculture. The foci of geoarchaeological studies of anthropogenic sediments involves, among others, establishing which sediments have been transported by humans deliberately (and wherefrom), which in situ sediments have been modified due to human activity (and how), and which sediments have been chosen to craft particular materials (wherefrom and how). The study of anthropogenic soils, on the other hand, includes how soil horizons' properties record the enduring influences of past populations (and to what extent the soil archive can be used to examine past land use), how these material signatures can be used to infer past human activity, and whether soils formed on old occupation deposits have been subsequently employed for cultivation, among others.

Historical Background and Current Debates

Archaeological research focused on anthropogenic inputs on soils and sediments trace their lineage back to Arrhenius' studies of phosphate enrichment in Sweden (Arrehenius 1929) and include geochemical prospection in a wide array of different contexts. The interpretation of modified properties as evidence of anthropogenic enrichment rests on the conceptual premise that humans concentrate metals and nonmetals, and develop other signatures in the sediment record (for instance, enhanced magnetism as a result of burning, changes in pH, etc.). Ethnographic and actualistic situations, in turn, document enrichment with phosphorus, carbon, calcium, potassium, magnesium, manganese, zinc, copper, and other elements associated with different settlement practices or activity areas (Woods 2003). These studies constitute a powerful tool to infer patterns in the use of space, especially when chemical properties are interpreted with the aid of micromorphological observations (Milek 2012). In this connection, compared to some pioneering research of the 1970s and 1980s (Eidt 1984, 1985), the application of micromorphological observations (Courty et al. 1989) has both greatly expanded the overall scope of this research and illustrated the remarkable heterogeneity that characterizes occupation deposits as archives of past human activity (Brochier 2002; Goldberg & Macphail 2006).

Approaches to the study of anthropogenic soils as archaeological entities owe much to studies of *plaggen* soils, the latter being deliberately enhanced farming soils resulting from applications of manured animal bedding made of heather, grasses, and peat by medieval farmers of the sandy lowlands of North-West Europe (Blume & Leinweber 2004). Examples are studies documenting the impact of *plaggen* cultivation on the landscape and research focused on determining new recipes for *plaggen* production (Simpson et al. 2005). Other examples of anthropogenic soils modified for agricultural purposes include soils modified by liming (Conry 1971) and *terra mulata* soils of the Amazon basin, modified by intensive in-field burning (Arroyo-Kalin 2012). In parallel, studies emphasizing the deliberate "making" of anthropogenic sediments include the construction of ash mounds of South India (Paddayya 2002), the making of Tell mudbrick (Rosen 1985) and New World adobe bricks (Goodman-Elgar 2008). Also important are studies devoted to the construction of mounds from more incidental materials, including earth and shells (Roosevelt 1991; Gaspar 1998; Villagran et al. 2011; Rostain 2012).

Worthy of note are examples of anthropogenic soils developed on abandoned archaeological sites, such as Amazonian Dark Earths (Arroyo-Kalin et al. 2009) and European Urban Dark Earth (Macphail 1983; Cammas 2004). Some of the more sophisticated geoarchaeological studies

of these deposits focus on ascertaining the properties, mode of formation, spatial extent, and variability of anthropogenic soils, with a particular emphasis on how pedogenetic processes have been affected by past human action (Cremasci & Nicosia 2010). Further areas of research include the actual timing of anthropogenic soil formation (Arroyo-Kalin 2012) and the extent to which these soils, enriched with human occupation debris, can be said to have been used for cultivation (Devos et al. 2009). The latter is an important avenue for research in light of ethnoarchaeological and actualistic studies documenting within-settlement soil improvement (Schmidt 2013, in press), as well as sophisticated, experimentally-based, studies of the material signatures of past cultivation (Lewis 2012). A related line of enquiry focuses on the use of refuse and/or manure in broad areas around settlements, which has prompted important discussion in the archaeology of North-West Europe, the Mediterranean region, and Middle East (Wilkinson 1989; Bintliff et al. 1990; Guttmann 2005).

Techniques employed in the study of anthropogenic sediments and soils are, for the most part, those deployed in other environmental archaeology investigations (Rapp & Hill 1998; O'Connor & Evans 1999; Goldberg & Macphail 2006): a combination between quantifying inclusions and fossil remains, measuring physical and chemical properties of terrigenous material, and studying undisturbed samples microscopically – all within an understanding of processes of landscape evolution. A key methodological issue, however, is the need to establish adequate baselines to assess anthropogenic modification. While human activity can be linked to higher phosphorous, calcium carbonate, carbon, as well as changing particle size classes and enhanced magnetism, it is not straightforward to successfully establish the extent of enrichment or depletion of soils and sediments in absolute terms. One approach is to use maps to compare relative abundance of selected parameters. Another is to employ a "background" for comparison. The extent to which this "background" is equivalent to "natural" conditions depends on the particular features of different regions: in some areas of the world agricultural modification of large expanses makes it next to impossible to detect parts of the landscape that are comparable to archaeological situations and which have not seen major impact by humans (Sanders in Turner & Sanders 1992). In other parts of the world, "backgrounds" can and should be sought because their study permits understanding local processes and situating anthropogenic modification in the specific context of local sediment dynamics and soil forming processes (Arroyo-Kalin et al. 2009). In this connection, some crucial considerations are to study "background profiles" rather than simply "background topsoil samples" (in order to compare to the profiles, rather than surface samples, of archaeological interest); ideally, to locate study profiles on the same landform as archaeological exemplars; and, importantly, to take into consideration the position in the soil catena or palaeocatena (French 2003).

Future Directions

The fundamental common ground between the study of anthropogenic sediments and soils is that both bear distinctive characteristics which can be traced back to human action. These characteristics are enduring, such that, on the one hand, they can be studied as material signatures of past human activity and landscape transformation and, on the other, they can affect the properties of anthropogenic sediments or anthropogenic soils, rendering substrates that have become enriched, depleted, polluted, or otherwise transformed as a result of human agency. Given the ubiquity of human modification of the landscape throughout the Holocene – in many cases an integral consequence of the widespread adoption of agricultural livelihoods over millennia – geoarchaeological studies of anthropogenic soils and sediments constitute a developing and ever more important research program. It is increasingly realized that questions such as "What was the human impact on past environment?" can in many contexts oversimplify the issues at stake, namely, that the legacy effects of past human

inhabitation constitute an important source of landscape variability which subsequent inhabitants had to both confront and creatively engage with (Stahl 1996). Put another way, in many cases, and via the enduring effects of manipulating environmental affordances, human populations have played the role of a keystone-species (Balée 2006), both in the flux of ecological interactions and as part of long-term processes of change that have modified the actual properties of the landscape.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Aksum: Environmental Archaeology
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Environments, Archaeology of
- ▶ Archaeological Soil Micromorphology
- ▶ Chemical Survey of Archaeological Sites
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Landscape Domestication and Archaeology
- ▶ Magnetic Susceptibility of Soils and Sediments in Environmental Archaeology
- ▶ Paddy Soils: Environmental Analyses
- ▶ People as Agents of Environmental Change
- ▶ Urban Dark Earth

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Antioch, Apamea, and the Tetrapolis, Archaeology of

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Introduction/Definition

Seleukos Nikator is traditionally referred to as the founder of a constellation of colonies in the Syrian region and in particular of the *Tetrapolis*, a consortium of four sister cities that occupied first millennium BCE settlements: two inland foci (Antioch and Apamea) and two seaports (Laodikeia and Seleukeia in Pieria). Altogether, these foundations were essential in stamping Seleucid hegemony over Syria in light of the overall peaceful settlement with Ptolemy Soter, who in turn seized most of Phoenicia after the fall of Antigonos Monophthalmos. By this rationale, the *Tetrapoleis* created a web of urban foci that firmly secured the Orontes Valley and the coastline in Seleucid hands, thereby curbing expansion ambitions of the Ptolemies. We can safely infer that this ambitious plan of geopolitics was brought to completion in fairly rapid terms during the last years of the fourth century BCE, following the foundation of the new capital at Seleukeia on the Tigris, Seleukos' assumption of kingship,

and Antigonos' defeat at Ipsos. As regards the agencies behind these foundations, the Macedonians, Athenians, Argives, and Syrians who figured so prominent in the ranks of the Seleucid legions in the campaigns between 306 and 300 BCE may have served in the initial construction of the *Tetrapolis* as well as in a series of equally ambitious urban achievements, many of which carried dynastic denominations.

Key Issues/Current Debates

In chronological order, Seleukeia in Pieria (Samandağ, Turkey) deserves primacy. It was the first foundation among the *Tetrapolis*, and what is more, in Seleukos' plans, it was to become the next capital as well as his final resting place. Hence, in the aftermath of his key victory against Antigonos in 301 BCE, he offered sacrifices to Zeus on Mt. Kassios and shortly thereafter founded the city at a site seven miles north of the Orontes' delta, near modern Samandağ. Bearing witness to the ebb and flow between Seleucid and Ptolemaic rule in the region, Seleukeia throve as a hub of commerce, in particular, during the days of Pompey the Great. Later, under the mandate of the Flavian emperors, the city was inserted in the grand scheme of militarization of the Orontes basin. A new harbor was built, and along with it came a vast program of canals and diversion of waters to ease the navigability of the Orontes and prevent the silting of the harbor itself. Furthermore, Seleukeia became home of the *Classis Syriaca* and of detachments from the fleets at Misenum and Ravenna, as attested by a rich corpus of funerary inscriptions. All in all, the eastern campaigns of the second and third centuries CE fully harnessed the resources of Seleukeia's harbor. With the tetrarchic era, however, the harbor's role began to dwindle, a process accelerated by the rise of new hubs at Tyre and Antarados further south along the Syrian coast. That the city's abandonment may have started at this time is a cogent hypothesis. All the same Isaurian raids, the early sixth century's catastrophic earthquakes, and finally the Sasanian king Khusro's invasion brought city life to a halt; aside from the names of its bishops, Seleukeia was heard of no more.

As for the archaeology, very little is known about Seleukeia. Cursory investigations were conducted by a Princeton team in the 1930s but limited to a handful of houses and their mosaic pavements, namely, a Hellenistic peripteral temple, the so-called Market Gate, and finally the late-fifth-century-CE remarkable martyrion near the latter. Yet, it is plain that Seleukeia's city plan negotiated the steep slope through systems of terraces; strewn over an upper and lower city, its configuration is arguably reminiscent of that of Pergamon, albeit on a smaller scale. The city walls are of interest: while stretches of polygonal masonry survive on the eastern flank of the acropolis, the rest of the perimeter uses an isodomic technique that seemingly harks back to the early days of the Seleucid foundation. Measuring approximately five km of length, these walls were punctuated by potent rectangular and semicircular towers. Outside of them, along the road leading to Apamea, are a hippodrome (now covered by maquis and shrubs) and the necropolis at Mağaracık. Seleukeia's main attraction, however, is the so-called Titus Tüneli, the spectacular tunnel that diverted torrential waters and thus avoided the inundation and silting of the bay. Several inscriptions around the harbor, referring to Vespasian and Titus, leave no doubts about the agency involved in these works and underscore the size of this undertaking as without par.

The fortunes and the decline of Seleukeia in Pieria, it seems, cannot be divorced from those of its twin-sister city Antioch on the Orontes (Antakya, Turkey). Poised on the southwestern-most tip of the Amuq Valley, Antioch sits on a highly dynamic ecosystem. Three rivers demarcate this landscape: the Orontes, the Afrin, and the Kara Su. While the former follows its erratic course from south to north, the other two originally emptied their waters in the Amik Gölü, that is, the Lake of Antioch, now dry, after a vast 1960s reclamation plan.

Antakya is Antioch's modern reincarnation. Its features are typical of many modern Turkish towns: large boulevards, squares dedicated to the leaders of the modern Republic, and the chaotic

allure of the bazaar. Antakya's gradual, almost tangible urban sprawling is ridding the city of old and ancient buildings by the day, and the modern cityscape bears no memory of what lies beneath.

Replete with great expectations, the 1930s excavations of Antioch were the first attempt to investigate archaeologically a city that had played a key role in the political landscape of Classical and Late Antiquity and had always attracted innumerable researchers thanks to the mediating powers of the textual sources. Financial cutbacks, strategy shortcomings, and ultimately pressures from the sponsoring institutions, however, greatly impaired the operations of the *Committee for the Excavation of Antioch and Its Vicinity*, thereby hindering the effectiveness of this short-lived enterprise.

The mosaics, frescoes, and sculpture recovered – enthusiastically hailed as markers of Antioch's elites – have reduced the city's complexity to a mere constellation of luxurious suburbs with vistas on springs and idyllic landscapes. What is more, the city's topographical and social configurations remain by and large conjectural. Ironically, what was the Seleucid metropolis, the Roman provincial capital, the seat of the first Christian community, the virtual capital of the Near East in the fourth and fifth centuries CE, and the seat of the Count of the east – to name but a few titles – remains an uncanny, almost abstract entity. Simply put, Antioch and its vicinity are still unknown.

Today, only a handful of heavily battered monuments survive and conjure up the glorious past of the capital: the aqueduct of Trajan, the late antique fortifications, the stadium's piers, a pagan temple, and finally the church of St. Peter. The rich textual sources, however, compensate for the dearth of visible ruins. The texts of Josephus, Libanius, John Chrysostom, and Malalas plus a vast array of early Christian and Byzantine sources are key in tracing the building programs that shaped the capital city time and again. The inconsistencies, discrepancies, and vagaries that these texts present, however, hamper the realization of a more precise picture. For instance, the location of most sacred areas is speculative at best; while we know very little of the several sanctuaries that existed in Antioch and in its suburban extension Daphne, the picture for 31 churches reported by several authors is even more perplexing, as none of them can be situated in space.

Nevertheless, some general narratives of settlement and of building programs can be presented here. Antioch was apparently founded only a month after Seleukeia in Pieria. Honoring the memory of Seleukos' deceased father Antiochos, the city was built on a site where there had been favorable omens. In addition, the entire population of nearby Antigonia was forcibly relocated to Antioch; the former, founded by Antigonos in 306 BCE, may have ceased to exist shortly afterward.

The growth of Antioch began under Antiochos Soter and Antiochos III, when the island on the Orontes and the slopes of Mt. Silpius were incorporated within the urban grid, likely in response to the number of new settlers and veteran soldiers that the city continued to receive. Under Antiochos IV Epiphanes, however, some decisive changes occurred. The quarter of Epiphaneia was added to the city, thus modifying the overall urban layout that, however, would remain basically unchanged for the rest of antiquity. A new square was also added, which might correspond to the "Tetragonal" agora that was later to become the stage for the disorder of 69 CE. Furthermore, an aqueduct was added at this time, providing Antioch a continuous supply of fresh water. On a different note, Antiochos IV also commissioned the construction of the *Charonion* bust, an apotropaic monumental group defending the city from a plague's explosion. Though heavily weathered, it is still visible today and it is Hellenistic Antioch's only visible monument.

This Hellenistic city plan defined Antioch for ages to come; despite the many overhauls that the walls in particular underwent in the following centuries, the layout of the city remained unchanged. A solid grid-regulated space, punctuated as it were by two possible agoras and their correlated sanctuaries, followed the tradition of the great cities of Asia. The gradual addition of new urban quarters and the building of the royal headquarters on the island coalesced with the

armature of the city, which at that point was structured around the main north to south thoroughfare. This road connected the various boroughs and also linked the city to south and northern Syria. Its modern reincarnation, Kurtuluş Caddesi, follows exactly the same trajectory.

More notably, however, this road was the locus for various manifestations of popular mobility: riots, acclamations, food distributions, and funeral parades, among others. Here, on this pivotal axis, Antioch's many historical layers converge. The grand military parade of Antiochos IV Epiphanes in 166 BCE, the mourning of the great general Germanicus' body plausibly poisoned by Piso in the year 19 CE, and the solemn entrance of St. Symeon's coffin in 459 CE bring into focus the centrality of this axis within the constant reshaping of Antioch's urban and social fabrics. A unique commingling of emotions, political anxieties, and religious tensions unfolded along this boulevard, and demarcated some of Antioch's most momentous events.

Punctuated as it were by agoras and sanctuaries, the thoroughfare underwent major overhauls at the time of Herod the Great, when Syria and Antioch were firmly in Roman hands. Half a display of loyalty toward Augustus and half an act of *euergetism* toward a city that tallied a sizable Jewish community, newly designated as cardo, now embellished by porticoes and colonnades, it inspired the appearance of similar colonnaded streets in most cities of the Greek East.

This new addition to the urban matrix, however, was germane to the insertion of buildings and venues that advertised the spirit of the Augustan Peace. The theater of Caesar and a sequence of baths along the slope of Mt. Silpius contributed to redesigning the map of amenities in Antioch while conveying the essence of *Romanitas*. In more practical terms, however, Agrippa and Augustus promoted the wholesale implementation of new quarters at the end of the first century BCE, in a way that reminisced and perhaps deliberately replicated what the Seleucid kings had accomplished in the previous centuries.

Be that as it may, the city at the time of Tiberius may have been girded by new, larger, and more potent walls. Caution is in order on this point, however, as Tiberius of all the Julio-Claudian emperors went down in history for not having promoted major building programs in Rome, let alone in the provinces. Otherwise, as a token to Antioch's splendor, prestige, and remarkable pedigree, the city became the capital of Roman Syria enjoying a series of grants and tax immunities. The largesse with which these gifts were accorded must be questioned. Antioch had many assets; as early as the Julio-Claudian period, the city became instrumental in keeping the recalcitrant South Syria and Judea districts in check. Moreover, from there, the Euphrates region and the Parthian border could be reached with ease thanks to a network of roads that was promptly enhanced by Augustus in the first decades of his mandate. In practical terms, Antioch had to accommodate the governor and his substantial entourage, plus the entire military infrastructure of the east. It retained civic independence, but it came with a price.

In spite of vast building programs that included aqueducts, baths, stadiums, and other amenities, Antioch's armature remained substantially unvaried through the Islamic era. The Theodosian and Justinianic fortifications, though conspicuous, replicated earlier perimeters; new quarters and building programs allowed grandees from Agrippa to the bishop Ephraem in the early sixth century CE to declare their ambition onto the local cityscape. But by early Late Antiquity, Antiochene urbanites must have felt cramped in a city that was getting too crowded and too constructed. Urban chaos, noise, and confusion resonate in Theodoret of Cyrrhus' descriptions of the city. Antioch's built environment and its experience, however, constantly changed. The city never stayed a museum to its own self, far from it. The traditional agora which had marked the center of public space was replaced by the courtyards of great churches, *sermons in stone* as Peter Brown comments. Their wide open plazas became ideal venues for social and religious aggregation as well as proselytism; the daily routines of Paul of Samosata's parading through the agora in 260 CE while reading aloud to his clients from his official correspondence are well known.

By contrast, the thoroughfare became the new heart of the city's economy after having been framed by porticoes and stoas as well as punctuated by shops. Earthquakes, fire, and floods had, however, their own share of responsibility in the reshaping of this community and in forcing continuous rebuilding and maintenance in Antioch.

Further upstream from Antioch lies the city of Apamea (Qalaat al-Moudiq, Syria), the best known among the *Tetrapolis*. According to Strabo, this city served as arsenal for the Seleucid kings as it accommodated thousands of mares and elephants as well as training facilities for the soldiers. Outshined by its neighbor and Syrian capital Antioch in the Roman period, Apamea acquired visibility in the third century when it was base of the Legion II Parthica. It suffered greatly from Sapur's raids in 252 CE and from the sequence of earthquakes that shattered most urban foci in the sixth century. In the census of the year 6/7 CE, Apamea apparently tallied 117,000 citizens.

Thanks to the extensive Belgian excavations, Apamea is now well documented and attracts visitors by throngs. The site's well-preserved ruins, which in the main predate the earthquake of 115 CE, open vistas onto the planning solutions adopted by the Seleucid planners for the *Tetrapolis*.

Framed by a mountain called al-Saheliyeh and dominating the middle course of the Orontes and the Ghab Valley, Apamea was laid out on a conspicuous plateau accessible solely from its north side. A grid consisting of 105 × 53 m blocks created the basic armature, framed as it were by a 7-km-long system of fortifications that date to the third/second centuries BCE – the tumultuous days of the Syrian wars – but underwent numerous overhauls during the Roman and Byzantine periods. Well known are the third-century-CE repairs that employed a cache of funerary stones from nearby necropoleis. Overall, Apamea's built environment encompassed 250 ha of space, seized by domestic and public areas. The backbone is the colonnaded street, by far one of the best preserved in the Greek East. At 1,850 m of length and almost 40 m of width and beautifully embellished by second-century-CE porticoes, it illustrates an architectural feature that was the signature of Greek cities in the east. At Apamea, this avenue linked the southern quarters to the Tycheion, the Agora, and the Great Baths, while also connecting suburbs to the city. Of importance is also the formerly prominent temple of Zeus Bêlos situated west of the colonnaded street, where emperors with the stature of Hadrian and Septimius Severus sought the response of the oracle, and the second-century-CE theater, one of the largest in Syria with its 140-m diameter. Also, it should be borne in mind that numerous houses have been excavated; by and large they date to the fifth and sixth centuries, and many showcase architectural and decorative solutions similar to the houses excavated in the 1930s near Antioch, Daphne, and Seleukeia in Pieria.

Finally, Laodikeia (Latakiyah, Syria) bore the lofty name of Seleukos' mother. Its population may have consisted in the main of Macedonian settlers, as attested by the 175 BCE decree that mentions the city's *peliganes*, a Macedonian term for city councilors. As with Apamea, Laodikeia was greatly affected by the political fluctuations of the Syrian wars, and it acquired independence as late as 83 BCE under Tigranes of Armenia. During the Roman era, it owed its reputation as hub for the shipment of its celebrated wine and to the famous incident that led to the downgrading of Antioch as kome (village) under Laodikeia's jurisdiction (so much for not siding with the just during the civil war of 193 CE). In the sixth century, Laodikeia was not exempt from suffering the blows of earthquakes, just as most of its Syrian counterparts.

Although obscured by the modern city, Laodikeia's urban configuration is fairly well known thanks to an early study by Jean Sauvaget. Built around its harbor, Laodikeia's design mirrors that adopted by the planners at Apamea, thus reinforcing the possibility that the same agencies were behind these foundations. A northern access, a colonnaded street, and *insulae* measuring 112 × 57 m are the features that legitimize this hypothesis. All the same, not much has survived among the temenoi and sanctuaries that allegedly punctuated Laodikeia's

cityscape. A tetrapylon of the Severan period is the sole reminder of Laodikeia's heyday in the Roman era. Finally, it should be noted that Sauvaget's reconstruction of classical Laodikeia was long upheld to illustrate the transition from the classical colonnaded street to the enclosed and covered market, the suq of the Islamic period. As it stands, this model is based on a notion of cultural decline and degeneration from an age of order to one of political chaos; its overall colonial posture is now called into question.

Cross-References

- ▶ Domestic Architecture, Roman
- ▶ Dura-Europos, Archaeology of
- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Greater Syria: Islamic Archaeology
- ▶ Late Antique Anatolia, Archaeology of

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Aphrodisias, Archaeology of

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Introduction

Aphrodisias is located on a plain south of the fertile Meander River valley, about 200 km southeast of Izmir in modern Turkey. The city was part of the region of Caria and the capital of the Roman province of Caria-Phrygia starting from the 250s CE. The city was well-known in antiquity for its cult of Aphrodite, sculpture production, and sculptors, who are known to have worked for domestic as well as Italian patrons.

Definition

Previous Excavations

The site was visited by several travelers in the eighteenth and nineteenth centuries such as William Sherard, Charles Texier, Sir Charles Fellows, Philippe Le Bas, and William Waddington, who mostly focused on recording the inscriptions of the site. Excavations were first conducted in 1904 by Paul Gaudin and later in 1937–1938 by Giulio Jacopi. Systematic excavations and research was begun in 1961 by Kenan T. Erim on behalf of New York University, until his death in 1990. After 1991, NYU excavations have continued under the directorship of R.R.R. Smith from Oxford University.

History of the Site

The site, with its buildings and monuments, is exceptionally well preserved, owing to its secluded location. The site's surviving monuments and material culture, which is predominantly in the form of marble sculpture, are mostly from the Roman and late antique periods and provide information on the history of the site from the Republican period to the fifth century CE. Some 2,000 inscriptions preserved on the site, on the other hand, illuminate the social history of the site and life in Roman Asia Minor in general.

According to a legend recorded by Stephanus of Byzantium and to the Greek tradition, the city was founded by Ninos, who was the mythical founder of the Assyro-Babylonian Empire, and the husband of Semiramis. There are substantial remains from the prehistoric and Bronze Age periods of the city, which were excavated from the two prehistoric mounds, the Theater Hill (Acropolis) and the Pekmez mound (Joukowsky 1986). There are fewer remains excavated so far from the archaic and classical periods. From the second century BCE onward, the city grew around the sanctuary of Aphrodite and witnessed major urban development in the first century BCE onward. By this period, as evident from coins, Aphrodisias was in a "sympolity," or close political or religious union, with Plarasa, a nearby city, which may have been the present-day village of Bingeç (Reynolds 1982: Doc. 2, 11-16).

One of the major sources for the history of the site, the north parodos wall of the Theater, the so-called archive wall, provides information about the early urban development of the site. In 39 BCE, after the city's loyalty to Rome against Labienus, who plundered both the sanctuary and private property, the city was granted freedom, nontaxable status, and increased asylum rights in the sanctuary of Aphrodite. The granting of these privileges was without doubt a major influence of Octavian/Augustus.

In the Imperial period, the city kept its "free" status until 250s, CE when it became the capital of the province of Phrygia and Caria. The first and second century CE saw major construction of marble monuments and urban development at the site (Ratté 2000). This construction stopped in the second half of the third century, but the city kept its vital culture under the influence of Roman governors. The rise of Christianity eventually put an end to the cult of Aphrodite. In the fourth century CE, the city had a bishop. In the fifth century, however, it was still home to a leading school of pagan Neoplatonic philosophy. The site was gradually abandoned in the seventh century and was home to a Turkish population beginning in the fourteenth century.

Key Issues/Current Debates

Major Monuments and Urbanism

The North and South Agora

There are two agoras at Aphrodisias, but the older civic center, the North Agora, is the area immediately to the south of the Bouleuterion and to the west of the Hadrianic Baths, (Smith & Ratté 1998). The space was surrounded by colonnades on all four sides. Recent excavations have shown that only the northern and southern colonnades had a double row of colonnades, whereas the eastern and western ones each had a single row (Smith & Ratté 1997). The northern colonnade of the North Agora was dedicated in the first century BCE by C. Julius Zoilos, an Aphrodisian, who was the freedman of Octavian/Augustus. The southern colonnade of the Agora is adjacent to the Portico of Tiberius, a colonnade that carried a mask and garland frieze.

The South Agora covers the area to the south of the North Agora and is bounded on the north side by the Portico of Tiberius. The South Agora seems to have been laid out as a consequence of second century CE urban development, and an earlier possible formulation of the area is ambiguous. In the second century, a columnar two-storey gate was added to the east, as well as a large rectangular pool with rounded ends that occupies the center of the Agora.

The Temple of Aphrodite

The first marble temple of Aphrodite was a prostyle building of the late first century BCE, which was turned into a pseudodipteros in the

first century CE (Smith & Ratté 1995). Two features were added to the sanctuary in the second century: the temenos surrounding it and the monumental gateway of the temenos ("Tetrapylon"). In Late Antiquity, the temple was converted into a Christian church and remained in use until the Middle Byzantine period.

The Sebasteion

The Sebasteion, discovered in 1979, is a large temple and sanctuary complex dedicated to Aphrodite and the Julio-Claudian emperors. The structure was a long and narrow street with a three-storey building on the north and south sides, a propylon on the west end, and the Temple of Aphrodite on the east. The building presents an unusual combination of well-preserved architecture, relief sculpture, and inscriptions. There are about 80 surviving panels of relief sculpture, which are either mythological or allegorical/imperial in content (Smith 1987). The mythological reliefs are unusual in that they provide us with the surviving visual vocabulary of ancient mythology in the Roman period. The allegorical/imperial reliefs, on the other hand, present a glimpse of the reception of Roman emperors in this eastern city. Current excavations have shown that almost nothing beyond the façade remains of the temple, which was replaced in antiquity by domestic structures.

The Theater

The Theater, a semi-circular structure built over the site of the Bronze Age occupation, was built in two major stages. The earliest phase was the construction of the stage building, dedicated in 28 BCE by C. Julius Zoilos, the same freedman who dedicated the north colonnade of the Agora. The second phase was the building of the auditorium out of marble, which was a Julio-Claudian undertaking and was perhaps still under construction in the Flavian period. The seats above the diazoma are lost today. Excavations in the 1960s and 1970s have unearthed the auditorium, the blocks of the stage building, which was restored on the first storey, and the so-called archive wall to the north of the *logeion* that records the communications between the city and Rome. The fourth-century CE colonnaded square to the west of the Theater, called the "Tetrastoon," was also cleared of blocks. Recent efforts have focused on studying the architecture of the Tetrastoon as a whole, together with its inscriptions and statues, and its contribution to the late antique urban plan of the site.

The Hadrianic Baths

The baths were built in the early second century CE and were dedicated to emperor Hadrian. The building, located at the west end of the South Agora, consists of three parts: a series of barrel-vaulted rooms, a forecourt with marble architecture in the east, and a late antique court (the "Tetrastyle" court) with a central pool in the north. Excavations in 1904–1905 and then in the 1960 revealed the walls of the main bathing block, its floors, including the well-preserved hypocaust system, the marble court, and the Tetrastyle court and its sculpture. Recent study efforts have focused on the Baths once again, with the aim of conserving the monument, explaining its architecture and historical phases, and opening it to the visitors.

The Bouleuterion

The building was the seat of the *boulē* and is a small semicircular auditorium on the north edge of the Agora, with a shallow stage building. The marble seating of the lower cavea survives intact, but the section above the diazoma has collapsed. The stage building was a two-storey structure with niches decorated with honorific statues and statues of deities. One of the major questions surrounding the structure is its exact chronology. The main structure dates to the second century CE with distinct Antonine and Severan phases. It remains elusive, however, whether there was an earlier first-century structure on the site (Smith & Ratté 1996). The structure was used through late antiquity. Several changes to the architecture were made to enlarge the orchestra for performances in the fifth century CE, when the cornice molding of the stage front (or *pulpitum*) was incised with an inscription identifying the patron (whose name is missing) of the *palaestra*. The word *palaestra*, originally

meaning wrestling place, could have been used metaphorically to refer to various competitions taking place in the building (Roueché 2004: 79).

The Basilica

The basilica is a long hall extending southward from the South Agora (Stinson 2008). Excavations since 1962 have documented the architecture and relief decoration of the building. The building, with a central hall flanked by two side aisles and a hall in the south opened to the main nave by arches, combined a Roman basilica with a Hellenistic stoa and meeting hall. The two-storeyed structure had an Ionic order on the lower storey and a Corinthian order on the upper one, with engaged half-columns and balustrade-like reliefs at the bottom of the columns. Built in the Flavian period, the building probably had a multi-purpose public function, including banking, money changing, and engaging in scribal activities and legal contracts. The building also served as a site to display important relief sculpture and inscriptions. There were reliefs and niches for statuary along the side walls of the long hall. The South Hall may also have served as an honorific hall for Flavian emperors and other dignitaries. In the fourth century CE, the north façade of the building became a surface to display Diocletian's Price Edict. Recent excavations have revealed the pillar capitals from the South Hall that were decorated with bull and lion protomes.

The Stadium

The 270-m-long building, entirely built of marble, is the best preserved example of its type. It has an unusual double-ended design with the auditorium running in semicircle on both ends. The structure has a seating capacity of 30,000 people, which is above the entire population of the city itself, showing that it was designed to host games for guests. The east end of the structure was converted into a small amphitheater in late antiquity (Welch 1998).

Domestic Architecture

Three major house complexes were excavated beginning in the 1980s and shed light on a portion of the domestic life of the city in late antiquity. One of the most significant domestic complexes on the site is the "Bishop's Palace," which was named so based on its proximity to the cathedral, but is now known as the "Triconch House" after its most prominent architectural feature (Berenfeld 2009). The house conveys the architecture and layout of a late antique house in the city and its relationship with the wider urban environment.

A second major house complex is the "Atrium House," which is adjacent to the back wall of the northern portico of the Sebasteion and consists of two complexes: an atrium complex to the north and an apsidal building to the south. The archaeology of the building and its peculiar sculpture, which includes a series of late Roman philosopher portraits, has been well examined.

A third housing complex of late antique date is the "North Temenos House," which is adjacent to the Temple of Aphrodite (Smith & Ratté 1998). A building with a large apsidal hall, the structure provided a mosaic floor and a series of late antique pilaster capitals with bucolic scenes.

Regional Survey

An archaeological survey of the surrounding areas was conducted between 2005 and 2009. The survey has documented several Hellenistic–Roman or pre-Hellenistic settlements, fortifications, Byzantine churches, aqueducts, marble quarries, tumuli, tombs, and sarcophagi.

Sculpture Studies

Marble workshops and sculptors from the city provided for both domestic and Italian patrons. For example, some sculptures from Hadrian's Villa at Tivoli and the Esquiline statues in Rome are signed by Aphrodisian sculptors. Due to the massive amount of Roman marble sculpture, both free-standing and in relief, sculpture studies have been one of the main focal points of the current excavation project. Several studies have dealt with Roman and late-Roman portrait sculpture, relief sculpture from the Zoilos monument, Sebasteion and the Basilica, the Aphrodite of Aphrodisias, mythological reliefs from the Agora Gate, sarcophagi (Smith & Ratté 2000;

Ratté & Smith 2004), and other pieces of sculpture material.

Epigraphy Studies

The epigraphic documents from the city, which survive in unusual numbers and provide tremendous information on the history of the site, have been studied since the eighteenth century by various scholars including Sir Charles Fellows, William Waddington, William Paton, and Louis Robert. NYU's systematic excavations carried out in the years 1961–1995 had Joyce Reynolds and Charlotte Rouché as epigraphers, who created the invaluable online database project known as "Inscriptions of Aphrodisias" (Roueché 2004; Reynolds et al. 2007). From 1995, the epigraphy of the site has been studied and published by Angelos Chaniotis (Chaniotis 2004).

Future Directions

Current research and planned future research at Aphrodisias can be reviewed under two separate headings: (1) the excavation and conservation of monuments and (2) the publication of major monuments and sculpture. In terms of the excavation of the monuments, the main focus of the current excavations is the main North–South Avenue of the city that connects the monumental gateway of the Temple of Aphrodite to the propylon of the Sebasteion. This avenue, reused in late antiquity, will be excavated and exposed to answer questions regarding the late antique urban layout of the city, and to enhance the visitor's experience of the site. Other excavation efforts will focus on the area to the south of the Theater, where a group of sondages will be dug in order to learn the early history of the site and to expose a major apsidal building, presumably a house complex, which was revealed in the recent geophysical surveys of the area. The excavation of this apsidal complex will be carried out as a collective effort by several experts.

The conservation and restoration of the existing monuments has been a major part of the seasonal activity at Aphrodisias, and the most significant of these efforts is the anastylosis of part of the south building of the Sebasteion. For this project, plaster casts of several reliefs were made and placed on the structure. Further studies will continue with a possible anastylosis of the propylon of the Sebasteion. Another major conservation project focuses on the Hadrianic Baths and includes wall capping and re-bedding of the tile floors. The aim of the project is to protect the rooms of the Baths from further damage from the elements and secure them well enough to open to visitors.

Four monographs have been published. The first two by the excavation director R.R.R. Smith deal with the funerary monument of C. Julius Zoilos (Smith 1993) and the Roman portrait statuary from the site (Smith 2006). The third volume is on the Aphrodite of Aphrodisias (Brody 2007), and the fourth monograph is about the mythological reliefs from the Agora Gate (de Bellefonds 2009). Publication of the monuments and sculpture will continue with monographs on the Basilica, the Bishop's Palace, and the Sculptor's Workshop. While publication projects such as the Sebasteion reliefs and the late antique statues from the site are imminent, other forthcoming publication projects on the sarcophagi and the Atrium House will explore issues of life and death in the ancient city.

Cross-References

- ▶ Domestic Architecture, Roman
- ▶ Eastern Provinces of the Roman Empire, Archaeology of the
- ▶ Epigraphy, Greek
- ▶ Erim, Kenan
- ▶ Hellenistic and Roman Anatolia, Archaeology of
- ▶ Urban Planning, Roman

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Apricot: Origins and Development

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Basic Species Information

Apricot, sometimes known as Armenian plum (derived from a mistaken belief of an Armenian origin), is the common name of *Prunus armeniaca* L./*Armeniaca vulgaris* L. The name apricot derives from the Arabic *al-birquq* through Byzantine Greek *berikokkia* from Latin *malum praecoquum* – early ripening fruit. The Latin *Prunus armeniacum* is a reference to an early believed origin in Armenia, which is one of the places where these trees are wild.

Apricot is a deciduous tree up to 10 m with broad ovate leaves, self-fertile white – rarely pink – flowers produced singly or in pairs before the leaves in spring. Some cultivars are self-compatible while are others are self-incompatible. Wild forms are fully interfertile with cultivated populations. Apricots are grown for their large fleshy fruit, a drupe with glabrous or pubescent yellow to orange exocarp and a soft mesocarp. The endocarp is lignified and slightly grainy on the outer surface. There is a pronounced ridge along the ventral suture. The seeds or kernels produce laetrile (cyanide) in wild forms, and some cultivars are bitter to avoid predation (Zohary et al. 2012). In other cultivars, apricot kernels can be eaten in substitution for almonds, especially in China where they are commonly roasted to make them palatable (Simoons 1991). Apricot kernels are also used to flavor Amaretto liqueur and biscuits (van Wyk 2005).

Apricots are cultivated in temperate, subtropical and continental regions. They require cool weather for dormancy, and the trees can survive winter temperatures down to −30 °C, but the buds and flowers are not frost resistant.

The fruit needs dry weather for maturation. Trees usually bear fruit the 4th or 5th year after planting.

Major Domestication Traits

Wild apricots have a disjunct distribution in the Caucasus region and in eastern Asia. These wild forms are characterized by smaller fruits and leaves and spiny branches (Lu & Bartholomew 2003; Gabrielian & Zohary 2004). In China, free-growing and possibly wild populations of a number of varieties are reported from hilly areas around much of northern and western China (Ningxia, Qinghai, Shaanxi, Shanxi, Nei Mongol, Liaoning, Jiangsu, Shandong, and Sichuan). *A. vulgaris* var. *vulgaris* is reported to occur in pure stands in the Illi prefecture of Xinjiang. While in China, these occur between 600 and 3,000 m elevation; in Armenia, they are found at 1,200–2,100 m only. Modern genetic diversity is suggested to have three centers of diversity (Yilmaz & Gurcan 1977; Maghuly et al. 2005), including one focused on the Caucasus, one on northwestern South Asia, Central Asia, and Xinjiang, and one on China. This strongly suggests that wild populations in Xinjiang and Armenia have contributed to cultivar diversity, although the origins of early cultivars may only have taken place in China.

Timing and Tracking Domestication

Archaeobotanically, apricots may be recognized from endocarp remains that differ from related tax (e.g., Fig. 1). Based around the Caucasus center of wild apricots are a number of early finds. These include archaeological evidence from the Eneolithic at Garni and Shengavit in Armenia (Arakelyan 1968), Eneolithic sites in the Ukraine ca 4,000–2,800 cal BCE (Zohary et al. 2012), and sixth and fourth millennia cal BCE sites in the Carpathian-Dniester region (Monah 2007). It is unclear if this indicates a formerly more widespread wild distribution or early translocation of cultivated trees.

Apricot: Origins and Development, Fig. 1 Illustration of endocarps (stones) of apricot (*Armeniaca vulgaris*), *left*, compared to the Japanese apricot (*Armeniaca mume*), *right*

In the East, archaeobotanical evidence points to origins of cultivars in Central China. It is difficult at this stage to separate stone remains of wild versus domesticated apricots in early assemblages. The earliest finds probably represent gathering, such as from Kuahuqao (6,000–5,400 BCE) in the Lower Yangtze region, alongside many wild nuts and fruits, including the related *Armeniaca mume*. Later in the Longshan period (after 2,500 BCE) and Bronze Age (second millennium BCE), there are several sites with apricot from Central China (Hosoya et al. 2010). The early history of apricot in China is intertwined with the mume apricot, or Japanese apricot, *A. mume* Siebold (syn *Prunus mume*), which today goes by the Chinese name *mei* distinct from *xing* used for true apricot. However, it is thought that *mei* might have originally referred to true apricots. *A. mume* is an important cultivar, especially in South China, Japan, Korea, northern Laos, and Vietnam. It is native to the slopes below 3,100 m in western Sichuan and western Yunnan (Lu & Bartholomew 2003). Disjunct wild populations are also reported from northern Taiwan. This species has sour fruits which are normally made

edible through drying, salting, or pickling (Simoons 1991). True apricots may have been used in similar fashion, with sweet forms developing later (or even outside of China). The first finds of apricot beyond its Chinese wild distribution is in Neolithic Kashmir by or shortly after 2,000 BCE (Lone et al. 1993). Much later finds include late First Millennium BCE in Nepal (Knorzer 2000) and in the Sampula Cemetery in Xinjiang (Jiang et al. 2009).

Apricots reached the Mediterranean region late, probably as introductions from Iran and Armenia around the third century BCE. Within a few hundred years apricots were well established in Spain, Turkey, Greece, and Italy (Zohary et al. 2012). They were taken to the Americas by the Spanish in the fifteenth century (Yilmaz & Gurcan 1977).

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Archaeobotany of Early Agriculture: Macrobotany
- ▶ Domestication: Definition and Overview
- ▶ Domestication Syndrome in Plants
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Peach: Origins and Development
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Plant Processing Technologies in Archaeology

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Arabian Peninsula: Islamic Archaeology

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Introduction

As the birthplace of Islam, the Arabian Peninsula holds a special place within the Muslim religion

and culture. Despite this the archaeology of the region has not been investigated to the same extent as many other parts of the Middle East, and there are still major sites and themes which are yet to be explored. The reasons for this situation are largely historical, and currently our understanding of the archaeology of the region is being transformed through new international and national projects throughout most of the Peninsula.

Definition

The Arabian Peninsula is a huge area covering more than one million square miles with a considerable diversity of climate, topography, and culture. It is located between Africa and Asia and with its own tectonic plate may be considered a subcontinent although conventionally it is regarded as part of Asia. Seven countries are located entirely within the Peninsula (Saudi Arabia, Kuwait, Bahrain, Qatar, United Arab Emirates (UAE), Oman, and Yemen), while large parts of Jordan and Iraq may also be considered part of the region. Saudi Arabia is overwhelming the largest country in Arabia and shares a common border with all of the other states. The regional significance of Saudi Arabia is further reenforced by the fact that it contains the two holiest sites in Islam, the sacred cities of Mecca and Medina. Despite being home to ancient civilizations, the modern states of Arabia are mostly fairly recent, and with the notable exceptions of Oman and Yemen, all are less than 200 years old.

Historical Background

Prior to the development of European interest in Arabia, inhabitants of the region had shown some interest in the antiquities of their homeland. For example, as early as the seventh century, the authorities in Mecca had investigated the antiquity of the Ka'ba and the earlier foundations buried beneath. Similarly the early tenth-century author Hasan ibn Ahmad al-Hamdani considered the antiquities of Southern Arabia in his book *Kitab al-Iklil* (Faris 1938). However, systematic investigation of ancient remains recognizable as modern archaeological practice was largely the result of European interests in the region. The archaeological investigation of Arabia began in different areas at different times although the earliest scientific exploration of the Peninsula was carried out by the Danish Expedition of 1761–1767 of which Carsten Niebhur was the only survivor. Although the expedition mostly retrieved information about the coast of Arabia with little information from the interior, it was unique because it was the first attempt to systematically document the region (Niebhur 1792). In the nineteenth century there were many expeditions to Arabia which included documentation of antiquities; the majority of these focused on northwest Arabia though Yemen was also an area of considerable interest. Although many of these early explorations collected information relevant to Islamic archaeology, most were concerned primarily with pre-Islamic remains and in particular the ancient Arabian civilizations. Interest in Islamic civilization was generally restricted to ethnographic studies although there was some interest in Islam as a religion with a fascination for the holy cities of Mecca and Medina. Early explorers who offered descriptions of antiquities include the Swiss explorer Burckhardt famous for rediscovering Petra in 1812. In addition Burckhardt made a trip to Mecca in 1814 where in the guise of a Muslim, he made a detailed study of the holy sites of Mecca including the Ka'ba (Burckhardt 1829). Nearly forty years later in 1853, Sir Richard Burton disguised himself as an Afghan Muslim and visited Mecca and Medina making detailed notes and measurements of all he saw within the holy cities (Burton 1893).

Against the background of increasing European interest in the antiquities and culture of Arabia, the political configuration of the Peninsula in the nineteenth century was gradually evolving. While the Hejaz (western region), Yemen, and al-Hasa were under Ottoman Turkish control, the interior Najd was the home to a growing fundamentalist Islam which was the

seed of the modern Saudi state. In the Arabian/Persian Gulf on the east coast of Arabia, Oman and a number of tribal territories along the coast were brought under British influence in order to protect the security of the sea route to British India. Despite the British presence in the Gulf, there was little interest in the antiquities of the area although records made by British officials have subsequently become indispensable for the study of archaeology in the area. Following the collapse of the Ottoman Empire in 1918, there was political turmoil in the region, and little archaeological research was carried out until after World War II.

From the 1950s onward there was increasing interest in the archaeology of Arabia partly funded by the quest for oil in the region. Important work was carried out in Bahrain and the Eastern Province of Saudi Arabia (formerly al-Hasa province) revealing a complex early society with links to Mesopotamia and India. Although the focus of this archaeology was on the pre-Islamic period, the presence of Islamic-period remains often overlying those of earlier periods could not be ignored. In general however Islamic archaeology was not regarded as something of interest in its own right. This is reflected in the works of Creswell who was famously dismissive of the Arabian contribution to Islamic architecture (King 1993). Even within the highly religious Kingdom of Saudi Arabia, the interest in antiquities in general and Islamic antiquities in particular was muted, and on occasions there seemed to be a hostility to archaeological research. The suspicion of archaeology was partly a wariness that archaeological sites could become shrines and as such used as a focus for unorthodox worship. There was also a sensitivity to interpretations of archaeological material which might conflict with accepted historical narratives. Examples of studies which have challenged Muslim historiography include Patricia Crone's work which suggested that Mecca was not a major trading center (Crone 1987) and Nevo and Koren's assertion that Muhammad was not fundamental in the establishment of Islam in Arabia (Nevo & Koren 2003). Although both these studies have largely been disproved by archaeological and historical research, they are both sensitive issues for the Saudi religious authorities.

The granting of full independence to the Gulf States and growing urban and industrial infrastructure during the 1970s led to a growing interest in protecting and investigating the antiquities of Arabia. For example, the government of Qatar commissioned the *Qatar Archaeological Report* which was the first detailed archaeological survey of the country and is still an important source of information for the Islamic and pre-Islamic archaeology of the country (De Cardi 1978). Also during this period the Saudi government began a comprehensive survey of archaeological sites throughout the kingdom and initiated a major project recording the Darb Zubayda (Muslim pilgrimage route from Baghdad to Mecca). The 1970s also saw the first publication of the *Proceedings of the Seminar for Arabian Studies* under the initiative of John Dayton. The Seminar provided a forum for the discussion and publication of issues related to the archaeology and culture of Arabia which is still continuing today. This period also saw the first excavations at Qaryat al-Fau by King Saud University under the direction of Abd al-Rahman al-Ansary. This major pre-Islamic settlement in central Arabia (first century BCE and fourth century CE) is important for understanding the Islamic archaeology of Arabia because it indicates the indigenous roots of Arabian civilization (al-Ansary 1982). However, the most important project for Islamic archaeology was the excavation of the early Abbasid site of al-Rabadha by Saad al-Rashid in the late 1970s and early 1980s (al-Rashid 1986). Although the site had been inhabited prior to the eighth century, the construction of the pilgrimage route from Baghdad to Mecca led to the development of the settlement as a major stopping place. The architecture and finds from the site indicate a sophisticated urban settlement with extensive trade connections.

Since 1980 the number of archaeological projects in Arabia has multiplied with both research projects and developer-funded excavations transforming our understanding of the archaeology of the region.

Key Issues

The archaeology of the Islamic period in Arabia is a subject which is developing very quickly, and it is likely that many of the current questions and theories will be modified or replaced as new data becomes available. For the present a number of areas of research dominate our understanding of this period which relate to urbanism, maritime/coastal archaeology, water management and agriculture, and trade and pilgrimage routes.

Urbanism

The birth of Islam in Arabia is intimately associated with urban life in Mecca and Medina, while the spread of Islam outside Arabia is also associated with cities and towns. Before the 1980s archaeologists working further north in Syria, Palestine, and Jordan tended to ignore this Arabian urban heritage looking instead at Islamic cities simply as developments of earlier Roman and Byzantine urban settlements. The discovery of both pre-Islamic and early Islamic cities within Arabia has led to a reassessment of this cultural bias. New research based on excavations at sites such as ‘Aqaba in Jordan has suggested that the pattern for Islamic settlement may in fact originate in Arabian forms of urban development (Fig. 1; Whitcomb 1996). In addition to an interest in the contribution of Arabia to early Islamic urbanism, there is also a growing interest in towns of the late Islamic period (Petersen 2009). In part this is connected with an interest in the origins of the modern Gulf cities such as Dubai, Abu Dhabi, Ras al-Khaimah, Doha, and Muscat (Peterson 2007). There is also a growing interest in traditional urban architecture which is seen as environmentally and socially more suitable than modern energy-intensive structures.

Maritime/Coastal Archaeology

Although typical images of Arabia are largely dominated by arid mountains and sand deserts, it also has coasts on three seas (the Red Sea, the Indian Ocean, and the Persian/Arabian Gulf). The majority of settlement in Arabia is located near the coast with traditional occupations including fishing, pearl diving, and maritime trade. A number of port cities have been excavated (e.g., ‘Aqaba, Qalhat, Bahrain, Ras al-Khaimah, Sohar, Jumeirah, Ras al-Hadd) with finds which indicate wide-ranging long-distance trade with sub-Saharan Africa (Kenya and Tanzania), the Far East (China, Vietnam, and Philippines), and India (Gujerat). Recently there has been considerable interest in the pearl industry in the Gulf with major excavations at Zubarah and Ruwayda in Qatar revealing much about the organization and material culture of a nineteenth-century pearling center

Arabian Peninsula: Islamic Archaeology, Fig. 1 The Mamluk and Ottoman fortress at ‘Aqaba, Jordan, excavated between 2000 and 2003. Originally founded in the thirteenth or fourteenth century, the majority of the standing building dates to the 1500 s and later. The site of early Islamic ‘Aqaba excavated by Donald Whitcomb in the 1980s is approximately one kilometer to the west

(Petersen & Grey 2010; Richter et al. 2011). Fishing has also attracted attention with the mapping and excavation of fish traps demonstrating considerable continuity from the pre-Islamic period to the present day.

Water Management and Agriculture

One of the distinguishing features of the Arabian Peninsula is the scarcity of water, and over the centuries the inhabitants have developed sophisticated means of water catchment and retention. Some areas such as Yemen and southern Oman benefit from seasonal monsoon rains and have developed complex irrigation and agricultural systems which maximize the available water. In other areas such as Oman and the UAE, water is brought from the mountains into urban agricultural areas by means of underground water channels (*qanat*s). However, in most of Arabia water is derived from wells or springs and is extremely scarce. Nomadic Bedouin are generally dependant on wells both for their herds and for themselves, and complex arrangements have developed to enable the water to be shared between different tribes. One of the key issues in the study of water management is the origin and the development of the *qanat* system which investigators have traditionally attributed to pre-Islamic Persian occupation. While some *qanat*s certainly predate the advent of Islam, it also appears that many of the *qanat*s in Arabia were built during the Islamic period (Lightfoot 2000).

Trade and Pilgrimage Routes

While Arabia had extensive connections through maritime trade in the Indian Ocean and the Gulf, there were also caravan routes which connected the towns and cities of the coast with the interior and the more settled regions of further north. The most famous caravan route is undoubtedly the incense road which connected south Arabia with Syria via the caravan cities of Medain Saleh and Petra. Although the incense trade seems to have declined before the advent of Islam, the route continued to be of importance during the Islamic period as the Syrian *hajj* route. During the Ottoman period this route became particularly significant as the link between the Constantinople and Mecca increasing the legitimacy of the Sultan's title of Protector of the Two Shrines (al-Rashid 1979, 1980; Petersen 2012). The network of pilgrimage routes which cover Arabia not only provided access to the holy cities of Mecca and Medina but also stimulated trade and the local economies of the towns, villages, and nomadic territories through which they passed. Other important caravan routes linked the settlements on the Gulf coast with those of Oman via the Wadi Jizzi. The advent of Islam increased the traffic on all the existing routes as well as creating new roads such as the Darb Zubayda.

Current Debates

The large number of archaeological investigations in Arabia as well as the increasing interest in the history and culture of the area has raised a number of difficult methodological problems which need to be addressed. These may be summarized as (1) how to incorporate churches and Christianity into the Islamic archaeology of the region; (2) how to deal with the archaeology of Mecca and Medina in the face of rapid development; (3) how to investigate the archaeology of slavery within the region; and (4) how to deal with the archaeology of different religious sects.

Churches and Christianity

Both historical sources and archaeological excavations point to a significant Christian population in Arabia before the advent of Islam. In eastern Arabia excavations have revealed churches and monasteries at a number of sites including Failaka in Kuwait and Sir Bani Yas in the emirate of Abu Dhabi. There is also significant anecdotal evidence of the discovery of churches in Saudi Arabia although these are generally unpublished (see, e.g., Langfeldt 1994). The general assumption is that all the churches are of pre-Islamic date and ceased to function soon after the time of Muhammad; however, it is probable that at least some of these communities continued well into the Islamic period.

The challenges include recognizing the archaeological evidence of continued Christian presence into the Islamic period and incorporating this into "Islamic archaeology" (see also Insoll 2005: 198-9).

Archaeology in Mecca and Medina

Like many religious sites around the world, Mecca and Medina have both a spiritual and an archaeological significance. The spiritual dimension of the cities includes both practical considerations related to the accommodation of ever-increasing numbers of pilgrims and also philosophical questions related to the embodiment of the faith in structures and locations. The archaeological dimension relates to the fabric of buildings as well as stratigraphic deposits and features which may be found within the cities. Massive building works in recent times have meant the destruction of much archaeological material, and it has been estimated that up to 90 % of the historic fabric of the cities has been destroyed. Reconciling the needs for accommodating vast and increasing numbers of pilgrims with the historic remains is undoubtedly a challenge and will involve some difficult decisions; however, archaeological documentation can still be carried out whatever the ultimate fate of particular historic structures.

The Archaeology of Slavery

The archaeology of slavery in the New World, in Africa, Europe, and elsewhere is an area of research which has seen growing interest in recent years. Within the Islamic world there have been a few attempts to investigate slavery through archaeology, but much more needs to be done. In Arabia there is considerable scope for investigating the phenomenon both because it survived much longer than elsewhere and also because there is potential for considerable material to have survived.

The Archaeology of Religious Sects

Although Muslims generally see themselves as part of a single community (*ummah*), there are many different sects and divisions, the most prominent of which is between Shia and Sunni Muslims. Within Arabia the majority of the current population is Sunni (specifically *Wahidun, Salafist,* or *Wahabbi*) although there are also significant numbers of Shia in the Eastern Province of Saudi Arabia, Bahrain, and Yemen. In addition Oman has a sizeable Ibadi population, and there are Sufi orders which although rare in present-day Arabia were a significant feature in Ottoman times. The recognition of these sects within archaeology is important to inform modern perceptions of heritage and to gain a full understanding of the past cultures.

International Perspectives

Archaeology in Arabia has always had international dimensions because of both the religious significance of the region and international strategic and economic interests in the area. For example, Russian archaeological expeditions were carried out in south Yemen during the period when the country was allied to the Soviet Union (1969–1992), while many of the early archaeological discoveries in Saudi Arabia were linked to the work of Americans working for the Aramco oil company. Other countries involved in Arabian archaeology include Denmark (with Danish teams carrying out excavations in Qatar, Bahrain, Kuwait, and the UAE), Japan, and Britain.

Future Directions

The rapid development of much of Arabia combined with a growing appreciation of the value of traditional heritage and culture means that archaeology is of growing importance for the region. Islamic archaeology is particularly significant due to its connection with the modern population of the area and because it is so well represented in the material record. Aspects of archaeology likely to develop our understanding of the Islamic period in Arabia include aerial survey, environmental studies, and heritage development, as well as some theoretical approaches adopted from historical archaeology.

Aerial Survey

The large and often inhospitable interior of Arabia lends itself to aerial survey, which has been used in the region since the early twentieth century. Although security concerns and territorial disputes have restricted the use of aerial survey in archaeology, the development of new techniques has opened up new possibilities. These include the use of declassified and open-source satellite imagery which together with increased accessibility to historical imagery have enabled significant discoveries of archaeological sites (Kennedy & Bishop 2011). In addition the development of unmanned aerial vehicles (UAVs) has given archaeologists the opportunity to selectively survey areas both as a means of site prospection and in order to monitor known archaeological sites.

Environmental Studies

Although environmental studies have long been part of prehistoric archaeology in the Middle East, their application to historic-period sites is infrequent. However, as the number of sites investigated increases, it is likely that it will be possible to investigate long-term patterns of production and consumption throughout the Islamic period. Of particular interest is the range and quantity of agricultural produce used on different sites, with associated implications for cultural adaptation and climate change.

Heritage Development

The growing importance of archaeology and historic buildings in Arabia is reflected in the increased attention being given to the presentation of sites and monuments as well as the development of museums. The Islamic period is particularly well presented in museums, while a number of specifically Islamic sites have been added to the UNESCO World Heritage list; these include the al-Turaif district in Saudi Arabia, Zubarah in Qatar, Zabid and San'a in Yemen, and Bahla Fort in Oman. In the future it is likely that the number of World Heritage sites in the region will increase, as will local engagement with archaeology and heritage (Figs. 2–4).

Theoretical Approaches

As a branch of archaeology which focuses on a historical period, Islamic archaeology can

Arabian Peninsula: Islamic Archaeology, Fig. 2 Corner tower of al-Jahili Fort in al-Ain, UAE. The fort dates mostly from the nineteenth to twentieth century and is one of nine forts in the al-Ain Buraimi Oasis. It was excavated in 2008 as part of a comprehensive restoration program

Arabian Peninsula: Islamic Archaeology, Fig. 3 Zubarah fort during National Day 2008. The site has national significance and is used as a location for heritage reenactments. To the south of the fort are extensive ruins of the city of Zubarah which are currently being excavated and restored

Arabian Peninsula: Islamic Archaeology, Fig. 4 Julfar ware jar in al-Khaimah museum. Julfar ware was produced from the medieval period until recent times and was widely used in the region of the Gulf

benefit from many of the theoretical and practical perspectives of historical archaeology as it has developed in Europe and the Americas. Particular importance can be attached to issues of globalization in which Arabia, as the bridge between the Mediterranean and the Indian Ocean worlds, was a key component. Also of interest is the diffusion of crops such as coffee from Arabia to the Americas as well as the importation of tobacco (see, e.g., Bouzigard & Saidel 2012). In the future it is likely that these approaches will demonstrate that Arabia was already a major component of world trade systems before the discovery and exploitation of oil.

Cross-References

- ▶ Historical Archaeology
- ▶ Iberia: Medieval Archaeology
- ▶ Indian Ocean: Maritime Archaeology
- ▶ Islamic Archaeology
- ▶ Ottoman Empire: Historical Archaeology
- ▶ Religion in Islamic Archaeology
- ▶ Rural Life in Islamic Archaeology

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Archaeobotany

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Introduction and Definition

Archaeobotany is a composite discipline, combining botanical knowledge with archaeological materials. Archaeobotany is also known as *palaeoethnobotany* (or *paleoethnobotany*). It focuses on the study of preserved plant evidence from archaeological sites and the reconstruction and interpretation of past human-plant relationships. The term "archaeobotany" emphasizes the archaeological nature of the evidence, with its recognition of site formation processes and sampling issues. The term *paleoethnobotany*, especially prominent in North America, recognizes the importance of modern ethnobotanical studies in contributing to interpretations of the past. This needs to be kept distinct from the term *palaeobotany*, which is the study of past plants, their adaptations, evolutionary relationships, and communities, from the fragmented remains that are preserved in old sediments. While palaeobotany takes in the whole history of plant life on land (approximately 415 Ma), archaeobotany focuses on the plant evidence relating to past human environments of the Pleistocene and Holocene.

Like many other specialist subdisciplines of archaeology, archaeobotany has evolved from a side-line pursuit of scientists outside of archaeology to something that is very much a part of archaeological research (for histories, see Hastorf 1999; Pearsall 2000; Fuller 2008). The origins of this field of research can be traced back to the nineteenth century, especially to a prominent expert on fossil plants, Oswald Heer, who carried out the first studies of archaeological plant remains recovered from waterlogged Swiss Neolithic and Bronze Age lake-side sites. His detailed monograph on these, in 1865, had a major impact on the discipline of archaeology and the early development of evolutionary biology; see by extension, summaries in Charles Darwin's *Variation in Animals and Plants under Domestication* (1868) and John Lubbock's *Prehistoric Times* (1872), which introduced to archaeology the term "Neolithic." For much of the subsequent century, recovered plant remains were sent by archaeologists to botanists for study, for instance, specialists working at natural history museums. However, specialist archaeobotanists taking part in archaeological fieldwork only began to be staples of archaeological research from the 1960s onward. Particularly important for this trend was the advent of improved systematic sampling of plant remains through the flotation method, first carried out in the USA and the Middle East in the 1960s. Flotation, a key method in archaeobotanical research, uses water to separate light organic remains (especially charcoal and carbonized seeds) from heavier archaeological material and the sand component of sediment (details of various systems in Pearsall 2000).

Key Issues /Current Debates

Research Themes

In general terms, archaeobotanical research questions relate to both past food-related practices/foodways, and past landscapes. A central concern of archaeobotany is the recovery of evidence for food plants exploited by past populations, where these plants came from, and how they were processed. In the study of hunter-gatherer societies, there are often challenges of preservation; yet, research on plant subsistence is crucial to examining issues of seasonal

Archaeobotany, Table 1 Archaeobotanical datasets, preservation environments, and typical spatial resolution

Data sets:	Preservation	Spatial resolution (typically)
Macros: remains of seeds and other fruit fragments	Charred	Local, biased by human procurement
	Waterlogged	
	Desiccated	
	Mineralized	
Macros: wood charcoal	Charred	Local, biased by human procurement
	Desiccated	
	Waterlogged	
Macros: parenchyma fragments	Charred	Local, biased by human procurement
	(Potentially desiccated)	
Plant impressions in pottery/ mud-brick	In pottery or hardened clay, therefore all environments where pottery or mud-brick is used	Local or nonlocal (traded), biased by human procurement and tempering preferences
Pollen	Fine sediments, especially acidic (alkaline and oxidizing conditions destroy pollen)	Regional
Phytoliths	Fine sediments, minimal bioturbation (of most pH levels except very high alkalinity (>9) and high temperatures).	Local plant use activities (on-site)
		Regional vegetation (when part of off-site studies, as with pollen)
Starch Grains	Preserved in dental calculus	Components of human/ animal diet
	From artifact surfaces (groundstone, ceramics)	Plant parts and taxa processed on these tools or vessels
Palaeofaeces (i.e., preserved feces or coprolites, and gut contents from mummies or bog bodies)	Mineralized	Local diet, but may contain regional pollen
	Waterlogged	
Diatoms are sometimes examined in archaeobotanical research		Regional aquatic environment

scheduling of activities, intensification of plant use and processing, storage, and niche construction (e.g., Mason & Hather 2002; Wollstonecroft 2011). Another major focus of archaeobotany is the transition to, and spread of, agriculture, including research on cultivation systems, arable weeds, and plant domestication traits (e.g., Fuller 2007; Piperno 2011). In contexts where agriculture existed, archaeobotanical research focuses on issues of diversification and intensification of agricultural systems and the organization of production and consumption of crops in relation to social hierarchy (e.g., Gumerman 1997; Fuller & Stevens 2009). When it comes to landscapes, archaeobotany has contributed to the reconstruction of past environments as well as to studies of environmental change due to climate change and/ or human impact. In this area, wood charcoal, on-site and off-site palynology, and phytolith studies are especially prominent.

Archaeobotanical Datasets and Subfields

Given that the various datasets define subfields of the discipline, few archaeobotanists practice research on all lines of plant evidence. Macro-remains analyses tend to focus on the study of seeds only, whereas wood charcoal and the analyses of phytoliths and starches are specializations in their own right. Still these various datasets are largely complementary and gain strength from integration. The sections below, and Table 1, summarize the main lines of archaeobotanical evidence and their respective potentials. The study of Palaeofaeces, i.e., the analysis of exceptionally preserved human coprolites and gut contents, is another source of archaeobotanical data that may combine several lines of evidence (Hillman 1986).

Macro-Remains: Crops, Chaff, and Weeds

Macro-remains refers to plant remains that are visible to the naked eye (larger than 0.25 mm),

but which still require microscopy to identify. Seeds, which are the most common evidence studied by archaeobotanists, can be preserved by numerous means, including mineralization, waterlogging, metal oxide preservation (sometimes called pseudomorphs), or as impressions in pottery. The most common means of seed preservation encountered, however, are charred seed remains. Generally, charred macro-remains can be identified by examination of their external morphology through a low powered binocular microscope (i.e., 6x–40x). It has now become possible to extract fragmentary ancient genetic information (i.e., aDNA) from ancient seeds, and the prospects of this technique are immense (Palmer et al. 2012).

In general, charred assemblages sample only a very limited range of the floristic diversity of local flora. This came to be recognized in Europe in the 1970s. It was observed that most archaeobotanical samples consisted of a similar range of taxa that are dominated by grain crops (seeds and chaff) and wild species known from modern field studies as weeds of cultivation or weeds of habitats that are disturbed by humans (Jones 1985). However, by far, the best represented remains were those of cereals, in part due to the good preservation of grain and chaff. Thus, aside from the remains of a few wild fruits likely collected for food, most of this fossil evidence can be interpreted as deriving from arable plant communities rather than the environment at large. Therefore, the associations of grains, chaff, and weed seeds can be used to infer aspects of crop-processing (Hillman 1984; Jones 1987; Fuller & Stevens 2009). After crops are harvested, they must be processed in predictable ways, to remove inedible husk (and weeds) and to separate the grain products. Through ethnographic studies, archaeobotanists have developed predictive models about sample composition, which allow the stages of crop-processing represented to be inferred. Most studies have been on the crop-processing of Mediterranean wheat and barley (e.g., Fuller & Stevens 2009), but one can also find studies of millets (e.g., Reddy 1997; D'Andrea & Wadge 2011), rice (Thompson 1996), and some new world crops (e.g. Lopez et al. 2011). These ethnoarchaeological models have made it possible to interpret crop-processing, which can be divided into two basic sets of activities: those that break apart the crop-plant and those that separate out the various freed components. The first activity includes threshing to break apart cereal ears, or separate the pods of some pulses. Another later stage, for hulled crops, is de-husking, which removes the hulls and glumes that are still attached to the grain. In simplified terms, the early stages produce waste that is rich in chaff (especially of free-threshing cereals, like bread wheat and barley) and weed seeds, especially smaller, lighter weed seeds that are removed by winnowing. Later stages will have a higher proportion of grains, fewer weeds that are generally larger and heavier, and will only have chaff from hulled cereals (like the glumes of emmer or einkorn wheat).

Parenchyma, the starchy storage tissue of plants, which predominates in tubers and other underground storage organs, can also be preserved by charring. Such material has not traditionally been searched for in archaeobotanical samples, but studies from a number of regions have found it to be fairly common among seeds and charcoal (Hather 2000), and this line of evidence has the potential for identification of wild or cultivated roots and tubers. This approach should be an important part of research on the origins and development of Vegeculture. Identifications of this material requires the high magnifications and depth of field provided by scanning electron microscopy (SEM).

Macro-Remains: Impressions

Another source of evidence of seeds and chaff is preserved impressions of plants. Plant impressions, often preserved in pottery, are one of the traditional sources of archaeobotanical information. However, today, the study of impressions is often eschewed when charred remains recovered through flotation are available from a site. Impressions can be studied at lower magnifications and often latex casts are prepared from the

molds, which can then be analyzed by SEM. Most cereal parts, such as chaff, are preserved in pottery since these readily available by-products of grain production were often used for tempering pottery. In some cases, this provides early evidence for crop domestication, such as in West Africa (e.g. Manning et al. 2011).

Macro-Remains Wood Charcoal

Wood charcoal is the most abundant component of archaeobotanical flotation samples. Given the centrality of fire in human cultures, wood charcoal is among the most abundant of cultural by-products. In contrast to seed remains, which represent chance/incidental burning, wood is generally considered to be the product of intentional burning. Wood can also be preserved under other circumstances, such as waterlogging. It is identified by looking at anatomical characters in transverse, tangential, and radial sections. This kind of study requires higher magnifications, generally 50x–150x, but sometimes as high as 400x, and beyond, which is aided by SEM. Since most fuel is likely to come from the vicinity of the site, it should provide some reflection of the surrounding vegetation. Numerous studies have utilized changes in the composition of wood taxa to examine changes in the landscape, but fuel choice may also reflect social and political concerns (Asouti & Austin 2005; Marston 2009).

Micro-Remains: Phytoliths, Starch, and Pollen

There are a number of lines of archaeobotanical evidence that are beyond the range of human vision and must be extracted from sediment samples, mounted on slides, and examined under high magnification. These lines of evidence are micro-remains, and include phytoliths, pollen, and starch grains. The most widely studied micro-remains in archaeology are phytoliths (sometimes called "plant opals," silica skeletons, or spodograms), which are the silica casts of plant cells formed by the evaporation of silica-laden water through plant transpiration (Pearsall 2000). Being an inorganic glass, these have a high potential for preservation in many sedimentary environments, although they are likely to be destroyed by mechanical processes. The study of these remains requires magnifications from 200x to 1,000x. Phytoliths are invisible in cross-polarized light. Phytolith identification is complicated by the fact that any given plant produces numerous different forms of phytoliths and similar phytoliths forms may be produced by unrelated species. Nevertheless, some phytolith forms are diagnostic. Because of the high preservation potential of phytoliths, they have proved particularly important for examining plant exploitation prior to agriculture in the Palaeolithic (Madella et al. 2002), and for tracking crops in tropical environments with poor on-site preservation of macro-remains (e.g., Piperno 2011).

A more recently expanding line of research are starch grains; the intracellular storage of starch by plants. The form of starch grains appears to be taxonomically determined, allowing separation of families, and sometimes genera and species (Torrence & Barton 2006). There also seems to be some indication of domestication in some taxa (e.g., Piperno 2011). Most often starch grains are extracted from the surfaces or residues of artifacts, such as groundstone, but they also become trapped in dental calculus and, as such, reflect human diet. Starch grains have been central to the archaeological study of past Chimpanzee archaeology (Mercader et al. 2007). Some traditional archaeobotanists still regard starch grains with suspicion and there is on-going research and debate on issues of taphonomy, preservation, and identification, as there is with other lines of archaeobotanical evidence.

Pollen is usually collected from off-site geological sediments (palynology) for examining palaeoecology, which is often of relevance for archaeological interpretations. Of particular interest are approaches to identifying the introduction or intensification of agriculture through pollen. In addition, pollen is sometimes preserved in archaeological sediments (archaeological palynology), which can help fill-out reconstructions of past vegetation

(e.g., Dimbleby 1985; Pearsall 2000). Pollen is studied at similar high magnifications as phytoliths.

International Perspectives and Future Directions

The growth of archaeobotany has been uneven internationally. As reviewed in Fuller (2008), several regions of the Old World have seen different chronologies for the development of this field. It was earliest in Europe, quite early but small-scale in India, and early in the Near East. Development in Africa has been slow, and the majority of sub-Saharan countries have had no archaeobotanical research. The USA has a long tradition of archaeobotanical research, but for much of the Neotropics, developments have been more recent and are spatially uneven (cf. Piperno 2011). Japan has had a longer tradition of studying waterlogged macro-remains, using flotation, and undertaking phytolith research, whereas such developments are quite recent in China or Korea. Most of Southeast Asia is un-sampled and understudied (Castillo & Fuller 2010). Thus, while archaeobotany has potential application anywhere – all human societies have used and consumed plants – its adoption has been uneven, partly biased toward countries with better funded research institutions and partly focused on regions deemed to be centers of origins of agriculture and civilization (e.g., Mesoamerica or Southwest Asia). Archaeobotany has greatly expanded internationally and across a range of subfields. It is set to continue to do so in the future.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agriculture: Definition and Overview
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Archaeobotany
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Landscape Domestication and Archaeology
- ▶ Maize: Origins and Development
- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Phytolith Studies in Archaeology
- ▶ Vegeculture: General Principles

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Archaeobotany of Agricultural Intensification

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Introduction

Although agriculture was introduced into Europe at the beginning of the Neolithic period, archaeological studies often suggest that intensive systems of agricultural production were not practiced until the Bronze Age. In the case of Britain and Ireland, for example, the increased appearance of archaeologically identifiable fields and farmsteads during the Bronze Age is often understood to represent agricultural intensification (see Brück 2000: 275). The intensification of agriculture in Bronze Age Europe is of enormous significance, as it is considered to be a precursor to increasing social stratification, with the creation of a strong agricultural economic base enabling the development of hierarchies that controlled the means of production and distribution of produce. This model of increasing intensity over time will be challenged here through detailed consideration of agricultural terminology and archaeological evidence for intensification, with a focus on archaeobotany and Ireland. It will be shown that intensification represents just one of many agricultural strategies available to prehistoric

farmers in Europe and cautions against an overfocus by archaeologists on this mode of production.

Definition

The definition of intensification used by many archaeologists worldwide is derived from the seminal work of a Danish economist, Ester Boserup, who published a revolutionary study in 1965 entitled *The Conditions of Agricultural Growth*. Boserup's study proposed a model for the development of intensification in nonindustrial farming societies. Since the publication of her work, the validity of Boserup's model has been much debated, mainly among ethnographers, but also in other disciplines such as agronomy, history, and, to some extent, archaeology. It appears, however, that many archaeologists have not followed these subsequent debates, while others are misinterpreting the basic meaning of intensification.

There is a need for more precision in terminology used to describe agricultural systems. In archaeological studies, the term "intensification" is sometimes used to refer to an increase in production or increased detection of remains (Morrison 1994, 1996: 587). The definition of intensification will be taken as follows: intensification is an increase in labor and/or capital inputs to a fixed area of land in order to increase or maintain production (after Brookfield 1972: 31). Intensification aims to achieve not simply an increase in overall production, instead it aims to increase productivity per unit of land.

Land capital remains the same in this process, in that the area of land being farmed does not increase; the increase is in labor and/or capital inputs with the aim of increasing or maintaining production. While labor inputs can be applied at a specific point in time, capital inputs – including the construction of terracing, irrigation, and field systems – may have to be created before they can be used, perhaps over a long period and then enduring for a substantial period of time (Brookfield 1972: 32).

If the goal is to increase productivity through the cultivation of a greater area of land than previously farmed, then this process is known as "extensification" rather than intensification. Extensification can take place when people move out over the landscape – thereby extending the area of land being farmed – rather than increasing inputs into a fixed area. Extensive farming is often characterized by a lower level of input and lower output per unit area, but a higher output per capita (van der Veen 2005: 158).

Historical Background

Boserup's model of agricultural intensification, *The Conditions of Agricultural Growth* (1965), is one of the most influential formulations of this issue from the last century. Based on ethnographic work, Boserup argued that an increase in population density was responsible for an increase in the intensity of cultivation. Boserup proposed that in preindustrial societies, as farmers intensify agricultural production, cultivation systems pass through a universal and linear sequence of evolutionary stages. According to this model, a clear trajectory of agricultural development can therefore be identified.

Boserup suggested that extensive forms of shifting cultivation gradually become more intensive by a reduction of the fallow length. According to this model, shifting cultivation might take place in order to minimize the possibility of soil exhaustion – land is cultivated and then abandoned in order to leave it fallow and allow the soil to regenerate, whereupon the land can be farmed again at a later time. With more intensive strategies, Boserup suggested that communities reduce the length of time that the ground is left fallow. Communities are able to reduce the fallow length by introducing more labor and/or capital until they eventually reach the stage of annual cropping or even multicropping. Increased labor will allow more tillage and seedbed preparation, as well as more weeding, all of which can encourage reduced fallow periods. Capital inputs can include the use of superior tools and increased diversity in

crops. Boserup also refers to inputs such as manuring and the enclosing of land in the progression towards intensification.

Many of Boserup's stages can be archaeologically identified, for example, in the form of innovative tools, soil modifications, and field boundaries. It is likely that the ability to identify these stages has influenced the popularity of Boserup's model in archaeological studies. The model appears to be straightforward – people start out by farming extensively with low inputs, progressing towards more intensive farming by adding in more labor, tools, and various other methods to increase or maintain productivity in an area of land. Boserup's assertion that population pressure was a causal factor in encouraging intensity of agricultural production has also found favor among archaeologists, as it has often been suggested that population pressure was a causal factor leading to societal and economic changes in Bronze Age Europe (Sherratt 1981).

Since the publication of *The Conditions of Agricultural Growth*, there have been many criticisms of this model of agricultural intensification and also of its application by archaeologists (Brookfield 1984, 2001; Kirch 1994; Morrison 1994, 1996; Leach 1999; van der Veen 2005). Boserup did, however, provide a very useful framework for highlighting some of the many variables in the process of agricultural change, and this seminal study resulted in much discussion and development of these complex issues as they pertain to different societies and environments throughout the world.

Key Issues/Current Debates

Does Agriculture Evolve from Extensive to Intensive Systems?

One of the main debates in agricultural intensification relates to the concept of unilinear progression, whereby agriculture is considered to start out as extensive and then becomes increasingly intensive as time progresses. Boserup (1965) proposed an evolutionary continuum towards fixed field-intensive agriculture, which argued for a clear trajectory from extensive to intensive farming. Diversity and variability are, however, critical aspects of both the structure of agricultural production and the process of agricultural intensification. Extensive and intensive forms of cultivation are different options, rather than stages of an evolutionary sequence. They represent strategies available to farmers to choose from, depending on local, social, and economic circumstances, and to use alongside other strategies such as innovation, specialization, and diversification (van der Veen 2005: 158). Intensification should therefore be viewed as consisting of one of multiple potential strategies, rather than a single process.

A consequence of this view is that there may be multiple paths or courses towards intensification rather than a single route from shifting to fixed agriculture, from extensive to intensive production, and from long to short fallows (Morrison 1994: 115). The direction, as well as the rate, of change may have varied, depending on economic and cultural circumstances at different times and places, with the possibility of reversals occurring, whereby agriculture became more or less intensive. Boserup's model suggested that early farmers would have made use of shifting agriculture, eventually moving towards fixed plot, more intensive agriculture. This model was applied by archaeologists to Neolithic societies in Europe, where it was assumed that extensive agricultural practice eventually gave way to more intensive systems in the Bronze Age. The archaeobotanical evidence from Neolithic Europe does not, however, support this application of Boserup's model.

Bogaard's (2002) study of early crop husbandry in central Europe investigated management of agricultural plots through analysis of ecological characteristics of potential arable weeds. Ecological characteristics relevant to the permanence of cultivation plots were previously determined during the "Hambach Forest experiment" in Germany, where experimental plots on loess soils, cleared of long-lived deciduous woodland, were cultivated over a six-year period and surveyed immediately prior to harvest time in order to document the weed flora. It emerged that arable weed flora associated with recently cleared

plots managed with little or no tillage and weeding (as in a shifting cultivation regime) are likely to be dominated by perennial taxa, particularly woodland perennials. Dominance by annual taxa is more likely to be indicative of long-established cultivation plots on regularly disturbed soils (representing a more intensive regime). Bogaard's analysis of archaeobotanical weed data from sites in the western loess belt and Alpine foreland demonstrated that many Neolithic cultivation plots in these regions tended to be long-established, rather than temporary, plots, suggesting that shifting agriculture was not taking place. Bogaard, together with Jones, more recently applied this approach to weed assemblages from Neolithic Britain, where they found further evidence for weeds associated with more intensive and long-term cultivation strategies in archaeological deposits associated with the earliest farmers (Bogaard & Jones 2007).

The difficulties in directly applying Boserup's model, which is based upon tropical agricultural systems, to temperate agricultural systems, such as Europe, have been highlighted (e.g., Sherratt 1981: 290). It could be argued that shifting cultivation is an agricultural system adapted to a specific set of ecological circumstances – found primarily in the humid inner tropics – to ensure maintenance of soil fertility. The application of such a system to Europe may be inappropriate, because different soil types and the presence of domestic animals enabled different forms of soil nutrient restoration in this region (Sherratt 1981; van der Veen 2005: 157).

Population Change and Intensification

Potential relationships between agricultural intensification and population change represent another issue that has been much debated. Population pressure has often been regarded as a causal factor leading to societal and economic change in Bronze Age Europe (Sherratt 1981). Boserup (1965) argued that population pressure was the primary causal factor of intensification – more intensive agricultural strategies can support increasing populations, with intensification in turn requiring increased labor per unit of food produced.

Boserup argued that intensification in food production originated as a response to factors beyond human control, in that humans were unable to prevent population increase. Anthropological studies have, however, revealed numerous examples of birth-spacing practices, abortion, and infanticide, suggesting that population increase has been subject to human intervention throughout prehistory (Kirch 1994: 310). More importantly, population growth and resultant land shortages are not in all cases the primary inducements for intensification. Demographic factors can be of variable importance in different cases, and intensification is not the only response to land shortage (Stone 1994: 317; Stone & Downum 1999: 115). Other responses could include migration, conflict, and changes to nonagricultural enterprises, while coercive social relations, such as chiefdoms, may also influence intensification. There is also the issue of which came first – was population increase followed by changes in agricultural practice or could populations have expanded *following* "favorable" circumstances, for example, where there was a stable agricultural base to support more people?

It has been argued that the disadvantages associated with intensive agriculture ensure that such modes of production will be adopted only when necessary, citing disadvantages such as increased labor inputs and declining efficiency of that labor over time (Boserup 1965). Diminishing returns on labor are assumed, which results in declining efficiency as intensification increases. Efficiency considerations can, however, be overridden, and an increase in production does not always correspond to a decline in efficiency (Stone & Downum 1999). Efficiency can vary according to the types of crops grown – e.g., hulled versus naked crops and spring-sown versus autumn-sown crops – and methods of cultivation. As well as technical innovations – such as new tools – social innovations can be hugely significant, including mobilization of labor, increases in productivity of labor, and improvements in the management of resources. Efficiency in time management, for example, rather than basic labor input, can be of

significant importance – there can be major differences in productivity between adjacent farms that are similar in workforce endowment (Brookfield 2001: 184).

It has also been argued that agricultural producers exerted the minimum effort required to meet their needs – the Law of Least Effort (Boserup 1965). In this way, people and societies make rational, informed choices in order to maximize the outcome of agricultural activities in the local landscape. But were agricultural strategies in Bronze Age Europe focused on maximization of production? As well as providing calorific value, crops can also be grown for social returns, being used, for example, in ceremonial and "ritual" activities. Ethnographic evidence indicates that inputs may appear uneconomic when measured against calorific returns yet reasonable when measured against social returns (Brookfield 1972: 38). Intensive production should not, therefore, automatically be assumed to be an objective in Bronze Age Europe.

International Perspectives

Were the Earliest Farmers in Ireland Engaged in Intensive Agriculture?

Arable agriculture was introduced into Ireland in the centuries after 4000 cal BCE, and it has often been suggested that the earliest farming was extensive, with intensive practices becoming more widespread during the Bronze Age (2500–600 cal BCE). This assumption is presumably based on the Boserupian model, which suggests that agricultural production would have started out in an extensive manner, eventually becoming more intensive. The relatively large quantity of cultivated archaeobotanical remains from Bronze Age sites in Ireland, when compared with Neolithic sites, is also likely to have been of influence. This evidence does not, however, necessarily mean that more intensive practices were being undertaken during the later period – increased production does not automatically mean intensification. It has been shown above that the evolutionary model of agricultural production – whereby systems progress from extensive to intensive – is not appropriate in many cases. A better method of assessing the intensity of farming practices in Neolithic Ireland is through ecological analysis of potential arable weeds.

The contribution of arable weed analysis in detecting intensity of agricultural production has already been discussed above, with reference to archaeobotanical studies from central Europe and Britain. Previous studies have established the types of arable weeds characteristic of a shifting cultivation regime versus arable weeds more associated with long-established cultivation, representing a more intensive regime. Analyses of arable weeds from Neolithic sites in central Europe and Britain have indicated that cultivation plots in these regions tended to be long established, rather than temporary, suggesting that shifting agriculture was not taking place (Bogaard 2002; Bogaard & Jones 2007). This approach has recently been applied to archaeobotanical data from Ireland for the first time, and a similar picture is emerging (McClatchie et al. in press). Although the Irish Neolithic dataset is smaller than that from Britain or central Europe, it appears to follow a similar trend, in that disturbed weed taxa are dominant and woodland taxa are rare, while annual species are more commonly recorded than perennial species. In common with Neolithic Britain and central Europe, the evidence from Ireland does not resemble the picture expected for newly cleared plots managed under a shifting cultivation regime. The earliest farmers in Ireland instead appear to be engaged in more intensive practices than previously acknowledged.

Do Prehistoric Field Systems in Ireland Represent Intensification?

It has been noted above that an increased appearance of archaeologically identifiable fields has been interpreted as representing agricultural intensification in prehistoric Europe. The construction of field systems creates both enclosures and boundaries. The enclosing of land can be effective in the prevention of further soil erosion, particularly on sloping ground, because it can help decelerate soil creep and encourage drainage. Boundaries can protect animals and

crops by preventing wind chill and providing shelter. As well as enclosing and bounding areas of land, the construction of field systems is also a form of *landesque* – investing in the land beyond the life of the current crop (Brookfield 1984).

One of the earliest, and indeed largest, examples of field systems from prehistoric Europe can be found at the Céide Fields, County Mayo, on the northwest coast of Ireland. Here, well-defined rectangular field systems, consisting of stone walls, were erected over an area of approximately 12 km^2 around the middle of the fourth millennium BCE and then covered by peat growth, thus enabling their preservation (Caulfield 1978; Figs. 1 and 2). The fields appear to be large in size and are often thought to have enclosed animals, although it should be noted that organic hedge boundaries, which would have left little trace, could also have been used to subdivide fields for arable use. While this early evidence from the Céide Fields is certainly significant, prehistoric field systems in Northwest Europe more often date to the Bronze Age, as is the case in Ireland (O'Sullivan & Downey 2004). Some field systems appear to have an orderly layout – for example, at the Céide Fields – while others tend not to be laid out in a coaxial manner, instead being less regular in their arrangement, perhaps indicating more gradual and incremental growth.

The erection of agricultural walls, dams, irrigation features, and terraces can require a substantial labor input in their construction and maintenance, which is sometimes interpreted as evidence for intensification. Although it is clear that the increase in field systems during the Bronze Age represents a change in the organization of production, this does not necessarily imply any enhancement in productivity. Studies of field systems often focus on morphology of the fields as well as economic and technological aspects of their construction and use. The increased appearance of field systems may also reflect changing social relations between people and the land that they occupy and cannot be explained solely in economic or technological terms (Johnston 2000). Field boundaries can be established for reasons other than increasing productivity of the land (Stone 1994; Brück 2000). Field boundaries can be constructed to mark boundaries – to transmit information – and also to protect boundaries, or control access. Field boundaries will therefore not *necessarily* occur where cultivation is intensive. It is also worth noting that landscapes can be demarcated conceptually and their natural features can convey symbolic meanings, without the land itself being altered in any way by field boundaries, ditches, lines, or posts (Bayliss-Smith & Golson 1999: 209). So while field boundaries may well be part of an intensive system, their presence does not automatically imply intensification. Field boundaries may even be part of an extensive strategy, whereby people are

Archaeobotany of Agricultural Intensification, Fig. 1 Aerial view of a section of the Céide Fields, County Mayo, Ireland – prehistoric stone walls (Courtesy of Photographic Unit, National Monuments Service, Department of Arts, Heritage and the Gaeltacht)

Archaeobotany of Agricultural Intensification, Fig. 2 Section of the Céide Fields, County Mayo, Ireland – prehistoric stone walls

moving out over the landscape. It seems, therefore, that a variety of economic and social strategies might have prompted the increased construction of field systems in Bronze Age Ireland. This may be better understood as a *transformation* in the way that agriculture was being carried out.

An alternative means of determining the intensity or otherwise of agricultural production is through geoarchaeological analysis of the sediments themselves. Manures can be important indicators for the intensification of arable production, because they are an example of applying increased inputs to a fixed area to increase/maintain production. Such soil amendment strategies have been detected at the Bronze Age field system in Belderg Beg, County Mayo, through geoarchaeological analyses (environmental investigations at this location are ongoing; www.ucd.ie/archaeology/research). Another recently developed technique is the investigation of manuring through analysis of stable isotope values in cereal remains (Bogaard et al. 2007). A variety of methods can therefore be employed to explore intensity of cultivation at an individual site.

Future Directions

It is clear that the causes and paths of agricultural change can be complex – variability and diversity are often evident in the archaeological record. Intensification is not caused by any single factor, such as population pressure. It may instead be influenced by a variety of demographic, social, and economic factors. There is not an evolutionary trajectory in all agricultural systems, whereby they go from extensive to intensive farming. Similarly, certain landscape features do not automatically imply any individual agricultural strategy – it has been demonstrated above that the construction of field systems is not always indicative of intensive agricultural production. The term "intensification" and its implications have, unfortunately, been misused and misunderstood in some archaeological studies. Future studies should aim to pay more attention to the use of proper terminology and to be more critical when exploring evidence for agricultural change – in the case of prehistoric Europe, it could be argued that the problem with Boserup's model is not so much the model itself, rather the way it has been applied and oversimplified by others. While the identification of true intensification in the archaeological record can certainly be challenging, a variety of useful environmental analyses are now available, including geoarchaeological and isotope studies. Investigation of archaeobotanical evidence – such as arable weeds – can also provide new insights into the intensity or otherwise of land use. More frequent use of such methods is recommended. Archaeologists should, however, be careful not to overfocus on trying to identify intensification in the archaeological record. Depending on local circumstances, different agricultural strategies may have been deployed at different times and in different places, with the possibility of co-occurrence. It may be more worthwhile to

explore the potential for a variety of different strategies, which may include intensification but also includes other options such as innovation, specialization, and diversification.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agricultural Practice: Transformation Through Time
- ▶ Agriculture: Definition and Overview
- ▶ Andes: Origins and Development of Agriculture
- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Hunter-Gatherer Subsistence Variation and Intensification
- ▶ Near East (including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Sherratt, Andrew
- ▶ Southern Africa: Origins and Development of Agriculture

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Archaeobotany of Early Agriculture: Macrobotany

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Introduction

Analysis of archaeological macrobotanical remains continues to be a primary source of direct evidence for the development of agriculture in many parts of the world. Macrobotanical remains are small in size, often fragile, and require special conditions for preservation, making interpretation of archaeobotanical assemblages a complex process. There are multiple ways that macrobotanical remains can be used to explore early agriculture and plant domestication, from techniques examining morphological changes in seeds to statistical analysis of changes in archaeobotanical assemblages. Recently, archaeobotanical evidence in multiple parts of the world has been used to argue for extended periods of "predomestication cultivation" in early agricultural systems.

Definition

Macrobotanical remains are archaeological plant remains that are large enough to be seen with the naked eye. These remains usually range in size from several centimeters (e.g., wood charcoal and tubers) down to 250 μm (e.g., very small seeds). Using stereomicroscopes, archaeobotanists examine these remains for diagnostic features that can be used to identify the plant to the lowest taxonomic level possible (e.g., genus or species). Morphological and morphometric studies are also often carried out on macrobotanical remains from early agricultural sites to examine changes resulting from plant domestication. Although macrobotanical remains can include items such as wood charcoal, herbaceous plant material, and parenchyma, in the context of early agriculture the focus of research is usually on the seeds of cultivated or domesticated plants.

Key Issues

The Nature of Macrobotanical Research in the Context of Early Agriculture

Although microbotanical remains such as silica phytoliths and starch grains have recently demonstrated some of the earliest evidence for agriculture in some parts of the world (e.g., in the New World Neotropics and Southeast Asia), macrobotanical remains continue to be the primary source of evidence for most archaeobotanists who study the development of plant cultivation and agriculture worldwide. Macrobotanical research, though often challenging, is particularly valuable because it allows researchers to directly investigate relationships between people and plants (Pearsall 2010: 247). By using strict methodological controls and statistical measures recording changes in seed

morphology, taxon abundance, and assemblage diversity through time, archaeologists can use macrobotanical remains to detect shifts in plant use practices that are not discernable through the analysis of any other type of archaeological remains.

Unlike mineralized artifacts such as ceramics and bone, macrobotanical remains require special conditions for preservation and special techniques for recovery. Carbonization transforms botanical matter into compounds that cannot be broken down and consumed by living organisms, such as insects and microbes. With the exception of dry, waterlogged (anaerobic), or frozen conditions, carbonization is usually required for botanical preservation at archaeological sites. The majority of botanical evidence for early agriculture comes from such charred macrobotanical remains, with some exceptions. For example, Grobman et al. (2012) recovered numerous partially charred and uncharred remains of maize (*Zea mays*) from a desert site on the north coast of Peru from layers dated c. 6700–5000 BP, and some of the earliest evidence for rice agriculture in central China comes from waterlogged levels at the Hemudu site, dated c. 7000–5800 BP (Zhao 2011).

Although macrobotanical remains can include relatively large materials such as charcoal and tubers, most macrobotanical remains are small and thus unlikely to be recovered through typical dry screening. The development and spread of the flotation recovery method in the 1960s allowed the recovery of representative archaeobotanical assemblages and were responsible in large part for the development of archaeobotany as an archaeological subdiscipline (Pearsall 2010). In flotation, archaeological sediments are disaggretated in a water-filled tank, allowing charred botanical remains to float to the surface of the water for collection in fine mesh sieves.

The requirement of carbonization acts as a preservation filter for macrobotanical remains, with important implications for the interpretation of archaeobotanical assemblages. Plants that are processed, consumed, and discarded in the absence of fire (e.g., many fruits) are unlikely to be preserved in the archaeological record, while those that are exposed to fire are more likely to dominate archaeobotanical assemblages. In the context of early agriculture, this can lead to ambiguities in the interpretation of wild and domesticated plant use, particularly in cases where dung may have been an important source of fuel. For example, Miller (1996) argued that the archaeobotanical assemblage at early Abu Hureyra (c. 11000 BP), which contained a broad range of seed taxa, including seeds which are inedible to humans without processing, was not just the result of crop processing but also of dung fuel use, however, Hillman et al. (1997) suggested that the assemblage of wild plant taxa was instead a reflection of the broad-based seed collection strategy practiced by site inhabitants.

In any agricultural site, the sequence and location of crop processing activities shapes the archaeobotanical assemblage. Heuristic models of pathways to botanical preservation (i.e., formation processes), often based on ethnoarchaeological studies, are required to accurately reconstruct past practices (Fuller & Weber 2005). These models should integrate how and where crops are harvested, threshed, winnowed, stored, ground, cooked, consumed, and discarded, as well as how taphonomic processes affect the distribution and preservation of remains after deposition (Fuller & Weber 2005). Variations in crop processing sequences between sites and time periods preclude simple comparisons of macrobotanical assemblages across time and space. The proportion of agricultural weeds may be much higher at one site than another, but this pattern could result from increased exposure of winnowed botanical materials to fire or the use of dung as fuel rather than co-consumption of arable weeds with agricultural crops.

The process of carbonization also affects the morphology of plant seeds. Seeds with hard testas or fruits with stony endocarps tend to retain their shapes during carbonization, while seeds and fruits lacking hard testas and containing large quantities of starch (e.g., grass caryopses) or oils (e.g., flax seeds) often exhibit dramatic changes in morphology and appearance after carbonization. Märkle & Rösch (2008) documented significant differences in the environmental

requirements (temperature, duration, and oxygen availability) for preservation through carbonization between cereals and oily seeds, showing that oily seeds are much less likely to be preserved than cereals in oxidizing conditions. Thus, interpretation of archaeobotanical assemblages must also take into account the different conditions necessary for preservation. The absence of a taxon in an archaeobotanical assemblage does not necessarily imply that it was not present or in use at a site.

Macrobotanical Remains as Evidence for Cultivation and Domestication

Evidence for early agriculture is drawn from multiple lines of evidence, including the development of novel tilling/harvesting/processing technologies, increased sedentism, changes in isotopic indicators of dietary composition, and many others. However, often the most direct form of evidence for early agriculture has come from the detection of domesticated characteristics in the morphology of plant seeds. Fuller (2007: 904–5) identified six phenotypic traits that comprise the "domestication syndrome" for field crops: elimination of natural seed dispersal, reduction in seed dispersal aids, increasing seed/fruit size, loss of germination inhibition, synchronous tillering and ripening, and more compact growth habits. Of these, the first four can be examined using archaeobotanical remains. One additional characteristic, parthenocarpy (fruit maturity in the absence of seed fertility), may be useful in identifying vegetatively propagated plants.

In addition to morphological attributes of seeds and fruits, characteristics in the composition and structure of archaeobotanical assemblages can also indicate plant cultivation. Examples include botanical remains found outside of their natural ranges, unexpectedly high densities of botanical remains within natural plant ranges, and changes in the maturity of seeds in assemblages.

Elimination of Natural Seed Dispersal/Reduction in Dispersal Aids

In the overwhelming majority of wild cereals, grains are connected to the rachis by a brittle attachment that shatters when the grain is mature. A small proportion of wild cereal plants exhibit nonshattering ears, a genetic mutation in which the attachments between the rachis segments are too strong to naturally dehisce. In these cereals, grains must be separated by threshing, leaving a distinct jagged attachment scar on the rachis or spikelet base (Fuller & Allaby 2009). A large proportion of nonshattering rachis fragments in an archaeobotanical assemblage provides strong evidence for domestication since seed dispersal and germination is dependent on human intervention in these contexts. Domestication also removes selection pressures maintaining plant anatomical structures that aid in seed dispersal (e.g., cereal spikelet hair cells and elongated awns), sometimes reducing or eliminating these structures (Fuller 2007).

Changes in Seed Size and Morphology

The process of domestication often results in enlarged seeds or fruits and sometimes in changes in the overall shape of these. In Near Eastern domesticated cereals, increases in seed size take the form of greater breadth and thickness in caryopses. At the site of Jerf el Ahmar in Syria, Fuller (2007) showed that the maximum breadth and thickness of both barley (*Hordeum vulgare*) and einkorn wheat (*Triticum monococcum*) caryopses increased dramatically between early (c. 11500–10800 BP) and late (c. 10500 BP) occupation levels. Unlike barley and wheat, increase in rice (*Oryza sativa*) caryopsis size in central China took the form of significantly increased *length* and breadth after c. 6000 BP (Fuller 2007). Bruno (2006) argued that seed size is not sufficient to distinguish wild and domesticated forms of quinoa (*Chenopodium* spp.) taxa. Rather, morphological features such as seed coat texture, pericarp patterning, and margin configuration are required to differentiate wild from domesticated forms.

Loss of Germination Inhibition

Many wild plants produce seeds that have physical or chemical characteristics which inhibit immediate germination. Harvesting of crops in

a single age cohort tends to select for seeds which germinate as soon as they are planted, reducing the incidence of germination inhibition in plant populations. This characteristic has been used primarily to identify domesticated quinoa taxa, which tend to have thinner testas than wild varieties. Bruno (2006) found that domesticated quinoa have testas 1.25–7.50 μm in thickness, while the testas of wild varieties are 11–55 μm in thickness. However, Bruno cautioned that the potential overlap between testa thicknesses between some wild and domesticated taxa makes this characteristic nondiagnostic on its own.

Parthenocarpy

Some fruit tree taxa occasionally produce parthenocarpic mutants in which fruits mature without fertile seeds. Parthenocarpic fruits can have larger quantities of sugars and carbohydrates than their fertile counterparts, making them more desirable for human consumption. Kislev et al. (2006) recovered nine apparently parthenocarpic fig fruits from the site of Gilgal I in the Jordan Valley, dated to 11400–11200 BP. While Kislev et al. (2006) interpreted the remains as early evidence for the horticultural propagation of fig trees, Denham (2007) argued that the parthenocarpic figs represented a small sample of specimens that may have been preferentially harvested from wild stands.

Archaeobotanical Evidence for Plants Outside Natural Ranges

The identification of domesticated or nondomesticated food plants outside of natural plant ranges can be evidence for local cultivation or for trade. Multiple lines of evidence, such as from the development of cultivation-related technologies or increased sedentism, can clarify which explanation is most likely. Weiss et al. (2006) suggested that the presence of morphologically wild lentil (*Lens orientalis*) at the site of Netiv Hagdud in the Jordan Valley around 11000 BP indicates that soon after initial loss of seed dormancy, lentil quickly spread southward from its genetic origin in northern Syria or southeastern Turkey.

High Densities of Archaeobotanical Remains Within Natural Plant Ranges

In cases where plants used as food occur in the wild only sporadically, large quantities of the taxon on archaeological sites may indicate cultivation. Weiss et al. (2006) argued that this is the explanation for hundreds of morphologically wild lentil remains at the site of Jerf el Ahmar in Syria, dated 11000 BP. The authors reasoned that wild lentils are unlikely to have been harvested in significant quantities due to their low abundance on the natural landscape and low seed production. They suggested that the lentil remains in the archaeobotanical assemblage represented cultigens that had lost seed dormancy, but had not yet begun to exhibit domestication-related morphological changes.

Changes in Maturity of Crop Seeds

The caryopses of wild grasses often do not mature in synchrony, but rather over a period of days to weeks. Fuller (2007), drawing on expectations of optimal foraging theory and ethnographic data, proposed that early rice harvesters could maximize wild rice (*Oryza* spp.) yields by harvesting several days after the first grains on inflorescences began to mature. At this time, many rice grains would be harvested in an immature state, creating a distinct pattern of high proportions of immature grains in archaeobotanical assemblages. Fuller (2007) argued that this pattern is evident in assemblages of early cultivated rice in central China and proposed that changes in rice morphology toward larger and plumper grains after c. 6000 BP reflect a shift toward harvesting larger proportions of mature grains.

Predomestication Cultivation and Multiple Domestication Origins

A longstanding model of domestication in the Near East proposed that founder crops were domesticated (a) relatively quickly, (b) as a package, and (c) in a single location or "core area" from which they subsequently spread (Fuller et al. 2011). This model has been called into question through recent research. By tracking changes in the proportion of nonshattering ears and in grain sizes at early agricultural sites

in the Near East, Fuller (2007) found that the period of transition from archaeobotanical assemblages comprised of wild wheats (*Triticum* spp.) and barley to those dominated by grains with domesticated characteristics was protracted, lasting up to 2000 years. Cultivation during this period, in which archaeobotanical assemblages contain both morphologically wild cultigens along with arable weeds, is termed "predomestication cultivation" and produces archaeobotanical assemblages with "semidomesticated" characteristics (Fuller 2007). Fuller et al. (2011) compared the archaeobotanical assemblages of early (c. 11000–9000 BP) cultivation sites across the Fertile Crescent. The authors found that the suite of domesticated Near Eastern founder crops was not present at one or a few early sites in a core area. Rather, they describe domestication as occurring in a mosaic or piecemeal fashion across the region, with particular zones focusing on a limited number of early domesticates. They argue that the putative "core area" of domestication is not the origin of the Near Eastern founder crops, but rather the location of later agricultural integration of crops domesticated in multiple locations.

This pattern of multiple origins of domesticates within a region likely applies to other parts of the world as well. Smith & Yarnell (2009) reviewed evidence for the earliest domesticates in eastern North America. At each of three widely separated sites dated from c. 5000–4500 BP, only a single domesticated crop was present; evidence for an incipient "crop complex" of multiple domesticates at a single site does not appear until c. 3700 BP.

Zhao (2011) reports clear independent centers of domestication for rice and millet in central and northern China, respectively. As in the Near East, archaeobotanical data suggests a protracted period of predomestication cultivation for both crops. Zhao (2011) proposed that rice cultivation may have begun around 10000 BP, with morphologically domesticated rice first appearing between 9000 and 7800 BP at the Jiahu site in central China. Zhao suggested that rice cultivation played a supplemental role in subsistence practices for an extended period, with full rice agriculture only beginning c. 6500 BP. Alternatively, Fuller (2011) argued that the evidence for domesticated rice at Jiahu was unclear, as archaeobotanical research at the site did not include spikelet base analysis or present clear evidence of morphological changes. Although Fuller (2011) traced the beginnings of cultivation in China to as early as c. 10000 BP, he proposed that the earliest evidence for morphologically domesticated rice comes from the Baligang site in interior central China, dated to c. 8000 BP.

Although preliminary evidence suggests extended periods of predomestication cultivation in multiple areas of the world, the number of proto-agricultural sites examined archaeobotanically is still relatively low in many regions (with the exception of the Near East). Additional research in the coming years will be needed to clarify this important issue.

Cross-References

- ▶ Agriculture: Definition and Overview
- ▶ Andes: Origins and Development of Agriculture
- ▶ Archaeobotany of Agricultural Intensification
- ▶ Archaeobotany of Early Agriculture: Microbotanical Analysis
- ▶ Australia and the Origins of Agriculture
- ▶ Domestication: Definition and Overview
- ▶ Genetics of Early Plant Domestication: DNA and aDNA
- ▶ Near East (Including Anatolia): Origins and Development of Agriculture
- ▶ Northern Asia: Origins and Development of Agriculture
- ▶ Plant Domestication and Cultivation in Archaeology
- ▶ Southern Africa: Origins and Development of Agriculture

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Archaeobotany of Early Agriculture: Microbotanical Analysis

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Introduction

Archaeobotanical research is conducted to gain an understanding of the relationships between ancient human populations and their surrounding botanical biosphere. To reach this goal, archaeobotanical researchers recover plant remains from archaeobotanical contexts, identify the botanical taxa present in the samples, and interpret the data within the cultural framework of the peoples who used the plants for various purposes including food, construction, and crafts such as basketry. Microremains are also used as tools to understand human impact on the surrounding landscape. It is the aim of archaeobotanical research both to gain a complete understanding of ancient plant use and to obtain the most solid, reliable evidence possible.

Perhaps the most common area of research is plant use and economy, a broad field of study that includes basic subsistence categories such as diet and construction materials, as well as more specific topics such as medicines or fish poisons. Because plants were often important economically, their remains can also be used to study migration and trade among human populations as seeds and other propagules moved from hand to hand across the landscape.

Another important archaeobotanical research subject is environmental reconstruction, which typically involves the coring of sediments in wetlands and subsequent analysis of the botanical microremains within. These cores and other samples from living and activity areas can also help us understand human adaptation to the environment including the introduction of plants into a new area, as well as their tending, cultivation, and domestication.

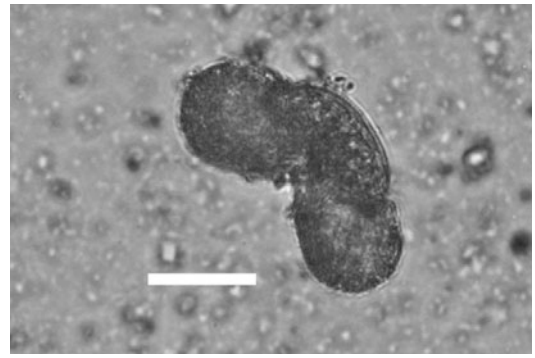
Finally, but no less importantly, archaeobotanical remains can be used to understand ancient human cultural activities including ideology and religion. Examples include plants in symbolic contexts; in art, as incense; and as hallucinogens for spirit journeys.

There are two major categories of archaeobotanical remains that are studied: macroremains, or large fragments of plants or their tissues, and microremains, the subject of this discussion, which are much smaller in size and, therefore, typically require more specialized equipment for both extraction and identification. Most microbotanical remains are of such small size that they must be viewed using instruments that allow for both high magnification and resolution. These instruments include the compound light microscope and the scanning electron microscope. Microremains are also, however, more durable than macroremains in harsh environmental contexts as well as at great depths where the heavy, overlying sediments can crush fragile charred specimens. Thus, microremains can be studied by archaeobotanists working in contexts that did not allow for the preservation and recovery of macroremains.

Key Issues/Current Debates/Future Directions/Examples

Microbotanical analysis is the study of ancient fragments or structures of plant tissues that are not visible to the naked eye, with the aim of understanding interrelationships between human populations and the plant world.

The three most commonly studied categories of microbotanical remains are pollen, phytoliths, and starch grains. All three types of microremains form in the tissues of plants and, just like the larger-scale flowers or fruits, differ in morphology between different groups or even species of plants. They are deposited in archaeological contexts via various methods, and archaeobotanists are able to extract them from sediments or artifacts, concentrate the extracts, and examine the assemblages of microfossils via microscopy. Microfossils can often be identified as being derived from specific plant taxa, and, thus, they are important indicators of plant presence and/or use in an archaeological context.



Archaeobotany of Early Agriculture: Microbotanical Analysis, Fig. 1 A pollen grain from *Pinus* sp. showing the distinctive bisaccate form. Archaeologists sample for ancient pollen using methods that eliminate the possibility of contamination from modern pollen rain. This pollen grain was extracted from a starch sample. The *scale bar* is 20 μm in length

There are many similarities between the types of microfossils and how they are used by archaeobotanists, but there are also some key differences. This entry presents basic summaries of the three types of microfossils and how their analysis is carried out and then used as an interpretive tool in archaeobotany.

Pollen grains (Fig. 1) are microsporangiate reproductive structures that form in the anthers of flowers. If pollen grains are recovered from archaeological contexts, they can be used as markers to identify the remains of plants in archaeobotanical samples.

The extraction of pollen grains from archaeobotanical samples can also recover other microfossils that are made of very durable materials (Traverse 1988). The exine, or outer

envelope of a pollen grain or spore, contains the material sporopollenin, and structures made by protozoa, fungi, or algae can consist of chitin, tectin, or other similar substances (Traverse 1988). These substances are resistant to degradation by the acids that are used by archaeobotanists to extract the microfossils from sediment samples, and, when considered as a group, these types of microscopic structures that occur in an assemblage are called palynomorphs (Traverse 1988).

The study of palynomorphs is called *palynology*. Archaeologists typically use palynology to provide evidence for three main purposes: environmental reconstruction, understanding human environmental impact, and documentation of the economic use of plants.

Environmental reconstruction involves the documentation of the species and diversity of plants that occur or move in and out of a system over time. Knowledge of the specific environmental requirements of each type of plant, such as rainfall, temperature, or soil conditions, then allows for an understanding of changes and/or stability in the studied environment.

The impact of human activities on the immediate environment is typically documented using specific changes in the plant community as well as other markers that may appear in the samples. Loss of timber species and the appearance of weedy taxa, for example, are good indicators that humans are clearing forest, perhaps for agricultural activities. If the landscape is altered, samples can show an increase in sedimentation rates as soil is exposed, and charcoal fragments indicative of burning activities may also occur.

The economic use of plants can be documented using pollen that may occur in specific contexts. Burials, for example, may include the ritual use of flowers that can then be identified. Identification will lead to a seasonal date of the burial due to the restricted time period in which the flowers bloom each year. Pollen can also be extracted from human coprolites. Typically, if the recovered pollen is from an insect-pollinated plant and is quite abundant, it can be interpreted as ingested. In contrast, pollen from wind-pollinated plants could have entered the system as "rain."

Pollen is identified using a one-on-one comparison with modern palynomorphs, and micromorphological features like shape and size as well as surface details such as pores and decorations are taken into consideration (Traverse 1988). Diagnostic forms occur in many plant groups but not in others (Traverse 1988). A three-dimensional viewing of pollen grains is usually required for identification, and taxonomic identification may be to the family, tribe, genus, or species level depending upon many factors including the types of pollen recovered and the quality of preservation.

When analyzing an assemblage of pollen remains, the archaeologist and paleoecologist must take several factors into consideration when making interpretations (Traverse 1988). First, the type of pollination system that the plant used is determined. Wind-pollinated plants make very large numbers of pollen grains that travel over distances. In contrast, insect-pollinated plants produce relatively few grains of pollen, and these grains will be dispersed only as far as the pollinator takes them. Some plants are pollinated by the movements of water, and these pollen grains tend to be very fragile and decay rapidly after deposition, while pollen grains from self-pollinated plants often germinate prior to the opening of the flower. Each type of pollination system will create a different signature, and, with the exception of wind-pollinated plants, most types of pollen are likely to be "underrepresented" in an assemblage or not represented at all.

Taphonomic processes can also affect a pollen assemblage. Degradation can occur due to the mechanical abrasion of sediment particles on pollen grains, the chemical destruction of the structure by alkalinity, and biological activity of decomposers like fungi and bacteria can digest pollen grains.

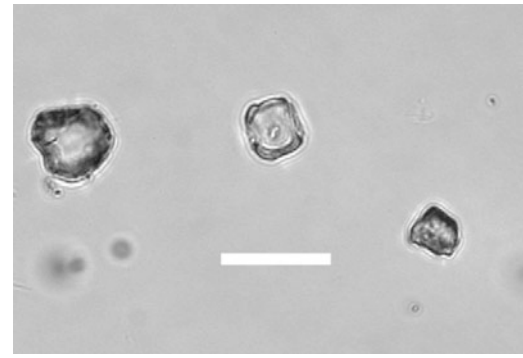
Pollen samples can be collected in different ways that are dependent upon the questions the investigators wish to address. The main goals are to collect samples so that naturally occurring pollen rain can be distinguished from cultural deposits and to minimize modern pollen rain and cross-contamination within the samples.

Samples for pollen analysis, and for microbotanical studies in general, can include stratigraphic sequences, feature sediments, washes from artifacts, cores from lake beds or other sources, and control and/or comparative samples. Modern comparative collections are typically assembled from locally occurring flora. Pollen grains are stored on slides or in vials for the purposes of one-on-one comparisons with archaeological pollen grains.

Phytoliths (Fig. 2) are silica "bodies" that occur within and between plant cells. Plants produce phytoliths using soluble silica that is absorbed from the soil, and they are believed to occur in plant tissues for various reasons including the structural support of the plant, to aid as a detoxifying agent against damage from heavy metals that occur in soils, and for defense against small herbivores such as insects (Piperno 2006). Unlike pollen and starch grains, phytoliths consist of inorganic silica and, thus, are the most resistant to degradation in sediments. The relative stability of a phytolith in a sediment is dependent upon several factors including the comparative fragility of the phytolith in its native state, concentrations of various substances in sediments like iron and aluminum oxides that protect phytoliths, or extremely alkaline conditions that can degrade them (Piperno 2006).

Phytoliths are extracted from sediments by chemical processing followed by a heavy liquid flotation (Piperno 2006). Notably, the processing techniques that are used to free phytoliths from sediment particles destroy pollen grains, and vice versa. Starch grains, in turn, are destroyed during the processing for both pollen and phytoliths. Thus, enough sediment must be collected from each relevant context if all analyses are to be employed. Phytoliths can also be brushed or washed from artifact surfaces. A sonic cleaner or sonic toothbrush can prove indispensable in extracting microfossils from artifacts, even in the field, and assemblages of phytoliths can reveal the function of the artifact in question.

As is the case with pollen, diagnostic phytoliths occur in some plant groups but not in others (Piperno 2006). Some plants produce commonly occurring or less-distinctive morphologies, while other plant groups do not make phytoliths at all. Two general approaches to the study of systematics within phytoliths are commonly employed within the discipline. The botanical approach studies phytoliths in situ, within the modern plant tissues themselves. The morphological approach studies disarticulated phytoliths that have been extracted from plant tissues. The goal of each approach is the same: to determine the typology for a particular plant or group of plants so that the remains can then be identified in the archaeological record.



Archaeobotany of Early Agriculture: Microbotanical Analysis, Fig. 2 A saddle phytolith (*center*) typical of those from grasses in the Chloridoideae. The presence of this type of phytolith in an assemblage is an indicator of the occurrence of chloridoid grasses in the sampled context. The scale bar is 20 μm in length

To successfully identify phytoliths, a one-on-one comparison with modern specimens is used, and the microremains are viewed in three dimensions. The archaeobotanist must understand the local flora, both modern and at the time of interest, and must also have a grasp of which plants in the area may produce similar types of phytoliths. With this approach, the specific characteristics necessary to separate groups can be determined, and secure identifications can be more reliably made. Like in palynology, the study of phytoliths is employed by archaeobotanists who are interested in studying environmental reconstruction, the impact of humans on their environment, and the economic uses of plants by ancient peoples.

Phytoliths are deposited in archaeological contexts via several mechanisms. Plant tissues can decay in situ, leaving behind the durable

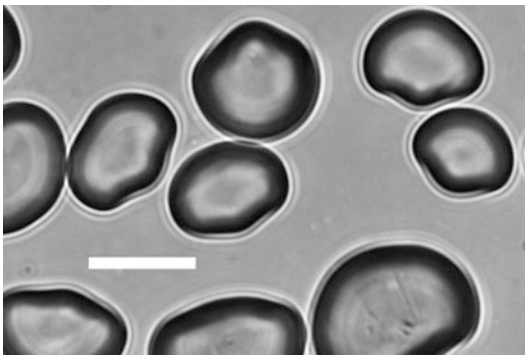
silica. Plants can also be burned, and phytoliths can bear the scars of fire with black markings or heat distortion. Digested plant materials, such as coprolites, will also contain intact, indigestible silica phytoliths. Via the careful analysis of context, archaeobotanists can collect phytolith samples from these cultural contexts and use them as tools to reconstruct ancient human activities. Phytoliths are also continuously deposited in non-anthropogenic contexts via the decomposition of plant tissues in "natural" systems.

As with pollen, sampling strategies for phytolith studies are typically dependent upon the research questions of the archaeobotanists. Cultural contexts, both sediments and artifacts, can be sampled, as can "natural" contexts like lake cores. Again, control samples can be key in determining the background "noise" and determining which deposits are culturally derived.

Starch grain (Fig. 3) analysis is the most recently applied method in the analysis of archaeobotanical microremains; however, due to the significance of starch in other fields including botany, food science, and industrial chemistry, it has been very broadly studied, and descriptions of both native and modified starches are common in various literatures (e.g., Reichert 1913; BeMiller & Whistler 2009). Starch grains are the eventual product of photosynthesis in many plants, and they are formed in amyloplasts within the plant cell. Storage starches in particular are studied by archaeobotanists because they are both used for food and are diagnostic in morphology, while other transient starches that occur in plant tissues are not.

Starch analysis has been used to document the origins of agriculture, the domestication of plants, and economic uses of plants. Because starches are much more likely to represent ancient foodstuffs than items such as construction materials and surrounding vegetation, studies of starch grains are typically, though not necessarily, diet focused. Just as is the case with pollen grains and phytoliths, diagnostic starch grains occur in many plant taxa but not in others.

Starch grains are identified very much like pollen grains and phytoliths are, via a one-on-one comparison with modern



Archaeobotany of Early Agriculture: Microbotanical Analysis, Fig. 3 Starch grains from a modern comparative specimen of *Nothoscordum bivalve*, or "crow poison." Modern specimens are key in identification of ancient microfossils. The *scale bar* is 20 μm in length

specimens and a three-dimensional examination of the morphological features of the grain. The archaeobotanist must have a grasp of the local plant communities, both modern and at the time of interest, and must also understand which related taxa in the area may produce similar types of starch grains. With this approach, the specific characteristics necessary to separate groups can be determined, and secure identifications can be more reliably made.

Starch grains can be deposited in archaeological contexts via various processes including the decay of discarded starchy plant tissues and through the processing of plant foods with, for example, cutting or grinding tools or cooking vessels. Thus, as with other microfossils, starch grains can occur both in sediments and on artifacts, and they can be extracted from both contexts. Extraction from sediments involves a chemical deflocculation followed by a heavy liquid flotation, while artifacts can be washed or treated with a sonic cleaner or toothbrush. Starch analysis can be used in the study of dental calculus (Henry et al. 2011), and starch grains have also been extracted from human coprolites (Vinton et al. 2009). Both of these contexts document the actual ingestion of plant food resources.

The processing of starchy foods in laboratory settings allows archaeobotanists to compare damaged starches to those found in archaeological contexts (e.g., Perry & Quigg 2011). Both mechanical

processing and heating, as would be applied in cooking, have been studied and documented archaeologically. These analyses allow for a more detailed understanding of the uses of ancient starchy food plants and a more comprehensive interpretation of ancient food-related activities.

Sampling for starch grains in the field, like in palynology and phytolith analysis, is dependent upon the research questions. Stepwise sampling of artifacts in the laboratory can include a dry brushing of the tool, followed by a wet brushing and a final sonic cleaning. This stepwise analysis can solidify the interpretation that the starch grains are directly associated with the artifact's function (Piperno et al. 2000), although, thus far, there has been no evidence that artifacts can be contaminated by decaying plant tissues in surrounding sediments.

Studies

Pollen studies, combined with phytoliths and particulate charcoal, have documented the sequence of farming practices in the tropical forests of Panama (Piperno et al. 1990) and helped document ancient cultivation of bananas in New Guinea at Kuk Swamp (Denham et al. 2003). Starch grain research has revealed the ancient use of millets in North China (Yang et al. 2012), ancient root crop agriculture in Panama (Piperno et al. 2000), the use of chili peppers throughout the tropics of the Americas (Perry et al. 2007), and the domestication of maize in the Balsas region of Mexico (Piperno et al. 2009). Multiproxy analyses using combinations of microremains are becoming more common. As an example, the integration of both phytoliths and starch grains revealed the early use of maize in highland Peru (Perry et al. 2006).

These are but a few examples of the many studies using microremains as tools for increasing our understanding of ancient agriculture throughout the world. These studies make a larger suite of economically significant ancient plants visible than can be recovered using macrobotanical analysis alone. As more archaeobotanists embrace these methods, ancient relationships between people and plants will be better understood.

Cross-References

- ▶ Multiple Microfossil Extraction in Environmental Archaeology
- ▶ Phytolith Studies in Archaeology
- ▶ Phytoliths in Islamic Archaeology
- ▶ Soil Pollen Analyses in Environmental Archaeology

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Archaeological Archives

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Introduction

Archaeologists seek to reconstruct the past through the material record. In doing so, they produce a body of data of their own – the archaeological archive. Without these associated materials that document the fine details of an excavation, the artifacts themselves, however impressive, run the risk of losing much of their intrinsic value as tools for understanding past human experience.

Definition

Archaeologists document an excavation thoroughly, beginning well before the ground is broken with background research and development of a research design. During fieldwork, excavators create detailed maps and drawings, take photographs, and make extensive and detailed field notes. Once the excavation is complete, artifacts and specimens may be conserved and analyzed and the archaeological site interpreted in the form of a final report, scholarly work, or publication. Together, these supporting components make up archaeological archives.

Key Issues/Current Debates/Future Directions/Examples

Archaeology is by its very nature an act of destruction. As cultural features and artifacts are removed from their original physical contexts, embodied information risks being lost without careful attention to documentation at each step of the way. Maintaining this documentation is an ethical obligation for archaeologists and institutions that house archaeological collections and records. Stewardship of archaeological records is a component of the statements of ethics for the Society for American Archaeology, the Society for Historical Archaeology, and other professional organizations (Society for American Archaeology 1996; Society for Historical Archaeology 2003).

Archaeological record curation facilities are as varying as the sites themselves. Some record repositories are unique to one site or area. Others are affiliated with universities or cultural institutions, and yet more are divisions of government agencies. In some instances, collections of artifacts are stored alongside related documentation, and in others, different types of archaeological materials and records are housed in separate facilities determined by medium. Many artifact curation facilities have collection policies that specifically spell out requirements for non-artifact records associated with an archaeological collection in order to ensure that they are housed in a safe manner and that they may be useful tools for future research (Parks Canada 2009).

Good archaeological supporting documentation begins in the field. It is imperative that field notes are written legibly and all paperwork properly labeled and organized before being sent off to a permanent repository for curation. The variety of media present within archaeological records can create a challenge for long-term preservation and storage. Large-format maps and field drawings, delicate photographs, scribbled and dirty field notes, computerized artifact catalogs, and other materials each require different accommodations and handling to ensure their survival over the decades and centuries. Environmental factors such as temperature, humidity,

vulnerability to insects and other pest, and threats of damage by flood, fire, or intentional human effects like theft and destruction must all be considered when developing strategies and policies for managing collections of archaeological records.

The loss of provenience data is another major risk for archaeological archives (as well as recovered artifacts and specimens). Great care should be taken to clearly mark each document with appropriate reference numbers and dates in case individual pieces of documentation become separated from a larger collection. An important photograph of an archaeological feature or excavation unit may appear unremarkable and indistinguishable from any other when viewed out of context. Field records written on or with archivally unstable materials (Kraft paper bags, napkins, water-soluble ink, etc.) may be photocopied onto acid-free archival paper to ensure long-term survival. Photographs should be printed to archival standards in order to ensure that the chemistry is stable over time.

Many record curation facilities employ the use of relational databases to serve as an index to these diverse materials, often organized by site and/or provenance. This level of organization is key to maintaining the usability of all the collected information. A fundamental value of archaeological archives lies in their ability to make existing collections valuable tools for current research. When supporting documents become lost or damaged, the research value of the collection as a whole is greatly diminished. In order for archaeological collections to be a vital source of data for scholarly research, the associated records must be diligently maintained. A well-documented excavation and collection can produce data repeatedly, data that can be analyzed in a myriad of ways beyond what may have been envisioned by the original researcher without any additional destruction to the archaeological site (Nelson & Shears 1996).

The digitization of archaeological archives has had a major impact on data from a global perspective. As more and more countries move into the digital era, it is becoming possible to easily relate data between sites located across the globe. With an eye on interoperability of archaeological records and databases, researchers have developed projects like the Archaeological Records of Europe – Networked Access (ADS 2012), the Digital Archaeological Record (Digital Antiquity 2012), and the Digital Archaeological Archive of Comparative Slavery (Thomas Jefferson Foundation 2012). Although standards for data collection may vary from site to site depending on the excavator, government requirements, site type, and other factors, modern relational databases allow for information to be parsed in a way that enables broader inter-site analysis.

The nature of archaeological archives has changed at an astonishing rate over past decades with the increased ubiquity of digital data for information capture and storage. Instead of 35-mm film, many archaeologists only take digital photographs. Site mapping may be done entirely in Geographic Information System (GIS) or Computer-Aided Design (CAD) software, using GPS coordinates obtained from sophisticated units in the field (or even mobile phones). Artifact catalogs may be part of large databases, and final reports may exist in the form of interactive websites or as a single digital file. While these technologies introduce endless new opportunities for ways to process and disseminate archaeological data, they also prove to be a challenge for managers of archaeological archives. Technology is not always sustainable. If a digital record is created using a technology that becomes obsolete, the data may be lost forever.

Sophisticated analytical methods such as geospatial modeling and 3-D scanning may produce large volumes of digital data. Many contemporary facilities holding digital materials as part of archaeological archives are currently struggling with ways to manage an ever-increasing volume of bits and bytes while

keeping the data accessible. A disorganized box of paper site records is just as difficult to use as digital data that is not well maintained and indexed. Without a way to connect the information to the excavation and artifacts, knowledge is lost.

Because of the fragile and irreplaceable nature of many archaeological sites, access to information held as part of archaeological archives is often restricted to professional archaeologists and other approved researchers. In the United States, the Archaeological Resources Protection Act of 1979 allows government agencies to withhold any information from public access that may make the site vulnerable to looting or destruction. Great care should be taken to protect the physical location of archaeological sites while still allowing for an open flow of information.

Cross-References

- ▶ Archaeological Record
- ▶ Conservation and Preservation in Archaeology in the Twenty-First Century
- ▶ Digital Archaeological Data: Ensuring Access, Use, and Preservation
- ▶ Paper: Preservation and Conservation
- ▶ Recording in Archaeology

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Archaeological Chemistry: Definition

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Brief Definition of the Topic

Archaeological chemistry, a subfield of archaeometry, is the application of techniques and approaches from chemistry and the chemical sciences to the analysis of the material record of past societies. Research in this field of study examines a wide range of human behaviors and formation processes including dating, provenance, technology, organic and inorganic residues, diet, migration, and human-environmental interactions, among other topics. Early approaches are reviewed by Caley (1948, 1951, 1967) and more recently by Pollard and Heron (2008), who describe the most common applications today: obsidian characterization, clay and ceramic provenance, chemistry of archaeological glass and metals, composition of resinous substances, amino acid stereochemistry, lead isotope geochemistry, human bone (diet, nutrition, health, mobility), and biomolecules (e.g., DNA, dairy products). A number of important textbooks have emerged recently, including those by Pollard and colleagues (2007) and by

Price and Burton (2012). These and related works emphasize the use of physicochemical instrumentation in solving archaeological problems, including (but not limited to) optical emission spectroscopy, atomic absorption spectrometry, inductively coupled plasma emission spectrometry, mass spectroscopy, X-ray fluorescence spectrometry, analytical electron microscopy, proton-induced X-ray emission spectroscopy, neutron activation analysis, infrared and Raman spectroscopy, and various chromatographic techniques.

Cross-References

- ▶ Archaeometry: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Bone: Chemical Analysis
- ▶ Bone Chemistry and Ancient Diet
- ▶ Isotope Geochemistry in Archaeology
- ▶ Laboratory for Archaeological Chemistry (University of Wisconsin)

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Archaeological Informatics

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Brief Definition of the Topic

Archaeological Informatics is the practice of analyzing, managing, and preserving archaeological information. This can include information relating to tangible and intangible heritage, and the term generally adheres to both information and data, created or held in digital formats. Such data might be held in databases, geographical information systems, as digital documents (such as text, spreadsheets, images, audio, video), as well as more complex digital objects such as CAD, remote sensing formats, and 3D datasets. It also refers to both the dissemination and the collection of information via digital media, such as the World Wide Web.

Just as digital technology has had an incalculable impact on multiple spheres of human experience, Archaeological Informatics has revolutionized archaeological practice in a number of ways, most noticeably in the near universal use of databases to store, manipulate, analyze, and ultimately disseminate archaeological information. It has also challenged traditional models of paper-based archaeological publication, particularly through broadening access to underlying datasets and to other traditionally unpublished material, such as gray literature, via the Internet. It is also true that Archaeological Informatics does not fundamentally remedy issues of representation, partiality, categorization, and interpretation that are inherent in the data themselves irrespective of the media in which they are held. The potency of digital media itself, particularly in terms of its association with modernity, precision, accuracy, and scientific approaches, may even add additional complexity to the task of critically assessing

data for interpretative purposes. This is especially true where data are being consumed by nonexpert audiences where, for example, data presented as a three-dimensional model might appear inherently more trustworthy than the same data presented as a hand-drawn image.

Breaking down barriers between isolated archaeological datasets remains a constant challenge in Archaeological Informatics because the adoption of archaeological information systems and digital recording techniques has generally taken place in advance of formats and systems that allow sharing of the data out with the project or organization in which it was created. Recent developments have begun with regard to data standards, that is, shared categories, definitions, and data schema, which facilitate meaningful comparison between cultural heritage records and the aggregation of these records nationally and internationally. This will have a significant impact on both how the heritage is curated and how it is presented to the public. The most obvious benefit to curation has been that digital sources, such as national and local monument inventories and digital repositories containing significant resources, need no longer be hermetic entities relating to a specific geographical period or subject boundaries but can make their content available as part of a larger aggregated dataset. Thus, researchers and cultural heritage managers are much more likely to be able to retrieve data on their area of interest from a single point of access without being constrained by arbitrary, technical, political, or regional boundaries.

Two important points which arise with regard to data standards are, firstly, they should be reactive to how data is gathered rather than proscriptive and the role of arbitrary classification should be balanced against the creative process of interpretation. Secondly, the level of their adoption is far from universal even in countries where such standards exist, recasting legacy datasets as compliant to data standards can be time-consuming and costly even using data-mining and natural language processing techniques. As well as local or national standards, the CIDOC Conceptual Reference Model provides an international standard with definitions and formal structures for describing the implicit and explicit concepts and relationships used in cultural heritage documentation. A number of countries also have national and or regional policies explicitly intended to create cultural heritage data infrastructures and/or aggregation services for cultural heritage resources or participate in projects with this aim, such as the NSF "Cyberinfrastructure" program in the USA, the EU-funded Europeana project, and the multi-European-government-funded Digital Research Infrastructure for the Arts and Humanities (DARIAH).

At the same time as standards development extends the interconnectedness and utility of archaeological datasets, a broader shift in Internet technology toward the "Semantic Web" has prompted a change in the publication of datasets online to linked data format (i.e., expressed as a series of dereferencable URIs linked together in subject-predicate-object triples). This acts to extend the linkages between archaeological and cultural heritage datasets to any other appropriate dataset, or data point expressed as linked data. In some countries, the driver for the adoption of this approach to structuring data is being explicitly driven by government policy (e.g., the UK data.gov.uk program). The impact that this change will have over time in widening access to cultural heritage information and embedding it in a broader "semantic Web" could potentially be on a scale of significance similar to that of the original World Wide Web.

A further significant focus for Archaeological Informatics is the representation of uncertainty. This is still considered a challenge more generally in informatics, but has particular implications for systems holding cultural heritage information. Many aspects of cultural heritage defy precise definition, geographically, temporally, and culturally, and even where the subject matter is amenable to some form of precise definition, there is often a lack of certainty due to incomplete evidence or competing interpretations. For example, for in-building or

development control purposes, precise boundaries for archaeology may be desirable, but some indication or representation of the "fuzzy" or contested nature of the data from which the boundary is derived is necessary to make the boundary actually meaningful when making decisions.

Perhaps the most significant issue facing archaeological informatics is the growing realization that digital data is extremely prone to corruption, loss, and software and hardware obsolescence. This is a particularly important point as virtually all archaeological data, from primary data to synthetic analysis, is now "born-digital," that is, it is originally created in digital form whether that be a simple word processing document or a three-dimensional laser scan. Much of this data, if lost, cannot be recreated. The need for all sectors of archaeology to have access to reliable and (preferably publically) accessible repositories with expertise in digital preservation and cultural heritage content remains a key concern in Archaeological Informatics. There are still few organizations able to offer viable preservation and access services specifically focused on the cultural heritage domain although good examples are the Archaeology Data Service in the UK (ADS), Data Archiving and Networked Services (DANS) in the Netherlands, and Digital Antiquity's data archive (tDAR) in the USA.

In tandem with the challenges relating to digital preservation, there has been a rapid expansion of opportunities for public dissemination and engagement provided by new media, particularly Web-based technologies such as social networking, public participatory GIS, (PPGIS), and other forms of user-generated content. These have to a certain extent blurred traditional boundaries between "expert" and "mediated" material and content, including interpretation, memories, opinions, and records of the cultural heritage generated by the broader community. This process can raise challenges for cultural heritage managers, such as understanding conflicting or contradictory viewpoints, as well as significant opportunities such as expanding the knowledge base and tapping into the many alternative perceptions of what actually constitutes the heritage.

Cross-References

- ▶ Archaeology Data Service (ADS)
- ▶ Cultural Heritage in the Digital Age
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Heritage: History and Context
- ▶ Intangible Cultural Heritage

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Archaeological Institute of America (AIA)

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Basic Information

The Archaeological Institute of America (AIA), located at Boston University, 656 Beacon Street, 6th Floor, Boston, Massachusetts, 02215 USA, http://www.archaeological.org, is the oldest learned society in North America devoted to archaeology. It is also the largest with over 200,000 members. The AIA was founded in Boston, Massachusetts, in 1879 under the leadership of Charles Eliot Norton of Harvard University (Sheftel 1979: 3). It has a unique structure based on local societies, now numbering over 100 across the United States of America, Canada, and overseas. The AIA counts among its members professional archaeologists, most of whom work in the Old World, and members of the general public with a deep interest in archaeology. The coexistence of these two groups has shaped the AIA throughout its history and continues to be a fundamental element of its character.

The AIA promotes archaeological research and disseminates its findings, notably in a scholarly journal, the *American Journal of Archaeology* (ISSN 0002-9114); in a popular magazine, *Archaeology*; and in professional monographs. It holds an annual meeting at which archaeologists present their latest results to colleagues and interested members. Through its local societies, the AIA supports a nationwide program of public lectures and other programs designed to inform the wider public about archaeology and significant recent discoveries. It has also developed educational programs for children. News about archaeology and the activities of the institute is communicated to members and the public through a newsletter and, increasingly, the worldwide web. The AIA provides a fellowship program for its younger academic members and also funds students who wish to gain some experience of fieldwork. Several awards recognize archaeologists and others who have made outstanding contributions to the field and to heritage preservation. The most significant of these is the Gold Medal for Distinguished Archaeological Achievement. This has been given to such distinguished archaeologists as George Bass, Robert Braidwood, Hetty Goldman, and Gordon Willey. Additional awards honor scientific contributions, books of special note, and excellence in undergraduate teaching. The AIA has long campaigned to end the international traffic in antiquities, arguing that this destroys part of our common heritage from the past. Recently, it initiated a program to preserve prominent archaeological sites worldwide and to promote best practices in site conservation.

At first the members of the institute were mostly Harvard University faculty and leading figures in the Boston business and social communities. Within a decade of its founding, the AIA could claim to be national in scope as local societies were founded in New York, Baltimore, and across the Midwest (Allen 2002: 12). Early in the twentieth century, the number of societies grew still farther across the western states, including California. In 1906 the United States Congress approved a charter for the AIA (Sheftel 1979: 14), an indication of the organization's growing national prominence. That document sets out a mission for the institute that continues to inspire its activities today. The charter states that the AIA was founded

> . . .for the purpose of promoting archaeological studies by investigation and research in the United States and foreign countries by sending out expeditions. . ., by aiding the efforts of the independent explorers, by publication of archaeological papers, and reports of the results of the expeditions which the Institute may undertake or promote. . ..

In its early years, the AIA sponsored excavations at the Pecos Pueblos in New Mexico; at Assos in Turkey; in Crete; at Cyrene in Libya and also in Guatemala, Mexico; and at Nippur in Iraq. The institute considerably expanded its reach through the establishment of schools of archaeology around the Mediterranean and in the Southwestern United States (Sheftel 1979). Among the most prominent were the American School of Classical Studies at

Athens, the American School of Classical Studies in Rome (now the American Academy in Rome – School of Classical Studies), the American School for Oriental Study and Research in Jerusalem (now the American Schools of Oriental Research), and the School of American Archaeology in Santa Fe, New Mexico (now the School for Advanced Research on the Human Experience). Later, schools of archaeology in Baghdad, Cairo, and Tehran were added to this list.

From the beginning, the institute developed a special interest in the archaeology of the ancient civilizations of Greece and Rome, together with the high cultures of the ancient Near East. This continues to be the focus of many of its professional members today and is reflected in the contents of the *American Journal of Archaeology*. Thus, for some of its members, the archaeology of the lands surrounding the Mediterranean has been of primary importance (Renfrew 1980). Others associated with the institute, however, have had more diverse interests within archaeology, extending widely across the Old World and into the New World also. Indeed, this dichotomy has been part of the institute's character from its founding as its early exploration of sites in the Southwestern United States demonstrates. Currently, that wider array of interests finds expression in the pages of the magazine *Archaeology* and in the lecture program, both of which embrace the exploration of the entire human past across the globe. Through these means, and also in the site preservation program, another global initiative, the institute has a worldwide reach.

Major Impact

Today the Archaeological Institute of America can claim to be the leading organization devoted to international archaeology in North America. It continues to provide significant support for professional archaeologists while expanding its outreach to members of the public, including children. The AIA has recently become one of the leaders in the heritage preservation movement internationally. Its rich array of activities is captured concisely in a motto "excavate, educate, advocate."

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Archaeological Licenses

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Introduction

The licensing of archaeologists is one part of a system of quality control of archaeological heritage management (AHM), sometimes known as archaeological resource management (ARM), cultural resource management (CRM), contract archaeology, rescue archaeology, and preventive archaeology. The other two parts of quality control are: oversight of an ongoing project by the appropriate government agencies; and review and approval of the final product or report by the proper authorities. Licensing often involves requiring registration of qualified archaeologists at the national or provincial or even local level, and it can also involve review of a candidate's qualifications on a project-by-project basis. Such a review can include personal interviews and submission of prior work upon which to base a certification of the archaeologist's ability to complete a project in an acceptable manner.

Definition

While quality control in archaeology has always been an issue, it did not really come to the forefront of consideration until in the mid-twentieth century; archaeology moved out of the academy and government and into the private or

contracting sector. Prior to that time, only archaeologists knew or cared enough about the quality of archaeology to make it an issue, and the quality of archaeologists and the work they did was thus generally controlled by peer pressure and academic ethics and organizations. As the public and non-archaeologists became more involved in archaeology through taxpayer and polluter-paid funding and by projects that were of more immediate local public concern, there arose a need for non-archaeologists to judge the qualifications of archaeologists, about which the average citizen, politician, and government bureaucrat knew virtually nothing.

Taxpayers and clients hiring archaeologists needed to know that their money was being spent in the most efficient and effective manner possible to protect the public's common archaeological heritage and to get approval and permits for development projects. The inherent conflict of interest involved in academic archaeologists or government agencies accrediting their own work also argues for the application of some kind of independent certification or licensing of such archaeologists so to protect the public's interests when public funding is involved. Despite this, however, licensing is generally only accepted by, and applied to, private-sector or contract archaeologists.

Qualifying archaeologists prior to commencement of a project, or in other words licensing, can be thought of as a "front-end" approach to quality control, and in some countries this is the full extent of attempts to control the quality of the work done. If you pick a well-qualified archaeologist, the thinking goes, the work done and the final product must be acceptable. This is a common system in countries with legal systems based on the Napoleonic code and in the Latin tradition.

Peer review of the final report of a project attempts to control quality by reviewing what the archaeologist has done to see if the completed work meets certain standards. This is usually accompanied by inspection of the project in progress and can be considered the "back-end" approach to quality control. This is a common system in countries based on Saxon or British common law.

Both the "front-end" and the "back-end" approaches have their advantages and disadvantages, and in most countries both approaches are used, with one or the other receiving most of the emphasis. Even in "back-end" countries like the United States, the United Kingdom, and Australia, where the government is not involved in prequalifying or certifying archaeologists beforehand, the qualifications of archaeologists are taken into consideration before awarding a contract. And conversely, in "front-end" countries such as Namibia, Portugal, and Ireland, there is some review of the final product at the completion of the project. In countries, such as France and Mexico, where there is no licensing, since archaeology is a monopoly of the state, the final product is subjected to at least a cursory review, and it is assumed that the archaeologists hired by the state are qualified at some level. In some countries, for example, the Netherlands where there is a recently instituted private sector, AHM is controlled by a complete system of "front-end" licensing, in progress inspection, and "back-end" review. But such a complete system of quality control, if not unique, is unusual at the beginning of the twenty-first century.

Key Issues

What is considered adequate work depends on the country and the laws and customs where the work is conducted. Neither the "front-end" nor the "back-end" approach by itself is sufficient to ensure that the work conducted is adequate in any country. The major drawbacks for the "front-end" approach are that the work may be poorly executed and a final report never submitted, which has often been a major problem of academic archaeology. For the "back-end" approach, the work conducted may turn out to have been inadequate, but once an excavation is completed the site and data it contained have been destroyed, cannot be replicated, and are irretrievably lost. Clearly, both approaches accompanied by ongoing project review, as in the Netherlands, are necessary to assure that the public's money has been spent wisely and that the

archaeological data has been collected to protect the public's common heritage.

It was mentioned above that even in "back-end" countries, where the government does not require a formally recognized register of qualified archaeologists, there are often informal qualifications standards, if for no other reason than that the client, such as a local government requiring national government review or a private developer needing an adequate level of investigation to obtain a building permit, must be assured that the work that will be done is sufficient to pass review prior to spending their money. In many of the "back-end" countries, NGOs have been instituted whose main purpose is to certify the qualifications of archaeologists and archaeological contracting companies. Two prime examples are the Register of Professional Archaeologists (RPA) in the United States and the Institute for Archaeologists (IFA) in the United Kingdom.

In the USA, there is no licensing at the federal, state, or local level, although federal agencies who oversee the implementation of the major AHM legislation suggest and sometimes require that archaeologists have a minimum level of education and experience. However, there is a private, nonprofit NGO, the Register of Professional Archaeologists (RPA), which certifies the educational and experiential qualifications of its members who join the organization voluntarily. RPA members who break the rules can be, and have been, expelled from the organization. Hiring an RPA member provides some assurance to the client that the work will be adequate and will pass review, but there is no requirement at any level of government in the USA that archaeologists be RPA certified, and few clients even know of the existence of the RPA. In the UK, the Institute for Archaeologists (IFA) has improved on the RPA by certifying not only individual archaeologists but archaeological contracting companies, including periodic inspections by the IFA of a company's financial and personnel records. The British government does not require that contractors be IFA certified, but clients hiring IFA-certified companies are assured that the individuals in the companies and the companies themselves are qualified. In addition, British clients are learning of the IFA and are increasingly requiring IFA certification of their contractors.

One of the major benefits of certifying companies rather than individual archaeologists is that companies, because of their varied work force, have expertise in various subspecialties that an individual archaeologist could not have, including such things as business management and meeting contract requirements, bio-archaeology, regional and temporal specialties, rock art, physical anthropology, and other specialties often necessary for the successful completion of a project. Even in countries that have no private sector, it is often the case that a government agency might have a particular type of expert, but scheduling may prevent that expert from being available in a timely manner to complete a project. Thus, the private-sector contracting system is often more flexible and able to address a variety of situations than single-source, centralized, governmental agencies. If one company is not available, another qualified company usually is.

Perhaps the main reason for the development and thus licensing of a private sector is the lack of sufficient personnel in government agencies and academia. This is often for a lack of financial resources even in developed countries. As an example, in the United States the main AHM legislation was passed in 1966. Over the next few years, clients doing work for or requiring permits from the federal government began looking for archaeologists to meet the new requirements. There were few if any governmental archaeologists available to do the work so developers seeking archaeologists looked toward the universities. At first, the universities met the need by using student labor, often managed by university graduate students. This was inexpensive and provided experience to students, but the quality and timeliness of the work varied greatly. By the mid-1970s, the demand outstripped the ability of universities to respond appropriately and within limited time frames. Some universities tried to set up separate contracting arms within the university, but these were generally poorly managed, underfunded, and unable to meet

schedules and budgets. As a result, the private sector was instituted, often with a graduate student or professor setting up a company on his/her own. By the early 1980s, there were so many of these extra-academic archaeologists and companies that developer clients could not determine if their contractors were qualified, since they were not clearly associated with a recognized university program. A need for some kind of certification was born, but, in the USA at least, it was not adequately met. The RPA which had been started in the early 1970s has never really caught on as a certification group by clients or government agencies, and as a result, the USA is still today without a system generally recognized by clients and government review agencies. Thus, the USA still has primarily a "back-end" system.

Examples

A perusal of the IFA, RPA, and the Dutch Archaeology Quality Standards gives a set of standards that could serve as a framework for certification in countries presently operating without such standards and who wish to develop a more well-rounded quality control system to meet the needs of their taxpaying publics, of developers requiring such work, and of their archaeological resources. Such standards might also be worth reviewing by those countries who already have a "front-end" system and even for those with a closed governmental monopoly.

Some of the major points in these standards state that a professional archaeologist should:

- Insure that any work conducted is replicable, management and results are open and transparent, and that methods are clearly stated and adequate to the job
- Provide for publishing the data in a timely manner and as completely as possible for use by other archaeologists and the public, and that the data is preserved for the future whether the work is paid for by the government or by the polluter-pays principal
- Abstain from dishonesty, fraud, and misrepresentation in dealings with others
- Deal fairly, responsibly, and ethically with colleagues, employees, and clients
- Cooperate with other archaeologists and the public and descendant groups
- Insure that the archaeologist has the necessary expertise to do a competent job
- Abide by laws protecting the resource and employees
- Protect client's privacy and interests if not in conflict with archaeological ethics
- Assure the timely completion of an adequate project
- Be aware of safety for employees and the public
- Avoid conflicts of interest
- Support and promote conservation of the resource base and the interests of descendant communities
- Not knowingly recover artifacts for commercial exploitation
- Give credit where credit is due
- Keep up with developments in the field
- Not commit plagiarism or falsely attack the reputation of another archaeologist
- Not take bribes
- Ensure that the research results will justify the destruction of the resource
- Avoid exaggerated and sensationalist statements about archaeological remains
- Be informed about the research at hand and before dealing with the public or giving legal testimony
- Report violations of the code of conduct to the proper authorities in a timely manner
- Insure that archaeologists and agencies put the archaeological resource first, and not their political agenda

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and Native Americans
- ▶ Cultural Heritage Management: Business Aspects
- ▶ Cultural Heritage Management: Project Management

- ▶ Cultural Heritage Management Quality Control and Assurance
- ▶ Ethics in Archaeology
- ▶ Heritage and Public Policy
- ▶ Heritage Sites: Economic Incentives, Impacts, and Commercialization
- ▶ Institute for Archaeologists (IfA)
- ▶ Netherlands: Cultural Heritage Management
- ▶ Stakeholders and Community Participation
- ▶ United States: Cultural Heritage Management

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Archaeological Prospection Laboratory (National Autonomous University of Mexico)

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Basic Information

In the same way that the development of medical technology has contributed to make surgical interventions less intrusive, by using images generated by X-rays, ultrasounds, and nuclear magnetic resonances and complementing them with biopsies, clinical analyses, etc., so, in the last few years, archaeological prospection has made available a variety of images from the subsoil that contribute to optimizing excavation strategies and accurately defining the areas and depths at which one can recover the information that is relevant to the objectives of an archaeological project.

Unfortunately, exploratory studies prior to excavation are well behind and a long way from being a generalized archaeological practice, unlike medicine, where you would not conceive of carrying out any surgery without applying all of those tests. Nonetheless, the international trend is, more and more, to make use of the information provided by techniques that can give details about the conditions of the subsoil, and so reduce to a minimum any disturbance of the archaeological context caused by excavating, and at the same time recovering as much information as possible. This is where the activities of the Archaeological Prospection Laboratory come in, which, during the last 30 years, has developed procedures, technologies, and tools for the study of archaeological sites in Mesoamerica.

Background of the Laboratory

The Archaeological Prospection Laboratory was created in early 1983, with a proposal to

incorporate, develop, and adapt instruments, techniques, and methods that permit to obtain data and interpret archaeological sites from the ground surface.

After training at the Lerici Foundation in Italy in 1981, Luis Barba outlined a plan to gradually incorporate various techniques into the laboratory, in the same coordinated way that the Italians have come to use so successfully. After further training at the University of Georgia getting his Masters Degree, Barba returned in 1983 to establish the laboratory. In that year, a mobile laboratory was designed and built to facilitate the acquisition of geophysical data and perform chemical analysis in the field. With this infrastructure, the laboratory began to take part in archaeological projects, with the purpose of carrying out exploration studies prior to any excavation work.

In 1985, Barba defended a Master's thesis at the University of Georgia that proposed a methodology for the surface study of archaeological sites that is still being applied by the laboratory. In this way, the Prospection Laboratory established a process that includes the application of remote sensing, geophysics, geochemistry, and archaeological techniques. This has been called the methodology for studying sites from the ground surface, and it provides information about the characteristics of the context and the buried structures, which permits decision-making about whether to excavate or not, and then where to excavate, based on scientific data.

In favorable conditions, it has been possible to obtain data about the function of a site before its excavation. This presents unquestionable advantages in the quantity and quality of the information that can be retrieved as well as the time and cost that the archaeological investigation will require.

The methodology mentioned incorporates a variety of archaeological exploratory techniques, organized in such a way that their application is as efficient as possible. Essentially, it makes use of a wide range of techniques such as satellite imagery and aerial photography to locate and delimit the sites. It records the conditions of the surface using the topography and the distribution of scattered material. The geophysical techniques are located at an intermediate level as regards the area of land that they cover, which shows the limits of the sites and the localization of the structures that form it.

At the last stage of this procedure, the samples taken from the site are chemically analyzed. In this way, at each stage of the process, the data obtained in the previous stage is detailed and verified. In every case, the variations detected for each indicator are represented by way of computer-generated maps and immediately after the acquisition of data to provide a constant feedback (Barba 1994).

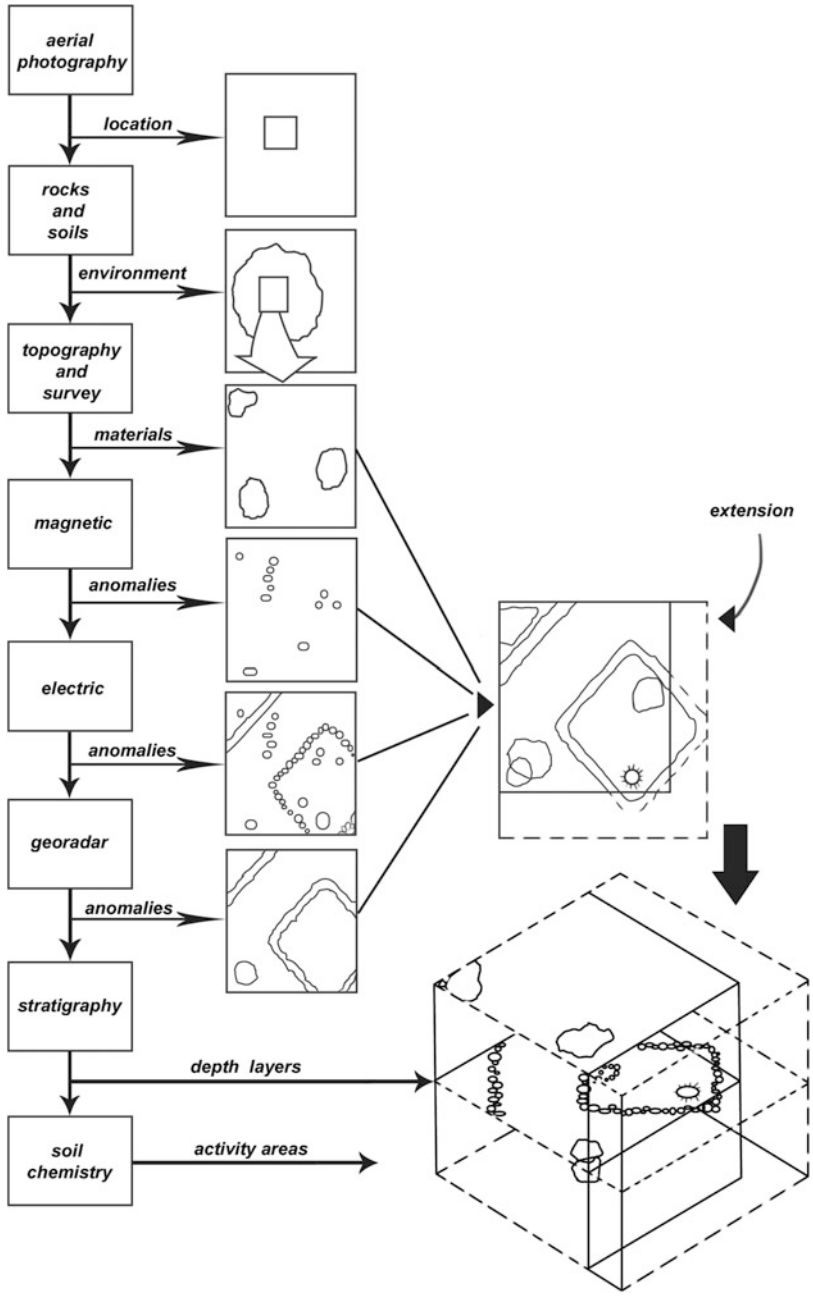
In this way, it is possible to cover several hectares in a few weeks of work, but at the same time, the results offer a sufficient level of detail in the areas of interest to guide subsequent excavation work. Recently, the quality of surface data has allowed us to visualize and understand complete archaeological sites without the need for any excavation.

Prospection Techniques

The laboratory has experimented with a variety of tools. One of the most successful has been the use of balloons to lift photographic cameras, triggered by remote control, to acquire aerial images for archaeology. That, complemented by the processing of images to produce digital mosaics of the site and combined with topographic surveys, has permitted a comprehensive recording of the surface using digital terrain models (DTM).

As one part of the technology used in archaeological exploration, geophysical techniques are utilized to identify what is below the surface and, by way of indirect observation, what materials have different physical properties. The most common techniques include measuring magnetic properties, currents and electric potentials, and the reflection of electromagnetic waves in the terrain that is being studied.

In archaeology, the techniques of geophysical prospection offer the advantage of being able to investigate areas in less time and with less cost than the use of traditional methods. As with other research techniques, they also have their



Archaeological Prospection Laboratory (National Autonomous University of Mexico), Fig. 1 Diagram showing the application sequence of analytical techniques used in the Archaeological Prospection Laboratory (After Barba 1994)

limitations, as there always exists some uncertainty in the interpretation of the data. Generally, one has to decide between the penetration (depth of investigation), the required resolution, and the speed of accomplishing the fieldwork. It is very difficult to achieve rapid and inexpensive measurements that will reveal in detail the deep structures, by using only one technique; because of

that, our work includes many of the currently available techniques, applied in a systematic and coordinated manner. Despite the undoubted contribution of geophysical techniques, our laboratory has never abandoned the use of chemical techniques, and the expected arrival of new elemental analytical techniques with portable XRF promises to revitalize the role of chemical techniques in archaeological prospection.

Major Impact

Main Contributions of the Laboratory to Archaeological Investigation

Throughout the 30 years of its operation, the laboratory has developed many analytical techniques and applied them in over 100 archaeological sites in which it has worked in various parts of the world. One of the most significant achievements is the establishment of the integrated methodology that has permitted, through the application of remote sensing, geophysical exploration techniques, and chemical techniques, enormous detail in the study of archaeological sites before initiating excavation. As is shown in Fig. 1, each technique collects data that are converted into images, producing layers of information, each time more accurate, of the archaeological site that is still buried.

As a consequence of applying chemistry to prospection, another significant contribution was made to the study of occupation surfaces: it was in this laboratory that, at the end of the 1970s, a research project was designed to reconstruct human activities by analyzing the chemical residues on floors of the excavated sites. In the early 1980s, the laboratory gradually incorporated geophysical tools in its fieldwork, at the same time reducing the role of chemistry in prospection but promoting the study of chemical residues, first on floors of occupied houses(Barba & Bello 1978), later on floors of archaeological houses, and finally on ceramic vessels.

The chemical study of floors has provided evidence of the activities carried out on them, allowing us to understand the use to which the spaces were destined. Such is the case in the identification of areas for food preparation, consumption of food, ritual zones, transit zones, storage, etc. Recently, the efforts of several laboratories have made ICP, XRF, GC-MS, and other analytical techniques available to detect those residues on floors (Middleton et al. 2010).

It has been also incorporated the study of residues impregnated in the pores of ceramic vessels in order to infer what liquid substances they once contained. The analyses applied as much to the floors as to the ceramic vessels include tests for phosphates, carbonates, pH, protein residues, fatty acids, carbohydrates, and sometimes the determination of color (Barba 2007). On occasion, additional tests to detect iron, nitrates, chlorides, and calcium have been applied to resolve specific problems. Nowadays, XRF has been incorporated to also identify some elements with cultural importance.

Cross-References

- ▶ Archaeological Soil Micromorphology
- ▶ Chemical Survey of Archaeological Sites
- ▶ Floors and Occupation Surface Analysis in Archaeology
- ▶ Prospection Methods in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Archaeological Record

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Introduction

Read history if you wish to learn the past? Well, yes and no. Read history, by all means. But the human past – hundreds of thousands to millions of years – vastly exceeds the 5,000 years of written records which, in any event, are highly uneven in time-space coverage even during that comparatively brief span. For most of the human past in most corners of the world, the archaeological record is our sole or chief source of evidence. The historical record is texts of various kinds. But what exactly is the archaeological record?

Definition

Everyone knows, or at least think they do, that the archaeological record consists of the material remains left behind by past societies. In the narrowest sense, this much certainly is true. An ancient hunter discarding a butchered animal bone, an ancient cook discarding the broken shards of a pot, and an ancient despot raising a monument to his or her glory that, like the statue of Ozymandias, at length falls to abandonment and disrepair all contributed to the archaeological record. The record, therefore, consists of all things that ancient people made, used, or otherwise transformed from their natural state and place. It is indeed material things that range in size and makeup from old bones and stones, dusty bricks, and shards of pottery vessels to palaces and pyramids. But archaeologists and even students in their introductory classes know that the record is not just material things but also abstract or intangible *context*. It is not just the old bones or broken shards, etc., but where they are found, associated with what else, and in what depositional matrix. The archaeological record is old things and contextual information about them.

Artifacts and other material things in the record possess intrinsic properties like their composition, size, and form, which characterize them whatever the nature of the record. Extrinsic properties include objects' abundance or number, their distribution, and their patterns of association. Extrinsic properties of things in turn comprise intrinsic properties of the archaeological record. The theory that explains how the record formed says nothing directly about objects' intrinsic properties but a great deal about their extrinsic ones, in the sense of what and how much is deposited, where, and with what.

Whatever its nature, the archaeological record is not entirely a thing of the past. It may have originated in "Thens" beyond number, but it is accessed in painfully finite "Nows". Archaeologists often emphasize the record's status as a contemporaneous thing to distinguish what we do from ethnography, the study of contemporaneous cultures by direct observation, not indirect inference from material remains in context. But the record is contemporaneous in another sense because "Nows" of different times involve different methods by which to recover the record. Forty years ago, for instance, tiny and nearly invisible fragments of plants and animals that ancient people ate were overlooked in archaeological deposits, too small to detect and systematically to collect. With the development of flotation methods, representative samples of those abundant and important parts of the record became commonplace, in the process altering our understanding of the past. Physical science methods allow us to identify trace elements in archaeological materials from pottery to stone and beyond in ways that earlier generations of archaeologists could not imagine. What parts of the archaeological record are accessible, and how, are themselves historical artifacts. Whatever he had in mind, so far as it concerned the archaeological record Faulkner was righter than he knew in saying "The past is. . .not even past."

Historical Background

For most of archaeology's own past, however, there was precious little self-conscious reflection about what the archaeological record was. It was there, and it clearly was meant to be dug and documented. Archaeologists simply got on with the task.

At a particularly influential moment in its history, though, a prominent archaeologist argued that the material record and context "present a systematic and understandable picture of *the total extinct* cultural system" (Binford 1962: 220; original emphasis). Salutary against the then-prevailing belief that the record revealed comparatively little about the past (e.g., Hawkes 1954), this optimistic view excited enthusiasm for ambitious attempts not just to learn the chronological order of things or to engage in sterile exercises in object classification but to determine how the record registered, if obliquely, the structure and organization of the past cultures that left it behind. Initial enthusiasm may have overreached, less so than some believe today, but had the virtue of rescuing archaeology from its traditional preoccupations with time order and taxonomy. In the process, archaeologists were prompted not only to think about what the record revealed of the past but also to appreciate that learning how the record formed was essential to revealing that meaning.

Besides its promise, this appreciation naturally led archaeologists to contemplate limitations of the record. Obviously, limitations include the natural processes like organic decomposition that reduce or alter the record after its deposition and those like disturbance by animals – "bioturbation" – that alter its context. Perhaps less obviously until archaeologists began to think about it, another limitation is that the record as deposited is neither time capsule nor preserved Pompeii. Instead, it is a confusing scramble of things used in different ways at different times for different purposes, all thrown together at the point of abandonment or discard with (as it seems to some of us at weaker moments) no regard whatsoever for the inferential challenges confronting future archaeologists. (Schiffer [1976] termed these "natural-" and "cultural-formation processes," respectively.) Confusing this scramble of things may be, but arbitrary it is not. Yet until the systematic properties of the scrambling process are, well, unscrambled, archaeologists cannot understand the record or, by extension, the past that it reveals. Failing to understand the complex, secondary patterns of association that dominate the archaeological record, for instance, anyone troubling to examine a family's trash when it contains food scraps, rosary beads, broken tools, and fragments of shingles, might mistakenly conclude that it dined on the roof using screwdrivers while adorned in curious jewelry.

Thus arose formation theory which, broadly speaking explains how the record formed and why it formed as it did (Schiffer 1976, 1987; Binford 1981; Shott 2006). It is one thing to know that how the record formed is critical to its grounded interpretation. It is quite another thing to accomplish this task in practice. Doing so requires knowing the record both for its promise and the limitations only briefly noted above. If, as David Clarke (1973: 17) once said, the archaeological record was "indirect traces in bad samples" of what ancient people did and how their societies were organized to do it, this rueful characterization merely underscores the challenge confronting archaeologists who wish to learn from the past from its material remains. No one promised that it would be easy; fortunately, some have thought seriously about the problem in ways that might help us meet the challenge.

For instance, Cowgill (1970) described the archaeological record as the transformed, progressively diminished remnant first of what was deposited, then of what preserved among the deposits, then of what could be found and recovered of those deposits. However mundane the argument may seem to outsiders, it focused archaeologists' minds on the steps in the process that separate living cultures of the past from the material record that we study now, and led eventually to serious theorizing about how the record formed and the systematic transformation that structure it at each stage. Archaeologists

called this "middle-range theory," "formation processes," "accumulations research," or "formation theory" (Shott 2006). In the 1970s, prominent American archaeologists debated what the record was. If to Schiffer (e.g., 1976) it was transformed ethnographic tableaux, Binford (e.g., 1981) saw all records as fundamentally different categories of evidence to ethnography's. To Schiffer, if we systematically account for transformations between ethnographic and archaeological contexts and more finely resolve past time, then we approximate the ethnographic record. Binford argued instead that not merely transformation and timescale separate the two records and that how they formed and what they revealed differed immensely. Like many debates this one gave off light but also much heat that sometimes obscured the good points that antagonists made. But at least it served to contrast archaeological and ethnographic data, a difference that, even now, archaeologists have assimilated imperfectly. In the process, it gave renewed emphasis to ethnoarchaeology, the study of living peoples and cultures for how they form their archaeological records. As a result, Binford but also many others documented how cultures of many places and characters generated their own archaeological records.

Briefly around 1980, ethnoarchaeology was popular, and it has continued since as a secondary but vital branch of archaeological theory and method (David & Kramer 2001). Just as ethnoarchaeology and formation theory began to gain traction in the 1970s and 1980s, however, their development was complicated by other intellectual trends. For reasons that had as much to do with contemporary sociopolitics and European, particularly British, intellectual reactions to American thought (Shott 2005) as with the past, a strain of post-modernism gripped archaeology in the 1980s. Somewhat subsided today, it nevertheless questioned legitimate archaeological concerns. For instance, postmodernists cited by David and Kramer (2001: 419) airily dismissed ethnoarchaeology as an immoral effort to deny peoples' or cultures' splendid isolation by subjugating them beneath general principles residing within bodies of thought like formation theory. In this view, there are different cultures, but no general patterns or causes of the undeniably immense variation among them. Instead, each culture must be contemplated only in its irreducible uniqueness. This is academic nihilism unworthy of serious regard and a brief for archaeology as glorified butterfly collecting.

Postmodernism also created the trope of record as text to be read to reveal its many voices and messages. In the process, many nouns became verbs and words like "multi-vocality" grew popular among archaeologists who regarded the effort to learn about and from the past as a futile bourgeois pastime. In its place, reading the record reduced to exercises in cleverness or inscribing a blank canvas with one's intellectual predilections. In this climate, how the record formed either was irrelevant, or its systematic characterization was hopelessly confounded by ineffable systems of meaning accessible only to the living mind and therefore beyond the reach of any theory of a material record whose producers do not survive to explain it (Hodder 1982). The latter is, at best, a clever counsel of despair.

Record as text identifies archaeology's material record with written texts. In the process, it rests on a conflation of very different purposes and origins. All writers write for an audience; even diarists write for themselves. In contrast, only vanishingly small fragments of the archaeological record were deposited with the self-conscious purpose of interpretation by those expected to encounter them later. Whatever the sources and origin of historical data, archaeology's is a record chiefly of what ancient people lost, abandoned, or discarded. The archaeological record, then, was not written for audiences; it accumulated as the by-product of actions, ordinary and extraordinary, and with no future readers in mind. As our only source of grounded knowledge about the remote past, archaeologists must properly recognize the material record as it is, not as their conceits may wish it to be: unintended consequence, not constructed text.

Key Issues

Despite such distractions, formation theory as a way to explain the record has made modest progress. One example of its contribution to understanding the archaeological record is formation theory's explanation of "discard behavior," where trash was placed, how, and with what other trash. This could be regarded either as trivial or impossible to know, but instead it was shown to pattern systematically with culture type, land use, and other factors (e.g., Murray 1980), whatever unethical subjugating of ineffable uniqueness entailed. And, far from being trivial, it matters a great deal to how we interpret the record in ways that range from the existence of "toolkits" (tools thought to be used together in performance of certain tasks and therefore to reveal the nature and frequency of ancient peoples' actions) to parsing the occupational history of complex sites (e.g., Varien & Ortman 2005; Chapman & Gaydarska 2007) with all its implications for population trends, political organization, and social process.

Another example concerns how we understand the abundance of things in the archaeological record. In an innocent past, the more abundant an artifact type was in the record, the more important was its role or frequent was its use in the past. Following such logic, future archaeologists might conclude that people today smoke cigarettes much more often than we wear expensive jewelry because butts are far more abundant than are diamond rings in the material record that we are accumulating. Correcting such misapprehensions draws our attention to an intervening factor – how long different things last in use, or "use life" (Schiffer 1976: 60) – and to systematic variation in this factor that must be understood as we interpret the record.

Current Debates and Future Directions

Would that there were many more examples and that formation theory and systematic study of the archaeological record *qua* evidence were actively debated today. Instead, in an archaeology that continues to lurch from fad to intellectual fad in its immature disciplinary state, formation theory and its critical role in explaining the record were left to languish somewhere between indifference and oblivion. Case studies cited above and others show that some archaeologists continue to study it seriously, but it no longer is a central concern of the field. One of our most urgent tasks is to establish the serious study of formation theory at what it pleases British academics to call the "high table." That is, archaeologists must regard formation theory not as an esoteric infatuation of the few but as an essential tool in every archaeologist's quest to learn about the past. If formation theory were vigorously debated today, topics might include the connection, if any, it implies between archaeology and anthropology and the relevance of the record and formation theory to the full range of general theories.

In North America, archaeology is subsumed beneath anthropology in ways not duplicated elsewhere. Whatever purpose its encapsulated status may have served historically, today archaeology is poorly placed within an anthropology whose chief preoccupations are vastly different from ours. Formation theory and the nature of the archaeological record sharply distinguish archaeology from an anthropology that requires neither. Archaeology also applies a range of general theory that differs in character and epistemological status from the interpretive traditions that most anthropologists practice. Perhaps if and when archaeology achieves in North America the disciplinary independence that it has deserved for at least decades, formation theory will rise in importance and stature.

Whatever the complexities of its formation and the obliqueness of the prehistoric action that it registers, the archaeological record is our sole evidence of the cultural past. Of course how we interpret the record depends crucially upon how we understand its formation. But how we understand the past depends also on how we explain the action, structure, and process that the record preserves; formation theory and general theory are equally essential to archaeological research (Shott 2006). Accordingly, the understanding of

how the record formed is not confined to theoretical traditions like materialism in its various guises. Rather, formation theory is equally vital to all theoretical traditions, including those that favor agency, symbol, or structure over material conditions. In its most radical programmatic statements, the post-modernism noted above denied the possibility of knowing the past and, by extension, the need to ground inference in evidence. Such views neatly reduce archaeology to the "irresponsible art form" that Clarke (1973: 16) feared it might become. But the excesses of post-modernism at least inspired the belief that the past might be understood in structural and symbolic terms, not just in the material terms of what people ate or did. At length post-modernism yielded to more constructive cultural and structural theories that, despite sometimes overwrought rhetoric, provide balance to the materialism that undeniably dominated archaeological, particularly American, thought in processualism's heyday.

Today, nonmaterial theory is both more diverse and, in significant degree, committed to grounded inference (e.g., Chapman & Gaydarska 2007). Warts and all, such theory considers not just material conditions and individuals or groups as strategizing agents but also intrinsic cultural context which, admitting only the possibility of systematic properties to cultural variation, therefore is accessible to both general and formation theory. To date, however, there has been more development of general cultural theory than the "middle-range (i.e., formation) theory of mind" (Cowgill 1993), of structure, and of organization that is as conceivable and essential as it currently is neglected. Sources like Hill (1995) and Chapman and Gaydarska (2007) are exceptions that prove the rule; cultural theory awaits the formation theory that can make its inferences reasoned, not a priori.

A start has been made using ethnoarchaeological study to illuminate social, political, and symbolic dimensions of cultures. The Colombian Nukak, for instance, deliberately break artifacts during dispute resolution (Politis 2000). Awá men of the Brazilian Amazon make arrows out of proportion to their utilitarian value; details of fletching, construction, and use are signifiers of maleness, not mere functional attributes, and "use" sometimes amounts to little more than carrying arrows (González-Ruibal et al. 2011). Applied mechanically to archaeological interpretation, these observations are mere cautionary tales (e.g., that the abundance of arrows in material records may not directly measure the frequency or importance of hunting) that underscore the often particular cultural contextualization of the record's formation. But compiled into a larger body of evidence itself synthesized as Cowgill's "middle-range theory of mind," they can reveal symbolic dimensions in the use of material objects and their discard into the record. In this way, formation theory is not narrowly material or utilitarian but broadly cultural in its scope.

Yet concerning formation theory, there is room for improvement in all varieties of archaeology's general theory. We have no shortage of general theoretical stances and predilections, most of which are inadequately grounded in evidence by a sincere effort to develop necessary formation theory. Varieties of evolutionary theory, for instance, have resurged since the 1990s (e.g., O'Brien & Lyman 2000). Context in the record does not figure prominently in their usage; also, they sometimes dismiss formation theory as an effort to reconstruct ancient behavior, which they reject on principle as unobservable. Yet every evolutionary invocation of transmission, style, drift, and function invokes behavior, at least implicitly; more broadly, formation theory and the understanding of the record's meaning that it provides are as essential to evolutionism as to any other general theory in archaeology. Similarly, intellectual traditions in classical and prehistoric archaeology are quite distinct, yet formation theory was central to Peña's (2007) study of Roman pottery.

Conclusions

Even in archaeology's present underdeveloped state of intellectual development, it is futile to debate what the record is; at least broadly, we agree on that score. Nor should we wonder if it preserves all relevant detail and content of all past

cultures. Of course it does not. Yet it is equally futile to suppose that the record is so limited and biased as to deny the possibility of systematic, fairly far-reaching inference to those past cultures or to free archaeological thought from any grounding in relevant evidence. The archaeological record is neither our best friend nor worst enemy. The archaeological record simply is. It is for us to determine what can be made of it.

Case Studies

Despite halting advances and sometimes bitter debate, archaeologists of various theoretical casts have used formation theory intelligently to improve their inferences from general theory and their understanding of the past generally, encouraging signs that serious study of how the record formed is regaining traction. Hill (1995) interpreted patterns and sequences of discard at British Iron Age settlements in symbolic terms, as ritual or "structured deposition" that revealed elements of world view. Careful analysis of deposits and building sequences at a Cypriot Bronze-Age village allowed Frankel and Webb (2001) to estimate population size and occupation span and gave insight into household size and structure and social reproduction otherwise obscured from view. Gallivan (2002) examined joint variation in population and sociopolitical complexity in the late prehistory of the American Mid-Atlantic coast. Varien and Ortman (2005) used formation theory to determine occupation span and sequence of Puebloan villages in the American Southwest, which they then linked to land tenure, economic intensification, and sociopolitical trends. Lamenting neglect of "how and when different kinds of pottery came to be incorporated in different amounts and in different conditions into different kinds of archaeological deposits" (2007: 1), Peña demonstrated the relevance of formation theory in Roman archaeology. Using mostly Balkan evidence, Chapman and Gaydarska (2007) argued that fragments of pottery and other prehistoric goods, whether broken deliberately or not, frequently were reconstituted for various symbolic and social purposes. In the service of this original if perhaps overstated symbolic thesis, they employed the very formation theory that postmodernists eschewed on principle. Surovell (2009) both integrated formation theory with a general theory, behavioral ecology, and applied it systematically to stone tools and debris, among archaeology's most abundant and widely distributed materials.

Cross-References

- ▶ Ethnoarchaeology
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Middle-Range Theory in Archaeology
- ▶ Site and Artifact Preservation: Natural and Cultural Formation Processes
- ▶ Site Formation Processes

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Archaeological Resource Management: The Changing Role of the State

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Introduction

In the United Kingdom (as in many other countries) the state, from the end of the Second World War onwards, played a dominant role in investigating, protecting, and presenting the nation's archaeological heritage. Now, in very many areas of life, the role of the state, and the relationship between citizen and state, is changing. Archaeology, and also heritage protection more generally, are affected by this in a variety of ways. The way in which state archaeological organizations operate in the future may be rather different than it has been in the past.

Key Issues/Current Debates/Future Directions/Examples

In 1945, immediately following the end of the Second World War, the Labour Party came into government in the United Kingdom, following a "landslide" victory in a general election. This marked the beginning of a phase of history in which, under the so-called "welfare state" philosophy, central government played an increasingly dominant role in many different areas of the life of the nation. The same trend was seen, in varying degrees, in many other liberal democracies in western Europe and beyond.

The investigation and protection of the archaeological heritage, and the presentation of this heritage to the public, was just one among many areas of activity in which the role of the United Kingdom state expanded greatly in the decades after 1945. Central government and its agencies undertook extensive archaeological surveys; new legislation was introduced to provide better protection for archaeological sites and monuments; officials selected more sites for such protection; greatly increased finance was made available for excavating sites threatened with destruction by development; important monuments were excavated, conserved, and displayed for the benefit of the members of the general public who wished to visit them; and guide books, produced and sold by the state at the monuments, gave authoritative accounts of the remains and their interpretation. One result of all this activity and expenditure was the development of a substantial archaeological profession. Another was the establishment of a particular kind of relationship, in the area of archaeology and archaeological protection, between the state and the archaeological profession on the one hand and interested members of the public on the other. The state was a major provider of interpretation and narrative (in a broad sense, and not least in the kinds of monuments and remains which it chose to investigate and protect), and the public was cast largely in the role of passive consumer of messages devised by officials of the state and archaeological professionals dependent on the state (Thomas 2004: 192-3).

Today, the situation is very different. The role of the state has changed quite significantly in recent years and is continuing to change. There is every indication that the rate of such change may, if anything, accelerate in the coming years. There are many reasons for this. Globalization, the Internet, and the emphasis on "consumer choice" have made people much less ready to accept single, "official" versions of the nation's past. Increased leisure and mobility (for some, at least) have prompted people to find new ways to spend time. The digital social media are leading people to expect to contribute their own views (and to have these listened to) rather than simply being passive consumers of information and decisions emanating from the state and other large corporate bodies (Thomas 2004: 193-5). Most recently, the economic crisis which has engulfed large parts of Europe since about 2008 has left many governments struggling financially. Many states are cutting their expenditure drastically; in the future, they will not be able to provide all the things which they have been providing in the recent past.

This, then, is the broad background to this entry. Two main forces for change can be identified. First, people are much less ready and willing today to simply accept the authority of the state without question; people wish to decide for themselves what they believe, and they also want their voices to be heard by authority. Second, the state is less able to provide services (of many different kinds) than it was previously. The archaeological functions of the state are no exception to this; indeed, they may be among the more vulnerable because these functions can easily be seen as less necessary than, say, health or education. It is easy to see how these two trends can reinforce each other.

How, then, are these trends being manifested in archaeology and heritage protection in the United Kingdom today? And how are state archaeological organizations and their officials reacting to them?

The rejection of "official" views of the archaeological past can perhaps be seen most clearly in the way in which prehistoric archaeology and prehistoric monuments have been taken up by "New Age" and "pagan" believers. The conflicts over access to Stonehenge are well known (e.g., Bender 1998), but there are other examples of contest over the rights to, and interpretations of, prehistoric monuments. A particularly telling episode occurred when a prehistoric timber circle was exposed by storms on a beach in Norfolk in the east of England. The monument was quickly labeled "Seahenge." English Heritage (the principal state agency for archaeology and heritage in England) believed the monument to be at risk of destruction. It decided that the best course of action would be to investigate the monument scientifically (in the course of which some physical damage would be caused) and to remove the timbers from their context in the hope of preserving them elsewhere. The state was seeing the monument primarily as a resource for scientific inquiry by dissection. Other groups, however, had different ideas. Pagans of various kinds believed that the monument was a sacred place and should be left in peace. The conflict was acute and generated a huge amount of media coverage (Champion 2000).

Seahenge was an example in which the beliefs and perspective of a particular group clashed with those of the state. In other cases, a group may simply develop its engagement to the past with little or no reference to what the state thinks (if anything) of that group's perspective. "Pagan" or "alternative" uses and interpretations of ancient monuments (particularly prehistoric ones) are an example of this (Cope 1998).

Thus, in some instances the authority of the state may be challenged; in others the state is simply ignored because it is not seen as relevant.

Shifting power relations can be seen very clearly in the relationship between the media and the state. The television archaeology series "Time Team" has been immensely popular in England (and more widely) (Taylor 1998). It portrays archaeological investigation as a rather breathless pursuit, carried out by people who some might regard as slightly eccentric. In some cases, Time Team has wished to work on protected monuments, meaning that English Heritage's agreement has been needed. The relationship has not always been an easy one. Sometimes English Heritage has had reservations about what was proposed and has ended up being made to

look slightly officious in the broadcast program. However, the public popularity of Time Team and its impressive viewing figures (routinely in the millions) have meant that English Heritage has not wished to be uncooperative towards the program and its makers.

Overall, certain wider social trends – a readiness to reject "official" versions of the past in favor of alternative ones, to challenge state authority, and to pursue different agendas from those advocated by the state – are reflected in the public's approach to archaeology and heritage. There is no doubt that responding to these trends poses considerable challenges for state archaeological and heritage organizations, accustomed as they are to "top-down" ways of seeing the world and of operating. How have such organizations tried to respond?

"Designation" (protecting buildings, monuments, and areas by giving them specific legal protection) has long been a key state function. Traditionally, decisions about which monuments to select for designation were made by officials, using criteria which reflected a particular outlook and set of priorities (Thomas 2004: 192-3). In recent years, a number of things have happened. First, English Heritage has encouraged members of the public to propose sites for designation and has provided a means of doing this online. Second, the idea of "local listing" – that is, designation at a local level, by local authorities, using locally developed criteria – has been promoted. This is seen as a more locally responsive system than one operated entirely by central agencies. In theory, "local lists" are meant to supplement national designation, allowing things which would not meet the stringent national selection criteria to be given some formal recognition, but it is possible that some locally listed items will be ones which are of national importance, but which central government has not yet had the resources to designate at national level. Third, English Heritage has undertaken a number of programs to assess the material legacies of "underrepresented" groups in England (English Heritage n.d. a, b, c).

Another interesting development has been the Portable Antiquities Scheme, in which public funding supports professional archaeological staff who record objects found by metal-detector users and other members of the public (Portable Antiquities Scheme n.d.). In England, there is no obligation on finders to report archaeological discoveries (other than those which fall into the restricted category of objects which are legally defined as "treasure"), so the scheme is very much about professional archaeologists reaching out to the public and working with them. Relations between professional archaeologists and metal detectorists have sometimes been uneasy in the past. When metal detecting first became widespread, some archaeologists wished to see it made illegal. That was never likely to happen (and certainly will not happen now), so engaging with metal detectorists has been the only viable option. In fact, many detectorists are deeply interested in the past and have a strong desire to be involved in its discovery but have chosen metal detecting, rather than (say) going on organized excavations, as their way of doing this.

Another recent growth area has been community archaeology (Council for British Archaeology n.d.). This is a large topic, but the broad thrust is clear – it is about nonprofessionals engaging actively in archaeology themselves and about some professionals acting as trainers and enablers, helping nonprofessionals to carry out archaeological projects which are of direct interest to them. One of the sources of funding for community archaeology is the Heritage Lottery Fund (which distributes fund raised by the National Lottery, established by the state in 1994). Of particular interest is the Community Archaeology Bursaries Scheme, under which the Heritage Lottery Fund and the state archaeological bodies for England, Wales, and Scotland support training placements "to equip would-be community archaeologists with the skills, experience and confidence to work with voluntary groups and communities." The message is clear – rather than the state doing archaeology on behalf of the citizen, it is helping the citizen to do archaeology on behalf of himself or herself.

All of the forms of activity described above are reflections of a changing relationship between state and citizen in the area of archaeology

and of changes in the way the state operates, made in response to this changing relationship. Citizens are no longer so willing to be the passive consumers of messages generated by state-employed professionals, and the Internet and social media provide new and larger opportunities for the citizen to make his or her voice heard and to exchange views and information directly with other citizens. At the same time, the state's ability to do everything itself is declining, which makes it difficult for professionals to argue (even if they wanted to) that archaeology is best left to the state and the professional to do.

In many ways, what is happening in archaeology in the United Kingdom today is a microcosm of what is happening in society more widely: a public which expects to have its views listened to by the state, a state which cannot afford to do everything which it might like to do or which it used to do, and a voluntary sector which is starting to show signs of filling some of the gaps left by the state. The activities described above are all examples of new kinds of relationships being negotiated between the state and the citizen, in a world which is changing rapidly and which is already markedly different from that of the "welfare state" which emerged after 1945.

There is no doubt, of course, that the state will continue to play a very important role in archaeology in the future. Not least, the imposition of legal controls on private property is something which can only be done by, or with the full backing of, the state. Nonetheless, it is clear that the role of the state in archaeology, and the relationship between citizen and state in this area, has changed substantially over the past 20 or so years. It seems beyond doubt that it will continue to do so in the years and decades ahead.

Cross-References

- ▶ Community Archaeology
- ▶ Heritage and Archaeology
- ▶ Heritage and Public Policy
- ▶ Metal Detecting in Archaeology

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Archaeological Review from Cambridge

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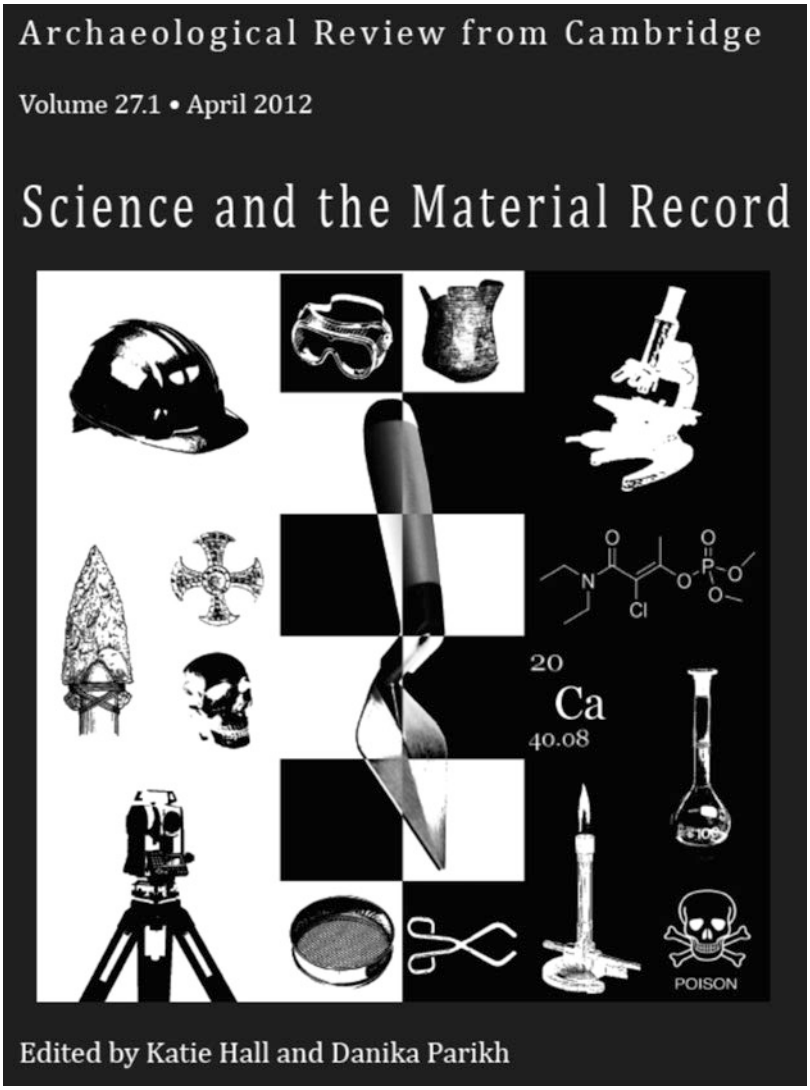
Brief Definition of the Topic

The Archaeological Review from Cambridge (ARC), first published in July 1981, is a biannual academic journal of archaeology, with calls for papers released approximately 18 months before its two publication dates (April and November) (Fig. 1). It is run on a nonprofit, voluntary basis by postgraduate students at the University of Cambridge. The present Committee is comprised of members working on such diverse research projects as Croatian Epigravettian subsistence strategies and Etruscan identities.

Rooted primarily in archaeological theory and practice, publication in ARC is open to all,



Archaeological Review from Cambridge, Fig. 1 Cover of the April 2012 issue of the Archaeological Review from Cambridge

and it increasingly invites a wider range of perspectives with the aim of establishing a strong, interdisciplinary journal which will be of interest in a range of fields. Recent issues have focused on such topics as violence in the material record, boundaries and archaeology, and economic crises:

Volume 26.1 (April 2011): *Archaeology and Economic Crises*. Edited by Suzanee E. Pilaar Birch and Rosalind Wallduck

Volume 25.2 (Nov. 2010): *Boundaries and Archaeology*. Edited by Mark Sapwell and Victoria Pía Spry-Marqués

Volume 25.1 (April 2010): *Violence and Conflict in the Material Record*. Edited by Skylar Neil and Belinda Crerar

Current issues under production include Katie Hall and Danika Parikh's (eds) *Science in the Material Record* (27.1 – April 2012), which looks at how advances in archaeological science have opened up new vistas when it comes to the interrogation of archaeological material in the twenty-first century, and Dominic Walker's (ed.) volume on *Collaborative Archaeology*, due to be published in November 2011 (issue 26.2).

Cross-References

- ▶ Cultural Heritage in Times of Economic Crisis
- ▶ Human Migration: Bioarchaeological Approaches
- ▶ Landscape Archaeology
- ▶ Modern Material Culture Studies
- ▶ Zoning: Boundary Areas and Buffer Zones

Further Reading

Archaeological Review from Cambridge. n.d. Available at: http://www.societies.cam.ac.uk/arc/.

Archaeological Soil Micromorphology

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Introduction

Archaeological soil micromorphology, which has become increasingly developed as a technique over the last 60 years, is now a major component of geoarchaeological investigations, especially in Europe. This is because it not only provides information for landscape studies but is best able to identify site formation processes, land use, and use of space within houses and settlements. Key to this is the recognition that soils and sediments are worthy of contextual study.

Definition

Archaeological soil micromorphology is adapted from soil science and geology using thin sections and the polarizing microscope, where undisturbed soils and sediment samples are stabilized by resin impregnation before thin sectioning. This method has now become developed specifically in order to investigate soils and sediments affected or produced by humans; the latter includes a wide variety of archaeological materials. The technique employs the use of standard optical (plane-polarized light [PPL], crossed-polarized light [XPL], and oblique incident light [OIL]) and fluorescence (e.g., ultraviolet light [UVL], blue light [BL]) microscopy, as well as instrumental studies on thin sections, such as Scanning Electron Microscopy (SEM), Energy Dispersive X-Ray Spectrometry (EDS), and Microprobe and Fourier Transform Infrared Spectroscopy (FTIR). Methods and applications have developed especially over the last 25 years with standardized descriptive and various numerical methods and the employment of such geological concepts as "microfacies" (Bullock et al. 1985; Courty et al. 1989; Courty 2001; Goldberg & Macphail 2006; Stoops et al. 2010).

Historical Background

Ian Cornwall, Institute of Archaeology, University College London, UK, was the first person to apply the new technique of soil micromorphology as developed by Kubiena (1938) when working with Frederick Zeuner, the first ever professor of Environmental Archaeology. Cornwall contributed numerous analytical reports on British and foreign archaeological sites during the 1950s and 1960s (11 are cited in a review of soil science in English archaeology; Macphail 1987). For example, Cornwall provided a barrow-buried thin section study on the classic Neolithic cultivated site of Kilham, North Yorkshire, when working with major environmentalist archaeologists (Dimbleby & Evans 1974). These first investigations were followed up by the Scottish soil scientists Romans and Robertson (Macaulay Institute, Aberdeen), who when providing analytical data on Scottish soils managed to investigate a number of monument-buried soils dating to the Neolithic and Roman periods, with special focus on environmental change and ancient cultivation (Romans & Robertson 1983). The next major advance came

in an international collaboration, which considered that the current understanding of soil science and geology could be applied to the soil micromorphological study of archaeological soils worldwide; this was done through a series of thematic chapters and case studies in "Soils and Micromorphology in Archaeology" (Courty et al. 1989). The authors had the great benefit of the advice of internationally famous soil scientist Nicholas Fedoroff (Institut National de la Recherche Agronomique – INRA; Paris-Grignon, France). Subsequently this methodology has continued to advance through experiments, the increased employment of associated instrumentation, and closer collaborations with other scientists (e.g., soil chemistry, macro-, and microfossils) studying the same soils and sediments (Viklund et al. Forthcoming/2013). As archaeology has now often come to rely on the data that thin section studies can provide, the number of workers in this field has expanded exponentially, while numbers of soil micromorphologists working in agronomy have shrunk dramatically. High standards have in part been encouraged by the establishment of the Working Group on Archaeological Soil Micromorphology in the early 1990s. Important advances have also been made by taking part in long-term archaeological experiments such as the Experimental Earthworks Project and Butser Ancient Farm in the UK and at Umeå University, North Sweden, and by extemporizing experiments and employing ethnographic analogue sites to examine specific questions across Europe and Africa (see Goldberg & Macphail 2006; Mallol et al. 2007; Shahack-Gross 2010; Lewis 2012).

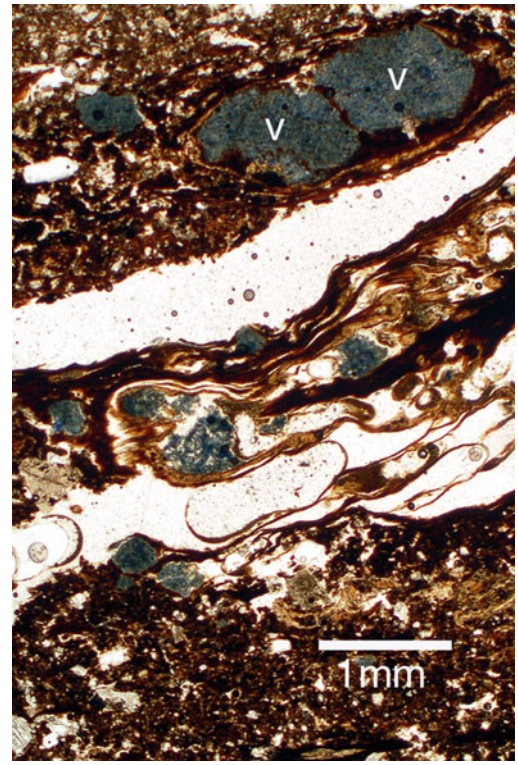
Key Issues

Current Themes of Study

The number of ways that soil micromorphology contributes to archaeological investigations is ever-increasing. In the first instance, these relate to attempts to match pedological and/or sedimentological formation processes with human occupation, whether in open-air sites or in caves, for example. In many cases, these formation processes are simply contemporary and not influenced by human activity. Such studies can only be carried out if there is a very clear understanding of the processes that effect *buried soils and sediments*. It also has to be remembered that during the Pleistocene and at sites affected by human-induced colluviation, surfaces may be ephemeral and pedological development is likely to be very weak. Here, we are dealing with *soil-sediments*. In some cases, sites have been preserved by sediments associated with alluviation and/or marine inundation, and here not only are these events required to be recognized but also their effects on buried surfaces need to be understood. Thus, *inundated sites* necessitate comprehension if microfeatures now present in buried landscapes are to be interpreted properly. Another key area is the study of *archaeological materials*, and these include everything from human latrine waste and animal coprolites to constructional and industrial materials. In terms of major human impact on the landscape, *clearance and cultivation* are often of primary importance and require accurate identification. Closer analysis of complex societies however also warrants a clear idea of how *occupation surfaces* reflect use of space by humans and stock, but this is only one part of how *settlement morphology* can be elucidated. There will also be water holes and wells, graveyards, and middening areas, for example. Lastly, *site transformation* studies show how once recognizable occupation layers and farmed soils, for instance, became reworked after abandonment or through a land use change. This is a key aspect of investigation on any archaeological site. In fact, there has been a major focus on these kinds of studies on some of the most challenging archaeological deposits worldwide, such as European Dark Earth and Amazonian Dark Earths (e.g., *terra preta*). These eight themes, which are presented in detail elsewhere (Macphail & Goldberg Forthcoming/2013), are now briefly discussed.

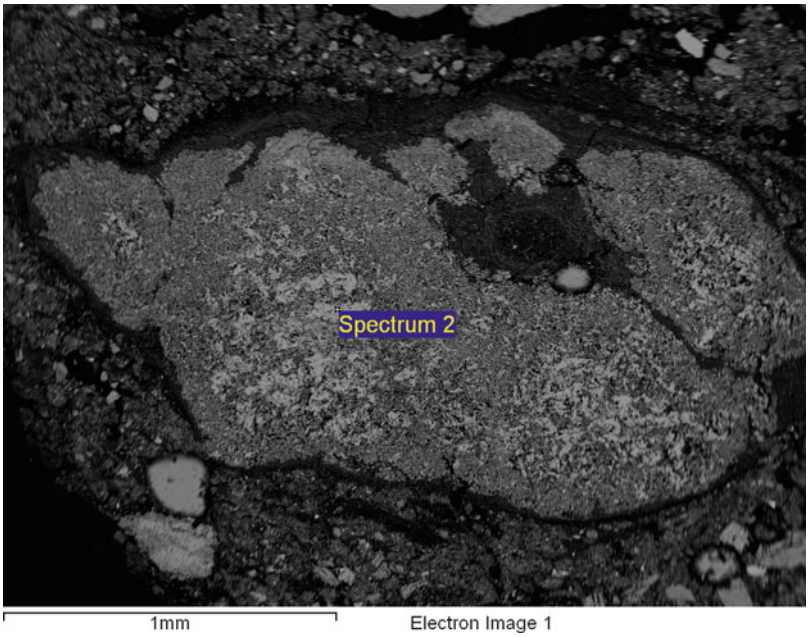
Issues concerning how *buried soils and sediments* could be accurately interpreted was first addressed by soil micromorphological components in the Experimental Earthworks Project, UK, both on base-rich chalk soils

(Overton Down, Wiltshire) and on acid soils (Wareham, Hampshire). The chief result was the recognition that changes and compaction occurred rapidly after burial, especially at Overton Down, where an open, rooted, and earthworm-worked Mull horizon was transformed into a compact soil. In places, earthworms had migrated upwards blurring the buried soil boundary. Compaction was in part due to a loss of organic matter (roots had disappeared or been finely fragmented) – as also shown by soil chemistry (Goldberg & Macphail 2006: 248-54). The nature of soil burial is thus very important, and conditions of burial vary according to pH, degree, or absence of waterlogging and/or periodic anaerobism, extant soil fauna, weight of overburden, migrating solutions, etc. The chalky soil dump which formed the Neolithic bank barrow at Maiden Castle, Dorset, encouraged earthworms to burrow downwards into the buried soil; chalky soil burrow fills were in stark contrast to the original decalcified buried soil. In the case of the Gokstad Ship burial mound, Vestfold, Norway, the anaerobic conditions which preserved the wooden long ship also encouraged the migration of phosphate within the turf mound. Vivianite became concentrated along some plant litter layers within the turf stack (Figs. 1 and 2).



Archaeological Soil Micromorphology, Fig. 1 Viking Gokstad Ship Burial Mound, Vestfold, Norway; photomicrograph of turf layers ("laminated Mull humus"), with vivianite (crystalline iron phosphate [e.g., $Fe_3(PO_4)_2\,H_2O$] formed under reduced conditions) associated with humified plant litter layers, and recording migration of phosphate from pasture soil turf within the mound. PPL (Macphail & Goldberg Forthcoming 2013)

Although an aspect of European prehistoric and historic colluvia is an outcome of clearance and/or cultivation, *soil-sediments* are more often encountered in Pleistocene sequences, where these deposits can bury palaeosols or form palaeosols. Investigations of palaeosols with associated artifacts should always pay attention to the provenance of bones and stone tools, as concentrations of such materials can simply be the result of geological processes rather than cultural activity. Accurate interpretation is even more crucial at early hominid sites. The micromorphology of soil-sediments and associated palaeosol formation, in relationship to the erosion of unstable soils for example, has been investigated for a long time (Fedoroff et al. 2010). Climatic conditions, especially those involving cycles of freezing and thawing, have come under special scrutiny, especially in North West Europe and North America. Cave sedimentology has also improved our understanding of natural geological and faunal processes and its ability to differentiate sedimentary layers that are strongly influenced by human activity. For example, mud flows occur beneath sink holes in caves, while bird and bat guano have a strong effect on phosphatization, while large animal scavengers might burrow into "middens" and deposit coprolites. Diffuse hearth deposits are often termed combustion zones because of fragmentation by wind, water, and human and animal activity (Mallol et al. 2007). Soil micromorphology and associated techniques have also helped identify fire-use in early archaeological contexts, such as the ~1.0 Ma

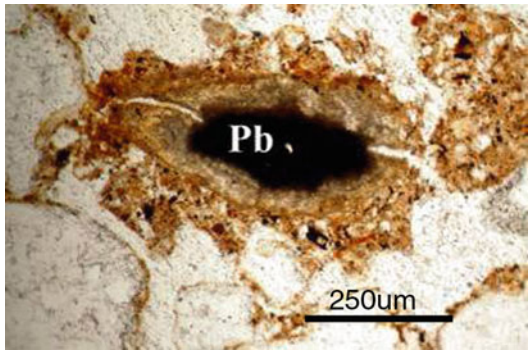


Archaeological Soil Micromorphology, Fig. 2 As Fig. 4, SEM/EDS X-Ray backscatter image of vivianite within laminated mull horizon characterized by layered plant litter and amorphous (humified) organic matter. EDS Spectrum found 45.6 % Fe (58.7 % FeO) and 16.7 % P (38.2 % P_2O_5). Scale = 1 mm (Macphail & Goldberg Forthcoming 2013)

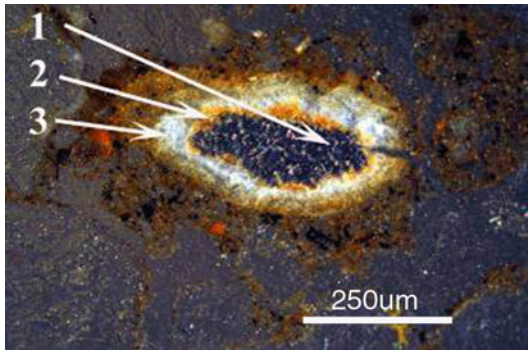
old Acheulian levels at Wonderwerk Cave, Northern Cape province, South Africa (Berna et al. 2012).

Open-air occupations are much more prone to reworking compared to caves, but there are some exceptions, for example, and *inundated sites* can show good preservation, although these have to be interpreted with caution. Soil micromorphology has shown that some low-lying terrestrial areas, which were a focus of occupation by hunters and gatherers for example, were affected by rises in sea level and/or freshwater inundation caused by a similar rise in base level. Together with faunal and artifact refitting analyses, sediment micromorphology showed that butchery and Acheulian hand axe manufacture occurred on mudflats within the intertidal zone at Boxgrove, West Sussex, UK, where a chipping floor was studied within marine alluvium (Macphail 1999).

In the case of complex societies, there is the ever-increasing need to identify *archaeological materials*, whether these are of simple constructional origin, such as earth-based daub/adobe or sophisticated manufactures – for example, lime-based plaster, iron slag, nonferrous metals, and alloys. Artisan activity such as soldering lead pipes in Roman and medieval constructions can lead to lead droplets being preserved in occupation sediments (Figs. 3 and 4). In addition, there are other background deposits in the form of fuel and kitchen wastes (charcoal, charred peat, calcitic ashes, bone, burned bone, eggshell) and animal dung and various forms of latrine deposits (Macphail & Goldberg 2010). Moreover, the interpretation of *occupation surfaces* within archaeological deposits has been crucial in determining use of space within structures (Gé et al. 1993); this has been further elucidated by experiments (Goldberg & Macphail 2006: 258-63). Such studies have also included ethnoarchaeological investigations as a way of understanding *settlement morphology* better. One example is the multi-method geoarchaeological investigation of dung, which included its preservation and spatial distribution associated with cattle management in abandoned Maasai settlements in East Africa (Shahack-Gross 2010). Some Neolithic cave deposits might be totally anthropogenic in origin, as many meter-thick ashed dung and stabling remains were formed by the overwintering of stabled ovi-caprids in the Mediterranean region. In the study of settlements and local land use, paths, trackways, cess pits,



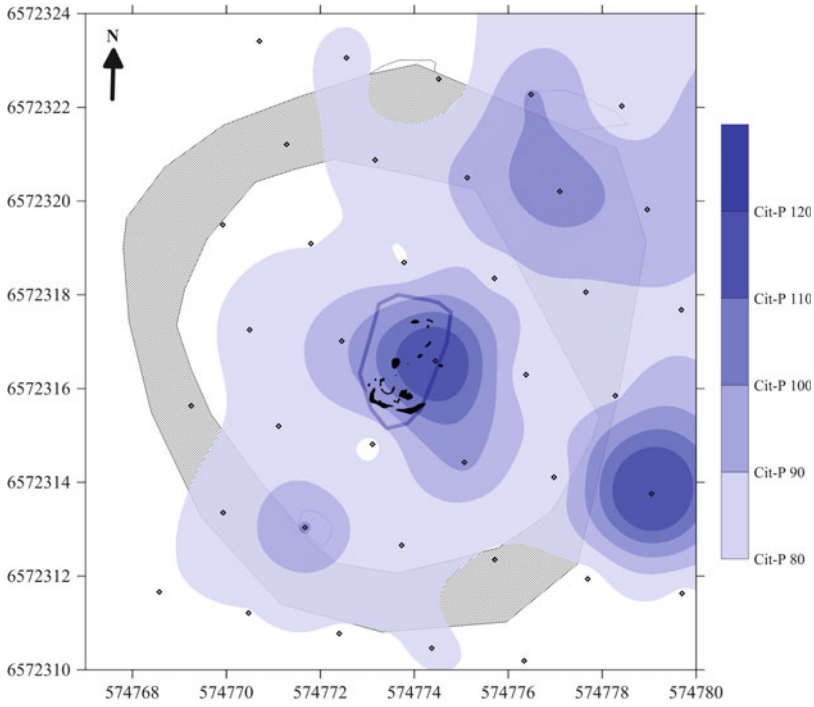
Archaeological Soil Micromorphology, Fig. 3 Late Roman Leicester, UK (Freeschool Lane, dark earth deposits); photomicrograph of lead (Pb) droplet embedded in calcitic ash, recording an earlier period of artisan activity – perhaps lead pipe soldering. This Context 6450 is generally strongly enriched in lead (2,560 μg g^{-1}), a common metal on Roman sites (analysis by John Crowther, University of Wales Trinity St David) (Macphail & Goldberg Forthcoming 2013). Plane-polarized light (PPL)



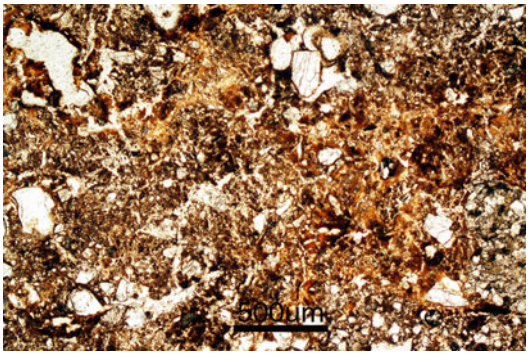
Archaeological Soil Micromorphology, Fig. 4 As Fig. 1, under oblique incident light (OIL). Thilo Rehren, University College London (employing a metallurgical microscope), tentatively identified pure lead (1), with corrosion haloes of red lead oxide (2) and lead carbonate (3) within this ashy aggregate. SEM/EDS analysis on this and other examples confirmed this: red lead oxide: 92.8 % Pb (100 % PbO); lead carbonate: 86.3 % Pb, 5.67 % Ca, 7.23 % P; surrounding ashes: 43.0 % Pb, 10.6 % Ca, 7.83 % P (Macphail & Goldberg Forthcoming 2013)

waterholes and wells, and even cremation, excarnation, and inhumation features require investigation alongside ubiquitous waste disposal midden deposits. For example, at a truncated Viking grave mound at Hesby, Vestfold, Norway, body stains, tentatively identified in the field and subsequently mapped by phosphate analysis (Figs. 5 and 6), were found to be amorphous iron-phosphorus-calcium compounds. Here, standard excavation, geochemical mapping, and soil micromorphology, complemented by EDS, fully characterized this Viking grave mound (Viklund et al. Forthcoming/2013).

Settlements are often associated with farming communities, and local areas would likely have undergone *clearance and cultivation*. One of the earliest contributions of soil micromorphology was its ability to identify cultivation. The microfeatures found in arable soils by Dutch soil scientists allowed workers to tentatively suggest that similar features in disturbed surface soils found under monuments, for example, could record a cultivation history (Romans & Robertson 1983). This suggestion was followed up by experiments in the use of cultivation tools, including replica ards, in France, Germany, and the UK, and the subsequent analysis of the resulting soil microfabrics (see reviews in Lewis 2012). It is has always been important, however, to be able to broadly differentiate between the soil disturbance and resulting colluviation caused by cultivation and that caused by woodland clearance (Goldberg & Macphail 2006: 193-210). While cultivation tends to homogenize soil, clearance soils in contrast might display heterogeneity, with fragments of mixed soil horizon materials being represented. Burned soil might also be present, if fire was involved. Arable soils which are not manured may lose structure and suffer reduced fertility, and so manuring practices developed. Soil chemistry and field walking may indicate manuring with animal dung and settlement waste. In thin section, the residues from manuring may also be evident. These can be in the form of pottery fragments and burned flint and daub, while coprolitic bone and amorphous phosphate – sometimes embedding calcitic ash – from night soiling, i.e., the use of household latrine waste, may additionally be found. "Mixed farming" involved both cultivation and animal management, and in some circumstances dung traces can be recognized in ancient arable soils, which are high in organic phosphate of dung origin. In the settlements



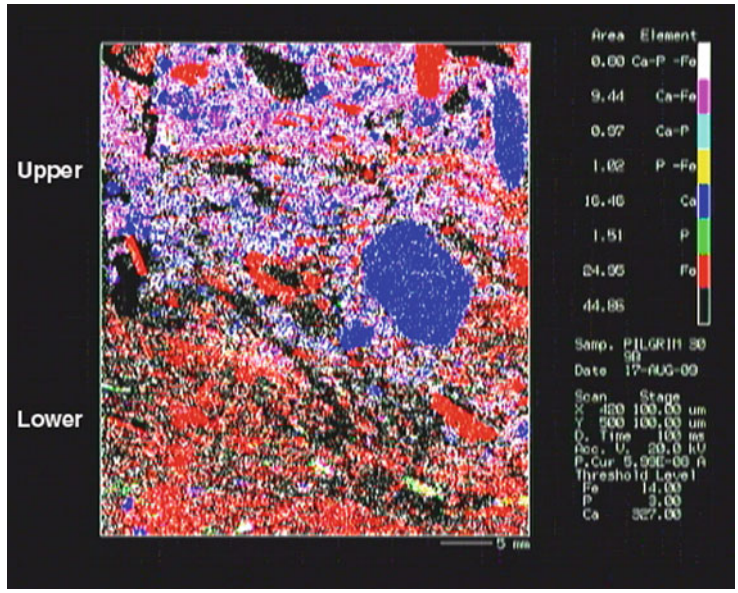
Archaeological Soil Micromorphology, Fig. 5 Map of truncated Viking grave mound (Hesby, Vestfold, Norway); map shows phosphate distribution (*dark blue* equals highest concentrations – see Fig. 6) (analysis by Johan Linderholm, MAL, University of Umeå, Sweden) (Viklund et al. Forthcoming/2013)



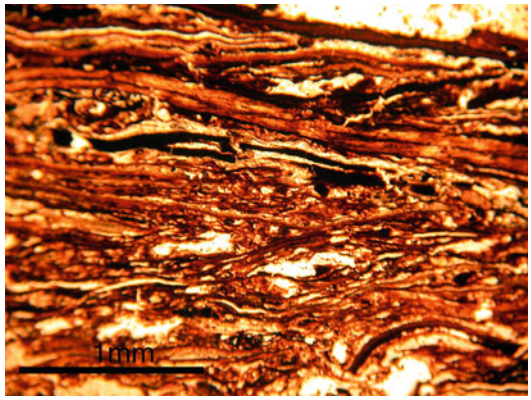
Archaeological Soil Micromorphology, Fig. 6 As Fig. 5, photomicrograph of phosphate-rich area; "body stain" fine silty clay fill inside grave, composed of very abundant iron staining and void hypocoating. Note fibrous secondary iron in voids. Iron also impregnates a relict organic content. EDS found mean 33.8 % Fe, max 48.1 % Fe; mean 9.34 % P, max 14.4 % P; mean 2.26 % Ca, max 3.77 % Ca, as mineralized human body residues. PPL (Viklund et al. Forthcoming/2013)

themselves, the use of space investigations can show areas of a long house or a specific roundhouse, for example, which was used to stable animals. In more urban environments, not all animal waste could be used on the fields and was often dumped by roadsides and in open area middens. Interdisciplinary analysis of layered, humified plant-rich stabling waste, employing soil micromorphology, microprobe, macrofossil, and pollen analysis (for example, at Butser Ancient Farm, Hampshire, UK), has found them to have specific characteristics (Figs. 7 and 8) compared to generally more minerogenic earth floors formed in domestic space. The latter is likely to include much more kitchen and burned waste and as a consequence often has an enhanced magnetic susceptibility.

Lastly, soil micromorphology has the ability to understand *site transformation*, when post-depositional processes (Courty et al. 1989: 138-89; Stoops et al. 2010) affect what may once have been recognizable as archaeological stratigraphy. These processes include mechanical working by plants and animals, as well pedological ones, such as leaching and horizonation. The effect of marine inundation on ancient land surfaces, as noted above, is one example where information on past land use may still be relatively easy to discern. There are other more extreme examples of the transformation of archaeological layers, and



Archaeological Soil Micromorphology, Fig. 7 Fourteenth century dumped occupation floor deposits (Pilgrims School, by Winchester Cathedral, Winchester, UK); microprobe map of Context 309B; 309B upper is composed of mixed calcareous (ashy) floor and kitchen waste (Pb [0.06 %] enriched); 309B lower is an Fe-stained layered stabling waste dump – which also shows some P enrichment; 1.12 % mean Fe, max. 7.12 Fe; 0.162 % mean P, max. 1.39 % P; 0.394 % mean S, max. 1.20 % S (see Fig. 8) (Microprobe map of Ca-P-Fe; scale = 5 mm) (Macphail & Goldberg Forthcoming 2013)



Archaeological Soil Micromorphology, Fig. 8 As Fig. 7; stabling waste in Context 309B lower: Overall Context 309 bulk analysis: 34.4 % LOI, 3.92 mg g^{-1} phosphate-P, 10.5 × 10^{-8} SI χ, 4.13 % χ_{conv}, 736 μg g^{-1}Pb, 84.5 μg g^{-1} Zn, 47.4 μg g^{-1} Cu; pollen from 309B lower: cereal types (19 %) and grasses (57 %) and range of herbaceous taxa (21 %) are consistent with presence of dung/stabling waste composed of straw/chaff and grass hay; long, horizontally oriented humified monocotyledonous plant fragments, with long articulated phytoliths and intercalated silt. PPL (Chemical analysis by John Crowther, University of Wales Trinity St David; pollen data from G. M. Cruise, freelance) (Macphail & Goldberg Forthcoming 2013)

these are the Urban Dark Earth of Europe and Amazonian Dark Earths (Arroyo-Kalin et al. 2008). In the case of northwest Europe, there has been a focus on seeking information on urban land use from dark earth that dates to the late Roman (late Antique) to medieval periods, where homogeneous deposits occur between stratified Roman and Medieval layers. Work in England, France, Belgium, and Italy has shown that soil micromorphology is one of the best tools for this kind of investigation, especially when backed up by associated and carefully analyzed small artifact and bulk soil studies that include macro- and microfossil identifications (e.g., pollen and phytoliths). Firstly, the decay of earth-based buildings and weathering of lime plasters and mortar, dating to a supposed decrease in urban populations, provides much of the "soil" in dark earth. Secondly abandoned and robbed-out house plots often became favored areas for ash middening by the remaining town dwellers. Latrine and butchery residue dumping and inhumations in newly formed waste ground within some Roman cities

likely reflect a breakdown in municipal regulations. These deposits became almost totally homogenized and weathered into brown soils, for example, during the second and third centuries CE. Other dark earth layers, on the other hand, can record a renewed and different use of "urban" space in the late Roman and early medieval periods. Middening and animal dung-rich deposits indicate stock management in a form of rural suburban lifestyle. There is compelling soil evidence that urban space was never totally abandoned in general and that early medieval urban life, recorded by dark earth and the micro-artifacts it contains, was possibly enjoyed by larger populations than during Roman times in some European cities.

International Perspectives

It is remarkable to note that the technique of soil micromorphology, first employed across North America and Europe to study questions concerning agronomy and palaeosols, has become a mainly "European" technique when applied to archaeology. Research and teaching in archaeological soil micromorphology in North America has been almost exclusively carried out by Paul Goldberg at Boston University and his past students. It is surprising that this application has yet to properly catch on in the USA. In Europe, in stark contrast, the subject has gone from strength to strength with major centers of expertise in the UK (Cambridge, London, Reading, Stirling, York), Belgium (e.g., Brussels), France (e.g., INRAP), Italy (e.g., Milan and Pisa), Spain (e.g., Barcelona), and Switzerland (e.g., Basel), with other key workers in Czech Republic, Germany, Greece, Holland, Romania, etc. Encouragingly, new students of the subject are now emerging from Asia, and North and South America.

Future Directions

Since the 1980s archaeological soil micromorphology has been an integral part of workshops and conferences, within organizations such as the International Union of Soil Science International Working Meetings in Soil Micromorphology (e.g., London 1981; Paris 1985; Austin; USA 1988; Ghent, 2001; Lleida, Spain, 2012; Mexico City, 2016). In addition, since the 1990s specific archaeological soil micromorphology workshops have been held annually/biannually, to aid training and promulgation of the discipline. Also, in recent years workshops have also been organized as part of Developing International Geoarchaeology (DIG) meetings, and since 2008 an annual week-long intensive training course in archaeological soil micromorphology has been organized at the Institute of Archaeology, University College London, where it had all started some six decades previously.

Cross-References

- ▶ Aksum: Environmental Archaeology
- ▶ Amazonian Dark Earths: Geoarchaeology
- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Archaeological Soil Micromorphology Working Group
- ▶ Chemical Survey of Archaeological Sites
- ▶ Geoarchaeology
- ▶ Paddy Soils: Environmental Analyses
- ▶ Urban Dark Earth

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Archaeological Soil Micromorphology Working Group

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Basic Information

This working group was initiated in 1990 by Richard Macphail at the Institute of Archaeology, University College (UCL), and with the encouragement of co-workers Marie-Agnès Courty (CNRS, France) and Paul Goldberg (Hebrew University of Jerusalem, Israel; now at Boston University, USA) (Courty et al. 1989). The first full workshop was organized at Birmingham University (with Susan Limbrey). A pattern developed comprising approximately alternating UK and European venues and organized at Cambridge (C. French, x2), Sheffield (C. de Rouffignac), Stirling (D. Davidson), and UCL (R. Macphail, x3), for example, along with Basel, Switzerland (P. Rentzel, x2); Brno, Czech Republic (L. Lisa); Dijon (D. Sordoillet) and Rennes (A. Gebhardt), France; Frankfurt, Germany (H. Thiemeyer); and Poviglio (C. Nicosia and M. Cremaschi), Pisa (G. Boschian, x3), and Milan (L. Trombino), Italy, for instance, e.g., Pisa 1998 (Arpin et al. 1998). Only one meeting took place in the USA and was held at the Boston University field school in New Hampshire (P. Goldberg).

Major Impact

The meetings are designed specifically to aid students in archaeological soil micromorphology; hence, prices are kept low and the emphasis is on practical help and study. Short presentations are mainly given to introduce material for the workshop and sometimes to improve a study ahead of publication, by getting feedback. In a number of cases, however, workshops have produced publications (electronic Bulletin 1, 1995–1997, Greenwich University web publication edited by Acott, T. and Macphail, R. I.) or have been associated with conference publications, e.g., Soils and Archaeology (Boschian 2007) and DIG (Developing International Geoarchaeology – Cambridge, 2007; French 2009). There has also been a close relationship with the International Union of Soil Sciences Commission 1.1 "Soil Morphology and Micromorphology." A joint workshop and conference was held, for instance, at Ghent, Belgium in 2001 (J. Mikkelsen) (Stoops 2003). Most recently (2012), a workshop was held in Spain at Barcelona University (R. Macphail and M. Bergada) in association with the IUSS Soil Micromorphology conference held at Lleida, which was the venue for posters and presentations by attendees of the workshop, to be published in *Quaternary International*.

It can also be noted that there have been themed workshops, for example, the link between soil micromorphology and (1) soil chemistry (e.g., phosphate and magnetic susceptibility; London 1997), (2) the field (the early human cave site of Tautavel, France 2006; M-A Courty and C. Perrenoud), and (3) phytolith studies in general. As training has always been the chief aim of the working group, a short intensive course in Archaeological Soil Micromorphology has also been developed for this need at UCL since 2005.

Acknowledgements The author thanks members of the Working Group who have organized workshops for their comments.

Cross-References

► Archaeological Soil Micromorphology

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Archaeological Stewardship

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Introduction

Stewardship is a term and concept often invoked in some archaeological circles and entirely absent from others. Archaeologists, anthropologists, museum curators, collectors, government officials, and members of descendent populations have all been considered stewards. Exploring questions about stewardship "for whom?" "of what?" and "to what ends?" reveals that the meanings and applications of archaeological stewardship, though entrenched and bureaucratized in some contexts, are neither universal nor unchanging. In fact, conceptions of stewardship seem to be shifting away from standardized interpretations of management, preservation, and conservation toward more collaborative, inclusive discourses and practices that recognize the special relationships many people have with the past. Collaborative approaches to stewardship sometimes result in restrictions on the activities of archaeologists as they begin to share "the past" on terms other than just their own.

Definition

"Stewardship," as defined by the Oxford English Dictionary (OED Online), refers to the office or duties of a steward (from the Old English, for "house" and "keeper"), which may include caretaking, administration, planning, control, or use of property or resources owned by another. Stewardship is also defined as an ethic, exemplified by responsible planning and management of resources.

In archaeology, stewardship has been closely associated with conservation, curation, anti-looting sentiments, resource management, and the nonrenewable nature of archaeological resources. In *Teaching Archaeology in the 21st Century*, Bender and Smith (2000: 34) present a narrow definition of stewardship as "the wise use of resources [that] can include stabilizing an archaeological site, preserving it in place, excavation, or promoting public understanding of the information content of the resources through site development and interpretation." More generally, and particularly in the context of North American archaeology, the term has come to mean the act of conserving and preserving the nonrenewable archaeological record for future generations, with the aim of promoting knowledge about the past.

Implicit in all of these definitions are assumptions that stewardship is a relationship that denotes responsibility for taking care of something for someone else. Stewardship implies choosing service over self-interest and, instead, acting in the interest of another. Thus, underlying the discourse of stewardship are various legal, cultural, economic, moral, and political interests, all of which raise fundamental questions of privilege and legitimacy. Who claims to be a steward? For whom? Whose interests does the steward actually serve?

For whom do archaeologists serve as stewards? The concept is fuzzy in this regard. Is it for a universal "everyone" – all of humanity, "the public"– or for "no one" because the archaeological record cannot be "owned?" Or do archaeologists serve the nation-state, which, in many cases, claims legal ownership of archaeological sites and objects? In arguing that archaeological stewardship is performed for "the public," archaeologists remove themselves from the problematic arenas of ownership or culture-based rights and instead purport to act as stewards of, and advocates for, cultural heritage that belongs either to no one, to everyone, or to the state (see Warren 1999).

Historical Background

Historically, at least in western contexts, "stewardship" has never been necessarily egalitarian or altruistic; in fact, the term has often carried an exclusive and elitist connotation. Originally, the term was primarily found in relation to the governance and management of elite wealth and property or as a title for an officer of the state, such as the "Great Steward of England." Later, stewardship was used in commerce to indicate a manager and also as a synonym for servant or aide. The term has long been employed in ecclesiastical contexts, both to refer to the manager of a church's property and the duty to use God's teachings and gifts wisely.

But the concept of stewardship has a much deeper history than the term itself or its co-option by state-based governance systems would suggest. It is deeply rooted in the ethics and practices of land-based peoples throughout time and place. For example, in New Zealand/Aotearoa, the Maori concept of "kaitiakitanga" is closely analogous to "stewardship" but translates more specifically as "guardianship" that is undertaken on behalf of a particular community or *whenua* (J. Coster, e-mail, 23 August 2012).

In recent decades, stewardship has often appeared in reference to the environment and natural resource use. "Earth stewardship" has come to connote one's duties not on behalf of an entity such as god, king, or nation-state but on behalf of the earth and its resilience (see Chapin et al. 2011). Indeed, archaeology should have a great deal to contribute to these discussions (see Hudson et al. 2012).

According to Shawn Malley (2012: 23), the concept of archaeological stewardship emerged

in conjunction with excavations of Near Eastern sites by British archaeologists in the mid-1800s, along with the rabid collecting of ancient material culture by western museums. Malley (2008: 623) notes that "the paternalistic ideology of Western stewardship" that pervaded British archaeology at the time served to rationalize less benevolent, imperialistic interests. By the late 1880s, western museums promoted themselves as stewards of the past for the public, responsible for educating the masses and promoting national identity. These deliberate policies reinforced particular ideologies and public imaginings about archaeology that later coalesced under the heading of "stewardship" (see Smith 2004: 85).

In the early 1900s in the United States, just as natural resource conservation movements were on the rise and the discipline of archaeology was beginning to embrace more systematic methods of research and training, massive commercial excavations of noteworthy sites by private entities prompted government action. The 1906 Antiquities Act essentially appointed archaeologists as protectors and stewards of sites on public lands, acting in the national interest. In the decades that followed, the US government funded many large excavations – whether to salvage the remains of earlier cultures, to investigate the "Mound builder" myth, or to bolster the American economy. Other nations also recognized the power of archaeology to reinforce nationalist narratives and developed similar programs. This use of government funds for archaeology endowed the notion of stewardship with a sense of public accountability that remains prominent today.

Laurajane Smith (2004: 84-92) associates the development of the concept of archaeological stewardship with the growth of liberalism – the idea that governments think they know what is best for others. She points out that long before the term actually came into use, archaeologists had assumed stewardship of the histories and prehistories of others. This presumption was nurtured by early twentieth century ideas that cultural objects embodied past identities in ways that revealed themselves through scholarly study. Subsequent ideological positions within archaeology, including the claim of processual archaeology to be a science of human behavior, the development of heritage as a public education issue, the establishment of CRM archaeology as a profession accountable to public and private interests, and the articulation of a "conservation ethic," all lent support to a notion of archaeological stewardship.

In the 1960s and 1970s, the United States, Great Britain, and Australia were among nations that enacted archaeological resource management legislation. This was in part a reaction to increased development, land use changes, and other threats to archaeological sites. Many of these acts defined the proper care and management of heritage objects and sites in terms of "preservation" or "stewardship." In many instances, sacred sites or other places of heritage value and their contents were reinscribed as "archaeological resources," in need of protection by trained professionals. The implementation of these top-down policies quickly fell to university-trained archaeologists, creating a cadre of professional managers that assumed both a legal right and a moral responsibility to serve as guardians of sites and objects.

By the mid-1990s, "stewardship" had been adopted as the primary principle of ethics by the Society for American Archaeology (SAA) (Lynott & Wylie 1995). This signaled an expanded responsibility for archaeologists, far beyond merely doing "good science." The concept of stewardship spoke to many pressing issues of the time, such as the growing reluctance to excavate except at threatened sites, the "curation crisis," threats posed by looting and the antiquities market, the need to preserve archaeological records, and a mandate for public outreach. Most of the other Principles of Archaeological Ethics set forth by the SAA evolved to address what stewardship meant in various contexts. Clearly, stewarding the archaeological record "in the public trust" entailed serving many different – and sometimes conflicting – interests.

During the 1980s and 1990s, archaeologists faced ardent criticism from Aboriginal peoples, especially in regard to assumptions about the right

to study Aboriginal pasts and claims of ownership by nation-states over heritage sites and objects. Reframing these potentially messy issues in terms of stewardship, instead of rights or ownership, could be called a strategic move on the part of state-based agencies, since it "require[d] all sides to accept their responsibilities as stewards and to put aside professional and political interests in order to act in the best interest of the property and the cultural heritage that property represents" (Hanna 1993).

But is it possible to put aside professional and political interests? What does it mean to act in the best interest of the archaeological record or the heritage it represents? Could the use of the term stewardship in such contexts – intentionally or unintentionally – serve to depoliticize archaeology and neatly smooth over or mask more contentious issues of rights and sovereignty? (see Smith 2004: Chapter 5).

Current Contexts

How is the term "stewardship" being used in various heritage- and archaeology-related contexts today? The brief discussion below incorporates responses to a query posted on the World Archaeological Congress listserv.

Government

The normative force of the concept of stewardship is clear from how pervasive and embedded the term has become in "official" discourses, where it puts a benevolent spin on who has the authority and expert knowledge to make decisions about how to manage, for whom, and to what ends. Federal programs typically follow standardized legal definitions that equate archaeological stewardship with cultural resource protection, preservation, management, and public outreach, performed under the direction of trained professionals. In many government contexts, "heritage stewardship" has become synonymous with "heritage management." Stewardship is also a central tenet of numerous government-sponsored public education programs, which impart particular values to citizens through participatory archaeology projects and "site steward" programs.

Sometimes codified definitions of stewardship embedded in agency policies and regulations conflict with ideas about good stewardship in practice. For example, US regulations legally mandate indefinite or perpetual curation of federally accessioned archaeological collections (see 36 CFR 79). This severely limits what actions can be taken, even when repatriation, reburial, or disposal is more appropriate.

Private Sector

Today the majority of archaeological work is conducted by private sector cultural resource management firms (CRM; also known as archaeological heritage management or AHM). In this context, stewardship typically refers to practices and decisions that protect or increase the significance and value of heritage resources. Here, preservation and conservation often compete with economic development, and stewardship may involve calculated destruction or mitigation that attempts to balance economic, private, and state interests. Some heritage management companies invoke "stewardship" as an advertising strategy, to express their moral superiority in contrast to other firms that practice "mere compliance."

The recent growth of private sector involvement in historic preservation has spawned a drove of "heritage stewardship" consultants who seek to bridge private interests and government mandates. Many of these consultants talk about heritage as an asset or form of capital and good stewardship as the means of protecting and growing these investments.

Professional Contexts

"Stewardship" appears in the codes of ethics and professional statements of many archaeological societies and not at all in others. For example, the Archaeological Institute of America's Code of Professional Standards describes archaeologists as "primary stewards of the archaeological record," while the professional statements of the Council for British Archaeology mention stewardship only briefly, in connection with local sites, and the Australian Archaeological Association makes no reference to "stewardship." The SAA Principles of Archaeological Ethics, which

declare "stewardship" as the primary principle, are widely cited in archaeological literature and training and have been adapted or adopted by a number of other national archaeological organizations, including the Society of Philippine Archaeologists and New Zealand Archaeological Association.

A refreshing approach is found in the Canadian Archaeological Association's (CAA) Principles of Ethical Conduct, ratified in 1996. As in the USA and New Zealand, the CAA lists "stewardship" as its primary principle but defines it as "respect for archaeological remains and for those who share an interest in these irreplaceable and nonrenewable resources now and in the future." This is notable for its openly stated inclusion of other interested persons. The CAA also has a Statement of Principles for Ethical Conduct Pertaining to Aboriginal Peoples, which essentially recognizes Aboriginal stewardship as a right.

Using examples of high-profile repatriations in the USA (Kennewick Man) and Australia (Lady Mungo), Claire Smith and Heather Burke (2003) have illustrated how differing interpretations of stewardship deeply affect the professional practices and outcomes of archaeology. They point out that a code of ethics which cites stewardship of the archaeological record as its primary ethical principle invokes a very different epistemological standpoint and set of practices compared to a code that foregrounds people and relationships (as do the CAA and the World Archaeological Congress).

Museums also take their professional role as stewards very seriously. During the twentieth century, most museum professionals came to see themselves as stewards not simply for the nation-state but with a mandate to serve the public. In yet another transformation of their stewardship role, a growing number of museums today act as caretakers of objects for particular descendant and source communities. This has opened up the concept of archaeological stewardship to new relationships and practices. It can also mean that archaeologists and other researchers may encounter restrictions on access to particular objects or cultural information, unless appropriate permissions are obtained.

University Contexts

The term "stewardship" is noticeably absent from most introductory archaeology texts. When it does appear, it generally occurs within discussions of CRM or Public Archaeology. As Sonya Atalay advocates (2008: 139), archaeology courses should be studying the social, political, and historical conditions that have led archaeologists to claim to be stewards of the archaeological record in the first place. University-level archaeology programs with a focus on stewardship have tended to be located in North America, and they are typically geared toward training in heritage management. This is changing, however gradually (see "Future Directions" below).

Indigenous Uses of Stewardship

When Indigenous peoples – who have their own potent relationships, values, and forms of knowledge associated with ancestral sites and objects – talk about stewardship, it can mean something quite different from what most archaeologists take the term to mean. According to Navajo archaeologist Rena Martin (1997), all members of the Navajo community consider themselves stewards of the land and what it offers, and archaeologists are often viewed as interlopers who disturb the dead and their belongings.

Many descendant or source communities recognize stewardship as describing the relationship that Indigenous populations had with their lands and cultural resources prior to European colonization, a relationship that many are seeking to recover (Atalay 2008: 123). They are concerned that their heritage continues to be appropriated without their involvement or consent, and they see this as a serious violation of their own principles and responsibilities as stewards.

Some First Nations and other Indigenous peoples utilize the term in governance to express their rights and responsibilities to protect and nurture cultural resources. For example, in 1988 the Navajo Nation passed a Cultural Resources Protection Act (CMY 19–88, 1988) based on the concept of stewardship. The Act suggests the same end goal described by archaeologists (to benefit present and future generations) but goes

further in advocating collaboration among all parties who play a part in administering Navajo cultural resources. As a result of amendments to the US National Historic Preservation Act in 1992, over 100 federally recognized tribes have established Historic Preservation Offices to administer duties that would otherwise fall under state supervision. Meanwhile, Indigenous archaeology, which integrates tribal-based teachings with principles of "cultural heritage stewardship," has become a vibrant subfield within archaeology (see the entry on "► Indigenous Archaeologies in Archaeological Theory" by George Nicholas and Joe Watkins).

Key Issues

In many ways, the concept of stewardship has acted to promote the idea that archaeologists have a special, or even primary, relationship to "the past," one that overrides the interests and relationships of others. What rationales have been used to justify this presumption of privilege?

- The training archaeologists receive does indeed give them a special relationship to "the archaeological record" (a term that claims the past as the domain of archaeologists) and implies that this domain is best cared for or managed by trained professionals (see Hamilakis 2003).
- Government-mandated policies that designate archaeologists as managers and protectors of heritage resources.
- The discourse of professionalism and expertise, which distances archaeologists from the public and at the same time creates a sense that experts are needed to help people understand and care for the past (see Zimmerman 2000).
- The "implicit presumption of scientific privilege," justified by intellectual and scientific authority (see Wylie 1996).
- The "fiction of universalism" that supposes a transcendent, panhuman interest in scientific knowledge about the past (Wylie 2005: 61-2).
- Related to this, the notion that archaeologists, in their role as stewards, are acting as "impartial caretakers of a common heritage" (Bendremer & Thomas 2008: 62).

Over the past 30 years, each of these presumptions has been deeply criticized and challenged by archaeologists, Native peoples, and others (see McGuire 1992; Wylie 1996, 2005; Zimmerman 2000; Groarcke & Warrick 2006; Bendremer & Thomas 2008).

At the turn of the century, David Lowenthal (2000: 19) declared that heritage stewardship had become an "enterprise of technical expertise, while the general public, devoid of professional competence, stands aside." He repeatedly warned against this kind of exclusivity, insisting that effective stewardship requires engagement with the complications of everyday life. Alison Wylie (1996, 2005) has long argued that archaeological expertise should not override other interests or ways of connecting with the past. Leo Groarcke and Gary Warrick (2006) find the claim that archaeologists are acting for "all of humanity" problematic and impossible in practice, as if "the public" were a homogenous entity with interests synonymous with those of the state. Cornelius Holtorf has pointed out that, insofar as stewardship claims to preserve or protect on behalf of future generations, there has been no substantive discussion about what future that should be or why we should assume that the heritage being preserved now will be valued then.

John Carman (2005: 75-6) has gone so far as to call the concept of stewardship a justification employed to legitimate state claims of cultural property ownership. Laurajane Smith (2004) has exposed stewardship as a strategy for government control and authority that positions archaeology to mediate between the record of humanity's past and interest groups in the present. She argues that archaeological stewardship is often an appropriation of someone else's history in disguise, used to justify "pastoral care" and legitimate archaeological intervention (Smith 2004: 100). Nick Shepherd and Alejandro Haber (2011: 13) have discussed how the concept of archaeological stewardship acts to devalue and transform local knowledge and ways of interacting with sites and objects into a global, professionalized discourse of "heritage" and "resources" in ways that enable

nationalistic interventions or re-inscriptions of local histories.

In spite of their robust nature, these and other critiques have not led to a reenvisioning of stewardship among the majority of practicing archaeologists. Nevertheless, there are archaeologists and Indigenous community members alike who are giving serious thought to what it means to be a good, active steward and to identifying qualities that characterize leadership in heritage stewardship (see, e.g., Welch et al. 2011). All in all, although some people advocate doing away with the term altogether, there are also important ways that the concept of archaeological stewardship is being redefined, expanded upon, and recast.

International Perspectives

The term "stewardship" may be an entrenched part of the discourse of heritage in North America, but in global heritage contexts and in many places around the world, its use is much more uneven, though the underlying rhetoric of preservation, protection, or conservation "in the public trust" is usually present. With a few exceptions, stewardship is noticeably absent from international discourses on heritage. UNESCO's mandate includes "promot[ing] the stewardship of the world's cultural resources, including the built heritage, which constitutes our collective cultural memory," but with no discussion of what this means. The International Council of Museums (ICOM) defines stewardship in its code of ethics in relation to a museum's duty to hold collections "in the public trust":

> Collections are a significant public inheritance. . .inherent in this public trust is the notion of stewardship that includes rightful ownership, permanence, documentation, accessibility, and responsible disposal (ICOM 2004).

Responses to a query posted on the World Archaeological Congress listserv indicate that stewardship is not a term commonly employed in archaeology outside of North America. In fact, many felt that it had negative connotations, related to an imbalance of power over decisions about the care and management of heritage, in favor of national governments and archaeologists.

In South America, the term "stewardship" is also not commonly used. A word that sometimes takes its place is "fideicomiso," which refers to holding property in trust but also connotes a process of appropriation and disenfranchisement that is tacitly normalized by the state (Herrera, in press).

A notable exception is the ICOMOS New Zealand Charter for the Conservation of Places of Cultural Heritage Value, which recognizes the Maori concept of "kaitiakitanga" as an obligation that extends beyond legal ownership (ICOMOS New Zealand 2010: §3). Although the text of the Charter does not mention stewardship, the glossary defines "kaitiakitanga" as ". . .the duty of customary trusteeship, *stewardship*, guardianship, and protection of land, resources, or taonga [cultural treasures]."

A few international colleagues saw value in using the term – not, however, to define an archaeologist's rights or responsibilities but rather when characterizing a community's right to manage resources on local terms. Several respondents noted that, in many international and intercultural contexts, and outside of North American governance circles, stewardship was more commonly associated with land and landscapes instead of sites and objects, and as an alternative to ownership. In this sense, the responsibilities of archaeologists may actually fall under the broader duties of land stewardship.

Future Directions

A number of significant changes in archaeology in recent years have challenged normative conceptions of stewardship and have brought about shifts in its meaning and uses. These include:

- Acknowledgment that living people(s) have potent interests in and intimate relationships with the past and may be strongly affected by the actions and interpretations of archaeologists

- Shifts in authority – in who is working for whom and who sets the agenda
- Respect for alternative, culturally appropriate ways of conserving, curating, and caring for sites, objects, and cultural knowledge
- Realization that the imagined divide between cultural knowledge and "science" is false as well as disrespectful of the diverse ways that people value the past
- Greater degrees of collaboration among those who have special relationships with "the archaeological record" or who are otherwise affected by archaeology
- In particular, the inclusion of non-archaeological voices and values in planning, interpretation, and decision-making

These changes have helped generate new conceptions of "stewardship" that begin to move beyond privileging archaeological knowledge or expertise.

Below are some examples of how "stewardship" is taking on new meaning in archaeology and heritage-related research and practice.

Shared Stewardship

Shared stewardship has become an important concept in international negotiations regarding ownership of antiquities and cultural property, where questions of valid title are so difficult to resolve (see Lyons 2002: 133). In another context, the US National Park Service now references "shared stewardship" as one of its "core values," purportedly as a way to signal a commitment to collaborating with members of the global preservation community. Shared stewardship is also occurring with greater frequency on small, local scales, where it means sharing control, authority, management, and/or decision-making. Examples include repatriations to source communities, the co-management of heritage sites, development of memoranda of understanding between museums and cultural descendants, and the use of culturally appropriate curation practices.

Collaborative Stewardship

Collaborative stewardship moves even further toward inclusiveness, honoring and supporting the obligations, values, and alternative approaches of others, and thus directly challenging archaeological privilege. For many archaeologists, incorporating alternative conceptions of stewardship, worked out in collaboration with others, is an important way to decolonize archaeology (see Nicholas 2005; Atalay 2008, 2010).

Community-Based Stewardship

Community-based stewardship – which is essentially collaborative stewardship guided by community-identified needs – is becoming an important aspect of twenty-first century archaeological practice. In community-based projects, archaeologists may act as facilitators, promoters, educators, or benefactors, while local people are full partners and beneficiaries. Frequently the role of steward, over time, is "devolved" from archaeologists or the state to those living and working in the area. The museum at Agua Blanca, Ecuador, is one example where, after years of collaborating with archaeologists, the stewardship of local sites and management of the local cultural center/museum is today in the hands of local townspeople (see McEwan et al. 2006).

Community-based stewardship presents archaeologists with considerable challenges, since community needs may have more to do with securing economic opportunities, jobs, or funding for local projects than with conventional archaeological goals. Swedish archaeologist Eva Svensson (e-mail, 28 October 2011) suggests that since heritage has become such an important asset for development, a community-based conception of stewardship could lend weight to citizen and community voices and thus help balance development decisions (often made by outsiders) with ideas about heritage and its significance held by local people.

Knowledge Stewardship

For archaeologists, knowledge stewardship has long been an important aspect of their own professional practice, but today it also refers to respect for how others have their own, sometimes very different, methods of caring for, nurturing, and sharing knowledge and other intangible aspects of culture. Atalay (2010: 65) notes that "[i]n many cases, caring for knowledge and place

simultaneously was often interwoven in traditional forms of stewardship." For example, the Ojibwe concept of *gikinawaabi* encompasses the responsibility of elders to protect and pass on knowledge. In this and many other instances, archaeologists are also learning that good stewardship sometimes means respecting restrictions on access to or circulation of cultural information or knowledge.

Indigenous Heritage Stewardship

Indigenous heritage stewardship is a term being used to describe approaches developed by, for, and with Indigenous communities, which place archaeology in the service of Indigenous goals and principles and have social justice as an underlying core value.

For example, for the White Mountain Apache, archaeology and heritage stewardship are playing an important role in ongoing efforts to strengthen tribal sovereignty (Welch et al. 2006). The tribe has created heritage policies founded on Apache principles of stewardship, which extend to caring for sites and objects that, due to historical circumstances, lie outside current tribal boundaries and ownership. These policies in turn inform tribal law, governance, and economic development decisions. Similarly, the Hul'qumi'num Treaty Group of Vancouver Island (Canada) has articulated protocols based on their own conceptions of heritage law to guide decisions about land and resource development (see McLay et al. 2008).

Today, several universities, including Northern Arizona University (USA) and University of Victoria (BC) Canada, offer programs in Indigenous Heritage Management (see Hunter 2008). John Welch, who teaches Indigenous Heritage Stewardship at Simon Fraser University in British Columbia, believes that this is the direction that the concept of stewardship is heading within archaeology.

Deliberative Democracy

When the participants of a 2008 conference session on "The Ethics of Archaeological Stewardship" shared their experiences, they discovered that "stewardship" had a different meaning in each and every situation (Shoup & Monteiro 2008). What seemed to matter most was the attitude of the archaeologist – in particular, an attitude of respect, the ability to listen, and a willingness to integrate local needs and interests into the research agenda. The concept of "deliberative democracy" emerged as a term that encompassed the kinds of practices that archaeological stewardship should nurture, both in daily interactions, dialogues, and decisions with local people and in broader heritage contexts (Shoup & Monteiro 2008: 331).

These are just a few examples of ways the concept of stewardship is being revisioned in archaeology.

Conclusions

The idea that stewardship is the purview and privilege of archaeologists and other heritage specialists is still very entrenched – especially in government agencies, international bodies, and private sector heritage industry. In some places, use of the term in relation to archaeology is virtually nonexistent. In others, it marks deliberate movements toward self-determination and more equitable practice, signaling empowerment of local people and descendant communities to manage, protect, and make decisions about heritage and its uses.

In general, the meaning of stewardship in archaeology has shifted over the past generation from being almost exclusively object-centered to becoming more relationship-centered and from being defined by state-based policies or universalisms to recognizing pluralisms and particularisms that embrace more collaborative and inclusive approaches. Archaeologists may find that these new approaches and relationships mean additional restrictions on current disciplinary practices as they find ways to share their sense of duty to the archaeological record with others. Whatever the case, as part of understanding and confronting the foundation of their discipline and its practices, archaeologists must continue to revisit the questions: stewardship – of what? for whom? on what terms? and to what ends?

Cross-References

▶ Archaeological Record
▶ Community Archaeology

- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage and Communities
- ▶ Ethics in Archaeology
- ▶ Repatriation: Overview
- ▶ Sacred Sites in Indigenous Archaeology

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Archaeological Theory: Paradigm Shift

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Introduction

The human and social sciences have undergone major changes in the past decade, thanks in part to (1) the critique of humanism, anthropocentrism and Eurocentrism; (2) the development of new connections between the humanities and the sciences, especially biology and the natural sciences; (3) the conventionalization of the interpretivist-constructivist paradigm which has prevailed in the humanities since the 1970s; and (4) the emergence of various, often conflicting trends related to new materialism and new empiricism, which share a turn away from the text and a return to materiality that is present and accessible "here and now." This shift is prefigured by the development of global capitalism, migration, the ecological crisis, natural disasters and new genocides and terrorism, and biotechnological progress, phenomena which the human and social sciences have attempted to describe and comprehend. The alternative trends proposed by scholars who represent cutting-edge research perspectives and lead the way in disciplinary debates suggest the need for a thorough rethinking of our notions of life, human nature, the relations between the human and the nonhuman, and for breaking away from the Western tradition of anthropocentrism with its reductionist concept of matter as empty, lifeless, and lacking agency.

Key Issues/Current Debates/Future Directions/Examples

While the variety of research tendencies and approaches constituting the contemporary

human and social sciences cannot be subsumed under homogeneous paradigms (understood here after Thomas Kuhn as research models or as a disciplinary matrix), in order to present a simplified model of paradigm shift which has arisen in the human and social sciences in recent years, two dominant models might be identified: the interpretivist-constructivist (postmodernist) and the posthumanist. This shift can be observed (among others) in the recent interest in animals, plants, and things. However, quite often while they are treated as interesting research topics and examined by means of known theories, researchers hesitate to address the relationship between humans and nonhumans in the context of the radical avant-garde of critical posthumanism, even though it is the latter that anticipates the appearance of new facts (e.g., Rosi Braidotti, Donna Haraway, N. Katherine Hayles, Bruno Latour, Cary Wolfe, as well as artists like Eduardo Kac or Stelarc). Scholars are increasingly interested in "disobedient" subjects, which often require complementary approaches combining the human, social, and natural sciences, such as environmental studies, animal studies, plant studies, and BioArt. The theories used in the human and social sciences today struggle with the problem of incommensurability: the results of their research are incommensurable with the changing reality and social expectations. That is to say, although scholars observe the ongoing changes, write about them, and create new research areas, they lack adequate tools to conceptualize them. This lack constitutes a major problem in today's human and social sciences.

The interpretivist-constructivist paradigm was not a homogeneous whole but a set of various research approaches and perspectives which have evolved in time and space. This paradigm might be regarded as characteristic of the so-called new humanities, which includes a variety of interdisciplinary trends such as gender and queer studies, postcolonial studies, ethnic studies, and disability studies (Fuery & Mansfield 1997). The interpretivist-constructivist paradigm has played an interventionist, emancipatory, and even insurrectionary role, actively participating in social change. During its domination in the humanities, scholarship has become a form of political activism and concentrates its interest around such key concepts as identity, power, and the other. The characteristics of this paradigm include a pragmatic approach to research, its politicization, emphasis on the relations between knowledge and power, ideological engagement of the researcher who wants to participate in social change and the struggle for justice, unmasking the practices of power, belief in the construction of social reality, and focus on reclaiming forgotten and/or excluded pasts. In terms of epistemology, the interpretivist-constructivist paradigm has promoted interdisciplinary approaches and epistemological relativism, the theory of the situated subject of knowledge (i.e., its subjectivity), and reflexivity and has emphasized the pertinency of interpretation over an interest in truth.

After the long dominance of postmodern "weak science," its politicization and ideologization, scholarship which is experiencing a paradigm shift, begins to look for ways to reestablish its authority, for new goals and standards, and for solid knowledge based on evidence and affording a sense of security in the world. It begins to readdress such classic worldly issues as good and evil, truth, values and virtues, universals, human nature, religion, and the sacred and looks for practical wisdom that would help answer the question of what to do and how to live a morally responsible life in a world where everyone has the right to their own truth.

The limitations of the interpretivist-constructivist paradigm are evident in relation to the process that sociologist of science Andrew Pickering described as "posthumanist displacement of our interpretative frameworks" (Pickering 1999: 561). One manifestation of this process is the emergence of the posthumanities (Badmington 2007; Wolfe 2010). The posthumanities can be defined as

a set of tendencies and research trends related to the intellectual movement and ethical stance known as posthumanism. They construct a knowledge that critiques and/or rejects the human's central position in the world, hence their preference for non- or anti-anthropocentric approaches. In a sense, the posthumanities can be thought of as non-anthropocentric humanities, although this definition is too paradoxical to be embraced without reservations. Ideas of a non-anthropocentric paradigm appeared as early as the 1990s. The primary research interests of the posthumanities include the boundaries of species identity, relations between the human and the nonhuman (the human's relations with technology, the environment, animals, things) and questions of biopower, biopolitics, and biotechnology. The point is not to exclude the human from scholarship but to critique the view of the human as the master and center of the universe.

Environmental history scholars have long criticized cultural and social determinism and the Euro- and anthropocentric character of knowledge. Richard C. Foltz emphasized the need to depart from fragmented knowledge and replace it with integrated visions of the relations between humans and nonhumans and to reframe the concept of agency as the historical (non-intentional) agency of nonhuman actors. He observes that "the environmental crisis is the playing field on which all other issues meet," while a "climate change may well turn out to be the historical event of our times, which future historians may see as the matrix within which all other historical events of our era unfold" (Foltz 2003: 20).

The changes described above provide a context for the growing "thing studies" (part of the so-called new material culture) associated also with an interest in the new materialism that manifests a departure from the traditional (Cartesian) concept of matter as passive and lifeless (Cole & Frost 2010). Characterized by focus on technological progress and humans' growing dependence on things, validation of autochthonous cultures' view of the relations between humans and things, and reliance on quantum physics, new materialism proposes a thorough rethinking of the concepts of matter, vitalism, and animism in the completely new context of today's world (Lury et al. 2006; Harvey 2006). Matter and things become active, unpredictable forms of constant becoming non-intentional agency.

While observing a growing interest in thing studies as well as in animal studies and plant studies, it seems that the reference point for human and social sciences is increasingly shifting from the human being and the humanist, anthropocentric view of its dominant position in the world to the human being as a species, considered in the context of the so-called deep or big history of life on earth (Christian 2004; Smail 2008) and understood as one of the forms of this life. Paradoxically, in the current geological epoch referred to as the Anthropocene (Steffen et al. 2011; Solli 2011) and characterized by a massive global impact of human activities on the environment and the climate, today's human and social sciences are defined by debates about the critique of anthropocentrism, posthumanism, species identity, and interspecies relations.

This kind of thinking has inspired the ideas popularized by Fritjof Capra in the late 1990s. Capra argued that we were witnessing a paradigm turn in science, a turn away from physics and to natural science accompanied by a change of values as researchers embraced the principles of ecological thinking (Capra 1997). During the last ten years a shift from the interpretivist-constructivist paradigm to the posthumanist paradigm (working label) can be observed that includes various pro-environmental approaches. Richard McNeil Douglas argues that "Environmentalism itself is not the paradigm, rather its antithesis, erupting from the growing contradiction between progress and reality, which tells us that a new paradigm is needed" (Douglas 2010: 214). However, posthumanities and ecological humanities, with their non-anthropocentric approach (seeing the world in terms of

collectives of humans and nonhumans, companion species, and kincentricity with the natural world) and interest in traditional ecological knowledges, already announce a growing fundamental change in scholars' consciousness. A process of "indigenizing the academy" – as Devon Milhesuah and Angela Wilson have called it (Milhesuah & Wilson 2004) – is worth mentioning here; they argue – as do postcolonial scholars – that the academy needs an alternative to the European tradition of thinking since this tradition does not offer a worldview that will be a successful survival tool. In a sense, a paradigm shift marks a return to the evolutionary understanding of scholarship as adjusting to a changing reality and a resumption of the debates about whether scholarship (the human and social sciences) has any survival value for the human species and for life in general. This shift is interesting and important because it adopts new points of reference and new goals for the production of knowledge. One of its reference points is life itself or *zoe*.

One sign of the major reconfigurations in the theory of the human and social sciences is a change of research perspective, from the vertical to the horizontal. Generally speaking, the vertical model of knowledge is being replaced by the horizontal model as the so-called flat alternatives and/or relational approaches grow in importance. Indeed, it is legitimate to say that contemporary human and social sciences are all about relations and interconnectedness. Among the many factors that stimulate this shift are quantum physics as well as traditional ecological knowledge that share a conviction that all things are connected. However, as mentioned above, Raymond Pierotti and Daniel Wildcat indicate connectivity "is not simply a homily and a romanticized cliche, but instead is a realization that no single organism can exist without the web of other life forms that surround it and make its existence possible" (Pierotti & Wildcat 2000: 1336). Pyramidal metaphor of viewing reality has given way to the metaphor of entangled relations, a web, net, and network but also assemblages, collectives, kinships, companions, and communities.

Thus, this shift has been caused, first, by ecological thinking, which endorses an ontology of connectivity between humans and nonhumans and humans and the environment, and second, by science and technology studies, which examine the relations between humans and things. It has resulted in a widespread use of flat alternatives and relational approaches. Flat alternatives operate in terms of horizontal relations, associations, assemblages, symbiotic communities, emergence, and entanglement. Examples of such flat ontologies are Bruno Latour's actor-network theory (Latour 2005), Manuel DeLanda's assemblage theory (DeLanda 2006), and more recently, Ian Hodder's project of relational archaeology (Hodder 2010). They share a critical approach to traditional social constructivism, whose idea of society as socially constructed establishes a certain social determinism (sociocentrism) focused on human subjects. Many scholars agree with Latour, who argues that society is not constructed exclusively by humans but emerges as a result of human-nonhuman interactions (Latour 1999: 199, 209). In this context the idea of hierarchy is being replaced by that of symmetry.

The idea of symmetry has become so widespread in the human and social sciences that avant-garde archaeologists, following in Latour's footsteps, have formulated the project of "symmetrical archaeology" (Witmore 2007). In his *In Defense of Things*, Bjørnar Olsen declares an egalitarian approach and a more symmetrical view of reality. He assumes that things, and material culture in general, are beings that coexist with other beings like humans, animals, or plants. They all have material properties and share the world they inhabit. Symmetry in this context does not mean that all these beings are equal or the same; they are seen as different and diversified forms of being, but

the differences among them should not be framed as ontological dualisms or negations. Rather, they are nonoppositional, relative differences that foster collaboration, transmission, and exchange (Olsen 2010).

The future of the human and social sciences is inseparably connected with reflection on the future of the human species, transspeciation, and of life itself. Knowledge about the past becomes a future-oriented knowledge that facilitates adaptation and is relevant insofar as it supports the survival of various species. Thus, knowledge about the past becomes part of the planetary project of sustainable development. Science, technology, and art open the way for the human and social sciences to think about the multispecies world of future communities.

Cross-References

- Agency in Archaeological Theory
- Archaeobotany
- Contemporary and Historical Archaeology in Theory (CHAT)
- Environmental Archaeology and Conservation
- Indigenous Knowledge and Traditional Knowledge
- Hodder, Ian (Theory)
- Material Culture and Education in Archaeology
- Materiality in Archaeological Theory
- Zooarchaeology

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Archaeology and Anthropology

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Introduction and Definition

This entry addresses the practice of modern world archaeology in relationship to its sister discipline of anthropology. My discussion explores two particular issues. First, I briefly describe a history of some of the shared interests that establish the relationship between archaeology and anthropology. Based in the analysis of material culture and spatial relations, archaeology has long drawn insight and inspiration from the anthropological study of cultural interactions, processes, and systems. I also consider the application of anthropology in the actual practice of modern world archaeology. This work is presented in two frames. The first is the use of anthropological data and approaches in the recovery and interpretation of past people and ways of life through surviving material remains. I focus specifically on cross-cultural studies, whose anthropological perspectives enhance the capacity of archaeology to contribute to the study of colonialism. A second frame is the use of anthropology as method for developing a reflexive critique of archaeological practice. In recent years especially, a great deal of work has aimed to better understand archaeology as a distinctly modern practice. In one guise, this work looks explicitly to connect archaeology with modern interests in heritage and cultural identity and establishing a record that recognizes diversity within modernity. Another expression is found in work that employs an anthropological perspective to establish archaeology itself as a worthy subject of study. In this work, archaeologists and others examine archaeologists and archaeological projects as cultural practices. The use of anthropology here is a realization of one of the discipline's most basic goals: to critique the "home" cultures and communities that conceived of anthropology and archaeology in the first place and to enhance the capacity of this work to cultivate greater understanding and democratic participation in modern life.

Historical Background

A logical place to start is Lewis Binford's classic and controversial 1963 *American Antiquity* article, "Archaeology as Anthropology." This essay is regarded as a seminal work for "new" or "processual" archaeologists, especially in the United States. While the essay has been critiqued, it still represents one prominent perspective on the practice of archaeology as a branch of anthropology. Binford (1963: 217) states his understanding of anthropology in this way:

> Initially, it must be asked, "What are the aims of anthropology?" Most will agree that the integrated field is striving to *explicate* and *explain* the total range of physical and cultural similarities and differences characteristic of the entire spatial-temporal span of man's existence . . . Archaeology has certainly made major contributions as far as *explication* is concerned. Our current knowledge of the diversity which characterizes the range of extinct cultural systems is far superior to the limited knowledge available fifty years ago. Although this contribution is "admirable" and necessary, it has been noted that archaeology has made essentially no contribution in the realm of explanation.

For Binford, the purpose of anthropology is to explain "cultural systems," and, as anthropologists, archaeologists should aspire to not only recover, describe, and classify material culture but to employ it as evidence to explain the causes of past activities. Binford sought to reinvent archaeology as a more rigourous scientific pursuit that produced causal explanations based on hypotheses tested against the archaeological record itself. Binford's career as well as that of many of his American peers and acolytes was defined by a scientific struggle to connect the archaeological record to the activities that produced it so that what happened in the past could be known, tested, and ultimately predicted (Schiffer 1976).

Processual archaeologists largely deployed cultural ecology as "anthropology" so that people

and their social and cultural contexts were defined by the resources and limitations of their environment. Cultural ecology also places great value on (eco)systemic stability and the importance of adaptation to explanations of human activity. An excessive focus on human-environmental relationships and the concurrent dehumanization of archaeology's subjects fostered a number of powerful critiques of cultural ecology (e.g., Shanks & Tilley 1987; Trigger 1989; Gero & Conkey 1991; Hodder & Hutson 2004). Nevertheless, a kernel of Binford's hope for an anthropological archaeology remains in general circulation. This is the idea that archaeology shares a basic common goal with anthropology: that expressions of humanity, including in and through material objects, are patterned and can be read to reveal influential practices and perhaps underlying rules that produced and reproduced meaning and action. While the cultural ecological approach of processual archaeology situated meaning in the adaptation of societies to their surroundings, the diverse post-processual archaeologies that followed it engendered a more broadly conceived approach to meaning-making in archaeology.

Couched in Marxism, feminism, hermeneutics, and other frameworks, post-processual archaeologies embrace a general notion that understanding agency and subjectivity is essential to the making and interpretation of the archaeological record. In fact, most post-processualists embrace subjectivity, arguing that the intersubjective spaces and activities people work through every day form the basis of active meaning-making in social and cultural life. Post-processual archaeology draws on the anthropological framework that succeeded cultural ecology. This approach has come to be termed "interpretive anthropology," a framework described famously by Clifford Geertz (1973: 5) in this way: "Believing, with Max Weber, that man is an animal suspended in webs of significance he himself has spun, I take culture to be those webs, and the analysis of it to be therefore not an experimental science in search of law but an interpretive one in search of meaning." Interpretive anthropology moves from explanation toward understanding such that even as we live now in our own situated and culturally structured worlds, we may still acquire a perspective on others, both past and present, in which they may be appreciated and understood on their own terms. The focus of interpretative anthropology is less the struggle for resources than the struggles for identity, power, change, and significance.

As interpretive anthropology matured, a significant interest emerged in the situated standpoint of all persons and institutions, including those of the disciplines and researchers working to document and represent diverse cultural worlds. Eventually a reflexive anthropology formed, especially following a set of powerful critiques of the discipline during the 1970s and 1980s. One critique showed the complicity of anthropology within the oppressive and racist colonial regimes where anthropological fieldwork traditionally took place (Asad 1973). A second critique, initially voiced by feminist anthropologists, rejected the capacity for anthropology to produce objective knowledge, insisting that all knowledge is situated and partial, especially knowledge constructed cross-culturally (Moore 1989). A third critique focused on the translation of experience into text and argued for the radical deconstruction of the research position as not only socially situated but also the result of distinct and under-theorized actions of writing and representation in and about the world (Clifford & Marcus 1986).

Reflexive anthropology fostered new approaches to writing and to the representation of cultural subjects. It also established that the practice of anthropology is itself more than description and interpretation but also is an active way to create meaning in and about the modern world. However, the most powerful transformation to anthropology achieved by reflexive approaches was an acceptance that not only are interpreters (i.e., anthropologists) viable anthropological subjects but subject persons and groups themselves are necessarily valid interpreters of anthropology. Seeking broader inclusion in the discipline and a deeper dialogue about the meaning of anthropology in the modern world, indigenous anthropologies illustrate some of

the most basic goals of reflexive research (Smith 1999; Kirch 2006).

In large part modern world archaeology is a post-processual, interpretive, and reflexive field. With access to historical and cultural documents, the textual silence associated with the creators of the prehistoric archaeological record disappears and in fact defines a new rationale for archaeology that aligns it with interpretive anthropology. Given the presence and authority of documents and oral testimony in modern life, archaeology and material culture provide complimentary data that reveal significant contradictions and uncertainties that lie in the spaces between the written and wrought and between the consciously recorded and the simply done (Potter & Leone 1988). Very much informed by interpretive anthropology, modern subjects are considered active social beings whose lives are marked by a rich negotiation with competing regimes of power and identity, such as nation, race, class, capitalism, and modernity. Moreover, with a complex array of documentary and material data at hand, the reconstruction of the interpreting subject is well within the reach of modern world archaeologists. At its best, modern world archaeology brings the world as subjectively conceived by it subjects into view and then deepens it as the statements recorded in documents are articulated with the practical consciousness of actions and artifacts.

Modern world archaeologists are also quite aware that they study the origins of the world as most people know and experience it today. Modern world archaeology thus contains a number of studies cast in the mold of reflexive anthropology. Some of these studies work to bring awareness and significance to what may be termed "minority histories." This sort of research takes as a starting point the fact that the making of modern world has involved the creation of the white western heterosexual male standpoint as the "normal" historical subjectivity. The perspectives and experiences of the modern world of women and nonwhites, as people without history, must therefore be excavated from the spaces where they were confined as secondary and abject and reintroduced as fully participating characters in the narratives of modern life.

A second branch of reflexivity in modern world archaeology researches what may be called "subaltern pasts" (these terms derive from Chakrabarty 2000). In these instances, a reflexive critique of archaeology works to challenge not only the absence of a historical presence for the majority of actors but the inherent biases that lie latent in the archaeological methods and practices we deploy to recover them. As with reflexive anthropology, an indigenous archaeology movement was forged alongside a great deal of productive research and analysis in the field of critical, community, and public archaeology. The remainder of this essay explores varied examples of the use of interpretive and reflexive anthropology in modern world archaeology.

Key Issues/Current Debates

Archaeologies of Colonialism

In most conceptions, anthropology is the study of cross-cultural interactions and subjectivities to provide a relativistic understanding of cultural experiences in different cultural milieus. Anthropology in this vein introduces an important layer of meaning and interpretation that transforms behaviors that may appear quite strange to outsiders into appropriate, culturally situated responses and actions. For example, Marshall Sahlins' (1985) study of the killing of Capt. James Cook by native Hawaiians in 1779 explains that the event, which lived up to the western conception of indigenous people as dangerous and wild, was rather a playing out of a native Hawaiian conceptual scheme that constructed Cook and his crew as representation of the deity Lono. Similarly, Michael Taussig's (1983) study of Columbian and Bolivian peasants shows that irrational practices like making deals with the devil and baptizing money are rather astute interpretative critiques of the transformations wrought by the capitalist planting and mining industries that came to dominate their communities. Many modern world

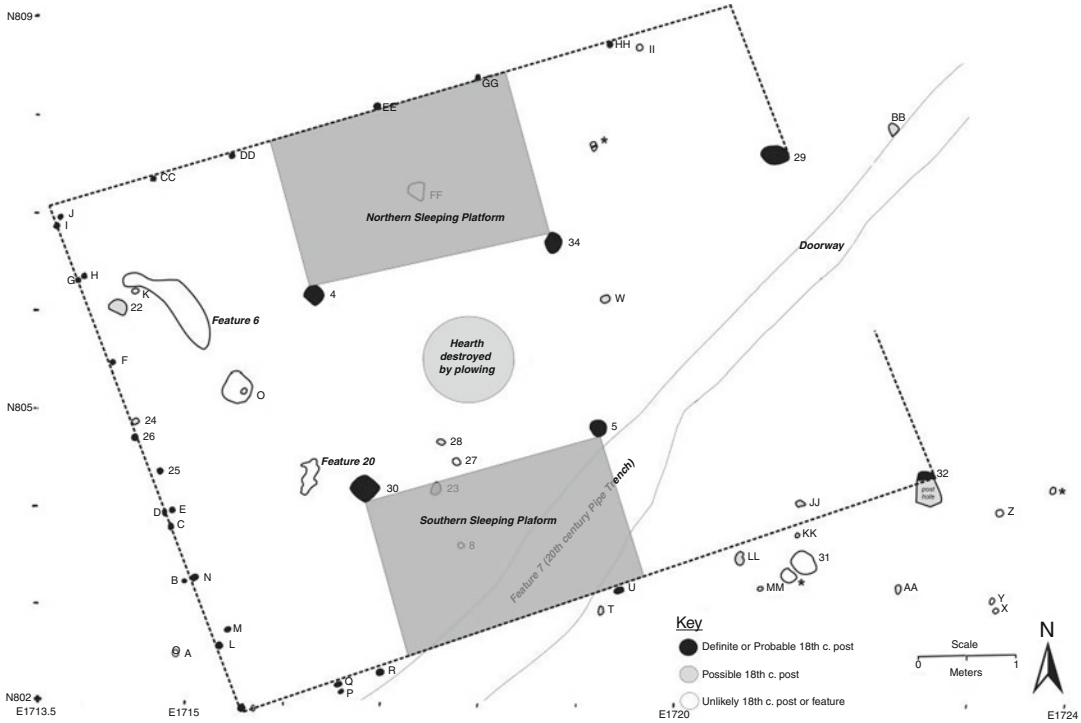
archaeologists work in comparable cross-cultural contexts that help reveal the contours and constructions of the modern world. While this sort of work may be found in varied contexts, I highlight here studies that examine the emergence and entanglement of cultures in colonial settings.

One of the most prevalent markers of the modern world are the thousands of intercultural relations that developed with European expansion and colonialism. Most research in this area begins with a conception of colonialism as the interaction of two or more distinct cultural worlds. The result has been an overwhelming majority of studies documenting the impact of colonialism on presumably stable "preexisting" indigenous cultures that underwent substantial change as they became modern. This sense of colonial cultures has undergone serious critique. In a nutshell, this critique illustrates Eric Wolf's (1982) concern with "people without history" such that before contact the worlds of the colonizer and especially the colonized followed secure and essentially timeless traditions that changed only after impact. It is misguided and self-important to think that colonialism instituted changes so substantial that colonized people were irreparably changed by their encounter with Europeans. For one, anthropology explains that all groups face changes and are culturally poised to respond, understand, and control their circumstances. This is the basis of Sahlins' interpretation of culture contact in Hawaii. Second, anthropology also shows that culture does not function outside of the social and historical circumstances in people's lives but is simultaneous and integral to the way history is made. This is what we learn from Taussig's research in South America. As such, we need to take care to recognize that colonialism is more than a context or a set of relations that situates people and groups in certain conceptual cultural worlds; colonialism is also a means of actual cultural production that creates and is created by the specific conditions that enable and control actions and social power through time.

An excellent approach to understanding the dynamics of colonial culture is Kurt Jordan's (2008) study of *The Seneca Restoration* in the early 1700s in New York State. Jordan urges the adoption of two critical standpoints. The first is a rejection of the dominant trope of "cultural decline" attached to the study of indigenous communities in the colonial era. In most instances, researchers posit a "precontact" indigenous people defined by the modern dream of the noble savage, a dream eviscerated as the unprepared native succumbs to modern desires, falters, and ends up destitute if not eliminated altogether. Regarding his study of the Seneca Iroquois, Jordan (2008: 18) points out the principal implication of the trope: "it declares that the only way for the Iroquois to remain Indians was to stay the same." In contrast, Jordan contends that the fact that we call people Iroquois (or another identifier) does not necessarily mean that they need to act in any particularly "Iroquois" way to leave behind important stories about the Iroquois people. Rather, how they struggled to remain a relatively autonomous and empowered community of Iroquois people is what we need to understand.

Jordan also calls for researchers to consider the "local political economy" in the interpretation of colonial lives. Referring to the places and relationships that make up the contexts of their daily activities, such as acquiring, cooking, and preserving food and tools and the maintenance of external relationships (through trade and conflict), he argues that understanding and operating in local contexts made up most of the consciousness of colonial subjects. A focus on local political economy does not replace a concern for broader-reaching contexts of colonialism or capitalism that are the general interest of modern world archaeologists. Rather, inasmuch as these broader concerns can be understood culturally, it will be in how they emerge in the actual daily practice in localities.

Jordan's study of the Seneca Iroquois in west-central New York State illustrates these standpoints masterfully. Most research argues that the Iroquois' encounter with British and French colonials is a story of decline defined by their participation in the international fur trade interspersed with periodic warfare, which left them decimated by disease and death and unable to reproduce vital cultural practices and remain



Archaeology and Anthropology, Fig. 1 Plan view of a Seneca short longhouse, Structure 1, DRC 1, Area D, Townley-Read site (Courtesy: Kurt A. Jordan)

Iroquois. The consensus is that by the early 1700s, the Iroquois were fully colonized and in this eroded state adopted what they could of European ways of life to survive. By the time they were subject to one of the earliest modern anthropological studies in the 1840s, Lewis Henry Morgan concluded they had become passive and lost the capacity for innovation, i.e., they were no longer Iroquois. Among the most visible effects of Iroquois acculturation was a change in housing and settlement patterns. Precontact Iroquois sites are associated with a matrilineal, multi-family house structure known as the "longhouse," built in clustered and often palisaded villages. By the 1700s clustered longhouse villages were replaced with dispersed settlements made up of smaller, sometimes nuclear-family, houses built with European materials. So, when "the people of the longhouse" (Jordan 2008: 13) stopped building longhouses, scholars took this as evidence of their decline.

Jordan counters this interpretation explaining that "many factors previously taken as evidence for acculturation or social disintegration in fact were innovations *beneficial* to Iroquois people" (2008: 23). His focus is the Townley-Read site, a component of the dispersed New Ganechstage Complex, located near the western shore of Seneca Lake. The site was established around 1715 in the years after a formal declaration of peace between Britain and France and occupied until the start of new international hostilities in 1754. Over several previous generations, international conflicts created a "landscape of fear" forcing Senecas to negotiate alliances with their Indian neighbors and colonial settlers and armies and, with a constant threat of war, be prepared to protect and/or uproot their settlements. However, after a peace treaty in 1713, palisaded villages were abandoned, and the Seneca moved to the dispersed New Ganechstage Complex consisting mostly of smaller "short longhouses" (Fig. 1).

Jordan argues that the 1713 peace treaty brought about the best conditions the Iroquois had experienced in decades. The shift to

a dispersed settlement therefore was a strategic development that allowed established Iroquois cultural practices to be put to use given the current conditions. Dispersed settlements supported greater household autonomy and better integration into the regional political economy. Households avoided a pattern of overusing key resources like firewood and cropland. Seneca women were also closer to water sources and their fields, giving them more time to devote to other productive activities. For example, the archaeological record suggests a greater emphasis on local deer hunting in this era. Deer meat was useful, but given more free time, women also extracted the maximum amount of value from a given animal. Marrow from long bones was collected for storable bone grease. Deerskins were also useful both in the household and as a valuable good in the international fur trade that still operated in the region.

Participation in the deerskin trade is paired with a documented shift in the source of beaver pelts to the Ohio territory and points west. Many scholars assert that this factor also evidences Iroquois decline. Jordan (2008: 341) shows that the western fur trade instead established a very useful "geographic middleman position" for the Seneca, in which good relations with the Iroquois were required for safe passage through their territory to the European trading forts. Iroquois are documented to have encouraged western groups to trade with Europeans in their region, most likely because this would have preserved and enhanced their role in the evolving trade network. Archaeologically this process is visible in a marked increase in the number of red pipestone artifacts which originate from the upper Midwest. More than exotic goods, these artifacts were part of an assemblage that also included glass beads and beaver pelts paid to the Seneca for safe passage through their territory. Notably, red pipestone was not valuable to Europeans at the trading forts so its value was restricted to Native American relations. Moreover, a 1730 document shows that western Indians went out of their way to visit Seneca villages, a record suggesting this was part of an established process of securing an alliance.

In sum, Jordan shows in these data and many others that the early eighteenth-century Senecas were not in decline but strategically situated to take advantage of the opportunities and limitations presented in their cultural world. Their selection of a dispersed settlement pattern suited the conditions of the era and allowed them to employ and adjust key "Iroquois" cultural practices in household management and trade relations. In effect, the evidence of being Iroquois in this case indicates the process of Iroquois people continuously transitioning to become modern within and against colonialism.

A second compelling archaeological study of modern colonialism is Akinwumi Ogundiran's (2002) study of trade beads and cowrie shells in Nigeria and Benin during the era of the African slave trade. Ogundiran works with multiple data sets including myths and legends as well as archaeological material culture to weave a brilliant interpretation of the uses and meanings of cowrie shells. Ogundiran (2002: 431) argues that "material culture, myth, and legends constitute a 'cognitive constellation' that shapes the perception of reality and provides insights about the world and about new experiences. In this regard, objects (whether locally or externally derived) are critical to generating, transforming, and transmitting ideas and values into physical reality. The conversion of ideas into objects and of objects into ideas, however, is a two-way process by which culture is created, codified, and contained." In this approach cultural expressions (both material and ideal) are practical statements seeking to provide stability to the dynamic and unsettled meanings that can emerge in colonial settings.

This study begins with the fact the Bight of Benin/Slave Coast region consumed almost half of the cowrie shells (more than 10 billion) imported through all West African entrepôts. Cowries are an Indian Ocean shellfish species first imported by Portuguese traders to serve as a trade item in Africa. Soon after their introduction, cowries were adopted as a form of currency and thus elevated from a bauble to a foundation of local economies. Ogundiran contrasts the use of cowries with that of glass trade beads that had

long served as sumptuary goods deployed by elites to display prestige, cement alliances, and fund attached specialists. Moreover, beads came to stand for preciousness, auspiciousness, good fortune, and spiritual health. Ogundiran offers the following translation of a Yoruba panegyric to illustrate:

> Child of one who wakes to thread, one who threads *segi* beads
> My father, one who rises at the crack of dawn to thread "groundnut" coral
> Child of Owara Aremu, who scatters *segi* beads in the forest
> He said it's because of the pluckers of leaves (leaf sellers)
> He said it's because of the breakers of sticks (firewoods sellers)
> He said it's because of the destitute who traverse the bush far and wide

Beads were the result of hard work and the use of one's wealth to care for those at the margins of society. While self-aggrandizing, elites were praised for their charity and support of the whole community.

The introduction of cowries and their use as currency supported an intensification of commercial activities among an ever-larger proportion of the population that ultimately undermined such reciprocal cross-class relations. Cowries were used for most payments including tribute and bride-price as well as accepted as payments for captives sent to the slave trade. It was the connection between cowries and captive people more than anything else that fractured earlier social relations. One key social factor of cowrie currency was their tie to the emergence of more centralized state power largely supported by elite control of the slave trade. With centralization, the value of cowries stabilized, and their use more became widespread such that while most African commoners rarely owned other Atlantic trade goods by the 1700s, almost everyone in Yorubaland had cowries.

Notably, cowries also became an "embodiment of transformative/ritual potency" (Ogundiran 2002: 440). One story tells of the origins of cowrie money as the result of the peace made between a Benin king, Oba Eresoyen, and the great deity of the seas, Olokun, who "as a reward ... heaped up cowries to the sky for Eresoyen and they were packed to the palace" (Ogundiran 2002: 441). This myth worked because the connection between the use of cowries and the transshipment of captives represented the basis of a new way of life for people tied to the generation of wealth and power from the ocean. Commoners also told stories that connected enslavement, cowries, and the sea:

> In the beginning of the world we had the forge and we forged things, we had weaving-looms and we wove our clothes.... we had boats from which we caught fish. We had no guns. We had no cowrie-money (akwa). If you went to the market you took beans in order to exchange them for sweet potatoes. You exchanged something for something else. Then the king brought the cowrie-money. What did the king do in order to bring the cowrie-money? He caught people and broke their legs and their arms. Then he built a hut in a banana plantation, put the people in it, and fed them bananas until they became big and fat. The king killed the people and he gave orders to his servants to attach strings to their bodies and to throw them into the sea where the cowrie-shells (akwa) lived. When the cowrie-shells started to eat the corpses, they pulled them in, collected the shells, and put the live cowries in hot water to kill them. That is how cowrie-money came to exist (Ogundiran 2002: 443).

Here we see how common people, those most vulnerable to capture, construed a direct human-cowrie conversion. Yet, this myth also captures the rising significance of commercial activity in coastal West African society during this era. With cowries, as with all money, the value of goods shifted from their use in barter to their use in the creation of wealth at the expense of those traded away.

Slave Coast West Africans also found ways to rationalize the transformation of their society toward the global system and an associated shift in the meaning of humanity from lineage and region to the commercial value of persons, enslaved or free, in the market. Ogundiran explains this change through the use of cowries in rituals of self-realization. Just as "Oba Eresoyen is remembered in the oral traditions of Benin as the king who 'built a house of money' because he 'decorated the walls and palace of his palace with cowries'" (2002: 445), so did others,

Archaeology and Anthropology, Fig. 2 House of the Head Shrine (Ile-Ori), dimensions: H. 13 3/4 × diam. 10 in. (35 × 25.4 cm) (The Michael C. Rockefeller Memorial Collection, Gift of the William W. Brill Foundation, 1962. Accession number: 1978.412.459a-c)

including both noble and common people. A significant expression is the proliferation of *Ibori* shrines and *Ile-Orí*, or individualized deities constructed with cowries as the main decoration (Fig. 2). The *Ile-Orí* were "the house of the inner head" used to protect individuals from harm by nature or the evil eye, secure their privacy, and ensure their self-respect. The key reference is how cowries supported the individual as the basis of social life and the distinctions between individuals as the result of their autonomous actions: "The centrality of cowries to the making of *Ibori* and its *Ile-Orí* is evidence that cowries became the value register for harnessing the spiritual and temporal powers of successful men and women after the sixteenth century" (Ogundiran 2002: 448). Cowries helped West Africans to conceptualize and enable the transformations wrought to their society by the impact of the slave trade both in the taking of persons and in the commercialization and individualization of everyday experience.

Minority Histories: Archaeology, Heritage, and Identity

A very active interest in modern world archaeology lies at the intersection of archaeological research and heritage interests. Heritage is a shared interest among anthropology and archaeology, especially in the field of applied anthropology (Shackel & Chambers 2004). Based on the promise that archaeology can recover new data and build interpretations that compliment as well as challenge dominant narratives of modern history, many archaeologists see their work being about the meaning of past actions to people living now. As applied anthropology, archaeology is used to provide tangible histories and material touchstones in support of the creation and recognition of minority identities in modern life and the construction of paths to the recognition of diverse heritages. Some archaeologists see their work as a form of civic engagement and adopt a distinctly political edge. These approaches deploy archaeological resources to work with minority communities in order to capture their interests in the past and to present their findings to the broader public with the aim of fostering recognition and social change.

Very good examples of this work come from research connected to the struggle to preserve "unrecognized" indigenous identities in postcolonial modern life. In United States as well as other modern settler nations, the legitimacy of indigeneity is a serious discourse that crosscuts questions about national and tribal identities, race, as well as propertied interests and claims. The basis of recognition in the eastern United States is especially difficult since federal recognition of tribal status demands a continuous and documented official tribal record over four centuries. Being poor, racially outcast, and largely dispossessed of their material and cultural property and heritage, many eastern tribal communities cannot produce the records required for official recognition. Archaeological research on the history of these communities in the modern world, therefore, enters a dialogue on heritage and identity with powerful meanings and results.

The Werowocomoco project (Gallivan et al. 2011) in tidewater Virginia provides a good

illustration of this sort of work. Werowocomoco was the capital of the Powhatan confederacy when the English settlement at Jamestown was constructed in 1607. Werowocomoco was also the likely site where Pocahontas saved the life of John Smith, establishing a key origin story about colonial intercultural encounters that most Americans know and embrace. The archaeological discovery of the site in recent years, especially as it was concurrent with the 400th anniversary of the Jamestown settlement, positioned Werowocomoco as a potent symbol to a wide number of groups, including both Native American descendants and non-Indian American patriots.

Gallivan et al. (2011) point to a contradiction that surfaced around the Werowocomoco project between the expectations of indigenous historical and cultural continuity and current trends in anthropological scholarship that challenge essentialist cultural claims. Anthropology in this vein draws attention to the fluid social networks and strategic adaptations groups adopt to preserve autonomy and power during stressful times. The problem for unrecognized tribes such as the Pamunkey and the Mattaponi is that, while this sort of research may produce a more accurate, decolonized depiction of their history as people who equally contributed to the making of the modern world, it undermines the requirements for recognition that they exist still as "fixed, bounded and historically continuous entities" (Gallivan et al. 2011: 12). As such, Native American collaborators in the Werowocomoco project "publically represented themselves and their communities in terms of tightly bounded, internally homogenous tribal identities" (Gallivan et al. 2011: 12).

Despite this context, the research team still found useful insights and approaches that helped to construct a novel understanding of an indigenous life during the early colonial era. Challenging preconceptions that the Powhatan confederacy was a regionally organized, hierarchical chiefdom, archaeologists now believe that the network of Indian communities was framed in more local terms with groups forming alliances and other "foreign relations" without the overarching authority of a centralized chief. With this perspective in mind, Gallivan et al. (2011: 19) consider the community at Werowocomoco and their descendants have long practiced "creatively incorporating cultural elements including colonists, Christianity, and (most recently) archaeology, while retaining meaningful connections to place as well as kinship ties that stretch across diverse communities." While the results of this project and the collaborations and political actions with which it is engaged are not yet fully realized, a view of how modern world archaeology intersects with the complexities of intersecting and diverse heritages is very evident.

A second approach to heritage-driven research in modern world archaeology draws from a more explicit and political engagement with the process of building community collaborations as social action. Through the negotiation of a shared authority over research and presentation, collaborations with descendant and local communities often serve to empower not only their recognition but novel forms of knowledge useful to understanding modern lives both past and present. The Hampden Community Archaeology Project (HCAP) in Baltimore, Maryland, is a wonderful example of this work in the context of industrial working-class heritage (Gadsby & Chidester 2011). The Hampden section of Baltimore is a former industrial zone and working-class district that thrived in the late nineteenth and early twentieth centuries. After the 1920s most factories closed and residents had to look elsewhere for work. By the late twentieth century, Hampden's industrial history became noteworthy, though this was based in stories of the district's industrial and technological achievements and not stories about its working-class residents. As is common in postindustrial districts, this history was closely tied to the renovation of mill buildings into high-end studios and offices and the opening of new restaurants and trendy shops as Hampden was gentrified for use by the middle class. While the working-class history of the neighborhood is largely neglected, it does make an appearance at "HonFest" an annual event that "lampoons an imaginary

Archaeology and Anthropology, Fig. 3 HonFest 2004. Hamden, Baltimore (Photograph courtesy David A. Gadsby)

blue-collar experience by disseminating inaccurate and cartoonlike images of working class men and women" (Gadsby & Chidester 2011: 106) (Fig. 3). The HCAP seeks to redress this slighting of the heritage of the working-class residents, who have always formed the core of the Hampden community.

Gadsby and Chidester (2011: 107) distinguish between public heritage, that which is marketable and often the focus of heritage and urban development professionals, and private heritage "in which the past is dynamically linked to the present, with heritage values interpreted and identified by community members rather than outsiders." Focused on landscapes, housing, and fixed historical associations, public heritage encourages forgetting as it separates people and places. Private heritage, however, promotes remembering as it is based on the people and relations that connect past and present and thus give historical contexts to places as they are actually lived.

In addition to excavations at sites associated with the historic working class of Hampden, the HCAP also developed a number of noteworthy outreach programs to illustrate and promote an appreciation of the private heritage in Hampden. These included a series of public history workshops, a project blog, an oral history project run with high school students, and a program that paid city youth to work on the project. These resources provided community members with a chance to participate, publicly share their interest in Hampden's working-class heritage, and criticize how this heritage is ignored by outsiders. These useful critiques enhance the capacity of the archaeological project to engage in informed social action. One example of this was the creation of an exhibit on working-class women's history in Hampden to be mounted during HonFest, which provided a counter-narrative to the disparaging public heritage otherwise represented at this event.

Subaltern Pasts: Diverse Meanings of Archaeology in the Modern World

There is one additional anthropological method used to engage the cultural complexity of the modern world in archaeology. This involves understanding the contemporary landscape of knowledge production that enmeshes archaeology in modernity (Thomas 2004). Taking a cue from reflexive approaches in anthropology, some modern world archaeologists have conceived projects that consider archaeology itself as a subject of study. While some have engaged in

ethnographic research of archaeologists at work (Edgeworth 2006), others pursue ethnographic research on the contexts that construct archaeology as a discipline and practice as well as the activity of specific persons in the modern world. From the latter especially, important insights on the intersection of archaeology and modern life have emerged that very well may change the discipline's future.

This line of research may be couched under Lynn Meskell's (2005) term "archaeological ethnography." For Meskell, there are two critical elements that define this approach. The first is an interrogation of the relations between archaeology and "the locals." Long associated with archaeology as laborers, constituencies, sources of "traditional" knowledge, descendants, and stakeholders, archaeological ethnography seeks to broaden the scope of "local" relations as they are defined by the global and local scales of the modern world. At the global scale, "locals" are defined by diverse and specific geopolitical positions that situate them in ethnic, racial, and class histories of place and locality. According to Meskell (2005: 82), "locals" are not passively engaged with their conditions but "directly enmeshed in their own critical reformulations, political negotiations, and constitutions of theory and interpretation." In addition, local communities engaged with archaeology are typically internally diverse, crosscut by gender, age, and class dynamics that will necessarily affect relations with archaeologists and other outsiders. Archaeological ethnography works through these dynamics to establish the proper cultural fields in which archaeology participates.

One result of this approach for Meskell was the clear pictures of archaeology that "locals" had in mind when she approached them about her project at Kruger National Park in South Africa. Meskell's interest was in developing a proper picture of the cultural meanings and interests that neighboring communities, many of whom had been displaced by the colonial and apartheid regimes to create the park, held for archaeological sites within the park. Intending to discuss this project with residents of a Malatji village, she was directed to a courtyard where women were preparing a plaster courtyard floor. Meskell realized they were showing her traditional Malatji construction techniques or what they thought an archaeologist would be interested in seeing in their village. A similar example of cross-cultural confusion arose when her team reached an impasse while interviewing Malatji elders. The new chief expressed reservations about sharing the elders' stories because of a history of their cultural knowledge being used against them, especially in regard to land claims. Meskell (2005: 92) puts it this way: "in most contexts the taxonomy of 'homeland' would be a positive one inflected with concepts of tradition, ancestry, and indigeneity, whereas in South Africa it is steeped in a dystopian history of dislocation and disenfranchisement."

A second critical element for Meskell is the interrogation of the discursive field archaeology occupies. In archaeological ethnography, researchers shift their attention from an interest in past dynamics to the notions and uses of "archaeology" and "the past" in contemporary culture. While the past is a vital resource for building heritage in the present, the structure of the past and even what constitutes being "past" are regularly debated. The structure of the past is defined in the conflicts between unified and fractured tellings of history: whose history is privileged? How and why are others left out? Does the acceptance of diversity in history require multiple histories or can a broader inclusive history be built? The question of what is actually past versus what is still present is one with especially great relevance in modern world archaeology. In fact, a defining characteristic of modern world archaeology is that the issues and topics driving research have direct relevance to the present. Topics such as capitalism, colonialism, industrialization, racism, gender and sexual bias, class formation, and oppression can all be situated in both past and present, often with clear ties between what happened before and why and how things are the way they are now (Hamilakis & Duke 2007; Matthews 2010; Voss & Casella 2012).

More pointed than expressions of cultural continuities, the question of what makes the

past is especially significant when the problem is whether a people still exist and therefore whether the claims of those living now need to be addressed. Similar to the question of recognition in the Werowocomoco project discussed above, Meskell found a sharp divide between natural and cultural history in Kruger National Park that removed responsibility from park managers for the maintenance of archaeological sites or from having a working understanding of the relevance of archaeological sites to nearby local communities. The additional complexity here comes from basic questions that emerge about what counts as archaeology and who is responsible (and how) for establishing its relevance in the contemporary world.

My own work with the descendant mixed-heritage Native and African American community in Setauket, New York, explores some dimensions of archaeology as a public discourse alongside its role as a method for recovering histories lost to modernity (Matthews 2011). This project began as a collaboration between a community-based historic preservation group, Higher Ground Intercultural and Heritage Association, Inc., and the Center for Public Archaeology at Hofstra University (the collaboration is now with the Center for Heritage and Archaeological Studies at Montclair State University). From the start the project was community-driven, in that Higher Ground sought to create an independent story of their community that captured what its leaders felt was a disappearing resource. Since the 1960s, the mixed-heritage minority community in Setauket has seen a great deal of change as their population dropped from more than 40 families to fewer than 15. The problem is that during this time the Setauket area became suburbanized, a process that introduced more people and commercial development in the local area. New people and resources in turn led to an increased demand for housing and municipal services that in turn drove up property taxes. The Native and African American community were not prepared for these changes, and many have since left the area for less expensive places to live. While the process of gentrification is common on the American landscape; in this case, the community being removed is one that has distinctly deep local roots, having been present in the area since colonial settlement in the 1660s, if not long before, given their Native American ancestry.

This community's story is also connected to another local effort to control suburbanization: the creation of a series of historic districts in the area that have protected historic sections of Setauket from demolition. These districts have preserved a wide range of structures dating to the colonial and postcolonial eras of the area that help to give Setauket an aura of the past that it uses to distinguish itself within the larger region. It notable that the sections excluded from these historic districts were those areas where the minority community, who have always been there, lived. In one case the neighborhood was already torn down and replaced with a strip mall; in another case, the community was already removed in order to create an all-white elite enclave, and in the third, the area known as east Christian Avenue, where those who remain still live, was excluded because its lack of properly "historic" structures. In the end, the historic minority community was surrounded on all sides by an official historical landscape that made virtually no mention of them.

In response, Higher Ground petitioned for the creation of the Bethel-Christian Avenue-Laurel Hill historic district in 2005 so that the last stronghold of the historic Native and African American community could be preserved. This act not only added a minority component to the local historical landscape, it created a social context for creating and telling a separate story about the past in Setauket. This is how the collaboration between Higher Ground and Hofstra University came about. Higher Ground deliberately sought an outside institutional partner with which to create an independent and critical story of Setauket as a historical place. The partnership therefore was formed not only to recover archaeological and historic data but to create a new perspective on minority history within a space where the official history is routinely and genuinely celebrated by the majority community. Moreover, the purpose of our project does more

than challenge the mainstream story about the past in Setauket but also makes plain that neglecting the minority community in local history is akin to neglecting their well-being and survival in the present.

In words of Mr. Robert Lewis, President of Higher Ground, archaeology provides an opportunity to do something "unconventional." For his whole life, Mr. Lewis lived in a Setauket that relied on a simple historical thread tied to its colonial and rural history, its association with actions during the American Revolution, and a long process of slow capitalist development that had always found a place for his people, although at the bottom end of the socioeconomic scale. When he heard this same story from white preservationists as he sought their help, he realized that the story itself was very much part of the problem because it was not the same resource in his community than it was for his white neighbors. He needed a story of his own that could excite his community and inspire them to protect their heritage despite the obvious challenges.

Regarding archaeology Mr. Lewis said, "because it is unconventional opportunities for exciting discoveries exist" (Matthews 2011: 50). So, in this project we not only share our findings and include community members in the process of creating knowledge about the past but seek explicitly to engage them in the association between archaeology and discovery that Mr. Lewis keyed into. Archaeology emerges through a different process and from a different archive than the traditional stories circulating in Setauket, and the sites and artifacts we discover are directly connected to members of their community. These sources and connections support a place for an indigenous knowledge not predicated on the survival of ancient traditions alone. Rather, it is based on the same process of discovery that has fueled mainstream knowledge and fascinations with the past but practiced in this case by subalterns who have traditionally been excluded from making discoveries and contributing to the making of modern places of heritage. Thus, in this case, archaeology is both discursively and practically in the hands of the community and therefore provides them with a tool to do more than represent diversity but also to create it.

Future Directions

This entry has considered the relationship between anthropology and modern world archaeology, and the studies reviewed were selected to provide a view on where the use of anthropology by modern world archaeologists is heading. The several examples show how the use of the interpretative and reflexive anthropological approaches creates potent frameworks for creating knowledge about and understanding of modern lives. One specific use of anthropology is in the cross-cultural analysis of modern colonialism where archaeology provides insight on local political economies and reveals strategic indigenous cultural practices that complicate master colonial narratives of decline and acculturation. A second anthropological approach lies in the development of heritage diversity in modern life. Considering examples of Native American and working-class struggles for proper cultural recognition, archaeology is shown to function as a tool for both research and social action and to provide a useful means for supporting cultural claims that complicate the histories of minorities that dominate modern life. Also discussed was the possibility of modern world archaeology to address the cultural realities that situate archaeology and archaeologists. These realities include miscommunications of the role of archaeology in the new South Africa and the capacity of subaltern people in New York to appropriate the idea of "archaeological discovery" to create an independent and politically useful indigenous history.

Anthropology serves modern world archaeology by providing frameworks that situate modern people, practices, disciplines, objects, and ideas in specific and productive material and cultural relations. In turn, archaeology activates a new archive of data that brings into view actual and possible counter-narratives that complicate our understanding of the experiences of modern life and the ability of

archaeologists to act as modern people coeval with the people and pasts that constitute their research and lives.

Cross-References

- Activism and Archaeology
- Authenticity and the Manufacture of Heritage
- Colonial Encounters, Archaeology of
- Community Archaeology
- Community Engagement in Archaeology
- Contemporary Past, Archaeology of the
- Critical Historical Archaeology
- Cultural Heritage and the Public
- Descendant Communities in French Guiana: Amerindians
- Heritage and Archaeology
- Indigenous Archaeologies
- Labor Archaeology
- Local Communities and Archaeology: A Caribbean Perspective
- Modern World: Historical Archaeology
- North America (USA): Historical Archaeology
- South Africa: Heritage Management

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Archaeology and Politics

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Introduction

This entry considers the institutionalization of the archaeological discipline in the context of modern Western science and puts forward the idea of "archaeology as politics." The analysis takes place from a South American perspective and takes a different stance from the widespread treatment on the subject which is based on the presumption of a division between science and politics as exclusive domains (although recognizing some influence of the latter). That is, it is not the intention of this entry to differentiate between archaeology and politics as separate spheres, which would imply the acceptance of the possibility of being able to "manage" at will the political side of archaeological practice in time and space. On the contrary, it is considered that archaeology is politics and its disciplinary practice inscribes power-knowledge relations both at the micro- and macro-political levels.

The dual anchorage of archaeology in modernity and in the unfinished transmodern reconfigurations predefines the political origin of absolutely all actions and choices involved with the production process, reproduction, and management of scientific knowledge. This is related to the geopolitical conditions implicated in the generation of knowledge and which preestablishes the preeminence of science over other forms of knowing. Geopolitical contexts refer not only to the physical space but also to the sociopolitical, historical, epistemological, academic, and editorial (among others) scenarios, through which certain forms of knowledge are generated and installed over others (Walsh 2007). To account for this, some historical trends will be discussed that have occurred in South America in general and in Argentina in particular, regarding the interrelationships between archaeological practices, theoretical frameworks, and political contexts. The geopolitics of knowledge impact not only the forms and conditions of producing and reproducing knowledge (i.e., science, academia, publishing companies) but also the definition and management of places of interest (e.g., historic sites, protected areas) and materiality (e.g., memorials, monuments, heritage, artifacts, museums) promoted by different sectors and actors with commemorative, recreational, educational, and cultural purposes. In this context, archaeology as discipline provides discourses, narratives, lifestyles, places, and objects located in time and space, thereby becoming a contemporary device in the classification of stories, landscapes, people, and their relationships from an Anglo-Saxon, colonial, and modern knowledge perspective.

Historical Background

Archaeology from a Political Perspective

Anthropology and archaeology as disciplines have a modern origin and are associated with the centers of political and economic power of liberal industrial countries (e.g., England, France, Germany, and the United States). Since its beginnings in the mid-nineteenth century, social sciences in general and archaeology in particular developed in relation to these power centers and became institutionalized as a knowledge-producing enterprise. In this historical constitution of disciplines in Western thought, there are two foundational assumptions that characterize modern social sciences (Lander 2003). On one hand, the existence of a universal metanarrative from which all peoples and world experiences are classified and ranked, with European industrial society considered the most advanced expression of this development. In this context, the first "articulations of cultural differences in chronological hierarchies" appear, activating classifications of premodern, traditional, and/or primitive. From this perspective the forms of knowledge that were developed to understand the "other" societies came to be the only valid, objective, and universal ways of understanding the world. Through this Eurocentric view which organizes time and space, a mechanism of colonial and

imperial knowledge was installed and naturalized that preestablished the superiority of the product of science over other forms of knowing (Restrepo 2007). The ideal of knowledge in modernity, besides being characterized by its objectivity and universality, is predefined as disembodied and ahistorical, that is, by its possibilities of transcending and disregarding persons, times, and places. This is connected with the ontological rupture between body and mind, an initial separation in the modern Western tradition, which places human beings in an external position and instrumental to their environment (Lander 2003). This reinforces abstraction and distancing as main heuristic elements in the construction of knowledge.

According to the Porto Rican philosopher Maldonado-Torres, if scientific knowledge is recognized as the only valid way of knowledge, cognitive faculties in racialized subjects (the "other" colonized) are denied, which provides the basis for the ontological denial and epistemic disqualification of the latter (Maldonado-Torres 2007). Descartes' cogito ergo sum gives primordial importance to the epistemological and expresses the sense of coloniality of knowledge, "others do not think, thus they are not." So, "not thinking becomes a not being signal in modernity" (Maldonado-Torres 2007: 145), and thereby exclusion, subalternation, and/or denial mechanisms are generated for all that is different from the way of thinking of the modern, Western, and white "us." The epistemic disqualification referred to by Maldonado-Torres can be linked to the concept of "epistemicide" proposed by Santos (2006), to refer to the death of alternative knowledge caused by the installation of the idea of scientific knowledge as the only valid and rigorous way of understanding the world. Consequently, this monoculture of knowledge, as it discredits and disqualifies "others," shrinks and reduces the present by eliminating different contemporary conceptions that do not fit within modern canons and scientific principles (Santos 2006).

Moreover, there is no doubt that the relationship between politics and archaeological practice has begun with the emergence and development of the discipline in the nineteenth century (Trigger 1989). However, discussions about the political implications of archaeology or on the uses and abuses of the past emerged only in the last decades of the twentieth century. Archaeologists' late treatment of these discussions can be seen as a result of disciplinary institutionalization which sought to cover archaeology with scientific status guaranteeing objectivity and neutrality. Simultaneously, the development of the firm belief that archaeology is synonymous with the past helps to install the view of the professional's role as being free from the vicissitudes and particularities of its own time. In that sense, the practice of archaeology, under the precepts of modern scientific thought, is inscribed and mediated by the denial of its contemporaneity reflected mostly in political, Eurocentric, and racist terms. Some academic theories, such as diffusionism and evolutionism, were the conceptual frameworks for the construction of national identities in different countries of South America and which white Europeans used to legitimate their treatment of indigenous peoples. At the same time, different archaeological investigations sought to demonstrate the historical discontinuities between high pre-Hispanic cultures and contemporary native groups. The cultural historical synthesis of large regions and areas was one of the main objectives of the South American archaeology in the early decades of the twentieth century. In this context, diffusionism and racial studies were one of the main mechanisms to explain the migration patterns of human groups through space and time (Politis 1995).

It was not until the 1970s and 1980s that scientists began to reflect deeply on the close relationship between the archaeological work and nationalist practices, as well as the sociopolitical contexts in general. The emergence of Latin-American social archaeology in Mexico and Peru, with its theoretical orientations in historical materialism and neopositivism, saw attempts to explain social phenomena scientifically. This movement sought to link the past to the present and aimed to be a weapon of liberation for the people. Issues relating to their origin and status as exploited or the transience of social

classes, institutions, and behavioral patterns were explored (Lumbreras 1974). Latin-American social archaeology was therefore characterized by the development of an original theoretical approach which sought to provide the basis for generating emancipatory political positions rather than academic positions. The most significant contributions were made in Mexico, Peru, Venezuela, Dominican Republic, and Cuba; however, the influences of this approach were restricted to those countries during the 1970s and early 1980s. In this regard, it has been suggested that social archaeology was associated with temporal contexts where the political model of the nation state tended towards a Marxist ideology (Oyuela-Caycedo et al. 1997).

Moreover, not all Marxist archaeologists ascribed to the tenets of the Latin-American social archaeology. Among them, some American archaeologists close to Marxism began to explore the political implications of the discipline and archaeological praxis and to discuss issues relating to the procedures and uses of the past such as ownership of archaeological materials, authenticity, ethnicity, restitution, and cultural resource management (Trigger 1989; Kohl & Fawcett 1995; McGuire et al. 2005). The emergence of post-processual archaeology in the Anglo-Saxon context also contributed to a deeper analysis of the relationship between archaeology and politics and broadened the discussion about the implications of professional practice and the role of the archaeologist (Shanks & Tilley 1987). The organization of the first World Archaeological Congress (WAC) in 1986 promoted the analysis and discussion of politics in archaeology and especially its inclusion in the research agenda (Ucko 1987). The founding objectives of the WAC, which among other things sought to promote indigenous peoples and defend their rights, were to activate relationships with and the participation of archaeologists from peripheral countries and engage in their sociopolitical issues. These were novel proposals that challenged the idea of a neutral archaeology and promoted other ways of considering professional practice.

In the 1990s, the vision that archaeology had consolidated, due to its origin, an inescapable political dimension and that nationalism is just one of many possible manifestations of this nature can be expressed both in its political and scientific activities (Silberman 1995). Some observations may be made in relation to this idea of archaeology and also in reference to the excision of political and scientific domains. Regarding the former, this assumption is still accepted without much discussion, and it appears that the political domain in archaeology is *one* dimension (Kohl & Fawcett 1995). This idea implies that the discipline must inevitably have other dimensions that are not political and that there is some possibility of disaggregating its components. Moreover, considering scientific and political activities as independent areas, besides representing the possibilities of disaggregation of archaeological dimensions, is part of the neoliberal agenda which is sustained by ideas of neutrality, detachment, and objectivism. As mentioned at the beginning of this entry, by its origin, scope, implications, overt and hidden actions, and omissions, archaeological practice is always inherently political. In this decade, and in some South American countries, constitutional reforms have recognized the preexistence of indigenous peoples and have consecrated certain fundamental rights such as the communal ownership of land as well as rights to health care, to education, and to practice their culture. These rights, established by the nation state, will become in the future significantly relevant for the indigenous peoples in their relationship with archaeologists.

The beginning of the twenty-first century heralded the deepening and multiplicity of voices associated with the politics of knowledge in archaeology. This development gave rise to changes in the ways archaeologists began to consider archaeological practice through an understanding of the plurality of agents involved. In recent years there have been, in different contexts of world archaeology, diverse theoretical and methodological approaches in the light of decolonizing thought that have tried to account for the involvement, participation, and coproduction in archaeological research projects of actors and historically

marginalized sectors (McNiven & Russell 2005; Smith & Wobst 2005; Gnecco & Ayala 2010).

In its disciplinary history, much of South American archaeology has developed behind closed doors privileging knowledge construction from a Western and white perspective. One could argue that this way of looking at archaeological practice in much of South America is a result of the theoretical and methodological influences from the historical cultural school and the processual archaeology that predominated and still influences this part of the Americas. Moreover, in Argentina in particular as well as in some other South American countries, democratic governments have alternated with coups d'état and military governments that have significantly influenced the development of archaeology in these regions through the promotion of national archaeologies (Politis 1995). In general and in brief, it can be said that in Argentina during democratic times, science advanced and academic activity progressed in many directions. During these moments, archaeological research consolidated, systematic financing research projects began, important national and international scientific events occurred, and new undergraduate and graduate careers were created. Conversely, during military periods, there were setbacks in research, some universities and anthropology careers were closed, and there was ideological persecution and discrimination (Politis & Curtoni 2011).

In recent years, especially since 2003, the Argentine government of President Néstor Kirchner promoted a progressive national and popular model, with a clearly defined foreign policy and South American connection, which meant a change in style and conception of international integration of the country. In the twenty-first century, this has been favored by the surging conditions in the South American scenario, generally characterized by a neoliberal exhaustion – through policies of market liberation; the emergence of social and political movements that put forward alternatives of production and management; the revaluation of the State versus the market, shown in the regulation and promotion of social equality; debt reduction and the proposal of autonomous relations with the United States; and, finally, the search and strengthening of processes of regional integration represented by the Mercosur and Unasur (Ayerbe 2011). This economic, political, social, and cultural repositioning, which has occurred in several countries in South America, has affected and still are affecting, to varying degrees and depth depending on national contexts, the ways to consider archaeological practice as well as its own theoretical elaboration. In Argentina, in recent years, discussions about the ethical dimensions of archaeological work and heritage management have been activated, and the participation and involvement of indigenous peoples in archaeological research projects has seen the emergence of new issues and problems of inquiry. For example, issues relating to local situations have been considered and claims and disputes raised by local groups (e.g., indigenous peoples, peasants) have been addressed in archaeological congresses (e.g., relating to territorial dispossessions, the destruction of sacred places, repatriation of human remains and associated materiales, and the destruction of sites).

Key Issues

Archaeology, Knowledge, Politics, Power

Since its conception, production, reproduction, distribution, and consumption, knowledges generated within academic institutional frameworks bear their geopolitical, geo-historical, and geo-cultural imprints ("knowledge" is used in plural in this entry with the intention of presenting the idea that knowledge in singular refers to the Eurocentric view while the plural makes reference to the Latin-American conception of the possibility of multiple knowledges). Referred to as the body politics of knowledge (Castro Gomez & Grosfoguel 2007), knowledges possess a place, context, body, color, and gender in their origin (Castro Gomez & Grosfoguel 2007). Thus, they are contingent, situated, and traversed by relations of space and power. These conditions may also express the senses of coloniality of power, knowledge, and being, which characterized ways of

knowing developed and imposed in colonial modernity (Lander 2003). The concept of the coloniality of power refers to strategies of modern exploitation and domination that had their origins in the naturalization of racial hierarchies and the ordering and classification of "otherness." The coloniality of knowledge is related to the central role of epistemology in the process of elaborating knowledge, which can allow reproducing colonial schemes of thinking and controlling all forms of subjectivity, of culture, and of production and reproduction of knowledges (Quijano 2003). Finally, the coloniality of being refers to the colonized subjects' lived experiences and histories and their impact on language forms (Maldonado-Torres 2007). Under these conditions, Western science's epistemic colonialism is imposed from the definition of the "zero" point as the main model of knowledge through which the world can be observed from a neutral, objective, and absolute locus (Castro Gomez & Grosfoguel 2007).

In Argentina, the thinker Arturo Jauretche reflected on the reality of the country in the 1950s in terms similar to those involved in the concept of the coloniality of power, by considering the geopolitical and chronopolitical dimensions of knowledge. In his essay on "pedagogical colonization," he said that under the appearance of universal values, "only relative values corresponding to a certain time or geographical location, whose appearance of universality arises solely from the power of universal expansion given by the centers that originate them" are still being introduced (Jauretche [1957] 2004: 99). Also, through national projects, the intellectual elites or "intelligentsia," according to Jauretche ([1957] 2004), identified the universal values of "culture" enshrined by the centers of power, thereby excluding all preexisting understandings. The ideal promoted by the "intelligentsia" was to create Europe in America through the destruction of indigenous peoples who were seen to be an obstacle and through the denial of all local values and possibilities of regional creations. Thus, the process of "Europeanization that was practiced did not consist in the incorporation of European values to the existing culture, but in its outright derogation" (Jauretche [1957] 2004: 102).

Hegemonic narratives are furthermore added that imposed some axiomatic formulations, discursively constructed, posing the lack of continuity between the pre-Hispanic past and contemporary indigenous peoples. In his book, *The Prophets of Hate and Yapa* (*Yapa* is Quechua word meaning gift that the seller gives to the buyer), Jauretche ([1957] 2004: 102) expressed, "The misunderstanding of our pre-existing as a cultural, or rather, understand it as anti-cultural, contributed to the fact that the pre-existing were deprived of all means of expression. It was not enough with the massive replacement of the native population by immigration flow. Intelligence became 'intelligentsia' and assuming that culture was exclusively imported it became one of the most effective tools to uproot the local elements of pre-existing culture." The idea of progress in America could materialize if both the past and the present were denied, "hence the insistence of American denial and anxiety about being European. This historical pattern caused a method that later became norm. Reality was replaced by abstraction" (Jauretche [1968] 2002: 30).

The effects of the coloniality of power and relationships with knowledge management have been criticized and denounced by various Argentine thinkers such as Ortiz Pereira, Manuel Ugarte, Scalabrini Ortiz, Jauretche, and Fermín Chávez, who sought to think of reality both from their own and from concrete needs. It was a way of seeing things "from here" because "the inability to see the world from ourselves has been systematically cultivated in our country" (Jauretche [1957] 2004: 108). Pre-Hispanic past denial and the denial of contemporary indigenous peoples became part of the essence of the modern cosmovision and modus operandi established from colonial order. For example, in the search for defining the identity of the pampas promoted by state authorities and based in the multicultural synthesis, "the indigenous" fluctuates in a complex way, being at times present as a figure of recognition and reparation and at other times absent ignoring their current claims and concessions. This is a consequence of the action of two simultaneous processes called the

"specific invisibility" and "generic visibility" (Curtoni & Chaparro 2008). Specific invisibility refers to the strategies of concealing, silencing, and denying that operate on the "indigenous being," on the concrete needs of the communities, their rights, and claims, as well as on political activism and its representatives. Different narratives have been attempting both to enunciate the absence of indigenous people in the region and to challenge the legitimacy of existing identities. In parallel, generic visibility mechanisms are generated, generally staged by state power, and associated with reparation, recovery, and revaluation of "the indigenous" actions. The preferred forms of expression of this process are the materialization or the monumentalization of "something" referred to as the indigenous world, without any discussion and consensus with local communities about what and how and with the intention of visibilizing actions and demonstrating political awareness. These constructions objectify indigenous agency and relationships. The official authorities' discourses are also activated which promote multicultural integration as a way of overcoming historical controversies (such as indigenous and white Creoles). In this search for Pampa identity, the "indigenous" fluctuates unanchored in different forms, being at times synonymous with the past, in the best case, in miscegenation, and in others and expressed as patrimonialized and/or monumentalized figures (Curtoni & Chaparro 2008).

These strategies, together with racist and ethnocentric elaborations, formed the basis of nation-constitution projects in different countries of South America in general and Argentina in particular (Politis & Curtoni 2011). Social science and archaeological practice taking place in these spaces of power were not free of ideological-political influences promoted by the colonial modern imaginary. Thus, the criticism of the colonial construction of knowledges requires an epistemological-political positioning that attempts to "decolonize" disciplinary foundations. This dual dimension is expressed in terms of methodology with the statement that there are no definitive and unique rules which guide research (see Haber 2011), together with the acceptance of other views and extra-academic elements in the construction of knowledges and at the political level with the critique of science's hegemonic, globalizing, and exclusive stance. The premise of the decolonization of knowledge is to make clear the place and relationships from which knowledges are produced and to analyze the institutions that produce and/or are managers of it and point out its power effects. It also entails transcending the senses involved in the "zero point" challenging detachment and neutrality and recognizing contamination and agreement in the generation of knowledge (Castro Gomez & Grosfoguel 2007).

Future Directions

In this sense, what is necessary is not just alternative knowledge, but new ways of producing and reproducing them (Santos 2006). These could rise from an intertopic criticism about the global imposition of knowledge, leading to the promotion of different and multiple places of enunciation though interrelated, coproduced, and pluriversal. The practice of archaeology "from here" (Jauretche's) results in a rupture with the academic-scientific privilege and status as the legitimate producer of universal knowledge construction, and on the other hand, it activates decolonizing procedures of instituted knowledge (pedagogical decolonization), thereby promoting new ways of knowing. What is sought with these statements is that the construction of knowledge is historically situated, i.e., not Eurocentric or based on the scientific rationalism of liberal modernity. Overcoming Eurocentrism implies, among other things, an anchorage of space in terms of the spatial, social, bodily, linguistic, epistemic, and political sense so as to activate our incorporation in concrete spheres of pluriversality where other bodies, languages, concepts, other knowledges, and epistemologies coexist. These "other spaces," where different knowledges are organized together with other epistemologies, cosmovisions, and rationalities, are prior to the interests and motivations of the academic field.

Therefore, neither do peoples and groups forming these spaces and knowledges, as well as the places themselves, need to be empowered (paternalist attitude quite common in some postcolonial and postmodern discourses) nor do they need the academic concourse or the "expert" wink to manage a position of credibility, legitimacy, and existence. On the contrary, it is essential to establish decolonizing processes at the subject's level in terms of its "pedagogical colonization," its scientific language and disciplinary practices, and its disincorporation, in order to overcome academic arrogance and the exclusion caused by epistemic hierarchies of the global coloniality and its incorporation – in the sense of embodiment – to local situations.

Throughout history and even in some current contexts, archaeology has developed and been installed as a hegemonic biopolitical device whose narratives construct and control stories, places, subjects, and their relations from a Anglo-Western, scientific, modern, and colonial production standpoint. Thus, archaeological practice is always inherently political, and it reflects in different ways and intensities the complex and dynamic interrelationships between interest groups, archaeologists, and sociopolitical contexts. The analysis of the relationship between archaeology and policy exhibits complicity between modernity and coloniality and the generation of knowledge as an ideological/political product. The subversion of this mode of production, which has been institutionalized and naturalized, involves at least the effort to place the constructions of knowledges together with and from local pluriversality and from geo-chrono-political stances so as to invert the relationship and thus retrace the itineraries of the archaeological politics in the light of other interests and other ways of knowledge production.

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Cross-References

- ▶ Decolonization in Archaeological Theory
- ▶ Indigenous Archaeologies
- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Social Archaeology
- ▶ South American Archaeology: Postcolonial Perspectives

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Archaeology and the Emergence of Fields: Environmental

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Introduction

Environmental archaeology is both an extension of general archaeological principles and an area of study in its own right. Formally acknowledged in the 1950s, it has grown significantly since then – so much so as to give rise to the fear of ever-increasing "silos" in the discipline of archaeology. Environmental archaeology uses proxies to investigate site context and forensically pursues artifacts and ecofacts to elicit data. Rigorous taphonomic investigations are intrinsic to methods used in environmental archaeology.

Definition

Environmental archaeology investigates the site environment at the time of human activity. The principal aim is to determine the link between changing patterns of human activity and local, regional, or even global environmental change. In this way, the environmental record can be used to make causal inferences about changes in the archaeological record.

Humans continually respond to their environment and any change to their familiar surroundings invokes changes in their response. This change is discovered in the archaeological evidence through the use of a number of subdisciplines. For example, paleoethnobotany (study of fossil plant remains), zooarchaeology (the study of vertebrate remains), geomorphology (study of landscape formation), palynology (study of past pollen regimes), geophysics (study of dynamic landscapes), landscape archaeology (the cultural landscape of the site), human biology (human remains), and human ecology (living in the landscape) are some of the subdisciplines in

environmental archaeology. Each subdiscipline offers a particular analytical methodology to investigate the past environment and its record over time. Change is scalar and can be anywhere from micro to macro. Smaller changes are generally harder to recognize in the archaeological record. Through the use of subdisciplines, a greater level of sensitivity can be applied, thus increasing the chance of successfully recognizing local, small-scale change. Identifying change on any level enables inter- and intrasite comparison and comparative archaeological analysis is the core of most archaeological research.

Historical Background

Environmental archaeology has been recognized as a serious component of archaeological investigation since the 1950s. The appointment of Frederich Zeuner as Professor of Environmental Archaeology at the Institute of Archaeology in London in 1952 allowed formal recognition of environmental archaeology as a substantial and significant subdiscipline of archaeology. Initially, the place of the natural sciences in archaeology was almost exclusively through the application of stratigraphy. Stratigraphy emerged through the efforts of geology to provide time lines for fossil finds and in so doing allowed a means of chronology to be applied to human occupation. Stratigraphy was also able to identify catastrophic environmental events such as sudden onset of aridity, floods, or lava flows. Such singular and dramatic, large-scale environmental events were readily recognized and their subsequent impact on humans could be investigated as an individual focus in archaeological investigations. Matching stratigraphic change to a chronological phase has allowed changes in human response to be recognized and environmental interpretations to emerge. However, the nineteenth century saw archaeological endeavor subsumed to some extent by evolutionary theory and it was not until the early twentieth century that a broadening of the discipline really came about.

A key turning point in the approach to archaeology had already begun with Eric Higgs paleoeconomics and an equivalent impact was delivered by Graham Clarke through his work at Starr Carr. Starr Carr is a Mesolithic site located in Yorkshire, England, and is arguably one of the most significant sites studied in the mid-twentieth century. This site is considered to have truly set environmental archaeology on its path by providing a momentous leap from simply looking at stone tools in isolation to applying other lines of scientific investigation. Indeed, Clarke was able to inter-relate human behavior and their artifacts with the environment. In this way, changes in the artifacts became signatures of changes in human behavior over time. From here on, archaeologists were able to seek the causal effects of changing environments on human behavior over time. It also allowed the reverse to be investigated – human environmental impact causing landscape, ecological, and even meteorological change over time.

Key Issues/Current Debates

Two schools of thought have arisen in environmental archaeology which can be simplified into a regional versus single site approach (Evans 2003). Some archaeologists concentrate on single sites while others adopt a regional approach by investigating a series of sites usually linked chronologically and/or culturally. A region is generally geologically defined such as a valley or mountain range. It is possible to consider sites as a single entity within a broader cultural landscape and both schools of thought offer advantages and disadvantages. Regional approaches allow greater scope for identifying large-scale environmental change and its impact on a region. Regional approaches also enable intersite comparison and broaden the investigation by including, for example, exchange and transport routes. However, the disadvantage can be the lack of intense investigation at any one site, as offered in the single site approach. Perhaps a combination of both is ideal if not always practical.

The rise of environmental archaeology has also been expressed differently on different

continents. O'Connor (1998) identifies a key difference existing in the 1980s between the United States of America and Britain. According to O'Connor, Britain was primarily focused on the "organic" content of a site while North Americans were primarily geologically focused. This could be an inevitable outcome considering the marked differences between these two continents in not only dimension, but also in geology, culture, and chronology.

Environmental archaeology does allow a site investigation to be reduced into many fields of enquiry. This fact has caused some concern, as expressed initially by Thomas (1990) and then considered by others (Wilkinson & Stevens 2003) in that environmental archaeologists operate outside of the mainstream of archaeology. Fear lies in the sublimation, or worse elimination, of archaeological aims and methods in the pursuit of identifying environmental change. The fact that environmental archaeology is independent of routine archaeological methods has been viewed as problematic and even threatening. For this reason, it is reliant on the archaeologist to synthesize the many streams of enquiry into a coherent interpretation that acknowledges the discipline for which it is written.

Others feel that the term "environmental archaeology" is redundant and all scientific pursuits relevant to archaeology are either bioarchaeological (zoology and biology) or geoarchaeological (sedimentology and pedology). This allows the archaeologist to maintain a clearer approach; however, if both are selected, then the whole reverts back to environmental archaeology! In the end, archaeology must remain focused on human response to localized change.

Environmental archaeology is investigated via key areas of exploration – geology (earth systems), zoology (animal systems), sedimentology (layering of soils and rocks), biology (ecosystems), botany (plants and floral systems), pedology (origin and change of soils), and taphonomy (site formation processes). These subdivisions fall into one of two key areas of investigation: via the organic or the physical. Bioarchaeology covers the former and geoarchaeology covers the latter.

Archaeological artifacts are composed of raw materials. These raw materials are termed proxies and it these proxies that are available for specific analysis. Proxies are more sensitive as environmental indicators compared to their "whole body" counterparts. A modern Australian kangaroo, for example, is a poor environmental indicator as its geographic distribution is continent wide and it has been on the same continent for many thousands of years. By comparison, pollen is a more sensitive indicator of the local environment. Preferred proxies are those with narrower geographic distributions or habitats and are themselves very sensitive to localized environmental change.

Proxies exist on macro- or microscales. Bioarchaeological macroproxies are mostly floral and faunal remains such as seeds, shells, bones, teeth, and insect carapaces and casings. Geoarchaeological macroproxies include sediments, soils, and rocks. Microscopic bioarchaeological remains include pollen, phytoliths (silica skeletons), diatoms (single celled algae), ostracods (bivalve crustaceans), and foraminifera (singled celled shelled animal). Microscopic geoarchaeology proxies include the chemical elements that make up soil and rocks. Most proxies are "ecofacts" as unlike artifacts, they are not directly attributable to human endeavor such as a wooden or stone implement. Ecofacts are not fashioned or manufactured for human purpose but provide an important opportunity for investigating the paleoenvironment. For example, meal discards such as shells found in Aboriginal middens are ecofacts. Midden shell is used extensively in archaeology to identify environmental change (through spectrum analysis, for example) and cultural change (through radiometric analysis).

Some proxies can be even further reduced into smaller elements and characterized to extract a finer level of information. However, all environmental archaeology effort is constrained and challenged by the degree of preservation operating across a site or region and the method employed. Sampling for microproxies relies on a high degree of structural preservation. Taphonomy investigates site formation processes and

offers a means of determining and assessing degrees of site and artifact or ecofact disturbance and preservation. In using proxies, it is critical to be able to identify when a proxy is an unreliable agent due to significant bioturbation or other impact on the site.

Charles (1998), for example, investigated the use of dung-derived plant material in archaeological sites in Northern Iraq. In areas where animal dung is used as a fuel source, dung cakes offer a means of identifying local plants by identifying seeds passed out in the dung. As Charles (1998) points out, critical taphonomic issues are that the plants can be a mix of grazed, crop residue or wild plant fodder sources. Dung is also likely to be sourced from a range of animals and the variable impact of digestion on seeds needs to be understood. A further key point is that dung cakes are burned and only those that partially or completely survive this process are useful for analysis. Some of the dung cakes also contained dung pellets, offering a means of identifying which animals produced the dung. Dung pellets may also contain seeds or pollen. Charles (1998) was able to consider the taphonomic aspects effecting plant remains in dung cakes and then compare the interpretative data from the dung cakes and pellets with ethnographic information on animal husbandry and seasonal cycles of cereal cultivation. Importantly, these two interpretative frameworks were not in unison and Charles (1998) suggests that critical changes within husbandry at these sites can be linked to local environmental change.

By way of another example, Church et al. (2005) have provided results from the first archaeological investigation of Norse settlement on the Faroe Islands. This archaeological investigation makes use of the results of prior paleoenvironmental investigations to assess the impact of early human economic practices. The archaeology explored reliance on and timing of animal husbandry, cereal production, integration of wild species, and sourcing different fuel supplies. Church et al. (2005) utilized animal and plant remains as vital proxies, integrated against the multiproxy approach employed previously in the paleoenvironmental investigations. By examining the animal bones in the excavations, it was recognized that Norse settlers commenced with a heavy reliance on puffins as a vital food source and the collection of driftwood, peat, and turf as fuel sources. This reliance on both food and fuel that was gathered from the natural environment altered the understanding of the beginnings of human settlement in this region. The eventual shift to the production of crops, husbandry, and managed fuel sources was matched against the environmental data to provide the contextual framework of Norse settlement on the Faroe Islands.

With multiple lines of investigation, the archaeologist is more likely to find at least one proxy from primary (humans bringing in materials), secondary (by-products of the processing), or tertiary (dumped rubbish) agents. Locating proxies also requires the application of purposeful sampling methods and it is here that the environmental archaeologist may seek the expertise of non-archaeological specialists.

Spectral analysis is a field of investigation used across the physical sciences. It offers significant potential for archaeology by identifying the elemental composition of proxies, a process known as "characterization." Characterization allocates the raw material of a proxy a unique signature or "fingerprint." The characterization of raw geological materials such as sedimentary rock (e.g., dolomite, basalt, and flint), sand or hematite or goetite rich clay pigments (e.g., ocher) is a key focus for geochemical investigation. Rock or clay from a quarry will have a different signature or "fingerprint" to rock or clay from another quarry. This uniqueness enables the distribution of objects to be mapped away from their quarry source. In turn, distribution routes of the raw material can be spatially located, thus connecting humans across different cultural and geographic landscapes. Characterizing ocher to its own quarry source is proving both successful and challenging as ocher is found to differ geochemically within as well as between sources (Popelka-Filcoff et al. 2008). Exchanged objects have also benefited such as ground edge axes manufactured from dolomite rock in southeastern Australia. Dolomite was sourced from

very few quarries and traded out from those centers. By characterizing the dolomite, exchange routes across southeastern Australia have been established (McBryde 1984).

Trade and exchange routes originally identified through more traditional archaeological methods are now able to be refined by use of highly sensitive analytical instruments that rely on infrared spectroscopy. Finds, such as the 100,000 years old ocher grinding tools from Blombos Cave in South Africa, provide a range of samples capable of providing detailed environmental data. These tools include abalone shell, ocher, bone, and stone which are all significant for geochemical investigation.

Environmental archaeology commenced with an awareness of the value of data gathered directly from the site context. Looking back, the gathering of environmental data was comparatively coarse, relying largely on macroproxies and rarely on microproxies. The introduction of highly sensitive instruments offering a range of spectrum analysis has shifted the balance to microproxies. It has also, as a result of that shift, placed increasing emphasis on ecofacts whereby artifacts and ecofacts can hold similar weight in interpreting the site. Environmental archaeology has fine-tuned its approach in response to the increasing availability of highly sensitive analytical instruments as a valuable methodological tool.

Other preferred proxies are those that are keyed to a single level of water quality – fresh or saline. Proxies that can withstand brackish environments are poorer indicators than those that are associated only with either fresh or saline hydrological regimes. Declining levels of fresh water are often identified in archaeological landscapes as the primary cause of a shift in technology, economy, and even geographic with groups moving elsewhere. In this case, diatoms, foraminifera, or ostracods are sought out in aquatic sediments, particularly lakes. These proxies are highly sensitive indicators of fresh or saline regimes and have proved successful in detecting varying water quality over long time scales (e.g., Gell et al. 2005).

The investigation of dune-fields is another key focus area for environmental archaeology. The occurrence and abeyance of dune-fields has long preoccupied human groups. Dune-fields are a natural feature but can be mobilized by deforestation. A major trigger for deforestation has resulted globally from humans seeking fuel and also fodder for domestic animals. Numerous settlements over time have been swallowed up by mobile dune-fields and the timing and consequences of this on human activity can be investigated through the characterization and aging of dune-fields (Hesp 2001).

Environmental archaeology through its reliance on proxies also requires a range or reliable datasets and reference materials. Diagnosis of animal and plant remains relies entirely on a comparative reference set. As found by numerous archaeologists, establishing such sets can be extremely problematic as it is also necessary to include as much demographic or seasonal variation as possible. Ideally each animal will be represented by male and female examples of juveniles, subadults, and adults. Such a plea was made by LeFebre (2007) during an investigation of the maritime economy on the coral reefs of the West Indies. Inevitably LeFebre was confronted with numerous fish bones and limited reference material. This is hardly an unusual situation and one that will continue to confront emerging environmental archaeologists. Fish are particularly sensitive environmental indicators. The need to identify to species level is critical if a robust environmental framework is to be established. Fish otoliths (earbones of fish) are an even more sensitive proxy than the fish itself, are species specific, and also offer data on the size and age of fish at death. Otoliths are structurally robust and preserve better than fragile fish bones, offering an almost perfect archaeological proxy. However, establishing adequate banks of otolith reference material requires high resource commitment and a skilled researcher to match archaeologically derived otoliths.

International Perspectives

The pursuit of environmental archaeology in Australia has progressed similarly to other

continents after having commenced in a recognizable format since the 1960s. Australian archaeologists at that time were particularly aware of Higg's paleoeconomic models and Clarke's paleoenvironmental approach at Starr Carr. Australian archaeology has also demonstrated a bold approach to integrating science into the discipline. In the 1930s, for example, Norman B. Tindale was collecting raw sediment samples, charcoal, and ocher in the belief that future technology could provide analytical tools for dating and deciphering the elements there in. Over the last 20 years, there has been considerable effort made to find an increasingly diverse array of proxies analyzed by increasingly more sensitive and sophisticated instruments. As a result, proxies become ever smaller and more diverse, offering multiple possibilities for highly sensitive signatures of environmental change. Australia's greatest challenge is the size of its land mass and the relatively few well-described sites and even fewer fully analyzed excavation assemblages. The ratio of open to deep deposit (rockshelter/cave) sites is also significantly in favor of open sites. Preservation of bioarchaeological proxies in particular is poor for open sites, leaving the vast majority of sites reliant on geoarchaeological proxies for determining environmental change. The limitations incurred under such conditions can be alleviated to some extent by a regional approach in the hope that at least some rockshelter/cave sites will be recorded along with the numerous open sites. However, this in turn can be problematic in view of the size of the continent and the scarcity of well-described sites. This can lead to valiant but statistically challenged attempts to identify regional and chronological trends drawn from a few sites spread over vast distances. Aboriginal occupation of Australia is well over 45,000 years and this only compounds the problem of too few well-described sites.

Although Australian archaeology has been unhesitating in its incorporation of scientific principles into the discipline, it too is hampered by minimal comparative reference sets of proxies and datasets. A hiatus in the 1980s saw numerous small research projects devoted to establishing proxy collections, but the more recent trend away from such core research has created a significant gap in valid reference material. A similar history exists with taphonomic reference material due to the demise of actualistic studies. Understanding growth rates and species diversity is also an under researched area and yet it is vital to making interpretations from elements such as bone and shell. Australia's unique environment with its consequent unique range of environmental agents needs to establish its own comprehensive data set rather than assume that data derived from other continental contexts is comparable. Happily, however, it is precisely Australia's unique situation with such a long era of hunter-gatherer occupation followed by the current and very brief era of colonial and pastoral settlement that offers enormous potential for environmental archaeology. Australia's way of life leads us to automatically look to the natural landscape to explain patterns of human occupation. The contribution from contemporary Aboriginal people has also enabled an inspiring approach in interpreting the relationship between humans and their environment.

A key difference between the Australian continent and other land masses is its hydrology. It is the driest continent on earth but capable of dramatic, short-lived floods and has very slow rates of soil deposition. All of this has great bearing on the preservation of archaeological deposits and proxies which in turn makes environmental archaeology in Australia unique. It also points out the urgency in generating our own data sets from a range of comprehensive biological, geological, and hydrological studies.

Future Directions

O'Connor (1998) and others (e.g., Evans 2003; Wilkinson & Stevens 2003) have pointed out that environmental archaeology is capable of reducing itself into innumerable pockets of research (soil, coins, trees, phytoliths, etc.). Although there is the potential for a "silo" effect as it is often known, it is rare that any one site offers an overwhelming range of proxies suitable for

intense analysis. Most sites offer only a few well-preserved proxies. In addition, it is reliant on the archaeological team to ensure that clearly stated archaeological aims are established and the driving and unifying force for the environmental investigations. The strength of environmental archaeology lies in offering a holistic view of the relationship between past ecosystems and changing human response. Data collection and building reference collections needs to be more robust, geographically wider, diverse in species and genus, and longitudinal. There has been a step away from experimental (simulation) archaeology, due to recognized inherent problems of replicating human and/or animal behavior in controlled conditions. Environmental archaeology is only as valid and robust as its datasets and reference material. Fine scale data, such as growth rates (e.g., Langlet et al. 2006) and species identification, is demanded globally. There is also an urgent need for complex and longitudinal taphonomic studies. The vagaries of site preservation have been long accepted but the understanding of factors affecting the preservation of a site and its objects is still poorly understood in most instances. If proxies are to be selected for specialist analysis, archaeology needs to ensure that they are relevant to the site and that they have structural integrity. To make environmental archaeology more rigorous, taphonomic investigations also need to offer more concise identifications of the numerous agents of change operating across a site and identify the implications of this for the use of proxies.

The opposing side of field work is the pressing issue of making archaeological collections sustainable. Archaeological collections are notorious in collecting institutions for their high-end need for space compared to other collections. Spectrum analysis is able to investigate the matrix of any element, thus urging archaeology to retain almost the entire site rather than just the objects and modest samples of excavation sediment. The need for space will escalate exponentially if collecting institutions allow archaeology to retain bulk samples and increasing amounts of ecofacts. This renewed interest in existing collections is extremely beneficial for research outcomes and for securing existing collections into the future; however, it is hoped that this is not at the cost of housing new collections.

The final challenge for environmental archaeology (as it is for archaeology generally) is to publish results more often and more widely. Too often it is only the environmental results that make it into the public domain rather than a broader and comprehensive contribution to the discipline of archaeology. Field activities such as excavation and surface collection continue to far outweigh the more laborious and in-house task of producing professional reports and peer-reviewed papers. It is vital that archaeologists offer the latter as some recompense for disturbing, or even destroying, cultural heritage sites.

Cross-References

- ▶ Aksum: Environmental Archaeology
- ▶ Biometry in Zooarchaeology
- ▶ Bone Chemistry and Ancient Diet
- ▶ Cultural Ecology in Archaeology
- ▶ DNA Interpretation Constraints in Archaeology
- ▶ Geoarchaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Historical Ecology in Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Submerged Prehistoric Landscapes
- ▶ Urban Landscapes: Environmental Archaeology

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Archaeology and the Emergence of Fields: Historical and Classical

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Introduction

In this entry two closely linked archaeological fields are discussed: classical archaeology and historical archaeology. We share Thomas Patterson's (2001) externalist approach to the history of science, considering the discipline not only through changes in ideas and concepts but also as a result of intellectual moves linked to social changes. This theoretical stand pays attention to social and cultural issues affecting scholarly production in general and particularly archaeology.

Historical Background

The relationship between classical and historical archaeology is not a given fact but a chosen way of understanding the archaeology of societies with written records and concerned with Western tradition. It is thus a theoretical stand, informed by a redefinition of the field from the 1990s (Funari et al. 1999). Classical archaeology arose very early, at the beginning of the nineteenth century, as part of the imperial project of Western powers, being military in character, a conservative and male endeavor (Funari 2002). It started as an ancillary to history and classics, mostly as art history illustrating classical references to peoples and places. In epistemological terms, classical archaeology was established as a philological discipline, concerned with cataloguing and typology,

and dependent on the mastering of Greek and Latin. First and foremost, a classical archaeologist was a military male with a good command of classical languages and literature as well as an historian. Until last quarter of the twentieth century, the field continued a conservative course, but since then classical archaeology gained a lot of traction from social theory and theoretical discussion in general, even if continuing in line with traditions of the field, such as having a good command of classical languages (Shanks 1996).

Historical archaeology developed in a completely different historical and intellectual context. It started in the United States in the 1960s, as an anthropological field interested in the material culture of Anglo-Americans. Although it departed from a completely different place in comparison to classical archaeology, the American discipline was also reactionary, focusing on the study of the White Protestant Anglo-Saxons (WASP) and praising the founding fathers (Orser 2001).

In the following decade, as a result of substantial social and academic changes in the United States, in the wake of the civil rights, antiwar, and feminist movements, new issues were included in historical archaeology, such as the study of subordinate groups, African-Americans, the Irish, and women. Years later, new concerns from outside the USA led to the inclusion of global issues, and the discipline started to discuss all historical periods with written documents, much beyond the original fifteenth century onwards thrust as was prevalent in the USA (Funari et al. 1999). From the late 1990s, there have been a growing number of people putting together the archaeology of Greece and Rome (classical archaeology) and the archaeology of other historical periods, including the historical archaeology of the modern period.

Key Issues/Current Debates

Historical Archaeology

Historical archaeology as the study of societies with written records comprises such diverse subjects as ancient Egypt, Greece, and Rome, medieval societies, and modern settlements but also sites in China and Vietnam, thus including all the continents. This broad perspective is now widely accepted, even if historical archaeology is still mostly a term used to refer to late medieval and modern material culture as attests a leading journal in the field, *International Journal of Historical Archaeology*.

Disciplinary boundaries are always a thorny issue (Burke 2006: 13-4), as it concerns not only an epistemological question (what is and what is not within the field) but an administrative one, related to power in academia and society at large, as stressed by Pierre Bourdieu (1988). Any study of the discipline is thus embedded in power relations and politics (Meskell 1998), and our own stand here is to contextualize the field and our own stand, as we are archaeologists from the periphery. We thus reject any essentialist standpoint, as if a specific definition should be correct, for we acknowledge the diversity of the field and different approaches. In this entry we will deal with two different traditions in the field: European and North American historical archaeology.

European and North American Traditions

The epistemological differences between European and North American traditions are rooted in the different historical and academic contexts. Archaeology started in Europe in the nineteenth century as a counterpoint to classical philology and history. Archaeology was the material study of ancient civilizations considered as the intellectual ancestors of the Western powers, Egypt, Greece, Rome, and later on Mesopotamia and Palestine. Different civilizations flourished in those areas in ancient times due to the mastering of writing, a key feature of civilized life. History itself was thus defined by writing, and due to an evolutionary approach, there was a perception that there was ever-growing progress from the most ancient civilizations to the apex of industrial capitalism (Nitecki & Nitecki 1992).

Archaeology was thus historical archaeology, in so far as it dealt with civilizations using writing to store knowledge. Prehistory and prehistoric archaeology developed later to study material

remains from much earlier people who lived before writing was invented.

Until the 1930s at least, archaeologists working in Europe were using philological and historical tenets in archaeological interpretations, particularly in historical or protohistorical contexts, such as Flinders Petrie, Gustaf Kossinna, and Gordon Childe. However, the role of writing has been challenged from different quarters, from the early twentieth century. First and foremost, the influx of social theory revealed the relevance of other sources of knowledge and questioned the well-established pivotal role of writing (Burke 2006).

This move affected archaeology by emphasizing identity issues (Kristiansen 2009). Archaeology has moved to pay attention not only to distant civilizations but turned also to more direct national roots, turning to the Anglo-Saxon in Britain, to Germans in Germany, to Vikings in Scandinavia, or to the Celts and Iberians in Spain. It is thus possible to conclude that in the European tradition historical archaeology emerged from a number of epistemological and political issues: the pivotal role of writing and the role of a historical framework in interpretation. In this tradition, historical archaeology studies us, the civilized people, producers of learned culture as expressed in writing, and it is thus linked to nationalist and imperialist contemporary interests and concerns. The conflict of different nation states in Europe led also to interpretive conflicts, such as the different identification and interpretation of Celtic, Germanic, and Slavic remains. Historical archaeology in the European tradition has been rooted in modern identity issues and to national pride and prejudice.

Historical Archaeology in the American Tradition

In the United States, archaeology started in two different ways. First, as in Europe, it was established as the study of civilization. The American Archaeological Institute was set up in 1879, and soon afterwards America was digging in the Old World, as attests the American School at Athens (1880) and the American School in Rome (1895) and in Jerusalem (1899). Classical and oriental archaeology were thus in the same European style and it still is a most active tradition in the USA. It was and in a way still is concerned with studying the Western tradition, rooted in the both the Middle East through Judaism and Christianity and in the Greek and Roman classical heritage.

Prehistoric archaeology though was from the start concerned with the other (Hartog 1988), native inhabitants of the continent, taken as completely foreign to the civilized American cultural milieu. It was thus only too natural that archaeology in this vein was taken as part of the discipline concerned with the other, anthropology. While linguistics studied Indian languages, biological anthropology studied bodies, social anthropology studied living Indians, and archaeology was to explore dead Indians through their remains. The American Anthropological Association was established in 1902.

It is thus clear that the archaeological study of colonial and national sites in the USA developed only lately. It started as the archaeology of historical sites still very much concerned with some national iconic sites. It was only in the 1960s, thanks not least to the influx of Roman archaeology as practiced in Britain, that historical archaeology took root in the country, searching for the equivalent of Romans, that is, the first introducers of writing and civilization to the land: the early Anglo-Saxon settlers of America. The Society for Historical Archaeology was established in 1967 and in 1989 the AIA, the American Schools of Oriental Research, and the Society for Historical Archaeology held the first Joint Archaeological Congress, further strengthening the link of historical archaeology concerned with modern roots and the other archaeological institutions equally in search of American and Western civilizations.

Changes in European and American Historical Archaeology (1970s Onwards)

Since the 1970s, historical archaeology in the USA gained traction and increasingly broadened its scope, as attests the seminal publication of James Deetz (1977). The original focus on WASP material culture shifted gradually to include other groups, such as African-Americans

(Orser 1988), and then a plethora of excluded subjects, including women, Chinese, and more. The publication of Eric Wolf's classic in 1982 signaled this trend towards the excluded and beyond the traditional emphasis on written evidence for interpreting material culture. Colonialism has thus also been put at the heart of the discipline (Hicks & Beaudry 2006; Kristiansen 2009).

Historical Archaeology and Capitalism

According to Hicks and Beaudry (2006), Charles E. Orser, and Mark Leone, among other pioneering Marxist historical archaeologists, such as Randall McGuire, managed to define historical archaeology as the study of capitalism and the resulting modernity and globalization. The Annapolis Project (1981) is a clear case of successful interpretation of material evidence as part of the capitalist order of things. The project was also responsible for the study of the subaltern, as with the case of the remains of African slaves, workers, and exploited people.

Orser (1996) produced a most convincing argument for historical archaeology as the study of capitalism, spreading from Europe and uniting the whole globe. Capitalism was not only the economic driving force, but it redefined the whole set of social relations (Leone 1999). Power relations, domination and resistance, and identity processes were among the subjects dealt with through the identification of historical archaeology and the study of capitalism. In recent decades, under the influx of other interpretive frameworks, most notably those criticizing normative schemes, several scholars have refined or even contradicted the overwhelming and totalizing power of capitalism. Some stressed symbolic issues (Hodder 1995), class conflict (McGuire 2008), and the role of writing (Little & Shackel 2007; Johnson 2010). However, it should be noted that some of those scholars were not American and this leads us to the role of peripheral outlooks.

Historical Archaeology in Latin America

Archaeology in Latin America started very early as it did in the United States, first as a search for Old World roots in the nineteenth century (Ferreira 2010) and then prehistoric archaeology developed for nationalist purposes in countries such as Mexico and Peru, but also in countries with less impressive prehistoric monuments. This was the case in Argentina with its quest for the earliest human remains worldwide. The study of Iberian settlements though developed late, as this was mostly as a result of the influence of the United States newly established field of historical archaeology. However, while the USA was always a democratic country with a wide variety of social movements, Latin America faced the contradictions of the Cold War (1947–1989), including dictatorships. Historical archaeology developed late and at first as an empirical endeavor, in tune with the times. The waning of authoritarian rule led to a freer and more diversified study of historical archaeology. The inclusion of the subaltern, such as maroons, slaves, and women, led to a growing social commitment of the discipline, culminating in the study of repression and the struggle for freedom (Funari 2001; Funari et al. 2009). Two different theoretical trends developed. Under the influence of the USA, historical archaeology has mostly been interpreted as the study of capitalism after the arrival of the Europeans in the Americas. Others though were keen to explore how the historical experience in Latin American has been also patriarchal, hierarchical, and prone to personal and patronage relations, as such the importation of the concept of historical archaeology as the study of capitalism was not always useful. On the contrary, the specificities of noncapitalist features in Latin America necessitated the study of material culture through different, local lenses (Funari et al. 1999). The diversity of approaches has fostered the interest of people outside to understand it, discussing such theoretical concepts as transculturation, patronage, and métissage among others.

Classical Archaeology

Classical archaeology was only recently affected by theoretical discussions in the discipline. At the conference celebrating the centenary of the Archaeological Institute of America, the leading

classical archaeologist Colin Renfrew (1980) pondered the three the most relevant achievements of the institute: the extension of the field of American archaeology in other areas and seasons, including the "ancient world"; the promotion of academic criteria for the discipline through its publications; and the creation of a discussion forum in this institutional space.

Renfrew interpreted classical archaeology as part of the so-called great tradition of the Western canon: the reading of classical literature in the original and a philological approach to the world. We can add that this tradition was grounded on repetition, memorization, and description. The past was always better than the present, as in other traditional cultures stressing past models rather than aiming for innovation, such as is also the case with the traditional Chinese worldview. This led to classical archaeology being from the start mostly descriptive and lacking interest in theoretical issues. It was only through the push of Anglo-Saxon anthropological moves, first new archaeology in the 1960s and 1970s and then post-processual archaeology, from the 1980s, that it reacted in a creative way. Let us turn to the main traditions of classical archaeology.

Traditions of Classical Archaeology

Over the last few decades, classical archaeologists from various parts of the world reacted to the challenge, rethinking their epistemological frames. We will study four main perspectives here: the German, English, Italian, and French. We start with the German, for it is the earliest and in a way the most traditional and probably also the most impervious to social theory issues, as the term is interpreted in the Anglo-Saxon world.

German Tradition

German classical archaeology predates the country and refers not to Germany but to German-speaking people. This is a key aspect of classics and classical archaeology in the German style: it is a culture area (*Kulturkreis*). Classics played a unique role in German-speaking areas such as Prussia but also elsewhere. It was a romantic way of fostering nationalism and identity in different contexts. The *Gymnasium* (grammar school) was the basket of the intelligentsia. Classical archaeology started as a search for material evidence relating to classical literature in the German-speaking principalities, municipalities, and even empires (such as the Austro-Hungarian), Greece and Italy, geographical concepts in search of a nationality. It is no coincidence that the 21st of April (date of the foundation of ancient Rome) 1829, a number of scholars, artists, and diplomats founded in Rome the *Istituto di Corrispondenza Archeologica*, aiming at studying monuments of ancient art, inscriptions, topography, and beyond. It was transferred to Berlin, in Prussia, in 1832, becoming imperial after the unification of Germany in 1874. Several branches were established and classical excavations spread throughout the Mediterranean.

German classical archaeology followed strict procedures in terms of publications paying attention first and foremost to complete catalogues with the largest possible cross-references. It was also subjected to nationalist and racist trends from society and academia, such as the search for superior Aryans and Indo-Germans: racist interpretations were widespread everywhere as attested to, for example, in books by Vere Gordon Childe, not to mention more imperialist archaeologists such as Mortimer Wheeler, both founders of the Institute of Archaeology, University College London. In recent decades, classical archaeology in German-speaking countries, even if still keeping most of the array of learned descriptions of sites and artifacts, is ever more open to social theory, German style, meaning the consideration of theories relating to religion, to economics, to iconography, and so on. This acceptance of a specialized theoretical discussion is thus usually concerned not with social theory in epistemological terms but with specific interpretive tools considered as useful for understanding specific sets of material culture.

The English Tradition

Classical archaeology started early in Britain, and as with classics in general, it was mostly influenced by German scholarship. It was,

however, from the start less obsessed with cross-referencing *ad nauseam* and was open to social theory, as attested to by two of the leading icons of the discipline of archaeology, Gordon Childe and Roger Collinwood. From those early-twentieth-century days dates also the preoccupation with interpreting material culture per se, not as mere parts of a narrative established by ancient literature. This led to a late-twentieth-century emphasis on the interpretation of material culture outside the framework of classical literature (Snodgrass 1987) and expanded the interpretation of periods before the use of writing, such as the Iron Age in several parts of Europe. Later on, issues such as colonialism, imperialism, and nationalism were used to study different classical subjects, such as obscure periods of Greek history (Morris 2000), so much so that for Morris (2000: 3) "archaeology is cultural history or it is nothing." The entangled relationship between past and present and reception and interpretation has also been stressed by such classical archaeologists as Richard Hingley and David Mattingly, using medium range theory, German style, and epistemological discussions about the discipline.

The Italian Tradition

Italian classical archaeology has been similar to the German tradition, since the early-nineteenth-century days. Filippo Coarelli (1994) explored the subject and concluded that historical problems and narratives guided classical archaeology on the one hand and on the other stressed cross-referencing and description. Even Marxist-inspired classical archaeology (e.g., Ranuccio Bianchi Bandinelli, Mario Torelli, Andrea Carandini, and Daniele Manacorda) upheld both tenets. Today, classical archaeology in Italy has been subjected to social theory via Anglo-Saxon influences, but mostly it is the German style of medium range theory of religion studies, economics, or even law studies which are most relevant.

The French Tradition

Classical archaeology in France was established in the nineteenth century as a reaction to German movements. The French established archaeological schools in the Mediterranean in the wake of the German ones, and the main German tenets were also adopted, but the French style came with a reversion of roles. While the Germans searched for Aryans, the French looked for colonizers and civilizers, as if the ancient Greeks were the only early bearers of civilization standards (*la mission civilisatrice*).

Renewal came from the 1960s due to several reasons, most notably French colonial setbacks. The discipline was also concerned with the importation of field techniques, such as the Wheeler grid. Most relevant has been the recent redefinition of the discipline as historical archaeology, as proposed by Étienne, Müller, and Prost (1990). The use of middle range theories from semiotics, religion studies, economics, and others is now much more common, and anthropological issues are also apparent. Again, this move is close to what happened in German-speaking countries and Italy, while a social theory of wider scope is still usually sidelined.

Future Directions

Historical archaeology and classical archaeology developed in completely autonomous, independent, and even contradictory ways. However, they share some major concerns with the role of writing and literary narratives in shaping the understanding of material culture. They also share issues relating to roots, identity, national, and imperial power, as well as how to deal with the other, opposing civilization and barbarism. In recent decades, several scholars have been stressing the usefulness of a closer relationship between all the archaeologies in general and particularly those studying societies using writing, from the Mayas to Egypt, China, and the contemporary USA (Gosden 2004).Even more related are historical and classical archaeologies, for they share a common classical canon but also the criticism of this canon in recent decades. The cross-fertilization of both fields has been going on for a while and promises to grow in the future for the benefit of an informed archaeological approach to ancient and modern societies.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Capitalism: Historical Archaeology
- ▶ Classical (Greek) Archaeology
- ▶ Historical Archaeology

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Archaeology and the Emergence of Fields: Maritime

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Introduction and Definition

Maritime archaeology in its most basic form is the study of material culture related to human

interaction with the sea. It involves the study of ships and shipwrecks, maritime infrastructure, maritime exploitation, maritime identities and landscapes, seascapes, and other types of heritage, tangible or intangible, associated with the sea. Related to maritime archaeology is the study of nautical archaeology which primarily focuses on "the ship" and all technical and social aspects of the ship, whether it is on land, underwater, or extant in a museum. Also related to maritime archaeology is underwater archaeology, which is concerned with the archaeology of sites located underwater, regardless of their connection to the sea; it includes not only shipwreck sites but also aircraft wrecks, sunken cities, submerged indigenous habitation sites and refuse sites. Thus, maritime archaeology differs from underwater archaeology in that its focus can be on wet or dry sites including shipwrecks, ship burials, shipwrecks buried in reclaimed land, maritime infrastructure sites (such as jetties and lighthouses), or shipwreck survivor camps. To further complicate matters, there are more related and overlapping study areas including lacustrine archaeology (archaeology in and of lakes), riverine archaeology (archaeology in and of rivers), marine archaeology (archaeology that occurs in the marine environment), and the list goes on. The development of maritime archaeology is intimately connected with each of these associated study areas through overlapping subjects, methodologies, and theoretical developments and can be difficult to separate when reviewing its history. Nevertheless, this entry will only cover the development of maritime archaeology as a subdiscipline, and as such, sites and studies not related to human use of the sea will be omitted.

Historical Background

The emergence of maritime, underwater, or nautical archaeology as a field or subdiscipline within archaeology has been primarily linked to the works of George Bass in the Mediterranean in the late 1960s (Bass 1967). His research project was the first underwater excavation of a shipwreck directed by a diving archaeologist. Nevertheless, as stated in the above definition, maritime archaeology is not strictly conducted on sites underwater. Lesser known, or less associated, are the earlier works and publications of a number of individuals and projects that set the pace for conducting maritime archaeology, albeit on land. Beginning in the late nineteenth and twentieth centuries, discoveries of watercraft in tombs and on dry land were investigated by antiquarians and archaeologists alike. Examples of such work include Jean-Jacques de Morgan's (1895) discovery and excavation of Egyptian boats in tombs at Dahshur and Basil Brown and Charles Phillips' team excavation of the Anglo-Saxon ship burial at Sutton Hoo in 1938–1939. While these research projects were not conducted underwater, the site types and subject matter can be considered well within the purview of maritime archaeological studies. The individuals who undertook this early work held university degrees and were trained in archaeological excavation techniques. Further, the archaeological questions asked were consistent with contemporary thought and revolved around the assembly of culture types and culture-histories.

Underwater efforts to recover objects and investigate sites by amateur archaeologists and salvors were also attempted through breath-hold diving, surface-supplied air sources, and diving bells. While these projects are interesting from a historical diving perspective, they contributed little to the development of the discipline other than fine-tuning some of the underwater exploration and recovery techniques which eventually would be used by archaeologists. In contrast, a project that is considered to be the earliest and first state-sponsored underwater archaeological survey took place in Greece at the naval warfare site of the Battle of Salamis by the Archaeological Society of Athens in 1885 (Lolos 2003; Catsambis 2006). Although trained archaeologists directed divers from the surface, this project represents perhaps the very first maritime archaeological survey underwater. The field reports of this survey were only recently found and translated, which leads one to believe that there could be several more of these surprising examples waiting to be discovered.

The development in the 1940s of the Aqua-Lung, a self-contained underwater breathing apparatus (SCUBA), allowed humans to reliably explore the underwater environment. SCUBA provided a vehicle for explorers, antiquarians, and, indeed, later archaeologists to begin freely examining material culture located underwater. For example, in the 1950s and 1960s, French and Italian SCUBA divers worked under the direction of archaeologists on wrecks at Grande Congloué, Cape Dramont, Île du Levant, Mahdia, Spargi, and Albenga (Atti del II Congresso 1961; du Plat Taylor 1965; Roghi 1965; Bass 2011). These surveys may not have included full-scale archaeological excavation or even diving archaeologists, but they certainly fulfill the criteria considered appropriate for conducting modern "deepwater archaeology" projects in which archaeologists on the surface direct activities underwater.

Arguably, one of the largest recovery projects to take place in the history of maritime archaeology was the raising of the Swedish warship *Vasa* in 1959 (Cederlund & Hocker 2006). This project set the pace for large-scale excavation and recovery projects, and for the next few decades, a number of large shipwrecks were recovered such as the warship *Mary Rose* in England and Dutch East India Company vessel *Batavia* in Australia. Alongside these projects being conducted underwater, equally significant maritime archaeological work was being undertaken in Scandinavia. By employing a cofferdam to allow submerged shipwrecks to be excavated as terrestrial sites, the Skudelev project involved the excavation of six Viking ships by Ole Crumlin-Pedersen and Olaf Olsen in 1962 (Crumlin-Pedersen & Olsen 1978).

What began with the untethered exploration of the underwater environment using SCUBA quickly developed into full-scale treasure hunting. Sites around the world were being destroyed in search of elusive treasure contained within shipwrecks. By the 1960s, legislation to protect underwater cultural heritage was being developed to prevent looters from destroying early shipwrecks. In fact, the Western Australian Government passed one of the earliest pieces of heritage legislation in the world in 1964 (Nash 2007: 3), which would ultimately become the model for Australia's *Historic Shipwrecks Act 1976*. By the late 1960s and early 1970s, several large-scale maritime archaeological projects were under way including excavations of the seventeenth- and eighteenth-century Dutch East Indiamen wrecked off of Western Australia, the fourth-century BCE Kyrenia ship in the Mediterranean, sixteenth-century Basque whaleships in Red Bay (Canada), and Spanish Armada wrecks in the USA and Caribbean. However, by this time, fewer were being directed from the surface as more archaeologists were conducting their own research on the seabed. John Goggin (1959–1960: 350), considered a pioneer in underwater archaeology for his work in freshwater springs in Florida (USA), was never more true when he stated, "it is far easier to teach diving to an archaeologist than archaeology to a diver!"

Another major step forward was the 1972 introduction of the *Journal of Nautical Archaeology and Underwater Exploration*, the first journal specifically devoted to the subdiscipline. Soon after, academic departments at universities in various parts of the world established programs dedicated to maritime archaeology; some of the early examples include those at Texas A&M University, University of Haifa, St. Andrews University, and East Carolina University. This was the beginning of what would become a proliferation of specialty degrees and would produce most of the first round of heritage managers and academics focusing on the subject.

Once maritime archaeology was a named degree or specialization within university archaeology and anthropology departments, it earned the status of a subdiscipline. While some speculate that this was a potential negative impact in the development of the discipline as a whole and that maritime archaeology should be taught alongside and in conjunction with the broader field of archaeology (Flatman 2008), others reveled in its acceptance and even benefitted from the newly developed specialty programs. As of 2011, there are no fewer than 15 academic departments around the world that teach maritime archaeology, and in nearly every country

that borders on water, there is a maritime archaeologist working. Indicators of the success of the subdiscipline include the 2006 introduction of a second journal dedicated to the field of maritime archaeology (*Journal of Maritime Archaeology*) and a steady increase in the number of jobs in maritime archaeology.

Today, the field is so broadly focused and diverse, if it were not for the definition of "human and sea," it would be difficult to describe it adequately. No longer is it necessary to be a diver to specialize in maritime archaeology because there are an equal amount of maritime-related sites being investigated on land as there are underwater. From lighthouses to shipwreck survivor camps, maritime archaeology is just as at home on the dry edges of the sea as it once was underwater.

Key Issues/Current Debates

Perhaps one of the most pervasive issues within the field of maritime archaeology is the need to protect underwater cultural heritage from those who wish to profit by selling, bartering, or trading associated material culture. Treasure hunting and looting of all forms is an offense maritime archaeology has battled from its inception. Even with the 2009 ratification of the UNESCO Convention on the Protection of the Underwater Cultural Heritage, the security of underwater heritage remains unstable in many countries around the world, and permits are issued regularly for treasure hunting endeavors. Public education and pressure to change laws at the State party and international levels are two areas where maritime archaeologists may contribute to correcting this problem. As Bass has so rightly pointed out, "[t]he distinction between archaeology and treasure hunting is misunderstood by far too large a part of the population" (Bass 2011: 14). Thus, education and engagement of the general public in maritime archaeology is critical. The media, from magazines to newspapers and television, is a powerful tool that has yet to be capitalized fully by maritime archaeologists and is a substantial key to educating the public about the difference. Treasure hunting is not profitable based on its "finds"; rather, it profits from selling a dream to unsuspecting investors. If there are no investors, there is no treasure hunting. Further, pressure to enact or change laws from individual and collective groups of maritime archaeologists, such as the Advisory Council on Underwater Archaeology and the Australasian Institute for Maritime Archaeology, can also provide protection to underwater cultural heritage. Through writing letters, lobbying governments, and providing technical assistance to developing countries that are often preyed upon by treasure hunting ventures, such groups are winning small battles. The enforcement of the UNESCO Convention on the Protection of the Underwater Cultural Heritage will be a huge leap forward in terms of managing and protecting underwater cultural heritage, but there is still much work to do on the local front.

Another related and key issue within the field is that of managing underwater cultural heritage. As more threats arise and budgets are restricted, maritime heritage managers are forced to find new ways of managing and protecting sites through survey (to locate sites), investigation (to identify sites and threats to them), and long-term monitoring (to ensure they are protected and to record changes over time). Over the last 10 years, large-scale excavation and recovery projects have waned. These projects are being replaced by in situ surveys, investigations, and monitoring, which involve leaving sites as they are rather than disturbing or recovering material culture. The current buzz word in the field is in situ preservation and conservation, and while most authors have pointed out that UNESCO defines in situ as a "preferred" method of management rather than the "only" method, it still weighs heavy on the minds of maritime archaeologists. Part of the issue with the concept in situ revolves around a lack of definition and principles for conducting in situ conservation and preservation. Because the field of in situ research is largely driven by conservation scientists and the results disseminated in conservation journals and conferences, there appears to be a lack of communication between the researchers (conservation scientists) and end users (maritime archaeologists and

managers). A study conducted in 2009 of practitioners revealed that many were unaware of what constitutes in situ preservation and conservation techniques and were therefore unwilling to consider in situ as part of their management practices (Ortmann et al. 2010). Thus, an area of research and discussion for the future of maritime archaeology will undoubtedly be focused in the coming years on in situ methods and their use. Closer collaboration, scientific investigation, and on-site application, as well as wider dissemination of results, may contribute to a better understanding of in situ practices.

The management and investigation of archaeological sites beyond the reach of divers, such as deepwater or remote shipwrecks, is an area of growing interest. Advances in technology are facilitating access for not only the archaeologist but also the novice and in some cases the treasure hunter. Deepwater sites often fall under the jurisdiction of State bodies, and practitioners are charged with managing sites that they cannot in fact view or visit. Additionally, deepwater wrecks require sophisticated and expensive equipment, large platforms for operating that equipment, and in some cases lengthy cruises to access the sites. Finally, because these sites are further out to sea, they are not protected under State legislation. Thus, they are unprotected from disturbance and treasure hunting. So how are these issues negotiated? The answers to accessing and investigating these sites may lie in the cooperation with large organizations, such as marine institutes that conduct geophysical, biological, or oceanographic research. However, partnering with groups who possess the technology and ability to access such sites will only allow the archaeologist to arrive at the site; the next issue is how to conduct archaeological investigations on deepwater sites. The same concern that others raised about archaeologists conducting archaeology from the surface in the 1960s, again, rears its head. Can proper archaeological work be conducted on sites that can only be accessed remotely? And perhaps more importantly, what types of research questions can be adequately addressed? Can questions that count be asked of sites where little ability exists other than to collect samples for identification of site type, function, and possibly cultural affiliation? Are basic archaeological site plans reconstructed though remote photography and video contributing to our knowledge about the people and culture behind the sites? Answers to these questions are currently being debated among academics and practitioners (Adams 2007). There are no easy answers to these questions; however, the issue exists and is not one that will disappear or even decrease in complexity.

A final key issue that has rippled beneath the surface and is occasionally communicated relates to interaction of indigenous peoples with the sea and the investigation of archaeological sites closely associated with these activities. Until relatively recent times, maritime archaeology has primarily focused on classical and historic period sites. Ships, lighthouses, boatyards, jetties, and harbors were typically constructed by historic culture groups. Thus, maritime archaeologists have given relatively little attention to sites and regions of the world where an indigenous population had/has an intimate connection with and use of the sea. These sites are overlooked primarily because they fall within the realm of terrestrial archaeologists who focus on indigenous sites. However, maritime archaeologists can contribute greatly to this area; the key lies in collaboration. Maritime archaeologists are trained to look at the specific "maritimity" of a site or object (Tuddenham 2010). When viewing coastal and inland sites, our first questions involve the location of the nearest port or how far inland a river is navigable. Answers to questions about access to goods and trade networks often involve waterborne travel rather than overland travel. Maritime archaeologists understand seasonality, maritime subsistence, and boat-building technologies. Some researchers have begun to collaborate on projects related to indigenous knowledge and use of the marine environment and the importance of watercraft in migration, but the work is slow to develop. This area of research could contribute not only information about past and present use of the sea but also indigenous claims

of tenure and sea rights. Maritime archaeologists and their research have the potential to contribute to relevant modern social issues in the areas of indigenous maritime tenure in the coming years.

Future Directions

From its inception, an overwhelming obsession with shipwrecks, method, and technology has left the subdiscipline of maritime archaeology unbalanced. Just as developing methods for finding and recording shipwreck sites underwater were a necessity for the field to grow, so was the need to align research with current intellectual and theoretical discourse within the broader field of archaeology and anthropology. Unfortunately, the field's practitioners failed to accomplish this second phase, and a period dominated by historical particularism characterizes most of the early work. However, all is not lost; in recent years, the battle to overcome the historical-particularist approach is well under way. A perusal through journal articles, books, and websites demonstrates that maritime archaeologists are actively engaging in greater intellectual and theoretical debates with the disciplines of archaeology and anthropology. The investigation of more terrestrial maritime sites including landscape and seascape studies and shipboard material culture are areas in which theoretical discussions are occurring.

Another future direction that is vital to the field of maritime archaeology is that of public engagement. This has never been more important than now when the world's economy is flailing and budget cuts are severely impacting State bodies, granting organizations, and education funding. The public write letters to those who make the laws, vote for the laws, and, ultimately, are for whom maritime archaeology is practiced. Engaging people in all levels through consultation, volunteerism, and eventually to the final product of publication and dissemination of results is an area in which maritime archaeology can expand. And it appears to be making progress; with successful organizations and programs such as the Nautical Archaeology Society in the UK, the Florida Public Archaeology Network in the USA, and the Museum of Underwater Archaeology online, the public is being brought into the fold. There remains, however, room for improvement such as involving and interpreting sites for the non-diver and producing stimulating media products to rival exploration and treasure hunting ventures. In an age of video games, simulation technology, and mobile applications, maritime archaeology offers a veritable and endless source of public entertainment and education.

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- ▶ Bass, George Fletcher
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
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Archaeology as Anthropology

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Introduction and Definition

Archaeology, it has been said, is one of the four subdisciplines of a larger discipline – anthropology – the other three being bioanthropology (formerly known as physical anthropology), linguistics, and social/cultural anthropology (a double adjective that honors both the British and American traditions). This account, however, largely only reflects the American context. In most other parts of the world – notably in Europe, where the "disciplines (or subdisciplines)" were born – the two have been separated thematically, pedagogically, and administratively. But even in the Americas, where the linking of archaeology to anthropology is rarely disputed, their explicit relationship is strained, and it could be argued that the stated relationship does not really exist; further, it has been utterly distant for the most part, so much so that in spite of an avowed nearness and their contributions to the same thematic field, they successfully ignore each other. Their closeness or distance is a direct function of their relationships, separated or in tandem, with colonialism, nation-building, and, nowadays, with post-national multiculturalism. Yet, what anthropology means to archaeology and vice versa is important to their destinies in postmodern times.

In considering the relationship between archaeology and anthropology, however, more commentary is required to clarify the discussion that follows. Archaeological interpretations have *always* used cultural data – especially as professionally produced by anthropologists – in order to give meaning (functional and symbolical, for the most part) to "things" and "sites" through cross-cultural analogies; although the latter were used intuitively and in a very relaxed way for decades, archaeologists have spent much effort to refine and control their use. In this regard, the intimate, unidirectional relationship of archaeology with anthropology is quite evident and needs no further development. Other stories can be told in terms of their mutual or separate articulation to wider agendas and purposes, political and otherwise; the following is the story I chose to tell.

Historical Background

The origin of anthropology is tied to the European colonial expansion of the nineteenth century. Baffled by the weird behavior of the very peoples they sought to colonize and exploit,

colonial governments rapidly understood that the best way to an efficient government was the understanding of the locals. The anthropological understanding of the "savages" thus emerged as a condition for better governments. Archaeology is older. It was born in the eighteenth century to feed the historical imagination of a recently created modern entity: the national society. Anthropology appeared to normalize the "other" of modernity (the "savages" located in an ontological exteriority), while archaeology tamed an undisciplined time vector built upon objectification, universality, and progressive temporality – modern time, that is. Their common European birth was thus not coterminous and arose in different contexts: while the latter provided the teleological and monoethnic temporality the recent nation-states needed, the former was geared to the administration of colonized peoples in Asia and Africa. Although canonical definitions have it that both were meant to deal with "men" as a cultural being (one in the past, the other in the present), in Europe and elsewhere they performed quite disparate functions. The story is different in the Americas, where archaeology was part and parcel of a larger field called anthropology.

The relationship between the two varies with place and time. In Europe and most of the world, it hardly exists or is merely formal. In the Americas – and, to a lesser extent, also in Australia and New Zealand (Harry Allen, *pers. comm.*) – it may be argued that they share a common genealogy. While archaeology in Europe wrote about the "savages" as proto-selves – in evolutionary terms, the primitive that eventually evolved into the civilized Westerner – in the Americas and elsewhere "savages" were written about as the "other" external to modernity. In European countries, the denegation of coevalness to their own pre-civilized "savages" was a function of teleology: they were not part of modernity because they truly belonged to past times; their rhetorical existence (their presence in archaeological narratives built upon "true" relics) and their eventuating into modern selves (their presence in national histories) were proofs of the elapsing of progressive time. In the Americas the "savages" as "other" (the paradigmatic Indians) were not part of that story: they did not evolve into the civilized self. As if that were not enough, in Latin America the appropriation of some indigenous achievements – carefully selected as to mimic European civilization (gold work, domestication of crops, monumental architecture, religious life, centralized governments, even writing-like systems) – by national storytellers, all members of elites that despised the Indians and considered themselves "white," was a brutal paradox. Archaeology became the notary public of the passing of pre-European societies; it legitimized the disappearance of the Indians (something of the past), and it paved the road to *mestizo* national ideologies.

Such was the basic difference between the colonial centers of power and the colonized areas in terms of storytelling. Indeed, in Europe, anthropologists were producing information from and about the "savages" while archaeologists were mere citizens proudly elevating their own heritage; in their colonies of Africa and Asia, European archaeologists were delving in the pleasures of antique hunting. In the Americas, Australia, and New Zealand, archaeologists and anthropologists worked toward a similar goal, nation-building. For these reasons, archaeology in Europe and its colonies was not part of anthropology. In contrast, archaeology played a different role in the Americas where it took part in the normalization of contemporary "savagery." Archaeology and anthropology in the Americas were one and the same; their relationship was a pure brand of the apparently odd complicity between modernity and colonialism. While anthropology set to normalize the "savages" through indigenism, archaeology normalized them by imposing a new temporality (that of civilization) and by using their chosen civilized traits as national symbols – the latter was especially true in Latin America. In short, both were modern disciplines designed to modernize "savagery" through the production of national imaginations.

While in most parts of the world archaeology and anthropology have silently traveled along different paths, it is not surprising that in the Americas their relationship has preoccupied archaeologists – anthropologists, aware of their

theoretical sophistication and the nuances of ethnographic renderings, have despised the rude empiricism of their disciplinary colleagues to whom they pay little attention. Archaeologists felt – and, to a large extent, still feel – that their subdiscipline was there to serve a higher anthropological purpose, the holistic understanding of humankind, through a painstaking spatial and temporal ordering of ancient things left in the ground. They did so, basically, by providing the long-term data that evolutionary typologies about society needed to fill temporal gaps. Yet, afraid that the relationship was drifting toward a mere departmental cohabitation with no epistemological articulations and seeing in anthropology a model to be followed, Philip Phillips (1955: 247) wrote what became a famous dictum, with lasting consequences: "American archaeology is anthropology or it is nothing." The anthropology Phillips was referring to was one of a kind – objective and disciplined by scientific protocols. The mirror archaeologists were looking at was that of a nomothetic and universalist science. Later on, Lewis Binford (1962) outlined even clearer relations through the use of the key term *explanation* ("the demonstration of a constant articulation of variables within a system"), the hinge that would articulate the disciplines dealing with "men" as cultural beings amenable to scientific scrutiny.

Anthropology was chosen as a model for archaeology due to an unreflective legacy that stressed a common origin, but it soon became a burden. A subservient dependence of archaeology to anthropology was resented by many, especially in terms of theory, so much so that a strong appeal grew for archaeology to develop its own conceptual machinery. The scientific program widely adopted since the end of the 1960s found necessary to maintain genealogical ties with the mother discipline but building its own theoretical and methodological apparatus (understanding that the technical attire was already at hand) as a way to elevate archaeology to full maturity. An iconic paper in this regard was written by David Clarke (1973) – a British scholar, to be sure – celebrating the loss of innocence of archaeology at the expense of almost ignoring anthropology. Confident that even its own "general theory" was reachable, archaeology decided to follow its own path. The decision was not surprising; although heralded by British scholars who came from a non-relational tradition, it rapidly took roots and sealed the abandonment of the last traces of its functional relationship with the nation – and of its relationship with anthropology! Archaeology locked itself in a scientific, meta-real world, away from contemporary preoccupations such as collective history and identity – the very stuff anthropologists were dealing with. For scientific archaeologists, the field that still linked them to anthropology, although by sheer instrumentality, was ethnoarchaeology, widely promoted as a contact with *living peoples* but which was simply devoted to producing information for the translation of statics (the archaeological record) into dynamics (the operation of cultures).

The wave of reflection and criticism that beset anthropology after the 1970s (which occurred due to the mounting accusations of its complicity with colonialism) eventually impacted archaeology. Although never as agonizing as in anthropology, the critical move took the form of metadisciplinary inquiries: the complex relationships with imperialism, nation-building, "othering," and capitalism came to the fore, in many cases, for the first time. The disentanglement of such relationships brought archaeology close to anthropology because it touched the nerves of the contemporary world. It also showed that archaeological products were constructed in social milieus and were thus social facts, inherently political. Politics are thus a recent archaeological preoccupation that has been engaged in several ways. Most archaeologists practice politics the multicultural way: politically correct while going public, they celebrate their proximity to "otherness" (still an academic object) but are careful not to mingle excessively and to safeguard their epistemic privileges – repatriation being the best example because it does not compromise the integrity of the discipline but allows archaeologists to get closer to the "other." A growing minority genuinely strives to reconcile knowledge and power, surgically separated since the end of the nineteenth century by

positivism, and has made archaeological interventions politically conscious at all levels; in doing so, it follows anthropology's estrangement from colonialism by siding with and giving voice to the very people it used to study for governmental purposes; it became anticolonial and even antimodern. Discontent with a discipline that was a favorite proxy of modernity *qua* colonialism, a sector of anthropology started to think and act critically and independently, so did many archaeologists who refused to be functional to the rhetoric of multiculturalism.

Yet, most anthropologists work within the current social and political order, providing the epistemic means through which "otherness" is administered by the rhetoric of diversity, not least through the ongoing promotion of development. A more academic approach has seen the adoption of a constructivist agenda that portrays culture (and its weaving of the social fabric through identity) as situational, fluid, conjunctural, and strategic, thus castigating cultural primordialisms, especially ethnic. Alternative anthropologies have emerged, though, building upon previous political commitments. They stress collaboration in research (establishing research priorities from the local up) and account for non-Western cosmologies; the latter are not any longer seen as exotics awaiting cultural translation but as meaningful renderings of life on their own. Further, the widespread academic anti-essentialism is countered by a critical, at times sympathetic, understanding of the politics of identity. Archaeology is also plural in contemporary contexts. Two or three decades of multiculturalism have altered its face. If archaeology had a clear relation with nationalism during its modern phase, in its house now reign disorder and confusion; if it formerly administered discourses partly designed to deal with others located outside of modernity, it now ignores what kind of discourses it administers when those others are no longer the exteriority of modernity but a constitutive interiority of multicultural societies. Many archaeologists, especially those in countries suffering aggressive capitalist expansions, satisfy market needs through cultural resource management (CRM) or cultural heritage management (CHM), becoming commodities themselves and undertaking their work according to a legalistic and vertical conception of heritage. Scientific archaeologists often fustigate CRM/CHM practitioners, arguing that their scholarly standards are piecemeal, if not unaccounted for; committed to an increasingly cumbersome liaison with science, they are unlikely birds in multicultural lands – decontextualized fellows who insist on courting a narrative monopoly already lost to other interested parties. Before that fact, a growing number of archaeologists have forged a curious approach that mixes a bit of old positivism with a pinch of new constructivism; they label it *public archaeology*, a fine multicultural product that accommodates the old tenets of archaeological practice to the changing multicultural contexts. Still others have embarked on different paths, seeking to forge alternative archaeologies – this is the case for disciplinary practitioners working through collaborative research agendas with local constituencies and/or via indigenous activism. Alternative archaeologies, though, still retain a metaphysical and ontological disciplinary core. For that reason, alternatives to archaeology are being casted world round with the aim of engaging non-Western conceptions of time, space, matter, and relations.

Key Issues/Current Debates

Several books (Gosden 1999; Gillespie & Nichols 2003; Garrow & Yarrow 2010; Shankland 2012) and a wave of professional symposia over the last few years show that the relationship between anthropology and archaeology is a matter of renewed interest. The main meeting points, sometimes intertwined, are ethnography and materiality; Ingold (1993) would add time and landscape to the list, but I will not explore them here given that they have received much less attention. Nor will I discuss the still widely held idea that archaeology is uniquely positioned to provide long-term data for the anthropological understanding of cultural practices or, as in the

case of *applied archaeology*, for the implementation of successful past technologies in current contexts – such as pre-Hispanic raised field agriculture in tropical places in South America. The archaeological access to the long-term (also called the *distant past*) would account for variations and changes (but also continuities) not available to the theoretical and methodological machinery of other social disciplines. The understanding of adaptations and extinctions (their causes, consequences, and advantages) has been usually mentioned as the basic field to which the privileged archaeological gaze can contribute. However, such a contribution is hampered by a widespread rejection of uniformitarianism and by a simple tautology: archaeological models based in anthropological data are used to inform anthropological interpretations.

Ethnography

The theoretical, metadisciplinary lookouts that archaeologists build to have a better view of their own work (and, many times, to elude their responsibility) are usually removed from practice, as if their reflection about general, past concerns protect and isolate them from the very processes to which they contribute, intentionally or not. The genealogies of particular archaeological trajectories – such as the relationship between the discipline and nation-building – have proven their utility to uncover its social/contextual character. Yet, they lack an essential ingredient: the ethnographic present in which we are all trapped and which forces us to confront our work in real time more than as the unavoidable legacy of faraway forebears. Such a limitation appears to be being overcome in recent times. Ethnography now appears as a common ground for archaeology and anthropology, so much so that a recent review paper (Hamilakis 2011) calls it "a multitemporal meeting ground" for them both.

New relational approaches, variously called "ethnographies of archaeology" (Edgeworth 2010), "archaeological ethnographies" (Hamilakis 2011), or "ethnographic archaeology" (Castañeda & Matthews 2008), "use ethnographic methods to try to understand the *cultural practices of archaeology* itself" (Edgeworth 2010: 54); their philosophical core is constituted by relations and meanings between beings, not things. They share a concern with the effects of archaeological activities (excavation, exhibition, curation, dissemination) upon local publics and, conversely, with how local publics engage archaeology and its diverse discursive objects. To use a time-honored archaeological expression, they document their own activities in situ: the archaeological *site* is thus elevated to a constructed place where the very materiality of the social and the political unfolds (the long-lasting effects of archaeological discourses – their articulation with national, regional, or subaltern agendas, for instance – are not the focus of their inquiry). Through reflexivity and self-criticism, they seek to understand (a) how archaeologists produce knowledge as situated and positional subjects, (b) how different publics relate to it (ironically, selectively, opposingly), and (c) how archaeological representations are deployed (and many times countered).

Archaeology may find in the ethnographic gaze a bountiful source of reflexivity about the observer/observed dichotomy. For decades, archaeologists disdained ethnography (that weird activity performed by anthropologists, uncomfortable bed partners to whom they didn't talk, with whom they didn't share) only to consider it now a novel way to connect past and present. Archaeological ethnographies are not akin to the ethnoarchaeological activities scientific archaeologists were so accustomed to. In spite of optimistic and condescending appraisals that posit it as a forebear of archaeological ethnographies, more often than not ethnoarchaeology reinforces the logocentric gaze, avoids intersubjectivity, and subdues multiplicity; its almost exclusive purpose is to produce dynamic cultural data for interpreting static archaeological information, bypassing or ignoring the lives of the peoples they judiciously study, those *mobile objects* whose sole role is providing information useful for archaeological interpretations; the people thus studied are just unveiled objects, measured, disciplined. But away from

ethnoarchaeology, archaeologists and local communities can engage in new kinds of relations, meaningfully built around interactions of lives and beings and intersubjective understanding – the very meaning of ethnography, anthropologists notwithstanding (Fabian 1990).

Materiality

A widespread and shared idea is that archaeology's specificity, more than anything else, lies in its expertise about artifacts, especially if they are ancient. For most of archaeology's history, artifacts were inert, exterior, and silent things geared to mediate between culture and nature; although resulting from human interaction, they were utterly reified. Yet, due to the holistic approach to culture championed by the scientific program, artifacts began to be considered more widely and interactively as an important part of *material culture*; the use of *material* as an adjective of *culture* (but not vice versa) signaled an important change whereby social relations entered the otherwise sealed and autonomous realm of artifacts. An important consequence of this move was that archaeology engaged in related discussions with other fields (philosophy, economy, history) and pitched its tent in time slices and topics formerly banished; such is the origin, for instance, of historical archaeology and its more recent offspring, archaeology of the recent past. Joining forces around material culture with other disciplines, archaeology began to speak about commodities, consumerism, and the constitution of social personas. Such an interdisciplinary endeavor is behind the creation of material culture studies (e.g., Buchli 2002). Part of the same move, the so-called anthropology of technology (Lemonnier 1992) brings archaeology and anthropology together by deploying ethnographic observations upon cultural practices around *techné*. Those observations downplay economic reductionism as a means to understand human choices regarding technical and technological options; instead, they show that such choices are often dictated by powerful drives that cannot be explained by functional criteria. The ethnographic, non-reductionist approach adopted by the anthropology of technology has humanized the mechanism inherent in studies designed to understand technological organizations, the Anglo rendering of the French *chaîne opératoire*. A related field of inquiry, from which archaeologists have largely profited, aims to reconstruct the social life of material objects (Appadurai 1988), mostly through the lens of political economy – the very reason that explains why things are thus considered in their mercantile phase as commodities. Another notable area of research along these lines put museums in the forefront because they are the iconic places for direct, bodily interactions between the public and archaeologically produced objects.

Not long ago, archaeologists brought theories of agency to bear on material culture, thus showing how humans position themselves actively toward "things" and how the latter participate in the production and reproduction of social life; the participation of things, however, does not occur as beings (as relational accounts would have it) but still as fetishicized and reified objects. Agency is accorded to humans, not to things. This fact underscores that most material culture studies are undergirded by modern ontological precepts whereby "things" and humans remain rigorously separated as much as mind and matter. For that reason, the term *materiality* is now preferred by those who favor processes and events and, perhaps more importantly, who think that objects can be disentangled from their modern ontological cradle. An exciting alternative has thus emerged, one that engages other ontologies in which life and the world are conceived and acted upon relationally, understanding materiality through its embeddedness in a web of living entities (Haber 2009). It is linked to the work of several individuals and traditions, basically in the social studies of science (e.g., Isabelle Stengers' *cosmopolitics* and Bruno Latour's *symmetrical anthropology*) and anthropology (e.g., Marisol de la Cadena's *multiontologies* and Eduardo Viveiros de Castro's *multinaturalism* and *perspectivism*).

Future Directions

Optimism is mounting among many archaeologists about the rapprochement with anthropology through ethnography, so much so that the editors of a recent volume devoted to the issue stated that "we foresee a time when ethnographies of archaeology such as these (which describe the social context, local reverberations, or political economies of archaeological ideas or objects) are considered just as significant to the field of archaeology as is excavation or artifact analysis" (Hollowell & Mortensen 2009: 8). However, there are powerful reasons why we should not celebrate so soon. Two contemporary conditions further the cleavage between archaeology and anthropology by solidifying the self-isolation of the former and by hampering its political edge: (a) its accommodated relationship with multicultural policies, especially those dictating political correctness and the commoditization of otherness, and (b) by embracing CRM/CHM projects, whereby disciplinary practice is geared to the needs of development.

The multicultural face of archaeology is pitiful. A "reformed" establishment is happy to share what it cherishes most with previously marginalized parties: disciplinary epistemic coherence. The gains are numerous: it keeps practicing archaeology as it was laid out by modern standards (it changes nothing of its metaphysical fabric); it does so in public (generously); it feels more democratic (by sharing); it gets closer to what it used to call the "savage," appeasing her/his demands while convincing itself that disciplinary nearness is tantamount to spatial, temporal, and cultural coalescence. All in all, however, archaeology keeps spreading the fruits of enlightenment and gets other (local) actors to participate in institutional spaces created to control the definition and management of disciplinary principles.

The intimate relationship of archaeology with capitalism – as expressed in its provision of empirical data for supporting progressive temporality – has been augmented by the expansion of CRM/CHM worldwide. Its impact is so pervasive that a significant number of archaeologists work for that growing market – in Brazil, for instance, where the situation is distressing, that number may be as large as 90 %. In doing so, they have abandoned any possible intervention in contemporary issues in order to dance to the rhythm of money. CRM/CHM is even producing profound curricular transformations (something achieved by no other event in the history of the discipline): new undergraduate programs – characterized by their short length (normally no more than 3 years) and their technical emphasis – are being created to mass-produce archaeologists to fulfill the contractual needs arising from aggressive capitalist expansions (transport infrastructure and mining are the most salient). In the process, the already weak ties with anthropology have been severed. The result is an utmost estrangement of archaeology from anthropology by severely abating the struggle for social justice, including engaging alternative social/historical cosmologies, and curtailing a critical stance toward the global order; by fueling the conversion of heritage and the past into commodities, long ago denounced; and by an overt complicity with market mandates, effectively diminishing the possibility for the discipline to rebuild its metaphysical and ontological apparatus, already clearly hierarchical and neocolonial. What archaeologists dreamed for decades (their independence from anthropology) seems to have been finally achieved by the most gruesome of means: their ultimate surrender to capitalism and the multicultural order. Although this complex stage would demand an attentive introspection, it seems that just the opposite is happening: most archaeologists are now more impervious to critique and self-reflection than ever before. They feel fine with their multicultural concessions; besides, the CRM/CHM money that flows through the inner circuits of the discipline is of such magnitude that they don't want anything or anyone disturbing their comfort. For these two main reasons (multiculturalism and CRM/CHM), most archaeologists are happy to preserve their privileges – cognitive and otherwise. This perverse situation has produced complacency and silence.

The future relationship between archaeology and anthropology is thus subjected to different forces. One is centrifugal and pulls them apart: it does so by accommodating to multicultural and

capitalist needs. Another force is centripetal and brings them closer, sharing concerns in a convergent, alternative platform where modern metaphysics and ontology are at stake. In this regard, archaeological ethnographies can produce the collapse of disciplinary self-referentiality, the demise of its closure. They can also offer intersubjective experiences as the loci of knowing, which cease to be a function of a methodological prescription, as the canon of modernity established, to be the result of relationships between subjects who strive to bring closer different worlds; such proximity can open up alternatives of life and action that truly are alternatives to a Western cosmology. The intersubjective space facilitated by the ethnographic encounter entails the dismissal of objectivism in archaeological and anthropological discourses. In the ethnographic encounter, but also in the establishment of horizontal and participative relationships that seek to eliminate distance (between observer and observed, researcher and object of study, the West and the rest), archaeology meets anthropology anew. This encounter, not accidental or bureaucratic any longer but deliberate and militant, is the stage for a new morality that cannot be found solely within disciplinary borders (stubbornly patrolled to preserve epistemic privileges) but which will more likely arise from an engagement, simple and non-hierarchical, with lives built and being built outside Western mandates.

Archaeologists are keen to talk about the past – well, that is what they basically do. They are not so keen to talk about the future, a temporal horizon far removed from their trade. It is not surprising, then, that it has been precisely an anthropologist who has ventured into the shifting grounds of prediction to imagine what archaeology and anthropology are going to look like four decades from now. For Tim Ingold, a concern with relatedness (instead of anthropocentrism) and the persistence of life (instead of preservation) will define a common agenda:

> Between Archaeology and Social Anthropology, then, there is no longer any difference of principle. They have, in effect, converged upon a science of life whose overriding concern is to *follow what is going on*, within dynamic fields of relationships wherein the forms of beings and things are generated and held in place… [Thus] the *archaeo-* of archaeology and the *anthropo-* of anthropology have lost their former appeal… [and archaeology] has become an anachronism for the subject that still goes by that name has long since lost its association with antiquity. It is not that archaeologists have ceased to dig down for evidence of past lives, any more than ethnographers have ceased to participate in the lives that are going on around them, in what we call the present. But they have dropped the pretense that what is past is any older, or more ancient, than the present, recognizing that the occurrences of the past are not deposited at successive moments while time moves on, but are themselves constitutive of that very moment (Ingold 2010: 160).

Cross-References

- ▶ Ethnoarchaeology
- ▶ Interpretation in Archaeological Theory
- ▶ Materiality in Archaeological Theory
- ▶ Multicultural Archaeology
- ▶ Nationalism and Archaeology
- ▶ Nationalism and Archaeology: Overview
- ▶ Supermodernity and Archaeology

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Archaeology Data Service (ADS)

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Basic Information

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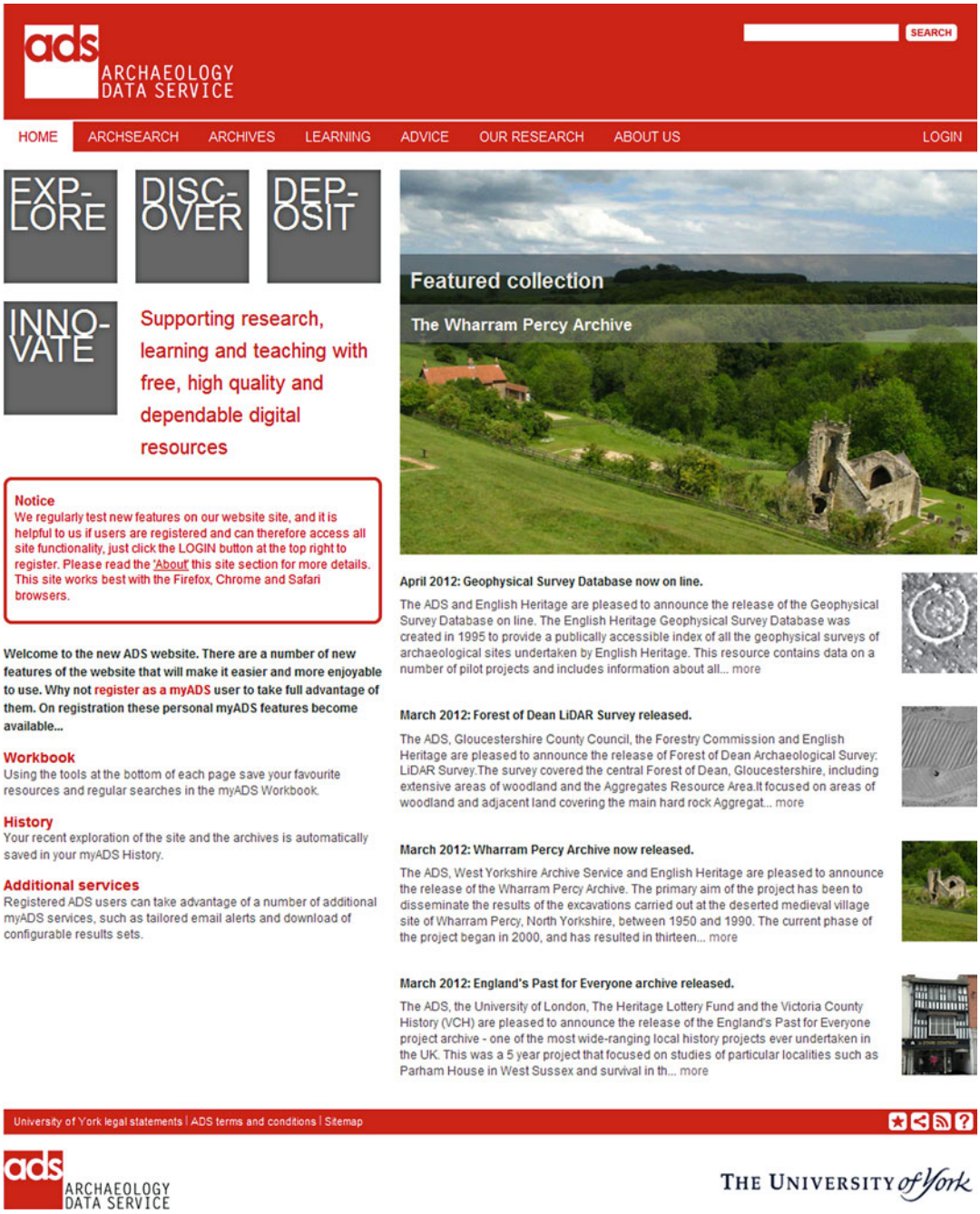
The Archaeology Data Service (ADS) was established on October 1, 1996, with the mission to preserve, catalog, and describe digital data generated in the course of archaeological research and to facilitate its reuse (Richards 1997; Richards et al. 1999; Wise & Richards 1999). These activities are mutually supportive as unless digital data are actively curated, they will not be available to future scholars, and unless researchers are going to reuse data, there is little point in expending effort attempting to preserve them. Preservation is therefore inseparable from dissemination and publication (Fig. 1).

The ADS was set up as one of five disciplinary-defined services within the Arts and Humanities Data Service (AHDS) (Burnard & Short 1994). It developed from a successful proposal from a consortium of university departments of archaeology and the Council for British Archaeology, led by the University of York where it is hosted within the Department of Archaeology. Initial funding came from the Joint Information Systems Committee (JISC) and the Arts and Humanities Research Council (AHRC). From an early stage, the ADS also began to receive external funding from a variety of other UK organizations, such as English Heritage, reflecting the diverse nature of the archaeological sector. Despite the AHRC and JISC ceasing their funding for the AHDS, the ADS provides ongoing support for digital preservation and reuse, for research, learning, and teaching for archaeology and the historic environment sector. Depositors are required to pay a one-off fee, at the point of deposition, based upon the ADS charging policy (Richards et al. 2010). Access to data, however, is free to all. The source of the data must be acknowledged, and copyright is maintained by the data depositor. The ADS takes a nonexclusive right to distribute the data and to take steps to preserve it. The ADS is a member of the Digital Preservation Coalition (http://www.dpconline.org/) and follows the Open Archival Information System (OAIS) model for the preservation of digital data (ISO 14721: 2003). In 2010 it was awarded the Data Seal of Approval (http://www.datasealofapproval.org/). All data archives are given a permanent digital object identifier (DOI) under the auspices of DataCite (http://datacite.org/).



Archaeology Data Service (ADS), Fig. 1 The Archaeology Data Service homepage, April 2012

Major Impact

Archaeology and the historic environment sector are in a special position in that much data creation results from the destruction of primary evidence, making access to data all the more critical in order to test, assess, and subsequently reanalyze and reinterpret both data and the hypotheses arising from them. Over the years, archaeologists have amassed a vast collection of fieldwork

data archives, a significant proportion of which remain unpublished. Access to data, even those which are published, is often difficult or inconvenient at best. The ADS works with national and local archaeological agencies and those research councils involved in the funding of archaeological research to negotiate deposition of project data. This includes data derived from fieldwork as well as desk-based studies. The types of data involved include text reports, databases (e.g., related to excavated contexts or artifacts), images (including aerial photographs, remote sensing imagery, photographs of sites, features, and artifacts), digitized maps and plans, numerical datasets related to topographical and subsurface surveys and other locational data, as well as reconstruction drawings. By 2012, the ADS provides access to over 1 million metadata records for the archaeology of the British Isles, over 20,000 unpublished fieldwork reports (the so-called gray literature), and over 500 individual project archives. These include a wide range of environmental data, including ABMAP (the Animal Bone Metrical Archive Project), the Environmental Archaeology Bibliography (EAB), and the Environmental Archaeology Unit digital archive. The ADS is also working with European and other international bodies to develop a worldwide infrastructure for archaeological research.

Cross-References

- ▶ Archaeological Informatics
- ▶ Digital Archaeological Data: Ensuring Access, Use, and Preservation
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data
- ▶ Strategic Environmental Archaeology Database (SEAD)

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Archaeology in the Enlightenment

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Introduction

Virtually no archaeological research, in the sense we understand archaeology today, was conducted during the period (1690 to 1789) that was embroiled in the intellectual ferment known as the Enlightenment. Yet three key concepts of the Enlightenment frame debate about archaeological theory in the present. The learned of Europe and the English colonies earned liberation from a servile obeisance to the established political and clerical order by the universalizing canons of science – empiricism, trust in sense perception, and the freeing of human consciousness from ignorance and received doctrine. History was conceived as a predictive science that was fully an equal to the natural sciences because of an abiding faith that all humanity was borne of a common ancestor, with implications for present prehistorians who ask by what methods and authority we can comprehend unrecorded motivations in the past. Lastly, the Enlightenment's signature publication, the *Encyclopédie*, elevated the humblest tool to a probe for comprehending the intellectual status of its craftsman maker, however remote in the past. One of the enduring legacies of the Enlightenment is the general acceptance that archaeology is the study of the remains of past people's actions upon a world as socially constructed and perceived – understanding of which can be empirically derived and is not obscured to the outsider by an inner logic (manual of translation for the meaning of behavior) forever hidden.

Definition

The Enlightenment celebrated scientific society as the highest moral end of history, with the promise that the historical sciences (eventually including archaeology) could reveal moral laws and practical means to increase human happiness.

Key Issues

There is some irony in writing about archaeology in the Enlightenment. Arguably, there was none (with one informative exception). Yet, it is also fair to say that three currents of Enlightenment thought converged to give us the fundamental questions we ask of all prehistoric data. It is a common place to say that all archaeologists can do is use fragmentary and ambiguous material evidence to make statements about how peoples in the past acted upon the world as they perceived it. Put another way, the intellectual history of archaeology has been the search to comprehend unrecorded motivations. Were the actors upon the ancient stage much like us, such that we can recreate their motivations in our mind? Or were they playing to a script that is untranslatable to an audience from another time and another society?

These questions would have had no meaning to those who thought about past peoples during the previous Speculative Period (post-Medieval, early Modern). Post-Enlightenment, these same questions became core to archaeologists' understanding of the world (and continue to split philosophers of the social sciences into partisan camps).

In order for archaeology to be something other than an academic vanity, there must be a basis for cross-cultural and deep temporal understanding. How that cross-cultural understanding is derived may be a matter of strident dissent (witness the ongoing debates between Processualists and post-Processualists, for example). The fact is that this question – how can we, at a remove in time and often of an alien culture, comprehend unrecorded motivations in the past? – is central to the archaeologist's enterprise and means that we are all children of the Enlightenment. But here we have to separate the intellectual task of archaeology from the data retrieval and processing task.

To the vast majority of those who dug into ancient monuments and remains during the roughly 100 years of the Enlightenment, little knowledge was gained. So let us deal with this issue first.

Thomas Jefferson's 1784 excavations of Virginia burial mounds (arguably the only systematic, if "unintended" archaeological excavation conducted as part of the Enlightenment project) was undertaken to gather data to counter the argument of degeneration of North American animals, indigenous peoples, and their institutions. The nitty-gritty of the excavation techniques could hardly be called up to standard; however, the description and recording of what was found and in which stratigraphic context was surprisingly good. If we can agree that modern systematic data collection starts with a question, a question that generates implications about patterning of the material remains, patterns that are, in turn, observable or non-verifiable in the field (falsifiability), and that the observation protocol (excavation, survey, etc.) must be fully described along with the ultimate conclusions so they can be assessed independently by others – then Jefferson did it all. His data recovery was in response to a European questionnaire that had at its heart an assumption (the question) that animals and humans removed from the old world to the new would inevitably degenerate (becoming smaller and less complex) because of some presumed environmental deficit. Jefferson reasoned that Native American remains stratigraphically below others in burial mounds would be older than those above; hence (according to the questionnaire's assumptions), the artifacts in those lower strata should be more developed (and the makers physically larger). Dug stratigraphically and compared layer by layer, the material remains did not show any differences – Jefferson uses the new Enlightenment canon of sense perception, empirical knowledge derived from experience to falsify the initial "hypothesis."

There has been some effort recently to rehabilitate the reputation of Rocque Joaquin de Alcubierre, the Spanish military engineer in the employ of Charles of Bourbon, king of Naples, and to name him the father of classical archaeology for his 1738 excavation of Herculaneum. Usually, vilified as a plunderer and foe of his more systematic successor, Karl Weber (excavated from 1749), he is now acknowledged for at least making lists of the antiquities coming up from his shafts into the Vesuvian detritus and some note of where these treasures were found. His research question (or hypothesis)? His plan of attack (or protocol)? – there were none of these. The same can be said for scores of other plunderers and curiosity seekers devastating the countless barrows, mounds, ruined cities and tells of Europe, and, increasingly, the new territories of European expansion during the years of the Enlightenment.

Post-Enlightenment it is difficult to comprehend just how liberatingly radical (and recent, only with Locke's 1690 *Essay Concerning Human Understanding*) and dangerous to the established order was this experiment with how we comprehend the world from the material evidence around us. If, however, Jefferson can be called the sole "accidental" archaeologist of the Enlightenment, he was nonetheless attacking his problem in a quite current archaeological manner. By the Enlightenment period's close, the problem of comprehending the motivations of peoples distant in customs or in time was turned on its head compared to how pre-Enlightenment scholars would have proceeded: They may be us as we once were, but they are us, nonetheless.

Intellectual Liberation: The Enlightenment

Europe's world expansion would not have sufficed to challenge medieval ecclesiastical doctrine that all but the Christian chosen were lesser approximations of God's image. There was far too much need for justification of conquest and genocide, such as Fray Ginés de Sepúlveda's (c.1560) assertion that the "savages" of the Americas were not even human. All that began to change with the realization that the rude stones and bones being unearthed in increasing numbers from the ancestral soil of Europe looked undeniably like those made by barbarous tribes far away. The best Enlightenment minds asked the archetypal archaeological question that rests

the basis for all current assertions of universal human rights: are they what we were once – or are now still? Beginning mid-seventeenth century, new inquiring minds of Europe began to invent a new authority to interpret distant savages and their own distant ancestors. The *philosophes* looked upon the face of modern savages and ancient brutes and saw there none of the revealed certainties of the senescent medieval order.

Intellectually, that medieval order, God's order was starting to crumble. The Enlightenment was not conceived in a vacuum. Since the sixteenth century, curios from voyages of discovery and amateur diggings, together with natural science samples, found their way into *Wunderkammern* or cabinets of curiosities. These were far more than proto-museums. They were the mirror of the universe, where Divine purpose was exposed to scrutiny of reason. Scholars scrutinized their *Wunderkammern* for universal, mechanical laws championed by Descarte, Kant, Buffon, and Newton. Dangerously, humans, too, were forged into God's Great Chain of Being and so belonged with all things measurable – animate and inanimate, present and ancient. Now, if God made the Great Chain, then He must have made it according to immutable principles. It was a given of the established order that authoritarian cabal of clerics, princes, and pre-Enlightenment scholars that each link in the Great Chain was a unique, well-differentiated "natural species." Each link was present since the creation, each unchanging – each so different from its neighbors on the Chain that one could talk of an organic barrier to the understanding of the mental processes of one from the next just as unassailable as the genetic barrier between species. This was particularly the case in the matter of the "micro-"Great Chain of Being on which each peoples of the globe stood arrayed, a reflection in small of the "macro-"Great Chain of all organic life forged by God.

Linnaeus was ranking species, not just classifying them, when he invented, *Homo troglodytes*, the link to the great apes immediately below the rudest of living primitives. So too, as late as 1790, Soame Jenyns produced a seriation of humanity from the "brutal Hottentot" to Newton. However, as early as 1636, Peter Heylyns's *Microcosmos* makes a direct comparison of North American aboriginals to Europeans 300 years after Noah's flood. While the members of the Scottish Enlightenment (Ferguson, Stewart, Adam Smith, Millar) and their French counterparts (Turgot, de Condorcet, Buffon, Montesquieu, Voltaire) were to make God an irrelevancy to the discovery of the principles of causation, they transformed how one uses the evidence of ancient times to know the workings of the minds of people very different than themselves. First, they championed the abandonment of the idea of a radical divide between the European and the rest of humanity. Secondly, there evolved an equation of ethnographic distance from Europe with the historical distance ancestors. This, in and of itself, was not particularly revolutionary. Certainly, it would not have been considered a remarkable insight when, in 1750, Turgot stated that all stages of development leading to the European nations were represented somewhere in the world. What was pioneering were the methods of analysis and the initial presumption of a transcendent, constant human nature.

If we take 1690 (publication of Locke's radical exposition of empiricism and the implicit challenge to the established order by denying the monopoly of a god-given warrant of truth and authority) as the beginning of the Enlightenment (and the 1789 beginning of the French Revolution as a somewhat arbitrary end), then what were the particular threads of thought in the multicolored weave of Enlightenment thought that made a modern archaeology possible?

Paired with the persistent anticlericalism of the period was a faith in Science. Science not in the sense of a protocol of skeptical testing and analysis that it has recently come popularly to mean but as a liberation of the mind and of human consciousness from ignorance and immature (read: received) doctrine. Each an authority unto himself or herself, each demanded by Locke to understand the world by the testimony of her or

his own sense perceptions, each person had within the soul of a scientist and student of natural laws of the universe and of humanity. In the case of moral (human) laws, the goal of these studies was to isolate causation of human history by pragmatic observation, classification, and experiment. The laws thus revealed were to possess the same structure as natural science laws and, because they were lessons to reduce humanity's pain, were of even higher moral status. The means were open-mindedness and unfettered empirical inquiry; the results would be democracy, equality, and progress! Laws were predictive. Infinite perfectibility was the law of nature. Societies develop along universal, linear stages, each developing out of the preceding. Scientific society was the highest moral end of history. As Kant wrote in his 1784 *Was ist Aufklärung?* "Enlightenment is man's release from his self-inflicted immaturity. Immaturity here means man's inability to make use of his intelligence without direction from another."

History could only be treated as an equal to natural science because of an abiding faith that all humanity was borne of a common ancestor. This (monogenist) faith in global innate equality of intelligence, articulated by Buffon (1749) and Ferguson (1767), is passed on to the next generation by Prichard (1813, 1841) as the "psychic unity" of the social evolutionists. However, the idea of progress (that Science or a society directed by a committee of Scientists would inevitably lead to a higher quotient of happiness or lessening of pain, or of enlightenment in the world) was not so highly regarded by all *philosophes*. Rousseau, with his 1755 *Discourse on the Origins of Inequality*, challenged the abiding faith of luminaries, from Voltaire to Adam Smith, that the (empirical) discovery of laws of human history would ineluctably lead to a better humanity. Rousseau's prescription was that the material gain that was science's harvest, especially private property and luxury, would rather lead to greater inequality, to the degeneration of society. Lost, perhaps, in most discussion of Rousseau is the shared assumption, his and his adversaries, that all humanity, all races, and all social classes partake of a universal psyche. By the mid-eighteenth century, at least in the rarified world of Enlightenment discourse, the revolutionary idea of a common human mind was unremarkable.

Eventually, the expression of this idea of a global innate equality of intelligence with greatest impact (albeit indirect) on archaeology was by the tragic Marquis de Condorcet, in his ten-stage, unilinear history *Esquisse d'un Tableau Historique des Progrès de l'Esprit Humain* (1793). This is the most revolutionary thesis of the Enlightenment in his use of antiquity to develop, empirically, not just a history of civilization but a "law" of the role of science in the grand schema of moral progress, justice, and human rights. Importantly, modern hunters and gatherers are survivals from the original human condition. They may still be steeped in ignorance because of environment or historical accident, but not because of biological (racial) barriers to progress or because they degenerated from an earlier condition. Stage by stage, the now familiar Enlightenment concepts of a comprehendible, universal, and law-driven humanity are expressed. Progress comes as ignorance is stripped away and as science increasingly drives rational society. Progress in the natural sciences will be followed by that of the moral or philosophical sciences, the latter with equal or more import for humanity. Expanding knowledge in all sciences leads inevitably to individual freedom and to more justice. And (as a methodology), study of the past reveals a causal order (laws, if you will) that can be rationally understood and that apply to all of humanity. Thus, the problem of comprehending the motivations of peoples distant in customs or in time was really a nonproblem: They may be us as we once were, but they are us, nonetheless.

The third Enlightenment "big idea," no less foundational to archaeology than liberating science and global innate equality of intelligence, is one that rarely gets mention. Denis Diderot and Jean le Rond d'Alembert edited the Enlightenment's signature publication, the 28-volume *Encyclopédie* from 1751 to 1771. The spiritual importance to archaeology is in its full title, *Encyclopedia*, or *Analytical Dictionary of the*

Sciences, Arts, and Crafts. Radical! In the last word of the title, *Crafts* or better in the French, *Métier*, the once despised (or at least neglected) "mechanical" techniques and tools of everyday craftsmen were elevated to equal significance with the more cerebral sciences and (fine) arts. Hundreds of articles on the everyday craft of working with material things and hundreds of pages of engravings of tools, all for the purpose of showing how human experience and understanding is embedded in the mastery of mechanical things. If all that archaeologists can and have every done is to read in the fragmentary material evidence the story of how peoples in the past acted upon the world as they perceived it, how better to try to comprehend the intentions and motivations of those peoples than through examination of the tools by which they acted upon the world? Ancient tools are not, of course, the be all and end all of archaeology. But arguably Diderot (himself the son of a master cutler) sped us on the way from an exclusive celebration of fine arts (as in Johannes Winckelmann) to the omnivorous purview of archaeology today. (Junior archaeologists forced to create their first lithic or ceramic typology curse Diderot still!).

Reactions to the Enlightenment

The Enlightenment remained in its armchair. Real, systematic excavation as we recognize it today would have to wait until the late nineteenth century (with Pitt Rivers at Cranborne Chase, 1887–1898) and, as a profession, much later. More troubling as the nineteenth-century reaction against revolutionary ideas of universalism and egalité and against the horrors of the French Revolution and as the Napoleonic betrayal set in, speculation about the past fell increasingly into the hands of nationalists and mystical Romantics. There were Enlightenment-like carry-overs, to be sure. Saint Simon (1813–1825) and, especially, August Comte greedily consumed classical antiquity and comparative prehistory as they carried the sputtering torch of progress and unity of method with the natural sciences. In his *Système de Politique Positive* (1824) and *Cours de Philosophie Positive* (1830–1842), Comte articulates a grand hierarchy of all the sciences. Social physics (history) will be the last to mature but will boast the profoundest laws. In the end, however, Comte's grandiose plans for history simply became irrelevant to the growing numbers of advocational field archaeologists. For them, the living prehistory represented by the diverse peoples of the new colonies overseas served as a quite adequate and uncomplicated illustration of how ancient peoples lived. The larger Enlightenment project of divining laws of moral progress by which all of humanity could be lifted up was largely abandoned. If those savages had had a history, it was irrelevant. The hand axes of Australian aboriginals were just hand axes, with no innate lesson to teach about causation of history or about progress. These nationalists and mystics held that each people had their own particularistic history, determined by geographical accident or race. Nationalism melded with the conceit that natural selection produced some races superior in intelligence and capacity for complex social institutions, while others – argued Lubbock in his *Prehistoric Times* (1865) – were destined only for cultural stasis.

Still, Enlightenment concepts lived on. Social evolutionists held as unremarkable the belief that variability in the ethnographic record mirrors humanity's past – so argued Lubbock in 1865. So Sollas still maintained in his 1911 *Ancient Hunters*, where he equates Tasmanians with the European Lower Paleolithic society, the Middle Paleolithic with Australian Aboriginals, and the Upper Paleolithic with the Eskimo and Kalahari San. The social evolutionists reinvented bastardized versions of "psychic unity"; Within the same stage, ethnographic and archaeological peoples share the same emotions and same intellectual capacities. Hence, Sir James George Frazer (1890, 1906–1915) believe in cross-cultural survivals of primitive totems and religion (eventually to give way to scientific thought).

One would be forgiven for seeing in more recent theoretical "stances" of archaeology (as anthropological archaeology) a pendulum swing toward and against fundamental Enlightenment contributions. We see a swing against in Boas'

rejection of cross-cultural unilinealism and his and his immediate archaeologist students' writings against all forms of speculative, comparative laws of evolution, race, or progress. The field swings toward Enlightenment ideas with those optimisms of the new archaeology's first flush that archaeology become a science would transform the discipline into a true anthropology of the past. More recently, we have witnessed the Post-Processual recoil against renouncing all attempts to make archaeology into an anthropology aping the natural sciences. In these theoretical swings and debates and even in the language in which those debates, we see revealed the Enlightenment's deep legacy.

From mid-twentieth-century European and North American skepticism that the motivations of the long dead could ever be known and W.W. Taylor's argument that the archaeologist can never be a part of the past, so it is impossible for him or her to reconstruct a civilization, to Lewis Binford's late career repudiation of an earlier position on the question of whether ancient beliefs and intentions could ever be reconstructed, and then the post-Processualists' astonishing reinvention of an empathetic source of real knowledge of the past (Hegel and Herder would have been proud), the Enlightenment belief that the mind (intentions and motivations) of past peoples might be comprehended by the living is alive and well (and hotly debated).

At the end of the day, one of the enduring legacies of the Enlightenment (and of debates post-Enlightenment) is the general acceptance that archaeology is the study of the remains of past people's actions upon a world as socially constructed and perceived. Few archaeologists would go so far as to say that the process of social construction is mystical and, hence, utterly unknowable empirically. Behavior does not depend upon an inner logic (manual of translation) that is forever hidden from outsiders to the community. There is an emerging optimism that past motivations can be at least partially revealed through the investigation of how symbols and objects function as devices or insignia communicating peoples' view of themselves. That would be a novel way of putting the issue, one that would make the *philosophes* scratch their chins (scratch beneath their wigs?). But it is a concept that would not be completely alien.

Cross-References

- ▶ Archaeological Theory: Paradigm Shift
- ▶ Histories of the Archaeological Discipline: Issues to Consider
- ▶ Nationalism and Archaeology
- ▶ Social Archaeology
- ▶ Winckelmann, Johann Joachim

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Archaeology of Art: Theoretical Frameworks

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Introduction and Definition

This entry provides an overview of the main *theoretical frameworks* used in the *archaeology of art* and outlines their main contributions and limitations. These frameworks can be defined as sets of *concepts* used by researchers to approach the

analysis and interpretation of *visual imagery* in the *archaeological record*, which includes *materials* such as rock art (petroglyphs, paintings, and geoglyphs), portable art (decorated tools and artifacts with no practical-mechanical function), sculptures, friezes, body ornaments (beads, pendants, etc.), and pottery decoration. These theoretical frameworks have varied along the history of archaeology according to factors such as the following: (a) *ontology*, the way "art" is defined and conceived from each specific theoretical perspective; (b) *epistemology*, the way art analysis and/or interpretation is carried out, that is, whether it uses induction and/or deduction, whether it focuses on qualitative descriptions and/or searches for quantitative patterns, and whether it uses one or more lines of independent evidence (e.g., image data, technical data, spatial data, archaeofaunal data, and ethnographic data); (c) the *topics* which are central to each framework and which are reflected by the *questions* asked about the materials under study and by the *concepts* used to describe, explain, and interpret them; and (d) *methodology*, the practical ways in which *data* are collected and *variables* are measured in the field, analyzed in the laboratory, and presented within the academic community (theoretical frameworks have also varied according to their historical and sociocultural contexts, but these will not be addressed here due to space limitations).

Some theoretical approaches to art stem from wider archaeological theoretical frameworks (e.g., culture-history, processual, post-processual, and evolutionary-ecological; see below), and thus, their concepts are mainly applications of their particular conceptions about past human cultures to the analysis and interpretation of artistic materials in the archaeological record. Other approaches derive from the application of theoretical frameworks generated in other disciplines than archaeology, such as anthropology, linguistics, or sociology (e.g., structuralism, semiotics, and historical materialism; see below). Finally, others focus particularly on the development of hypotheses about art's functions (e.g., shamanism and art as landmarks along caravan routes; see below) which have been developed to tackle specific cases-studies (Fig. 1).

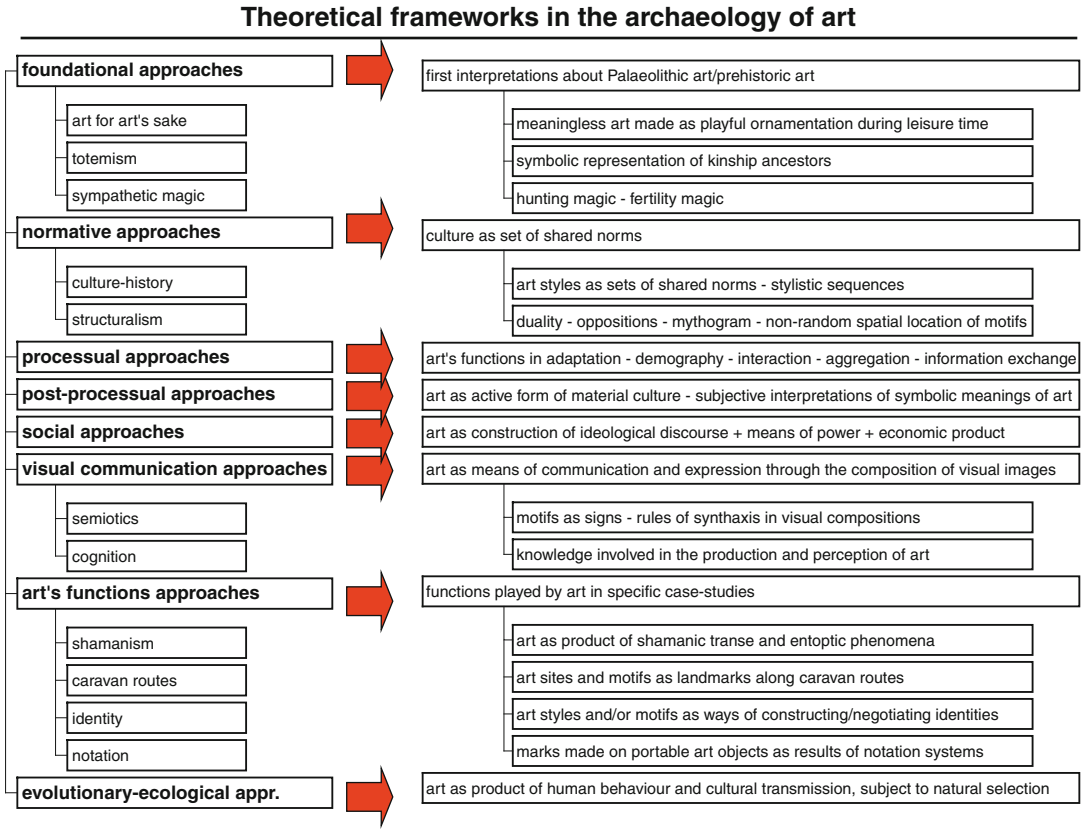
Historical Background

Foundational Approaches: The Pioneer Interpretations

In the late nineteenth century, researchers followed evolutionist ideas that viewed prehistoric hunter-gatherers as "savages" with a minimal cultural development; hence, they did not conceive that they could have the creativity potential to produce art. This was reversed by series of archaeological discoveries, firstly of portable art in Paleolithic contexts (e.g., Lartet & Christy 1865 in Ucko & Rosenfeld 1967; Bahn & Vertut 1988; White 2003) and later of rock art of Paleolithic origin (see De Sautuola-Carthailhac debate in idem). Interestingly, by that time similar findings and inferences about art's antiquity were also being made in other continents: in South America, some of the first rock art discoveries were made as early as 1876 in Patagonia (Argentina; Moreno 1876) and in 1877 in Northwest Argentina (Liberani & Hernandez 1950), and in both cases, they were attributed to native peoples of pre-Hispanic times (which are obviously not comparable to Paleolithic antiquity but are conceptually comparable insofar as they are both prehistoric contexts).

As part of the realization that art had prehistoric origins, the first interpretations about its origins and purposes were proposed. Given that by that time archaeology was still not a formal academic discipline, these hypotheses were not developed within an explicit archaeological theoretical framework but rather were ideas that stemmed from the contemporary conceptions about Paleolithic life, about Western art, as well as from ethnographic analogies with hunter-gatherer societies living in several territories colonized by European countries.

An early interpretation, known as "*art for art's sake*," proposed that *portable art* had *no meaning*, pursued only an *ornamental* purpose, and was produced due to plentiful Paleolithic environmental conditions which enabled hunter-gatherers to dedicate to these activities during their spare time (Lartet & Christy 1864 in Ucko & Rosenfeld). Interestingly, this idea is detectable in contemporary authors of South America:



Archaeology of Art: Theoretical Frameworks, Fig. 1 Theoretical frameworks in the archaeology of art

for example, when referring to rock art from Patagonia (Argentina), Burmeister (1892) inferred that these images had been made by the native inhabitants during "leisure times." This hypothesis is difficult to test insofar as meaning is the most evasive aspect of prehistoric art. However, the fact that visual patterns are sometimes repeated within individual items and among assemblages indicates an intentional reproduction of certain decorative motifs which can be interpreted as socially significant, that is, responding to cultural norms of material culture design, presentation, and use, regardless of their potential symbolic meaning. Moreover, it is also interesting to note that the *emphasis* placed by Lartet and Christy on *environmental conditions* entails that already this early hypothesis was taking into account a *production context*, which, in turn, was positively valued in spite of the dominant negative ideas about hunter-gatherer life.

A second pioneering interpretation was that of *totemism*, which originated in *ethnographic analogies* and asserted that some Paleolithic *rock art motifs* could be conceived as *symbolic representations* of *kinship ancestors* (Reinach 1903). Such hypothesis, which had relatively little academic impact, only took into account few animal representations and disregarded other motifs and was clearly very hard to test. However, it did bring into attention the fact that prehistoric art could have had a social function, in this case related to identity and ritual use.

A third interpretation was that Paleolithic art had been produced as part of *sympathetic magic* rituals carried out in order to increase success in *hunting prey* and/or in its *fertility* and thus in its availability for further hunting (Reinach 1903; Breuil 1952; see details in Ucko & Rosenfeld 1967; Bahn & Vertut 1988; White 2003). This interpretation was based on the fact that *species*

represented in rock art were also *consumed* by Paleolithic people, as well as the fact that the images' *location* was often hidden in *dark panels* of caves, a context that was assumed as likely for *ritual practices* and not general domestic use. Superimposed motifs were interpreted as ritual reiterations, while marks made on rock art and clay-modeled animal representations were interpreted as symbolic wounds. In turn, rock art depictions of animals with swollen abdomens were seen as pregnant individuals, while the portable "Venus" figurines were considered as fertility symbols given the exaggeration of the reproductive portions of the human female body in some of these figurines.

The number of images interpreted via this approach was later expanded by Breuil (1952) to account for other motifs: for example, predators which were not part of the diet were depicted to control them symbolically; geometric signs were representations of traps or weapons; incomplete animals were represented as deprived of their senses or body parts in order to symbolically prevent them from escaping; human hands superimposed or near to animal figures represented their appropriation.

Criticisms to the sympathetic magic hypothesis have been many, including the following: (a) hunting scenes are infrequent, (b) some animals with swollen abdomens are male, (c) most represented animals are not "wounded," and (d) there are discrepancies between the represented taxa in the archaeofaunal and artistic records (a point that would later be approached by other frameworks; see below). Moreover, the exclusively inductive epistemology underlying these interpretations also weakens their explanatory power. However, one of its core contributions is the combination of an idealist ontology with some materialist underpinnings: the symbolic aspects of art are combined with its core practical functions in a hunter-gatherer world where prey availability seems crucial. Furthermore, both Reinach and Begouen (in Ucko & Rosenfeld 1967) stressed the fact that the *act of making* these images was essential to the *performance* of the sympathetic magic rites, a detail which points to an early – though implicit – interest in what later would be the concepts of praxis and engagement through art production.

Normative Approaches: Culture-History and Structuralism

Normative approaches to the study of art in archaeology share in common the fact that they consider *culture* as a *set of shared norms*; hence, art materials would reflect such norms in their design and technique.

Culture-history was the first formal theoretical framework developed in academic archaeology by authors such as Willey and Phillips. It operated within a normative conception of culture, and its main aim was to identify "*archaeological cultures*" or "*industries*" defined by spatial-temporal distributions of artifact *types*. Each type was defined by one or more trait/s that allowed the *typological classification* of artifacts found in the archaeological record. In turn, archaeological cultures involved specific artistic *styles*, defined by similarities in the types of motifs (their form, color, etc.), their layout on the artifacts, the themes represented in the figurative images, the techniques with which they were created, etc. Culture-history analyses tended to create *periods* which organized the archaeological cultures in a diachronic succession: thus, when approaching art, this theoretical framework created *stylistic sequences*. With portable art, these were mainly based on the stratigraphic position of decorated artifacts in successive layers of sites. In rock art these were based on (a) the superimposition of images, which were used as indicators of their relative dates, and (b) the indirect association of rock art images located in the walls of a site with pigment residues in sequential archaeological layers, dated sediments sealing the walls, or fallen wall fragments with imagery buried by the sediments.

These stylistic sequences were related by the authors to the periods not only as a way of providing a context to the former but also as a way of defining the latter. Yet it is interesting to note that in several cases there was no univocal correspondence between one style and one archaeological culture, implying that despite of the "shared cultural norms" premise, archaeologists did not

assume that industries and artistic styles changed necessarily in a coordinated manner. For example, in Western European Paleolithic art, Breuil (1952) defined two "cycles," Aurignacian-Perigordian and Solutrean-Magdalenian, while similar – though more complex – stylistic sequences were proposed by Laming-Emperaire and Leroi-Gourhan. This kind of stylistic scheme was applied to the study of portable art and rock art in many other regions of the planet (e.g., Gradin et al. 1979 in Patagonia, Argentina).

Due to its emphasis on culture as a set of shared norms, this framework focused mostly on the types of artifacts and of motifs which could be used as "fossil guides" due to their high frequencies and/or visual distinctiveness, to construct cultural periods and stylistic sequences, thus disregarding cultural variability. Its idealist ontology – entailed by the notion that culture was a "projection" from mind to practice – and its highly inductive epistemology also limited its explanatory power insofar as little room was left to move beyond descriptive and empiricist accounts of the past. However, the creation of art periods and stylistic sequences is still used by most archaeologists as a means of organizing archaeological data, although it has now become clear that this is only a means, and not an end, in the archaeology of art.

A second and entirely different normative approach to art was *structuralism*. In accordance with the core ideas of Levi Strauss about culture being structured by associations and oppositions as a reflection of the human mental structure, and following early suggestions by Raphael in 1946 about the fact that in European Paleolithic rock art animal representations were spatially displayed with a nonrandom structure, Leroi-Gourhan (1964) and Laming-Emperaire developed systematic analyses in search for spatial patterning of motifs in European cave art. Such analyses were carried out by (a) *classifying motifs* in *groups* (e.g., A = horses, B = bovines, P = fish, a = lines and dots signs, b = ovals and triangles), (b) partitioning the *topographic zones* of the caves (e.g., entrance; central zone; passageway; etc.), and (c) *quantifying* the motif groups in order to search for their *combination patterns* and their *links* to the *topographic zones* (Leroi-Gourhan 1964). The emerging patterns were then interpreted as *mythograms*, that is, the graphic symbolization of shared myths whose structure was projected from the mind to the cave walls. Such structure emerged from *dual associations and oppositions* such as light-darkness and life-death. Also, certain *animal motif types* were also associated to certain *geometric signs* and attributed a *sexual meaning*.

Although these authors also developed stylistic sequences in the normative fashion with an essentialist and idealist ontology, the differences of structuralism compared with the former framework are profound: (a) its emphasis on a synchronic view of art, (b) its partially inductive and partially deductive epistemology, (c) its use of quantitative data, and (d) its highly interpretive approach to the emerging patterns. Criticism did focus precisely on these issues: for example, the synchronic view collapsed images made centuries apart into one single data corpus and the mythogram interpretations were untestable. However, this framework did develop for the first time the systematic recording and quantification of art data (motif types, their combinations, and their spatial location) and proposed a testable hypothesis regarding the nonrandom layout of images, which are still of relevance in the archaeology of art.

Processual Approaches: Variability, Adaptation, and Information Exchange

A revolutionary breakthrough from normative theories was achieved by a group of archaeologists in the 1960s (e.g., Binford, Flannery, Schiffer, Redman, Renfrew, Watson, Wobst, etc.) who, following ecological concepts applied to the study of human behavior, proposed a definition of *culture* as an *extrasomatic means of adaptation* of *people* to the *environment*. This meant that culture could be seen as a *system* integrated by several *subsystems* (subsistence, technology, etc.), each of which complied with a specific *function* in the adaptation of a human group via the deployment of *adaptive strategies*. Thus, breaking away from finding cultural norms and creating periods which focused on the

average items of the archaeological record, these "new archaeologists" focused instead on the study of cultural *variability* and on the circulation of *materials*, *energy, and information* along wide spatial scales. This materialist ontology was combined with a hypothetico-deductive epistemology: both were foundational in one of the most innovative and pervasive archaeological frameworks (though with obvious shortcomings; see below).

Although its main concern was with subsistence and technology, this theoretical framework had a clear impact on art analyses. Archaeologists following this perspective stressed the need to (a) study variability *within* broad periods such as "Paleolithic art" which covered thousands of years and often masked actual variations in human behavior, (b) consider that terms such as "parietal art" or "portable art" were also labels that often masked variability in spite of their usefulness in academic communication, (c) go beyond inductive typological descriptions of periods and stylistic sequences and offer explanations proposed by explicit hypotheses tested against systematically analyzed data, and (d) focus not just on the potential symbolic meanings of art (which are often unattainable) but also on art's functions within the human groups that produced it (e.g., Conkey 1985).

These ideas were applied to several Paleolithic case studies, in which authors – following Wobst's demographic simulations and analyses about hunter-gatherer populations – focused on portable art and/or rock art similarities to identify inter-site links viewed as evidence of regional interaction. Art was a key evidence through which networks, alliances, and aggregation sites were identified by (a) qualitative comparisons between *designs* (Bahn 1982; Gamble 1982), (b) inter-site comparisons of relative *frequencies* of *decorated artifacts* (Conkey 1980; Bahn 1982; White 1992), (c) detailed analyses of *element repertoire* and *structural principles frequencies and diversity* (Conkey 1980), and (d) *number* of rock art *sites versus* stylistic *regionalization or homogeneity* (Jochim 1983). These data were contextualized by their environmental setting (e.g., paleotemperature, sites' geographic location, vegetation distribution, faunal diversity, carrying capacity, exploitation and intensification strategies, and their relation to the relative population densities they could afford) to characterize the natural and social context in which these "adaptive strategies" were operating.

In accordance with the processual agenda, these studies tended to see art production and use as a means of overcoming environmental stress and potential competition for resources triggered by environmental changes and/or demographic pressure by creating and reinforcing social bonds. This functionalist view of the adaptive purposes of art has been subsequently criticized by several authors (including self-criticism by some pioneers of this framework; e.g., Conkey 1984) for its environmental reductionism and for its teleological reasoning. While taphonomy/conservation, sampling, identification, and publication were explicitly considered as biasing factors of the artistic materials within the archaeological record (e.g., Bahn 1982; Conkey 1985), these analyses have been criticized because of their sampling strategies and statistical methods, which have subsequently been refined.

Following the adaptive approaches to culture, *style* and *function* were dichotomically conceived by some authors, the latter being considered as adaptive while the former being considered as nonadaptive (e.g., Dunnell). However, other authors argued that style did have specific adaptive functions as *systems of information exchange* (e.g., Wobst). This, in turn, led to a whole debate on the active and passive functions of style which are applicable to art analyses (see the entry on ▶ Style: Its Role in the Archaeology of Art in this encyclopedia).

Another crucial development within this framework was the flow model presented by Schiffer in 1972 "to view the "life history" or processes of *systemic context* of any material element" which included "procurement, manufacture, use, maintenance, and discard," in order to account "for the production of a substantial portion of the *archaeological record*." This model, similar to the *chaîne opératoire* concept, was adapted to the analysis of rock art production

by Aschero (1988) and applied to the study of production sequences of portable art by White (1992); clearly, both models supercede the processual agenda and are useful for the study of art materials from other theoretical perspectives.

The main criticisms to this theoretical framework were (a) its ecological reductionism and determinism, which often is not enough to explain art's creation, uses, and changes; (b) its teleological conception of culture, and art within it, as exclusively a means of adaptation, which leaves aside other potentially "nonadaptive" uses of art; and (c) its functionalist view of culture, and art within it, as a homeostatic system which paid little attention to its potential internal contradictions, which are often core factors leading to change. Although the search for variability was a key contribution of processualism, which is part of the research agenda nowadays, paradoxically its deterministic view sometimes gave little room to the study of the diversity of human actions, that is, human agency, social divisions, and inequalities. Other theoretical frameworks took up these challenges.

Post-Processual Approaches: Symbolism and Interpretation

One of the strongest reactions to the processual framework in the 1980s can be found in publications by, among others, Bender, Conkey, Hodder, Shanks, and Tilley who criticized it as positivist, reductionist, functionalist, and deterministic. Following postmodern concepts, they proposed instead that archaeologists cannot reach an objective truth about the past because the *past* is a *construct* made from the *present*, and as such it is a *situated* and *subjective* construction – that is, biased by the socioeconomic status of the researcher, his/her cultural and ideological background, and his/her gender, values, intentions, etc. Thus, the key means to approaching the archaeological record was via its *interpretation*, metaphorically reading it as a text, and offering as a result not necessarily just one but several subjective and *multivocal* insights to the past. Against the processual view of human behavior as a passive response to environmental conditions, post-processual archaeologists saw *human agency* as an active construction of *subjective relationships* between *persons*, *objects*, and *landscapes*. Thus, *material culture*, including art, was conceived both as *active* (bearing traces of its producers' actions but in turn having further effects on its users' actions) and *meaningful* (bearing multiple – sometimes ambiguous – senses and intentions). This was partly derived from ethnoarchaeological observations such as those made by Hodder, who studied the *decoration* of calabashes in the Ilchamus society of Kenya and inferred that, in this male-dominated society, these objects were decorated by women with designs that had several meanings, some of which were *gender*-related and *symbolized* female resistance.

A foundational example of the application of this framework to rock art interpretation is that of Tilley (1991), whom in his study of the engraved "*de*signs" of Nämforsen (Sweden) developed the following themes:

(a) An initial *question* about "*What is their meaning, significance, and value* ***today****? … Or can we hope to mediate them productively, reinscribe them into the present, and open out the carvings to subjective experience once more*?" (Tilley 1991: 8).

(b) Several *interpretations* of the carvings' meanings, including the use of the petroglyphs as totemic symbols (expressed through nature/culture dual oppositions), as ideological reinforcements of social control between the hunter-fisher-gatherer groups and as intragroup symbols operating in terms of age and gender distinctions (idem: 99, 167, etc.).

(c) An open *dialogue with the reader* in which he portrays the critical questions he thinks the reader will ask of his book, for example, that the discourse includes an open-ended array of possibilities, that the author has evaded his responsibility to tell the reader what the carvings in fact mean, and that the author's relativism destroys any productive links between past and present. To this, he replies that a "totalizing framework" or "totalitarian

solution" that tries to box in many interpretations will anyway leave a surplus of meaning/s that cannot be captured in one single discourse (Tilley 1991: 173). Through such final deconstruction of his own work, the author actively engages the reader in the realization that unique conclusions are neither feasible nor desirable in the human sciences.

Other post-processual conceptions and analyses of art have been less relativist and skeptical and have focused on applying concepts related to art's spatial distribution, such as the notion of social geometry, with lattices of people and objects deployed in space to *construct socially meaningful landscapes* (Conkey 1984). This includes the knowledge to navigate in these landscapes, which is not just verbal but also expressed through material culture (e.g., movable, as in portable art, and fixed in space, as in rock art). Thus, following Bourdieu's notion of habitus, Conkey proposed that human practices and knowledges structure space and in turn such structured space structures humans: the reproduction of such trends can be identified in the archaeological record (idem). This kind of approach to the ways in which people have engaged themselves in the construction of a visually marked landscape via rock art placement at significant locations has been fruitful and is still used nowadays (Bradley et al. 1994).

Finally, the interpretation of art from the *aesthetics* point of view – defined as the particular way in which a person experiences an object and through such process generates a subjective feeling – can also be included within the broad spectrum of post-processual approaches to past visual imagery (see the entry on ▶ Aesthetics in Archaeology in this encyclopedia).

This framework has pinpointed a crucial issue in terms of the *self-awareness* and *self-criticism* that archaeologists need to develop by acknowledging the *biases* of their *situated knowledge-construction process*. However, in spite of such contextual approach, the idealist ontology and the hermeneutical epistemology of post-processual framework can be criticized for their extreme relativism, which leads to the notion that any interpretation is valid. Moreover, post-processual discourse can end up being more self-referential (about the researcher) than analytical and informative about the persons who lived in the past: if multi-vocality is truly advocated, then those *past voices* and *agencies*, which are inscribed in the *materiality* of archaeological *artefacts-images*, should also be listened to, without of course claiming that they can be accessed objectively. Thus, it is useful to draw a distinction between the *past events* and the *knowledge about the past*: present researchers have had no intervention in the creation of the former but do have total intervention – and responsibility – in the construction of the latter.

Social Approaches: Ideology, Power, and Economy

Partly independently and partly as a response to processualism, a relatively small group of archaeologists started applying *materialist* and *neo-Marxist* concepts to archaeological analysis (e.g., see publications by Bate, Earle, Gándara, Lumbreras, McGuire, Patterson, Vargas Arenas, etc., which in some cases follow the much earlier and foundational work of Childe). Challenging processualism, this framework pointed out the fact that culture is not always a means of adaptation due to several reasons, including that *societies* are often *not homogenous*, hence not all members of a group have the same chances of accessing *resources* and *information* vital for their social reproduction: culture can adapt some people at the expense of not adapting others. From this point of view, the basis of a society is its *economic structure* (briefly defined as the division of labor entailed in the process of extraction-production-circulation-consumption of raw materials, finished goods and services, the property of production means and of their profits). This determines the existence of a *political and ideological superstructure* developed to sustain and *reproduce* such structure, particularly when it entails situations of *social inequality* and *labor exploitation*. Within this framework, *art* has mainly been considered as part of *political strategies* manipulated to maintain control and enforce *power*, as well as part

of *ideological discourses* to *mask* and/or *justify inequalities* (Earle 1989, Lumbreras 1998, Perez Gollán 2000).

Such *political functions* to create and reproduce intragroup differences can be identified by studying art styles and luxury items, which are a means of conferring and sustaining *status* and *power* due to the fact that they operate visually, catching people's attentions and generating aesthetic reactions – which are sometimes difficult to manage rationally, hence their high effectiveness (Earle 1989). Moreover, the power emanating from durable objects tends to feel more permanent, hence unquestionable, thus conferring solidity also to the social position of their owners (Earle 1989). In turn, *ideological functions* of art have been often studied by analyzing the images' motifs/topics and the ways in which these are represented: for example, in the case of Aguada style (found in the pottery, metal objects, wooden artifacts and textiles from Northwest Argentina), the images of a sacrificer holding a human head and, particularly, of a feline are pervasive throughout these materials and have been interpreted as a means of *legitimizing* power and hereditary social inequality, by linking the governants with sacred beings and, through such iconographic manipulation, represent the elites with divine attributes (Perez Gollan 2000).

These analyses of the political and ideological functions of art have focused heavily on art's capacity to express ideas and thus on the *mental dimension* underlying its creation and use, while the *material conditions* in which it was produced and displayed have mainly been considered as an *external context* which determined art creation, but have often not been thoroughly analyzed as an *internal component of art's production*. However, some authors have indeed noted that art can also be conceived not just as a *representation* but as a *presentation* of a material object and, as such, as a "*productive work*" (Lumbreras 1998). Thus, the artistic *work process* can be reconstructed via the analysis of the *production sequence* (Aschero 1988; White 1992). Also, conceiving *art* as an *economic product* entails that it is a material artifact made through the combination of *productive forces* (raw materials, tools, techniques, human labor) and *social relations of production* (the engagement of persons and materials and knowledge in such work process) in order to create an image-artifact. In turn, art production entails a certain *labor investment*, which can be assessed via multiple variables, for example, (a) media on which to produce the images, their abundance/scarcity, accessibility/inaccessibility, hardness, and texture; (b) raw material availability to make tools and prepare paint; (c) expedient/curated nature of engraving and painting tools; and (d) simplicity/complexity of image-making techniques and of visual designs produced with them. The study of such variables allows one to transcend a descriptive approach to the *materiality of art* and is relevant to characterizing the amount and quality of labor invested in its production, thus revealing economic aspects underlying its creation, which in turn shed light on some of the ways people *engaged* themselves – through practical manipulation and visual perception – with the *material features* of these images.

The orthodoxy of these approaches has been rightly criticized for its reductionist economic determinism and for its mechanistic and teleological approaches to art's functions as mere reproductive reflections of the economic structure. Moreover, on many occasions, the potential political and/or ideological functions of art are not well grounded, hence reducing the explanatory power of these concepts. For this reason, materialist and neo-Marxist approaches need to not just assert but demonstrate in each case why and how a certain art form has complied (or not) with such functions. Yet, breaking away from the Cartesian mind-body split, which originally led to art being associated with ideology and not with economy, and recognizing that art is *intrinsically* and *simultaneously* ideological-political-economic, strengthens the viewpoints proposed by this framework. Moreover, its materialist ontology – which allows to focus on contextual *and* internal material aspects of art production and display – and its dialectical epistemology, combining deduction and induction, have great potential within the archaeology of art.

Approaches to Art as Visual Communication: Semiotics, Cognition, and Expressive Symbolism

Most frameworks do involve the notion that art has a communicative aspect, but two frameworks have focused on this feature as their core concept. On the one hand, following the work of linguists and semioticians such as Saussure, Peirce, and Barthes and also having clear influences from the structuralist framework presented above, the *semiotics* approach has put forward the notion that visual art is the product of an act of *communication*, which includes a *source* who produces a *message* containing information, a *code* in which it is formulated, a *channel* through which it is transmitted, and *receiver*(s) who decodes it (if they share a common code with the source) and who may respond or *feedback* to it. Three sets of rules function in the code in order for the information contained in the message to be transmitted: *syntactic*, *pragmatic*, and *semantic*. The first two have clearly a greater chance of archaeological visibility in art designs, since the *types* of motifs and their *spatial relations* in terms of association, juxtaposition, direction, distribution, etc. (e.g., Llamazares 1992) can help identify aspects of the rules underlying the syntactic composition and pragmatic use of the images.

Also having developed partly from structuralism, approaches oriented to the study of *cognition* in the archaeology of art have focused on analyzing the steps taken by past artists in the creation of images with specific features (symmetry, size, etc.) and how their *visual perception* has participated in such process. To do so, special attention has been given to how *forms* (a) are *selected* and filtered among a wider array of possibilities, through the emphasis of some details and the omission of others, in order to facilitate and *economize* their visual perception and interpretation; (b) are *categorized* within each cultural context; and (c) are contained within a *cultural memory* which allows the *organization* of image perception, makes images *recognizable* and *significative*, and influences the *elaboration of future forms* (Washburn 1983). Finally, following Parsons' work, the *expressive symbolism* approach has proposed that an art object functions as an expressive symbol when it operates as a token of the *feelings* or the *attitude* of an "ego" toward an "alter," thus mediating the *affective component* in such *interaction* (Tanner 1992).

The complete application of these approaches seems to require other sources of information rather than just the archaeological materials, thus being more fully applicable to historic than to prehistoric cases. Yet many approaches developed by these frameworks can be found in diverse case studies.

Approaches to Art's Functions: Case-Oriented Hypotheses

A number of art analyses are based not on wide theoretical frameworks but rather on specific hypotheses which are oriented and applicable to specific case studies. Such is the case with *Shamanism*, which proposes that many rock art motifs are representations of images seen during *altered states of consciousness*, induced through *trance* and/or through the consumption of *hallucinogenic substances* which generate *entopic phenomena* (Lewis Williams & Dowson 1988). The application of this hypothesis, originally developed for South African cases, requires the use of ethnographic information as an independent source of data to corroborate it when applying it to other case studies in order to avoid equifinality problems: otherwise, similar motifs could be ascribed to shamanism when in fact they may well be the product of rather different causes.

Another function attributed to rock art is that of marking significant points and roads along *caravan routes*. This hypothesis has been tested by plotting the distribution of rock art sites and motifs depicting llama herds along wide spatial ranges in Northern Chile and checking their correspondence with trails followed by llama shepherds on their travels across long-scale distances and with sites containing evidence of these faunal resources (Nuñez Atencio 1976).

Rock art has also been related to *identity* in two different and complementary manners: (a) as an *archaeological indicator* of social groups and their boundaries and (b) as an *intentional*

construction of *self-expression* of social identity (Domingo et al. 2008). What they share in common is that identity is a twofold phenomenon, which requires simultaneously the construction of *similarities* to produce a *sense of belonging* to a group and of *differences* to *distance* such group from other surrounding groups. Thus, identity may have archaeological visibility, although it is sometimes difficult to distinguish whether such identity is mainly a construction by the archaeologist derived from a set of visual designs attached to material culture or whether such designs were intentionally produced as an identity expression. In turn, this notion is very much related to that of style (see above and also the entry on ▶ Style: Its Role in the Archaeology of Art in this encyclopedia).

Finally, the sets of marks such as dots and notches found on the surface of many Paleolithic portable art items have been interpreted as *notation systems* (e.g., lunar calendars and event tallies). This hypothesis was originally proposed by Marshack (1972) who used *microscopic observations* of *archaeological materials* to provide evidence to support it. However, such interpretations and methods were challenged by D'Errico (1995) who pinpointed the need to use *independent criteria* derived from microscopic observations of *experimental marks* as *parameters* to assess the observations of the archaeological materials and to recognize whether the sets of marks had been made with a single tool or with several tools and in turn whether it had been made in a single event or along different events (D'Errico 1995; see also White 1992). Heated debate led to the refinement of these methods and to the conclusion that indeed several Paleolithic materials functioned as notation systems, but not all marked artifacts can be interpreted as such.

Evolutionary-Ecological Approaches: Human Behavior, Cultural Transmission, and Natural Selection

Following neoevolutionary concepts but breaking away from the processualist teleological and functionalist explanations about culture, the *evolutionary-ecological* approaches in archaeology led by authors such as Dunnell, Gamble, Lyman, Mithen, O'Brien, Shennan, etc., focused not just on adaptation but on the broader process of how *human behavior* is developed and reproduced within an *ecological context*, thus including *mechanisms* of *variability production*, *cultural transmission*, and their *natural selection* under specific *environmental conditions*. Its materialist ontology and positivist epistemology are also shared with processualism, but the evolutionary framework has entailed a broader spectrum of behavioral possibilities that range from *adaptive* to *nonadaptive* outcomes, thus allowing for a conception of *culture* which is *not always homeostatic*.

Although the core lines of research followed by this theoretical framework do not include art, when applied to the study of such materials, this approach has proposed, for example, that *Paleolithic art* has been regarded as "an emergent property of the interactions between individuals as they pursue their own social and economic strategies" (Mithen 1991: 105) and thus as a method of *information storage and retrieval* which would help hunter-gatherers to take *decisions* that would help "increase their *chances* of *survival* and *reproduction*" (Mithen 1991: 105). Thus, patterns in faunal assemblages have been related to patterns in art representations: the risk and uncertainty generated by changing ecological conditions that affected species availability would have been partially coped with via the information gathered through their visual depiction. This would also account for the discrepancies between archaeofaunal and artistic taxa representations insofar as the latter included informative cues for two different strategies – mass-hunting and stalking of individual animals – which would leave different quantitative traces in the archaeofaunal assemblages (Mithen 1991: 105).

Within this framework, the *diachronic frequency distributions* of *decorated pottery* from early Neolithic Central Europe have been quantitatively analyzed in order to find out whether their *variations* responded to a "*neutral model*," in which variation is regarded as the result of *random drift* of stylistic traits, or to a "*selection model*," in which variation is regarded as the

result of *biased selection* of functional traits (Shennan & Wilkinson 2001). The authors conclude that the case-study data coincide with the model involving selection, that is, bias in favor of novelty toward the recent phases of the analyzed period, and stress that "this does *not mean* that there is a *radical separation* in the real world between "*style*," in the sense of neutral variation, and *function*, in the sense of variation under selection. In the present study it is clear that *both drift and selection are operating*" (Shennan & Wilkinson 2001). Also, analysis of the *tempos* in portable art production can show the *pace* at which *variability* increases or decreases diachronically and thus unveil the *rates of change* of a decorative repertoire and their links to underlying social, technical, and/or economic factors (Fiore 2011).

Another approach based on ecological-evolutionary ideas is the *ethological* conception of art, which focuses on the *behavioral* aspects of making art, or "*artifying*," and their adaptive underpinnings: for example, their capacity as *pleasure sources* and their occurrence under *crucial life concerns* are seen as reasons for the reproductive success of this behavior within the human species and of the human species along its evolution history (Dissanayake 2008).

Some of these concepts have been criticized for their naturalization of human actions, which entails a passive conception of people as entities behaving only according to biological conditions. However, people not only create cultural variability but also have a certain influence in the selection conditions of such variability: this conception allows for researching human agency underneath art production, continuity and change, at long-time scales characteristic of the evolutionary framework.

Key Issues/Current Debates

Several debates are currently developing within the archaeology of art arena, of which three are outlined here. One regards the reasons *why* such production occurred, which have mostly been related to human *cognitive capabilities* (including rational, perceptual, emotional, manual-skill, mnemonic, and neurological factors) and to the *potential symbolic functions* of visual images and their *adaptive and social implications* (Davis 1986; Chase & Dibble 1987; Davidson & Noble 1989; Mithen 1996; Conkey et al. 1997; Bednarik 2003; Hogdson 2006). Another revolves around whether art has been created exclusively by *Homo sapiens sapiens* (Mellars 2005) or whether it has also been created by *Homo sapiens neanderthalensis* (D'Errico et al. 1998), the latter possibility being slowly strengthened by early finds not attributable to the former species.

Finally, due to their strong aesthetic appeal and social implications, art materials often tend to be considered as valuable *cultural heritage* by *researchers, local communities*, and the *general public* (Loubser 2001). This situation sometimes entails conflicts of interest but also bears the potential of enriching the conservation, uses, and knowledge of this heritage if proper and mutually respectful dialogues among all the concerned agents are developed.

International Perspectives and Future Directions

The current theoretical panorama in the archaeology of art is quite heterogeneous, given that several of the above-mentioned frameworks are currently being used by researchers. It is clear that some of these frameworks have similar ontological and epistemological roots, making them complementary, while others are incompatible due to the fact that their perspectives contradict each other in the way they define and conceive art and/or in the way they have devised its analysis and interpretation. Moreover, different perspectives do sometimes approach the same topic from different points of view – for example, information transmission through art has been tackled from processual, post-processual, social, semiotic, and evolutionary-ecological approaches – and these approaches to such topic may or may not be complementary according to the ontological

and epistemological similarities or differences discussed above. A combination of different frameworks can often be viable and relevant where they are not mutually contradictory in their core concepts and methods. Through this critical panorama, the reader can follow those approaches of his/her interest and explore, pursue, and link their paths in order to shed new light on ancient art.

Cross-References

- ▶ Aesthetics in Archaeology
- ▶ Art Studies: Normative Approaches
- ▶ Mobiliary Art, Paleolithic
- ▶ Post-Processual Archaeology
- ▶ Post-Processualism, Development of
- ▶ Statues and Monumental Art in Archaeology
- ▶ Style: Its Role in the Archaeology of Art

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Archaeology: Definition

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Brief Definition of the Topic

Archaeology comes from the Greek term *arkhaiologia*, meaning "the study of ancient things," and is defined as the study of past peoples and culture. Archaeologists develop interpretations about the past through the recovery and analysis of material culture (which may include graves, monuments, buildings, inscriptions, tools, pottery, etc.) and associated evidence such as pollen, charcoal, residues, skeletal remains, etc. In order to provide interpretations about the past, archaeologists must accurately recover and record all aspects of a site.

Archaeologists may study the recent (historical) or distant past and are interested in a diverse range of questions: living conditions, how humans organized their social groupings, a interacted with and/or exploited the environment, diet, health status, trade patterns, burial choices to name a few. For this reason archaeologists may have specific areas of expertise which could include the analysis of specific material culture (e.g., pottery), environmental samples, human and/or non-human skeletal remains, dating techniques and so on.

Cross-References

▶ Bone Chemistry and Ancient Diet
▶ Buildings Archaeology
▶ Ceramics: Scientific Analysis
▶ Field Method in Archaeology: Overview
▶ Forensic and Archaeological Analyses: Similarities and Differences
▶ Plant Domestication and Cultivation in Archaeology
▶ Skeletal Biology: Definition

Archaeology: The World at 1800–1850

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State of Knowledge and Current Debates

Introduction

Archaeology as a social science is no stranger to the time in which it develops; therefore, it is constantly changing in its objectives and procedures. Similarly, it is not uniform, its development and practice are the function of its practitioners, and it relates to political and economic powers of every age and their interests. This eventually ends up forming dominant or official groups within the discipline that do not always coincide with the best of science or with what archaeology can do as a social science.

So although archaeology as a discipline starts emerging in Europe in the nineteenth century, the archaeology of the nineteenth century (the archaeology of capitalism or colonialism) starts at the end of the twentieth century. Industrial archaeology is one of the newest branches of archaeology, which is dedicated to the study of sites, methods, and machinery used in production processes introduced with the Industrial Revolution and the forms of social behavior and habitat resulting from such change. The term "industrial archaeology" arose in England and goes together with the concept of industrial heritage (Vincenti 2007). The overall aim is to go beyond written documents and graphics, but with diverse interests and approaches: for example, not with history as auxiliary but contrasting with what is believed to be known according to historiography, contributing to the explanation of the process of globalization that starts at this historic time. This archaeology has been practiced as an alternative to the study of documents of the Industrial Age, which have revealed biased in favor of the ruling classes and insufficient at allowing reliable research on the life of the subordinate classes, the peasantry, marginalized minorities (the end of African American slavery, aborigines from different parts of the world, communities or religious or political minorities). The starting point assumes that archaeological data not only allows the opportunity to balance the information but also to verify the truth or falsity of what the documents say and identify the discrepancies between them. It has therefore been the archaeology of capitalism, gender, "the border" – that is, the contact of the indigenous with settlers (with different approaches: the duality of domination-resistance and creolization or mestizaje).

Even the nineteenth century is investigated from archaeology with the aim of restating scientific methodology itself and revealing its biases (from feminism, for example) or searching for (pre)supposed incapacities and limits of archaeological methodology. Finally, it is being considering an archaeology of the modern era with profitable interest into what will be called industrial landscapes/industrial heritage, with industrial tourism routes included, especially in Europe, or to reclaim the recent history of other continents (from a vision of Native peoples not as a distant past, or as "acculturated passive" indigenous).

Although this nineteenth century archaeology began in Europe, in the same way as prehistoric archaeology, it rapidly spread to the USA and to areas that were colonized or industrialized in the nineteenth century: Australia, Central and South America, the Caribbean, Africa, and Asia. There are at present international journals, as well as Industrial or Historical Archaeology societies in different countries that publish journals and monographs where a large amount of information can be found. Its variety of approaches, objectives, and praxis are causing the various denominations within this Archaeology: historical, of capitalism, industrial, urban, ethnoarchaeology, colonial archaeology.

Global Perspective

Tierra Del Fuego Hunter-Gatherer-Fisher Societies

In this context, in 1988, a Catalan research team with Argentine collaboration began an ambitious

Archaeology: The World at 1800–1850, Fig. 1 Lanashuaia archaeological site in Tierra del Fuego (Argentina)

ethnoarchaeological program in Isla Grande, Tierra del Fuego. The shores of the Beagle Channel had been until the late nineteenth century an important part of the territory of aboriginal groups considered canoeists, namely, the group that the Austrian ethnographer Martin Gusinde had called *Yámana*.The aim of the project was basically methodological and ethnoarchaeological:to test the possibilities of modern archaeological methods to elucidate the nature of social relations that organize a hunter-gatherer society. In order to do this, excavations were carried out on sites that were last occupied by those societies, when they had already had contact with Europeans and were well documented and described. That is, eighteenth and nineteenth century Aboriginal settlements located on the coast of the Beagle Channel were excavated, and as an element of comparison, the northernmost settlements in the interior of the island corresponding to other native groups, called selknam by ethnographers, were also excavated. These were the yamana sites of Tunel VII: a settlement/hut with ten successive occupations; Lanasuhaia: settlement with a prolonged occupation of several months (Fig. 1); Alasawaia with the excavation of consumption remains of the last occupation of a settlement; Harberton, a midden shell burial of an adult (male); Mischiuen III a burial of an adult female in a rockshelter (reused as a burial area) and Cabaña Remolino, a site which hosted one of the last yámana ceremonies according to Gusinde, and in the heart of the island, the selknam sites of Ewan I a ceremonial hut and Ewan II, a hut with an occupation related to the one mentioned before.

The results of the above work allowed the archaeological documentation of the last moments of these societies and the causes of their disappearance (Estévez & Vila 2007).

These canoeist Aboriginal groups, whose history in the area dates back to 7,000 years ago, lived in the nineteenth century (first half) basically exploiting coastal and marine resources (fisher-gatherer-hunters).They had a technology that today is described as simple with rigid social norms that maintained structural inequality between women and men at all levels. Previous archaeological work had shown that after a long historical process, a social organization had been achieved, which held control over food and consumer goods production as well as over biological reproduction.

With the archaeological evidence of the studied sites, the first indirect contacts with Europeans/whites were found. Shortly after the first European expedition passage through the Strait of Magellan in the sixteenth century, European raw materials had reached the area of the Beagle Channel (a fragment of glass in Recent Component Lancha Pakewaia site, 250 years BP at least). This means that the first indirect European

Archaeology: The World at 1800–1850, Fig. 2 Fueguian knives: the two to the *left*, traditional making with mollusk valve blade, the three at the *right* using European iron blades hafted in the traditional way

influence came 200 years before the first official expedition, the HMS Beagle.

In the nineteenth century sites, European materials are already present, although in small quantities (glass fragments) or have indirectly been documented through cutting marks left by metal instruments in some large animal bones. This European presence only involved changes in the raw materials used in their technological system, improving efficiency level: For example, glass or iron found on beaches from ships or shipwrecks was used to replace the mussel shells as knife blades or arrow stone heads and fragile bird bone awls. Initially, these new materials were worked with the same methods used for local raw materials (percussion, abrasion, polishing) and they were even given shapes that imitated traditional forms (awls are European metal nails shafted in bird long bones such as the traditional awls, the European iron blades are hafted transversally like the aboriginal mollusks-blade knives.) (Fig. 2).

Perhaps due to the fact that the archaeological sites are not yet fully documented at an extensive level, substantive changes either at settlement or social organization levels have not been observed as yet. Big changes are only confirmed later (in the second half of the nineteenth century), when there is written information of missionaries who settled in the area. Hut remains of the contact time do not differ from those of previous ages, although it is possible that at the time of the proto-contact and first contact, there were hut settlements formed by larger groupings of those described from the second half of the nineteenth century. This could be the case at the Lanashuaia site, and also of the camp sites that can be observed in the engravings of the first expedition to Cape Horn.

European Diseases

Although the first impact of diseases is not known, it is likely that new diseases and new outbreaks of existing ones, and which are archaeologically verifiable in human remains, drastically diminished the number of people. On the issue of diseases, we do not know the impact of those that could be transmitted at a distance, before the actual arrival of Europeans. However, there are documented infections that occurred from direct contact, although there are no written records until later when the missionaries had settled, who described episodes of mass mortalities. It is therefore possible that the ethnographic image constructed from the second half of the nineteenth century offers a different humanscape that could have originally existed in the time prior to European contact.

However, not enough human remains of those times have been analyzed yet, even though there are already enough excavated: a burial in a midden of an adult with two glass scrapers in

Harberton, a young woman in the rockshelter Mishiwen III, near one of the first settler-missionary settlements, or a burial in Acatushún midden, with an adult and six buttons associated.

However, it is known that there were direct contacts with crews of whaling ships and fur-sealers, crews with scientific and political expeditions, and later missionaries who actually not only introduced new diseases but favored certain everyday practices that negatively affected the health of the indigenous population.

At this time, the practice of abduction and translocation of indigenous people also began, which continued into the twentieth century. By 1829, during the first trip for scientific exploration of the South American coast, Lt. British Royal Navy Robert FitzRoy took three native young men and a girl from the coasts of the channel to Britain in the brigantine Beagle (Fueguia Basket, Jimmy Button, York Minster, Boat Memory). And in 1831–1836, the same FitzRoy now Commander on the second voyage of the Beagle (which is famous for the travel journal published by Charles Darwin) brought back the three surviving Fuegians: Fueguia Basket, Jimmy Button, and York Minster.

Christian Missions

It was on this 1836 journey, that the first failed missionary attempt occurred: Richards Matthews, appointed by the Church Missionary Society to remain among the Fuegians, stayed a few days at Wulaia Bay (now Chile) but resigned and returned to the ship. Later, in 1848, the second missionary attempt would take place, by Allan Gardiner in Picton Island (the mission failed and afterward the human remains of the first missionaries who died of scurvy and hunger were rescued). It was not until 1871 that the Anglican mission of Thomas Bridges and his family (Mary Ann Varder and her daughter) was definitively established in the channel. This first stable mission, a small village with farm gardens would become the modern city of Ushuaia which has not been excavated, nor have subsequent missionary settlements in the area.

Predation and Overexploitation of Native Resources by Europeans

One of the phenomena that excavations in Tierra del Fuego have shown is the relative and significant increase of fish remains together with the decrease in the proportion of sea lion consumption in these eighteenth and nineteenth century settlements (Tunel VII, Lanashuaia, Alasawaia) compared with their presence at sites of previous eras. It was interpreted as evidence of an frustrated attempt to change the strategies of subsistence. The pinnipeds resource had been one of the keys to maintaining the livelihood of these peoples, since the last breeding areas of these animals were in the outer islands and the Antarctic Ocean, away from the technological range of the indigenous population. So the intensification of fishing could be an attempt to develop an alternative resource against a continually descending abundance of pinnipeds. However, it is very likely that the rigidity of social norms, the catastrophic effect of diseases, and the scattering of the population, together with the subsequent missionary activity, did not allow a possible slow structural change, but precipitated the disintegration and dissolution of the native society.

It has been shown that even though the paleoclimatic record found at archaeological sites shows slight variations throughout the Holocene, there was not a natural biotic or abiotic cause to explain this final disturbance.

In the early nineteenth century, Euro-American seal and whale exploitation began in the Antarctic, although there are not yet too many historical details about its magnitude, temporality, dynamics, and intensity. However, in the 1990s of the twentieth century, archaeological projects were initiated in the Antarctic confirming the assumptions made about the causes that affected the issues mentioned before. Indeed, the whaling settlement excavations confirmed documentary sources pointing to a constant presence of sealers and whalers fishing boats directly slaughtering in the breeding zones with technologies much more lethal than the ones of the natives. This caused the catastrophic decline of marine mammals, a fundamental element in the diet of the canoeing people of the Fuegian archipelagos.

Archaeological excavations of camps and sealer shelters in Desolation Island and Cape Shirreff (South Shetland Islands) provided the first physical evidence of the coexistence of foreign and indigenous hunters, demonstrating that these boats used male natives as workforce/sailors/pilots and women as sex objects. All of these contributed to the disintegration of native social organization. In the archaeological sites, indigenous artifact remains were found in direct association with remains of wood, ceramics, earthenware, iron, glass, and seeds from English or American origin of the nineteenth century. In Yamana Beach, close to two rockshelters that were used by sealers, a complete skull of a young mestizo adult woman and two femurs, apparently from the same person, were found.

It was also found in other beaches a marked architectural difference between settlements and, in some cases, constructive differences which are attributed by researchers to persons of different status within groups.

Since there is no radiometric method that could be applied to these archaeological findings reliably, the exact chronology is a problem. Consequently, due to the high homogeneity exhibiting archaeological materials and knowing that the first stage of hunting, between 1819 and 1825, was the most intense of all and which brought the largest number of hunters, there is a tendency to ascribe the findings to this moment. Furthermore, the type of pipes present in these sites strongly reinforces this assumption, since the pipes found in the sites are from the 1780–1820 period (Stehberg 2003: 177).

Another interesting archaeological project in this regard is the Spanish-Chilean project that sought the location of the Spanish ship San Telmo, considered as being lost in South Atlantic waters of Cape Horn in the spring of 1819 when it was sailing from Cadiz to El Callao, in the American coast of the Pacific Ocean (Stehberg 2003). It was sent together with three other ships and troops to try to help the Spanish royalists in the rebellious colonies in South America.

The archaeological study included not only the search and identification of the ship remains but also all evidences left by successive visitors to the area. In a large bay enclosed to the west by some islets called Telmo Island on old maps, a kind of shelter on a cliff was found that may have been artificially prepared. Throughout the area and in other large bay, the Media Luna, there was scattered wood debris, seal and sea lion remains, and some whale bones.

In a superficial survey, a skull was found which, according to an anthropological examination conducted at Santiago de Chile University, may correspond to an indigenous woman carried by sea lion hunters as servant in a boat.

Finally, five sites were located with scarce remains of estructures and disseminted materials corresponding to small temporary camps. Excavations in four of them provide the first evidence for the area that matches with similar settlements found in Byers Peninsula, King George Island, and elsewhere in the archipelagos of the South Shetland and Orkney.

The verification of the final process of aboriginal societies of Tierra del Fuego brings up the question of whether it was an isolated case because they were socially and technologically simple societies, or if it was a repeated and general process affecting small scale societies, whose subsistence was centered on hunting, fishing, and gathering.

To check this issue, the processes experienced by other native societies based on fishing-hunting-gathering should be analyzed.

Societies of the Northwest Coast of America

The recurrently considered more complex hunter-gatherer societies inhabited the land at the other end of the American Pacific coast. In the societies on the central coast of North America Northwest, archaeological research show that ethnographic descriptions have important anachronisms, errors, and gaps. Information contrasted archaeologically shows a similar process to Tierra del Fuego: The trigger for the contact was the exploration and fur demand since 1742. Firstly sea otter and then when they were rarefied from 1815, hunters turned to the inland fur trade (mostly for beaver).

Two archaeologists (A. Martindale and P. Prince) both point out a first

protohistoric/proto-contact period previous to the nineteenth century in which European influences come indirectly, followed by a second period of exploration and fur trade in the early decades of the nineteenth century. During this time, the indigenous maintain their economic autonomy and their production relations. After the first settlement of trading posts (Fort Simpson in the Tsimshian area and Fort McLoughlin, further south in the area Bella Colla), there would have been a post-contact phase in which trade and exchange increased until finally shopkeepers, settlers (in 1834, Fort Simpson is founded and in 1849, Fort Rupert), gold seekers (1858), European canneries and sawmills began to settle in the territory and from the second half of the century, eventually swallow the indigenous population in the market society.

Throughout this period, there is a change in relations between Europeans and Indigenous parallel to the process of change experienced by the European society itself (moving from business contact to colonization).

In the coastal Tsimshian area, the first direct contact occurred in 1787. But there is what we call proto-contact period in which, as in Tierra del Fuego, the natives are exposed to indirect influences of Europeans (diseases and European objects like coins and metallic elements, which have been found throughout the Skeena River course). This first European trade's indirect influence is archaeologically perceived besides the presence of some industrial objects, by the increasing number of fur animal remains in the settlements and especially changes in the settlement pattern itself. In the lower Skeena, permanent occupations change to seasonal occupations and new settlements are located, as Metlalka in natural harbors. Inside the lower course of the river, there is a shift to a hierarchy of settlements and larger villages appear along the Skeena and the confluences with tributaries (Exchamsiks and Kitsumkalum).

Another thing was happening in the middle course of the Skeena, in the Gitksan area, where fortified settlements were placed (e.g., sites of Kitwanga-GgTa1-in-Gitlaxdzawk Kitsumkalum Canyon and GdTc1-in Kitselas Canyon) with permanent occupations on the river to participate in the fur trade traffic between the interior and the coast, where European boats arrived. Settlements became more sedentary and large (up to 17 houses), but the houses got smaller and started having European elements.

In brief, there was an increase in the participation of the commercial economy (the subsistence economy losing importance) and a reduction in houses (social segmentation, which could be explained by the effect of diseases but also by the effects of internal segmentation).

The presence of exotic European assets empowers already existing tendencies as e.g., surplus accumulation, violent conflict (the towns became fortified), social inequalities, and the slave trade. The first two are very well documented in the town of Kitwanga Hill Fort dating from the period 1750 to 1859. There, European items are distributed homogeneously in the houses, but at the end of the period, they are more concentrated in certain areas of a central house (Prince 2001). There, fur animal remains are concentrated and exotic goods accumulation is documented as well as a much more varied diet than in the homes of the periphery which are more modest in their construction.

Despite these changes, social reproduction structure remains essentially unchanged in this proto-contact moment. While the size and number of houses in villages are different, the internal structure of the houses will not change substantially until late nineteenth century. Martindale attributes this resistance to change, among other things, to the fact that until the complete settlement of the European colony in Fort Simpson and especially to the final installation of the missionaries, the natives depend on the strategies and traditional subsistence-production relations.

This was documented in the Psacelay site (GbTh-4). In this town, the pre-contact houses are as described ethnographically as large (up to 11 * 18 mm), multifamily, with internal divisions, with an uneven distribution of consumer goods and accumulation of surplus in the "noble" (the innermost) part of the house. In this site, one of the two pre-contact houses is abandoned

Archaeology: The World at 1800–1850, Fig. 3 Historical site Fort Langley. The original was built by the Hudson Bay Company in this place in 1839. Here, in 1858, the colony of British Columbia was proclaimed. The reproduction was built for the touristic visit

coinciding with the presence of post-contact European elements in the other house (Martindale 2006); however, the internal structure remains the same. The same happens in the town of Ginakangeek (GbTh-2) where crafted glass, dishes with blue decoration, trapper tools, lead fishing weights, and rifle caskets were found in one of the houses.

Trade of European goods (iron, iron tools, muskets, copper plates, fabrics, paint, sugar, biscuits, molasses, rum, tobacco) was superimposed, taking advantage of preexisting sharing networks (dentaliums, slaves, eulachon oil, dried berries, canoes, etc.) and was used to enhance prestige, with natives as intermediaries and with European ships acting as intermediaries among the natives.

With the installation of Fort Simpson (Port Simpson, British Columbia), from 1834, the natives began to cluster around European settlements, increasingly abandoning their winter settlements. Although hunting and fur preparation was mainly carried out by autonomous indigenous peoples, here, as in Tierra del Fuego, written documents speak about hiring Indigenous labor: first Aleuts by the Russians (1810) and then Indians by the British of Fort Simpson. Furthermore, since 1840, we find the natives integrated to European settlements. From 1870, they become employees in sawmills, packaging plants and they even migrate to the city of Victoria (the settlement of Fort Victoria was installed in 1843).

From the European forts, diseases spread, with one in 1836, killing one third of the native population (Fig. 3).

Similarly in the area of Bella Colla, analysis of all materials at Kimsquit settlements demonstrates a gradual incorporation and modification of European goods which are incorporated into native life, which retains indeed most of its own elements. It is not until the second half of the nineteenth century that the use of these foreign items becomes widespread, albeit sometimes with native functions and uses. That is, European materials were selectively adopted. In some cases, they worked with these materials with traditional techniques, giving them new and original forms different than the ones they had before. However, sometimes, it was not just about replacing traditional items, but that using imported objects acquired added value or that these objects were used as prestige goods (firearms, buttons, uniform, transparent glasses, and keys).

The fur companies that entered from the east of the continent advanced by 1806 to establish forts (Fort St. James, Fort Kilmaurs, and Fort Connelly) in the headwaters of the Pacific.

The missionaries of the Church Missionary Society arrived later and settled in 1822 in Red River (Rupert's Land), but in the Pacific Northwest, the first missionary (William Duncan member of the same Church Missionary Society) was installed in Port Simpson much later (in 1857), as in Tierra del Fuego. The objectives and strategies of these missionaries were the same at both ends of the American continent.

Australasia

Although there are different elements, the process that took place in the eastern Pacific had many similarities to the other end of the South Pacific. Archaeology has helped to restore a more complete picture of the early days of European settlement, particularly through the Australian Society for Historical Archaeology founded in 1970 by Judy Birmingham that published a newsletter from 1973. Later, in 1983, this publication became the Australian Journal of Historical Archaeology. This Society from 1991 was extended in Australasian Society for Historical Archaeology that publishes the ASHA Newsletter and Australasian Historical Archaeology Journal, as well as a series of occasional papers and monographs since 1984.

Archaeological works, many published by the Australasian Institute for Maritime Archaeology, have analyzed sunken and stranded shipwrecks and trade of materials transported. Whaling settlements, consumer goods factories (saltworks) and mines, farms, sheep farming, forts, war scenarios, military installations (e.g., the 1840 military settlement of Port Essington or Fort Ligar), prisons, missions, and urban development of cities such as Sydney, Wellington, and Auckland have also been studied. Indigenous life and activities of the subordinate population: Women, and female convicts and aboriginals have been taken into account.

The inrush of the Europeans occurs in an analogous manner: There were some initial Iberian and Dutch seafarers exploratory trips (the archives on the Peninsula are scarcely known and studied by Anglophones scholars), but it was the famous Cook's travels that, in an expansive social context of the metropolis, triggered the scalar increase of the contact. Shortly after his travels, fur seal and sea lion hunting boats started coming to the south coast and southeast, and in 1788, the European settlement in Australia with convicts started in Port Jackson (now part of Sydney). This settlement would be followed by the arrival of the missionaries and little by little, during the first half of the nineteenth century, the interior of the Australian continent was explored.

Although the first to establish seasonal jobs in Van Diemen's Land, present Tasmania, were sealers, the settlement, with soldiers, convicts, and free people, was officially founded in 1803 by a British expedition sent from Sydney to prevent the landing of the French. Colonization was very fast and fatal as evidenced in a punitive expedition of 1815 against the indigenous for killing as many as 930 sheep. The colony quickly became a sheep and livestock colony with hundreds of thousands of cattle, for which they had to take native territories.

The estimated colonial registered population grew from 7185 in 1821 to 24,279 in 1830.

The archaeology in New Zealand, as it is an island and it has similar social and environmental conditions, illustrates the parallels with Tierra del Fuego and the Northwest Coast.

In all of these sites, it can be seen that there was a proto-contact phase (with sailors of various nationalities around their shores) documented by some European items in indigenous contexts: nails, axes, glass, and collar beads. A period of more intense initial contact with seasonal whalers and sealers settlements would follow, which is seen in the increase of these materials in New Zealand (Smith 2005) and the installation of the first penal colonies on the continent. Archaeological research clearly illustrates this contact process in which Aborigines initially tried to take advantage of the presence of Europeans and the introduction of new items incorporating these enclaves within their own networks, which probably like occurred in Tierra del Fuego and in the Northwest Cost, also stimulated significant and stable clusters of people around settlements and European trading points. The settlement of men on the coast generated a certain symbiosis and

also problems of isolation and survival of new settlers, transference from the aborigines to the settlers and mixed settlements.

In New Zealand, the first Europeans to settle seasonally were sealers (mostly in the western part of the South Island), in some settlements where, since 1792, they lived with Aboriginal women and their mestizo offsprings. The first official settlement was that of the missionaries of the Church Missionary Society in 1814 in Oihi, Bay of Islands (Middleton 2006).

Colonization was conducted shortly after the system of privileged companies that violated treaties (such as that of Waitangi in 1840) installed more than 20,000 settlers in just 10 years. From 1803 to 1854, there were over 74,000 convicts transported from the British Isles, including some 12,000 women. This expansion policy confined the indigenous, reduced to a quarter, to the most bad lands.

As in the Pacific Northwest (and later in Tierra del Fuego), in the 1850s, the gold rush attracted more settlers to the Australian continent.

Violence and Disease

From the first contact in 1769 between Cook and the Maori in New Zealand, there began the confrontation between Aboriginal and newcomers. In Australia just 4 months after the first settlement in 1788, there was a confrontation. In December 1790, there was the first recognized massacre of indigenous people. On the mainland, the killings continued unpunished until 1838, by military officers, settlers, and ranchers. But it would be extended along the entire nineteenth century (until 1932) as the frontier advanced, and the conflicts would be reproduced between newcomers: between free settlers and deported, and between squatters, ranchers, and farmers.

In Tasmania, although it is assumed that there must have been some previous encounters between Aboriginal peoples and sealers, the first known violent episode occurred the year after the European settlement in 1804. Violence against Aboriginal people did not cease until its peak (the so-called Black War) between 1823 and 1834. After a major "cleansing" operation in the districts already colonized, it culminated in the deportation of all survivors (about 220 people from different groups of Tasmanian) to Wyllbaenna settlement on Flinders Island in Bass Strait. Most would die during capture and confinement: 14 years after their confinement, in 1847, there were only 47 survivors (Birmingham 1992).

This process is quite similar to that which would occur later, with the advance of the sheep border, in Isla Grande of Tierra del Fuego on the Selknam population, which saw them imprisoned in missions, segregated, deported, and confined on Dawson Island.

In New Zealand (after Cook), hostilities were reproduced, this time between sealers and Maori, with the war called the Red Shirt War which lasted from 1809 until the 1820s. As in the Pacific Northwest, with the well-known case of John R. Jewitt from 1802 to 1807 (Jewitt & Stewart 1987), there were Europeans who trespassed over the border to become "Pakeha" Maori. Their knowledge of the habits, ways of acting, production processes, and access to European goods (such as muskets) made them highly appreciated by the natives. This would lead to the creation of a mestizo population segment as the one that had been formed, by 1821, on the islands of Bass Strait in Tasmania.

As in the North American coast, European interference stimulated some preexisting trends in native society. The cultivation of potatoes, as in the Tsimshian area, was quickly adopted and used as an exchange good by the indigenous, allowing them to enjoy lower dependence on subsistence seasonality and increase production and at the same time increase the workforce. This, together with the possibility of acquiring European guns, stimulated and increased preceding tensions, the war and slavery between groups and Maori peoples (as happened also in known cases of the east coast of Vancouver Island). Thus, bloody episodes occurred as in the so-called muskets war among Maori between 1807 and 1842.

The Treaty of Waitangi between the British and Maori, which was signed in 1840, served to turn the archipelago into a colony out of fear of French influence. The Treaty was not respected

by the settlers, which resulted in the Maori wars between 1845 and 1872 wars that would definitely change the balance of forces in favor of the newcomers.

As it had occurred in Tierra del Fuego, in regard to armed violence, the kidnapping of natives and their removal to Europe soon followed. In 1790, two Aborigines were taken to show them to the king of England. Women and children abduction was also common in Tasmania occupation (especially between 1816 and 1818).

The first settlements of sealers resulted in the sexual predation on indigenous women for using them as company for their campaigns between November and May each year. Europeans got them from the natives themselves in Tasmania and New Zealand in exchange for European objects, sealion furs and dogs. Some missionaries were engaged in kidnapping children (especially girls) and they kept them segregated in special enclosures, with the excuse of saving them from venereal disease. As in all the Americas, diseases reduced indigenous populations to a third. The first recorded epidemic occurred around the European settlement in April of the year following their establishment. Epidemics were reproducing regularly in 1792, 1822, 1831, etc. In their explorations, the Europeans continued finding people marked by smallpox, contributing to the suggestion that the diseases were introduced by Asian fishermen from the North before European arrival.

Sexually transmitted diseases, alcoholism, and segregation policy (implemented first by the missionaries and then by the colonial government itself) helped to dismantle the Aboriginal population's reproduction mode, it would take over a century to begin to recover and reorganize it.

Resource Predation

The early days of pinniped exploitation are poorly documented. Records begin in 1791. At the beginning, the aim were the skins (more than 45,000 skins were gathered per year) to be exchanged, first in China for handicrafts, spices, tea, and silks and then in London where oil, fat, and skins were selling well, and where industrial processes of preparation and preservation developed. It affected the regions from the southern shores of Australia to the southern islands of the Antarctic. In the southern coasts of New Zealand, it lasted until mid-1810, but in just 4 years from 1798 to 1802, pinnipeds were overexploited in all the region of the Strait of Tasmania, and the sealer boats had to move increasingly to the South. Business decreased due to hostilities with Maori in the south, with a slight recovery in 1823 after temporary cessation of fighting and the installation of small sedentary settlements. But animal populations in Australia and New Zealand were overkilled in 1830 and the potential for massive exploitations nearly depleted. The exploitation of pinnipeds for their fur and their fat was supplemented in South Australia, Tasmania, and New Zealand and southern islands with intensive exploitation of whales (for their fat, bones, and whalebones) well before 1803. This hunt was conducted from factories located in coves and bays. Depletion of animals near the coast and the competition of the kerosene as fuel by 1850 changed the type of exploitation, directing it to open sea.

In the productive activities of these exploitations, Aboriginal women and some men were incorporated. Aboriginal New Zealanders also participated in this marine exploitation working at the factories situated in the south of the archipelago. Small settlements were formed with a varying mix of natives and Europeans.

Social Dislocation and European Settlement

Missionaries' permanent installation in New Zealand in 1814, the coastal bases of whaling operations, New Zealand forest and linen exploitation, and agropastoral expansion increased these contact and the transferred materials. The rapid colonization of white people led to an advance of the frontiers, increase of armed fighting, and missionary activity. Survivors were relocated and reservations were established, missionaries tried to attract the natives to Christianity, to the European way of life, to resource exploitation of commercial interest and wage labor.

Excavations in the afore mentioned Wybalenna mission in Bass Strait, where

Tasmanian natives were relocated between 1833 and 1847, may provide additional light on how Tasmanian Aboriginal society came to disappear. Archaeological work confirms the historians' views, which suggests that the Wybalenna settlement was not viable: Living conditions were the poorest and food was scarce; thus, some Aborigines died from malnutrition and disease. They spent time on hunting local native wildlife to supplement their diet: There is a mixture of bones of small marsupials, molluscs, and European domestic fauna (which will increase its proportion over time). They have also shown that not all residents alike accepted the conditions imposed: There are knapped glass instruments and different proportions of local and imported animals in the different rooms. It is clear that there was an attempt to reeducate them in the habits (e.g., sweeping the rooms, ceramic tableware) and with the European system (pencils, ink). Other European items, such as buttons, beads, necklace beads, tobacco, and ceramic pipes, should be bought with coins, and thus, the incorporation of natives to the wage labor and market economy is demonstrated. The official establishment of the colonies and the transformation of the settlements into real urban administrative centers since 1840, as well as the establishment of cities such as Sydney (1852), Perth (1856), Melbourne (1847) by Queen Victoria, marks the end of this period of colonial settlement.

The End of Contacted Societies

In all these areas, were native societies subsisted on fishing or hunting, the same process is archaeologically documented, even though it differs qualitatively or is not completely synchronous at a local basis:

1. A proto-contact (indirect or isolated and littoral) whose effects are documented archaeologically by European materials (raw materials and other utensils reformatted with their own techniques and adapted to their own use) found in Aboriginal sites. There was first the impact of European diseases and the gradual adaptation of European technology in a context of social relationships and native subsistence systems. At the same time, a change in settlement patterns to position themselves in relation to this new foreign input, but still within the traditional relations systems, was experienced. Certain existing trends, such as aggregation, women subordination, social inequality, and, in their case, intergroup violence, were stimulated.
2. Direct contact and European settlement (travelers, traders, missionaries, miners, and settlers), which involved new episodes of catastrophic epidemics and sometimes fights/slaughters. These Europeans, after the first contacts that involved more or less violence, tried to kidnap or capture some native people to serve them later as translators or introducers in their society. European settlements that were installed by the mid-century acted as attractors of the indigenous population while spreading diseases, alcoholism and as bridgeheads for waged (independent) labor and bases for exploitation and competition for resources and territory.
3. The integration of natives as a laboring force (guides, trappers, hunters, food suppliers, translators, trade intermediaries) for both men and women, the latter always with the addition of sex, was produced.

Throughout this century, these groups were completely socially unstructured, and even physically almost gone by the first half of the nineteenth century, like the Tasmanians or Beotucos of Newfoundland. The survivors would be integrated into the market economy and even became dependent on it for their livelihood, forming part of the lower salaried classes of the new society.

The long history of these native societies came to a sudden end in the nineteenth century. They could not control the de-structuring effect on their social networks. Although perhaps it provided initially a series of specific daily improvements for a part of these native societies, it was eventually lethal to the survival of their organizational structures. Aboriginal societies would only be "resurrected" or reconstructed as entities, from World War II and for political reasons and following a political struggle.

In this intermission between the first contacts and the disappearances is when religious missions,

industrial companies, gold seekers or adventurers, or sailors of marine resource exploitation companies and the different governments that were formed in the new countries that emerged from colonization, played an important role.

Global Causes

So far the description of processes that affected societies at the end of European colonial expansion has been explored. Since the verification of the existence of this phenomenon and recurring global processes, the evidence reporting the global causes of the end of some social systems that had survived many crises over thousands of years should be analyzed. Allochthonous objects (metal, porcelain, glass, etc.) found in archaeological sites in settlements at the ends of America and Oceania from early nineteenth century came from maritime routes. These items relate to the newly emerging Europe in this century, the nation-state, colonial-expansionist-scientific-industrial-educated Europe.

In the first half of the nineteenth century, Europe was undergoing major changes. European capitalism of the emerging industrial revolution developed and consolidated new sources of energy (steam power machine). Transport systems (such as the train), with coal as fuel and iron as the backbone, widened markedly and there were large movements of people (from the countryside to the cities). All this led to, and was caused by, an increase in the demand for a means of production of increasingly sophisticated, luxury goods for the new upper class/bourgeois society and consumer products for the metropolitan working classes and the new colonial population in expansion. It was about a basically legitimist, clerical, and reactionary Europe, where nationalism and liberalism prevailed. Nationalism was an important political factor and the mercantilist theory provided a stimulus for the development of a new type of colony; the colony was established by Europeans as a social and economic expansion of the metropolis. This system, which required major sources of raw materials and new markets to sell their products, now also started its own colonial expansion. The exploration of last boundaries for evaluating potential resources briefly preceded colonial penetration, which was often justified by cultural and ideological-religious arguments: as a civilizing and/or evangelizing mission.

Therefore, the causes of the disappearance of those native life systems successfully achieved and experienced for so long, with local characteristics and specific crises themselves, were not internal. Commercial competition between nations led to the establishment of new colonies in the new lands, the processes that occurred in the contacts and meetings with the societies called "primitive"/ethnographic led quickly to their end. So their disappearance was caused by a confrontation with a growing external socioeconomic system whose intrinsic emerging characteristics made it prevail, destroying those it contacted.

History, after the first contacts, is the history of European colonization.

Transformations in the Colonies

The greed and force of this new system are evident, not only in the new lands that the European metropolis occupied in this century, but in the former colonies established centuries before. The consequences of this struggle between European nations, between the metropolis and its former colonies, or between the new settlers and the Indigenous can be detected archaeologically, along all coasts through archaeological remains of the land and naval battles like the underwater remains of the iconic Trafalgar confrontation.

Rivalries between the major European powers for the appropriation and exploitation of the territories "discovered/conquered" were the first stimulus to scientific-political travels (with adventurers, pillaging, and kidnapping). The voyage of the HMS Beagle is the best-known example of the first half of the nineteenth century (Fig. 4). These trips were aimed at finding and evaluating new resources, exploring possibilities for their exploitation (sealers-whalers-gold-fur-trappers) and establishing new commercial circuits. Goods and circuits are known by archaeological analyses of wrecks and the distribution of allochthonous goods that have been found. From the records of the ships, the circulation of

Archaeology: The World at 1800–1850, Fig. 4 Drawing of Fueguian canoeists made by T. Lanseer and reproduced as engraving in King 1839

some goods can be followed. Goods that included: porcelain, spices, silk, and tea from China that were exchanged for fine furs of North America or from the Subarctic first, and later opium (in the first Opium War, England imposed its use in 1842); fuel, minerals, wool, cotton, tobacco, groceries, coffee, and sugar in the already established colonies in exchange for value-added products or industrial products (textiles, Staffordshire porcelain, alcoholic beverages, and consumer luxury goods for the ruling classes and the emerging middle classes), and of course work force (slave, forced or free, African, European, or Asian).

Under these economic conflicts between European nations, changes of "ownership" of some colonies occurred, for example, the purchase of Florida and Louisiana. Enrichment desires of the new Creole elites – both large producers and urban intermediaries – will lead to the independence of the countries in the early decades of the nineteenth century, processes that were not foreign to the interests of the metropolitan rival powers to get these new markets (such foreign interference had occurred since the first independence, that of the USA). The archaeology of Spanish and French Caribbean colonial fortifications perfectly indicates where the problem came from in the first place.

The idiosyncrasies of the different colonizations are reflected in the particularities of the archaeological evidence and settlement patterns, for example, among the Spanish, French or English Caribbean. The displacements and relocations of settlers also have their archaeological expression when compared archaeologically: for example, the housing structure of the Arcadians compared to the houses of the preinstalled settlers in the south of the United States of America.

The strength of the commercial circuits that were stimulated by the desire of exotic goods and imported products prompted the intensification of production in these ex-colonies, both imported products (coffee) as well as their own products such as rubber, guano, or tobacco. Thus, a new class of landowners, stockholders, and businessmen emerged, who often built a residence in the cities in addition to their large properties and homes in the countryside. As a reflection of what was happening in the metropolis, these emerging new classes in the new countries tried to follow European fashions, imitated behavior styles, architecture, luxury objects, furniture, fashion in clothing, etc. In order to fulfill their needs, they directly imported many luxury items.

The presence of European luxury goods and evidence of new production means is archaeologically confirmed: For example, there was a move from the small artisan press to the sugar mill with the early introduction of the steam engine and the railroad. The set of buildings for sugarcane

processing, the sugar mills, have been archaeologically well studied in Cuba, Dominican Republic, Venezuela, and Argentina. In Cuba, for example, at the beginning of the century, sugar mills multiplied, numbering more than a thousand in the 1830s. They produced not only sugar but also began to produce rum. Coffee haciendas in Venezuela, Guatemala, and Cuba have also been archaeologically studied.

Tobacco and cotton were other colonial star products that began to rise in this period. In the USA, large landowner exploitations in the South to small farms in the North have been archaeologically studied. Agricultural intensification explains the flourishing of guano exploitation. In 1845, Peru began exporting this famous fertilizer due to high demand in North America and Europe to increase their agricultural production to cope with population growth.

The same happened with other products to meet industrial demands. For example, the rubber extracted in the subtropical forest was an essential commodity for British industry. There have also been archaeological studies documenting such exploitations.

The same intensification pressed the largest colonies into hinterland occupation where indigenous people survived. They had developed new political, social, and economic organizational strategies, taking advantage of new elements (horses, livestock, crops, weapons).

European expansion, occupation, and the final removal of indigenous people, that have an archaeological reflection at battlefields and military buildings, will start in the first half of the nineteenth century but will intensify and consummate in the second half, from the 1840s.

The most relevant examples of which we have archaeological traces are, in addition to "Maori war," the advance of the whites in South Africa, the "conquest" of the West in the USA, and the so called "war of the desert" in Argentine Patagonia. In Argentina, there was a sustained situation of an unstable border that had generated a native and mixed population which had developed new social and economic strategies: regrouping, mixing, working with cattle and horses, or the exploitation of salt to meet consumption and military demands of the European population, and even participating in the colonial and internal disputes. There is archaeological evidence for the transformation of the natives (e.g., watering hole structures) and Argentine and Spanish ancient forts. The effort to disintegrate the indigenous structure and absorb "undomesticated" – indigenous and gaucho – labor force will be completed with the intensification of the war, and archaeologically well reflected in the forts and border forts and in the means of production and consumer goods recovered at these sites.

The emergence of an urban class of intermediary traders contributed to the remodeling of existing colonial cities and their growth as a service center and as locations for primary processing industries. The case of Buenos Aires is quite illustrative, with a planification that had begun to regulate even before independence in Charles III's regulations (Schávelzon 2002). With the independences, their creole industries, local factories (e.g., china), and at the same time some old ways of organizing work of religious inspiration, such as the Capuchin monks in Venezuela, are terminated (Sanoja 1998).

The same powers (especially Britain), that favored the independence that allowed them to penetrate these markets, stimulated rivalries and interests or divergent plans that emerged between different local elites. Immediately after independence, there followed civil wars and wars between neighbors that tried to prevent the installation of large countries that could threaten the hegemony of the maximum emerging power.

The case of the best-known rivalry and also archaeologically best known was between the USA and Mexico. The expansion of the future new power was oriented not only to the north and west but also southwest, conflicting with Mexico with which they went to war, and they finally snatched 55 % of Mexico's former territory.

Economic and Ideological Changes in the Metropolis

Large commercial transatlantic circuits generated a demand for raw materials and at the same time value-added products, which led to the development of mass production that installed a second

phase of the industrial revolution, the mechanized factories. This process has been well studied by Industrial Archaeology in central and northern Europe.

The development of urbanization and industrialization on the continent, which had begun in the last third of the previous century, has continued into the first half of the nineteenth century. The demand for labor will attract people from the countryside to the cities and industrial areas. Industrialization and mass production systems were developed: Fine porcelain production and transfer systems designs are an excellent example well-studied archaeologically. The chain of production processes accelerated the feedback of all these cycles: Textile mills, for example, required the development of new machinery which in turn stimulated metallurgy, the demand for metals and fuels, mining.

This development required a fundamental transformation in production relations. The change meant the end of slavery and the residues of feudal production relations, which were not carried out without resistance. Archaeology has studied the moment of the end of slavery, from the analysis of the remains of sunken slave ships in the Caribbean to the mills and large slave plantations or runaway slave shelters (e.g., in Cuba).

The capitalist mode of production would be based on non-slave wage labor, for which they had to reeducate the workforce. These new production relations had to be imposed by force against the resistance of certain classes of large agricultural producers, but were especially advantageous in industrial environments. Indeed, they had the advantage of reducing fixed costs, labor market flexibility to adapt to the increasing mechanization and massification and generating new cycles of consumption and profit (rental housing, consumer sales that are materialized in industrial colonies whose architectural and archaeological traces are found throughout Europe).

The restructuring of the labor force and economic growth will lead to large population translocations: mass migration of central and northern Europeans toward the colonies, and the displacement of people from India to South Africa. By mid-century, China also began to move toward the Americas. The loss of male labor in the wars between the metropolitan powers in the colonial liberation, in the emigration to the colonies, etc., needed to be replaced: It was therefore about placing women as reproducers (of the labor force and ideology) and also as a reserve labor force.

The political, legal, and economic status of women did not change significantly with the industrial society and liberalism. They continued to be the victims of discrimination. Female labor in factories and mines did become widespread, but in conditions of extreme exploitation and wage discrimination against their male coworkers. Moreover, women were banned from professional areas of greater responsibility and higher education.

Ideological Changes

The existence of labor force and free consumers demanded restructuring relations of social reproduction: the construction of an ideology for alienation and ideological domination on the one hand, and to stimulate the reproduction of the same workforce on the other hand. An ideological shift was essential to achieve a revolution in the reproductive sphere. Linking morals with reproduction has its paradigmatic theorizing in Malthus's work, which, among other things, would serve as a basis for the development of the theory of Evolution and, therefore, the foundation of biology. Parallel changes occurred in political ideology. Nationalism encouraged the identification of consumers with producers unifying and thus favoring domestic consumption in central nations and metropolitan product in the colonies. Colonial elites not only imported luxury items imposing European fashions but a good dose of liberal ideology and a new lifestyle in the image and likeness of the European bourgeoisie.

The cultural demand of these elites is linked to Neoclassicism and Romanticism, which ensures Archaeology of this period is reunited with its own origin. We are in front of the birth of archaeology as a discipline, in parallel to other sciences

(such as geology or biology). Nationalism also brought an interest in the past and the role it could play in the construction and legitimation of the present. The remote past – prehistory, and in particular Greco-Roman civilization – becomes the focus of interest and is investigated/excavated. Romanticism, in turn, intensifies the interest for lost civilizations: Near East, Egyptian, Mayan and for a dark common past: Celts and megaliths.

The development of archaeology is linked to the demand for exotic and cultural consumer goods: It is expressed in the architecture (neo-Gothic, neoclassical) that is documented in the excavations of mansions and gardens that speak for these interests of the bourgeoisie. In the early nineteenth century, the demand for antiques by states and collectors becomes so great that the great museums in Europe and the USA are created to preserve and exhibit relics of the past. Thus, the nineteenth century is the century of the museums, the pillaging of antiquities in Egypt, in Greece (Parthenon friezes are purchased), and exhibition of exotic people – "other peoples" – that reinforce the European system, civilization, and the status quo.

Resistances

However, the enforcement action of this capitalist system immediately provoked significant reactions and social crises. One can speak of the "Europe of revolutions": the bourgeois revolutions and independence revolutions of the colonies which are followed by other crises, revolts, and working class resistances. Unions and social movements emerged as Luddism, opposed mechanization and was severely repressed, Owen's utopian socialism (1839) that inspired the founding of utopian colonies. These culminated in the mid-nineteenth century with the publication of the Communist Manifesto (origin of scientific socialism), the publication of Proudhon's works (origin of anarchism), and the European revolutions of 1848.

In that same year 1848, the first American feminist collective document, the so-called Seneca Falls Declaration, which was approved on 19 July in a Methodist chapel of that locality in the state of New York, became public. This document first expressed what might be called a "feminist philosophy of history." A philosophy which denounces the abuses women had suffered throughout history.

Conclusion

The causes of the disappearance of native social systems based on controlled production and reproduction were structurally and contextually external and violent. Their origin must be sought in Europe and attributed to its initial capitalist system that begins to expand and consolidate in the first half of the nineteenth century. This required a globalization where colonies fructified, soon converted into independent countries, and for its resource and territory voracity implied delimitation of marginalities incompatible with the new system.

Archaeology allows complete our understanding of the global system expansion illuminating the dark side of the story: those elements that were considered not worthy but removable or to be ignored.

Cross-References

► Histories of the Archaeological Discipline: Issues to Consider

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Archaeometry Laboratory at the University of Missouri Research Reactor (MURR)

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Basic Information

The Archaeometry Laboratory at the University of Missouri Research Reactor (MURR) supports collaborative research on archaeological materials to answer questions about past human behavior (http://archaeometry.missouri.edu). Using information from trace-element and/or isotopic characterization of artifacts, raw materials, and human remains, the Archaeometry Lab at MURR works with archaeologists to investigate resource utilization, trade and exchange, human migration, and environmental adaptation. The laboratory was established in 1988 with support from the National Science Foundation and the University of Missouri (Glascock et al. 2007).

Major Impact

The well-equipped Archaeometry Lab is one of the few laboratories in the world dedicated to performing this type of research and is unique for having these powerful analytical methods under one roof. The main analytical capabilities available in the Archaeometry Lab at MURR include:

- Neutron activation analysis (NAA) – The 10 MW Research Reactor is the largest university-owned research reactor in the world. MURR has the highest possible sensitivities for NAA, especially useful for bulk analysis of pottery, obsidian and other artifact types requiring minimal sample preparation.
- X-ray fluorescence (XRF) – Table top and portable XRF spectrometers enable nondestructive surface analysis of materials such as obsidian, metals, glazes, and paints.
- Inductively coupled plasma-mass spectrometry (ICP-MS) – Three spectrometers (i.e., quadrupole, high-resolution, and multi-collector) and associated equipment (i.e., laser ablation and microwave) provide the highest possible sensitivities by ICP-MS for trace elements and isotope ratios in a wide variety of artifact types.
- Petrography – A petrographic microscope enables the identification of minerals present in thin-sections of ceramic materials.

Laboratory personnel are highly trained and have several years of experience in collaborating on compositional analysis with the archaeological community. Laboratory personnel include the following professional scientists:

- Dr. Michael D. Glascock (Ph.D., 1975, Iowa State University) is a Research Professor and the Group Leader of the Archaeometry Lab with more than 35 years of experience with NAA and gamma-ray spectroscopy as applied to archaeology, geochemistry and environmental science. His research focus is on obsidian source and artifact characterization in Mesoamerica, South America, and the Russian Far East.
- Dr. Jeffery R. Ferguson (Ph.D., 2007, University of Colorado) is a Research Assistant Professor in the Archaeometry Lab. His research

focus is on the archaeology of western and southwestern North America.
- Mr. Matthew T. Boulanger (M.A., 2009, University of Missouri; current Ph.D. candidate) is a Research Specialist in the Archaeometry Lab. His research focus is on the archaeology of eastern North America, landscape ecology, and geographic information systems applied to archaeology.

The Archaeometry Lab's scientists are supported by several skilled technicians most of whom are undergraduates at the University of Missouri. The student technicians perform sample preparation, collect analytical data, and archival of artifacts. They are also frequently involved in various aspects of data interpretation and report writing as part of their educational and research experience. The experiences gained by the undergraduate students who work for the Archaeometry Lab make them well prepared to perform graduate research in archaeology in the future.

The laboratory encourages short-term visits by graduate students and faculty from other universities who are collaborating with the Archaeometry Lab. The laboratory provides training in the preparation of artifacts for chemical analysis, offers recommendations regarding the selection of appropriate samples, gives guidance in selecting the appropriate trace-element and isotopic methods, and provides instruction in the application of multivariate statistical methods for data interpretation.

Customized software developed by the Archaeometry Lab for interpretation of compositional data on artifacts and source materials is available. The Archaeometry Lab software performs many of the multivariate statistical operations commonly employed to interpret large multivariate datasets, including principal components analysis, canonical discriminant analysis, cluster analysis, Euclidean distance calculations, Mahalanobis distance calculations, missing value replacement, bivariate and trivariate plotting, and compositional profile plots. The software is distributed from the Archaeometry Lab webpages at no cost to the user.

Since 1988, the Archaeometry Laboratory at MURR has collaborated on hundreds of research projects ranging in size from one sample to 2,000 samples. The total database of analyzed archaeological samples numbers more than 110,000 specimens. Approximately 70 % of the samples are ceramics and clays; 25 % are obsidian artifacts and source specimens; and the remaining 5 % are chert, basalt, limestone, metals, etc. The database enables many collections of artifacts, both small and large, to be traced to specific locations around the world. In recent years, more than compositional data 6,000 samples per year have been added to the compositional database. These data are continually added to our website and are available for download after publication by the principal investigator.

Cross-References

- ▶ Ceramics: Scientific Analysis
- ▶ Inductively Coupled Plasma-Mass Spectrometry (ICP-MS): Applications in Archaeology
- ▶ Neutron Activation Analysis (NAA): Applications in Archaeology
- ▶ Provenance Studies in Archaeology
- ▶ X-Ray Fluorescence (XRF): Applications in Archaeology

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Archaeometry: Definition

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Brief Definition of the Topic

Archaeometry (*syn*. archaeological science) is a formal field of study whose practitioners apply

techniques and approaches from the physical, chemical, biological, and earth sciences and engineering to address archaeological questions and problems. Together, the sciences provide archaeology with empirical and systematic ways of collecting, analyzing, synthesizing, and interpreting data related to the inorganic and organic material record of human history. Investigations involve both instrumental and noninstrumental approaches and target materials research (e.g., properties of substances and their constituents) as well as chemical and biological substances and residues from the molecular scale all the way up to macroscopically observable artifacts and ecofacts. Applications of archaeometry take place in field, lab, and museum settings and include a wide array of topics, such as radiocarbon dating, provenance of ceramics, stone tool production and use, properties of metals, diet and health in ancient populations, geophysical prospection, soil chemical residues, computer and statistical modeling, and the conservation of archaeological objects and historical monuments. Archaeometric techniques are fundamentally important to archaeological research because they reveal the varied ways in which humans engage the material world and the range of earth processes that are involved in this relationship – from the production, use, and modification of natural and synthetic materials to their ultimate deposition in the archaeological record, the cultural and natural processes that impact them until they are recovered by archaeologists, and their long-term care and conservation.

In the early 1950s, Christopher Hawkes at Oxford coined the term *archaeometry* to characterize the growing emphasis of absolute dating, physicochemical analysis, and quantification in archaeology. By the late 1950s, an international journal, *Archaeometry*, was established, followed in 1961 by the first annual scientific meetings of the International Symposium on Archaeometry. That same year, Martin Aiken (1961) and Karl Butzer (1964) produced some of the first textbooks on the subject. In the 1970s, archaeometric research accelerated around the world, with an important textbook by Michael Tite (1972), a new international journal in 1974, *Journal of Archaeological Science*, and the creation of the Society for Archaeological Sciences in 1977. Today, the field is as vibrant as ever, with occasional edited volumes in the long-standing *Archaeological Chemistry* series from the American Chemical Society (since 1974) and the *Materials Issues in Art and Archaeology* series from the Materials Research Society (since 1988), new textbooks (e.g., Stuart 2007; Pollard & Heron 2008; Price & Burton 2012), and another key journal, *Archaeological and Anthropological Sciences*.

Cross-References

- ▶ Aitken, Martin
- ▶ Archaeological Chemistry: Definition
- ▶ Biomolecular Archaeology: Definition
- ▶ Butzer, Karl W.
- ▶ International Symposium on Archaeometry
- ▶ Society for Archaeological Sciences (SAS)

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Archaic *Homo sapiens*

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Introduction

In Asia and Africa, many human fossils of Middle and early Late Pleistocene age cannot be allocated to *Homo erectus* (sensu lato), premodern and anatomically modern *Homo sapiens*. They are generally allocated in a taxon, referred to as early or archaic *Homo sapiens*. But recently, a growing number of paleoanthropologists prefer to attribute some of them to other taxons such as *Homo heidelbergensis* or *Homo rhodesiensis*. Specimens of this kind, such as that from Kabwe and Bodo, will not be included in this entry. In the following section, fossils that are usually included in the taxon archaic *Homo sapiens* from Asia and Africa will be described.

Key Issues/Current Debates/Future Directions/Examples

Dali

The site is situated at a loess terrace in Dali County, northwestern China. The human fossil is a rather complete cranium, but the lower part of the face was deformed by the upward depression of the alveolar process. It is associated with Mode I lithics and mammalian fossils of late Middle Pleistocene age. U-series ($^{231}Pa/^{230}Th$) dating of an ox tooth, associated with the human cranium, gave an age of 209 ± 23 ka. The stratum of human skull is 13 m below a layer of paleosol which is estimated as around 247 ka with IRSL analysis, so the human fossil is earlier than this age; ^{230}Th analysis of the enamel and dentine of an associated rhinoceros gave ages of 258 +34/−26 ka and 349 + 53/−38 ka, respectively; ESR analysis of the associated Lamprotula resulted in an age range of 297 to ~210 ka. All of these suggest a date of between 300 and 260 ka. The ESR/U-series date for animal teeth is around 281 ka.

The human cranium is rather robust and has many metrical features intermediate between *Homo erectus* and modern humans and shows a morphological mosaic between these categories. Some measurements and indices of Dali fall within the range of modern humans, whereas some features seem to be in the status intermediate between Middle Pleistocene hominins of eastern and western Eurasia. The cranial wall and brow ridges are as thick as that of the hominin from Locality 1 of Zhoukoudian. The brow ridge is thickest at its middle part. The most protruding point of the median sagittal profile of the frontal bone is located at its lower half. The cranial capacity is 1,120 cc. There is no supraorbital notch, foramen, and tubercle. In addition, it has many features similar to that of Jinniushan cranium. These are as follows: a median sagittal ridge at the lower part of the frontal squama; the fronto-nasal and fronto-maxillary sutures form a curve which is nearly horizontal but slightly convex upward; an angular torus; the superior border of the temporal squama is slightly curved; the notch between the squamosal and mastoid portions of the temporal is rather deep; the mastoid process is small; between occipital and nuchal planes there is an angular turn marked by a weak occipital torus which extends along the middle two-thirds of the occipital squama; the zygomatic arch is thin, and its upper border

is slightly lower than the Frankfurt horizontal; the nasal profile is nearly vertical; the infero-lateral orbital margin is blunt and forms a nearly right angle; the anterolateral surface of the fronto-sphenoidal process of zygomatic bone faces more forward and the lower margin of the zygomatic process of the maxilla is curved.

Jinniushan

The site is a cave located on Jinniushan Hill, Yingkou Municipality, northeastern China. Human fossils include a nearly complete, but broken, human cranium, 6 vertebrae, 2 ribs, 1 left ulna, 9 carpal bones, 2 metacarpals, 7 digits of a hand, 1 left innominate, 1 patella, 11 tarsals, 2 metatarsals, and 13 digital bones of the foot. They are associated with Mode I lithics and a lot of mammalian fossils of Middle Pleistocene age. A U-series date on associated animal teeth is around 280 ka. The cranial capacity is 1,390 cc. The cranial wall is close to that of modern humans in thickness. Brow ridge is not thick, and its thickest point is at the medial part, while the thinnest is in the middle. The postorbital constriction is obvious. There is a supraorbital notch, and the supraorbital process is distinct. The nasal bones are wide. The upper incisors are shovel-shaped. The coronoid process of the ulna resembles that of modern humans in shape. The position of iliac buttress is more anterior than that in modern humans. This structure and the ischial tuberosity are gracile.

Xujiayao

The site is located on the west bank of the Liyigou River, 1 km southwest of Xujiayao Village, Yanggao County, North China. Human fossils include 12 parietal fragments, 2 fragments of occipital, a nearly complete temporal bone, lower part of a child maxilla with teeth, a mandibular fragment, and several teeth. The fossils were embedded in lacustrine deposits also associated with Mode I lithics and mammalian fossils of early Late Pleistocene age. U-series dates on associated rhinoceros range between 125 and 104 ka.

Parietal No. 6 is rather complete, with distinct parietal tuberosity. It is slightly smaller and much thinner than Parietal No. 10 which is intact except for its anterior part. The branches of the middle meningeal artery are thinner than that in *Homo erectus* from Zhoukoudian but thicker and less ramified than that in modern humans. The supero-posterior corner of both parietals is naturally lacking, hinting at the possible existence of an Inca bone. Other parietal fragments are small. The Parietals Nos. 3 and 4 are similar to No. 6 in the presence of straight grooves on the outer surface. These grooves radiate forward, upward, and backward from the parietal tuberosity and seem to represent traces of scraping before death. The bregmatic region of Parietal No. 5 is full of dense small foramina that are probably due to osteoporosis or represent cribra cranii externa. No. 10 is a pair of partial posteromedial parietal bones from an adult. It exhibits a congenital defect, an enlarged parietal foramen. The posterior part of Parietal No. 14 has a small hole that seems to represent a healed wound. The thickness of most parts of the parietals is within the range of variation of *Homo erectus* from Zhoukoudian. Both occipital fragments (Nos. 7 and 15) are very thick. The cerebral fossa is larger and deeper than the cerebellar fossa in Occipital No. 7. A shallow supratoral sulcus exists on Occipital No. 15 but not on No. 7. The temporal bone is of left side. The mastoid process is small and the muscular markings on the surface of the temporal squama are strong. The thickness at the parietomastoid suture behind the parietal notch and at the occipitomastoid suture medial to the mastoid process is very close to the range of that in *Homo erectus* from Zhoukoudian. The length-height index of the temporal squama is 64.5. The tympanic plate is more medially located than that in *Homo erectus* from Zhoukoudian and Hexian. The thickness of the tympanic plate is intermediate between *Homo erectus* from Zhoukoudian and modern humans. The styloid process and stylomastoid foramen align with the mastoid notch. The transverse section of the pyramid is closer to *Homo erectus* from Zhoukoudian than to modern humans, but the upper border of the pyramid is as sharp as that in modern humans. The anterior nasal spine is distinct but not prominent.

Five teeth are attached to the left maxilla. A newly erupted median incisor is shovel-shaped. The canine and molar have strong cingulum but the isolated left upper molar has no cingulum. All teeth are larger than that of female *Homo erectus* from Zhoukoudian, some measurements are even larger than the male from the latter.

Maba

The site is said to be situated in a cave on Shizishan Hill, 1.5 km southwest of Maba Village, Shaoguan Municipality, southern China. The human fossil is a skull-cap which was unearthed by local farmers. The mammalian fauna from the same cave provides a U-series date of between 135 and 128 ka. No stone artifacts were found.

A short median ridge exists on the frontal squama above the supraorbital groove, which is rather deep except for its median part. The frontal tubercle is weakly developed. The middle and lateral segments of the brow ridge are 11 and 12 mm thick, respectively. A top view of the skull shows the medial end of the brow ridge is located more anteriorly than the lateral end. There is a trace of the fusion of the metopic suture on the anterior surface of the glabellar region. The postorbital constriction is as exaggerated as that of *Homo erectus* from Zhoukoudian. The frontal sinus is rather large. A semilunar scar 14 mm long exists on the outer surface postero-lateral to the right frontal tubercle. On the inner cranial surface at the place roughly corresponding to this scar, there is a bulging about the same size. The parietal is 7.0 mm thick at both the bregmatic region and parietal tuberosity. The fronto-nasal and fronto-maxillary sutures form a more or less horizontal curve. The naso-malar angle is 146 °. A median longitudinal narrow ridge exists on the nasal bones, the profile of which is close to a right angle. Most of the right orbit is preserved and is more or less spherical. Its infero-lateral margin is sharp instead of blunt. The orbital index is 88.0. There is no supraorbital notch, foramen, and tubercle. The anterolateral surface of the right fronto-sphenoidal process of the zygomatic bone faces more forward.

Chaoxian

The site is situated at Yinshan Hill, Chaoxian County, eastern China. Fragments of occipital and maxilla, as well as three isolated teeth, were found from deposit of a limestone fissure, associated with mammalian fauna of Middle Pleistocene age. No artifacts were found. U-series date of associated animal teeth is between 200 and 160 ka.

The occipital torus consists of two curved eminences that are short and only slightly prominent. The transition between the occipital and nuchal planes is rounded. No external protuberance exists. The supratoral sulcus is indistinct, except for a small fovea seemingly corresponding to the suprainiac fossa. Distance between inion and endinion is 22.0 mm, and the thickness at the center of the occipital torus is 7.0 mm. The pyriform orifice is probably rather wide. The incisive canal extends more or less vertically. The massiveness of the teeth is within the range of *Homo erectus* of China. Attrition of anterior teeth (only the lateral incisors are preserved) is much greater than that of the molars. It has been suggested that this difference may imply that the anterior teeth functioned as tools for chewing hard and tough food.

Changyang

The site is in Longdong Cave, Changyang County, Central China. The lower part of a maxilla was found by local farmers, and an isolated left lower second premolar was found by Lanpo Jia from the same cave. No artifacts were found. U-series date of presumably associated mammalian teeth is around 195 ka. The straight line connecting the nasospinale and prosthion forms a 60 ° angle with a plane deduced from the occlusal surface of the first premolar and first molar attached on the maxilla. The massiveness of the premolar and molar is close to the lower limit and median value of *Homo erectus* of China, respectively.

Dingcun

The site is at the gravel on the third terrace along the east bank of the Fenhe River near Dingcun Village, Xiangfen County, North China. Human

fossils include three teeth of a child and a fragment of infantile parietal bone. They are associated with Mode I lithics and mammalian fauna of Late Pleistocene age. U-series date of associated mammalian teeth is between 210 and 160 ka. Lamprotula fossils yielded a U-series date of 150–83 ka. Both upper median and lateral incisors are shovel-shaped with weak basal tubercles and fewer finger-like processes. All of these teeth are much smaller than the corresponding teeth of *Homo erectus*. The shape of the supero-posterior corner of the parietal indicates the possibility of the presence of an Inca bone.

Miaohoushan

The site is at a limestone quarry at Miaohoushan Hill, in Benxi Municipality, northeastern China. Two human teeth and a fragment of femur were found in association with mammalian fauna, with a U-series date of between 240 and 140 ka. The human upper canine is much smaller than that of *Homo erectus* from Zhoukoudian, and the lower molar is close to the lower limit of the latter.

Tongzi

The site is at Yanhuidong Cave, Tongzi County, southwestern China. Human fossils include five teeth. They are associated with Mode I lithics and mammalian fossils of Late Pleistocene age. U-series dated to between 180 and 110 ka. The upper median incisor is shovel-shaped, with three finger-like processes. The canine has a basal tubercle and cingulum. The left premolar has traces of cingulum. Cingulum is obvious and very weak in the left and right molars, respectively. The size of most of the teeth is within the range of *Homo erectus* from Zhoukoudian, except the canine and the left molar, the breadths of which are slightly shorter.

Dadong

The site is at Dadong Cave, Panxian County, southwestern China. Human fossils include two teeth. They are associated with Mode I lithics and mammalian fossils of Late Middle Pleistocene age. The upper median incisor is shovel-shaped. The canine has a cingulum. The root of the canine shrinks suddenly near its tip. These teeth are slightly smaller than that of *Homo erectus* from Zhoukoudian.

Locality 4 of Zhoukoudian

An upper first premolar was found in association with mammalian fauna of Middle Pleistocene age and Mode I stone artifacts. Thermoluminescence dates for the associated ash layer is 257 ka. The size of this human premolar is within the range of *Homo erectus* but without cingulum.

Narmada

The right half of a human skull was found on the surface of an alluvial terrace along the Narmada River, 200 m west of Hathnora Village, central India. Stone artifacts and vertebrate fossils have been found from the sandy/silty boulder conglomerate in the area where the Narmada cranium was found. Based on the mammalian fossils, the Narmada cranium is inferred to be of late Middle Pleistocene age. The Narmada cranium is moderately large and long. Cranial capacity is estimated as 1,200 ml. The frontal is not very receding, and the vault is high and narrow. Its broadest part is across the enlarged mound-like supramastoid ridge. The temporal squama is very long but not very high. The parietal notch is vertical and bears an ossicle. The postorbital constriction is moderately shallow. The supraorbital torus is strongly arched and uniformly thick across. The orbital roof is moderately concave.

Zuttiyeh (Galilee)

The frontal bone with part of a left zygomatic was found in a cave on the edge of the Wadi Amud, below the Amud site, and about 3.5 km from the Sea of Galilee. The associated lithics are generally considered as pre-Mousterian from the Acheulean-Yabrudian industry, and an age of well over 200 ka has been suggested. The arched supraorbital torus of both sides connects across the glabella. The lateral portion of the torus is thinner. The forehead rises quite sharply behind a narrow supratoral groove. Five or six lesions are shown on the frontal. The interorbital region is wide. The anterior part of the zygomatic arch

sweeps back, curving laterally very rapidly. Demarcation between the temporal and infratemporal fossae is very clear.

Jebel Irhoud

The human remains include a broken, but fairly complete, cranium, a skull-cap, a broken juvenile mandible, and a juvenile humerus. They were apparently unearthed near the bottom of a fissure in limestone near Chemaia, about 60 km east of Safi, Morocco. A precise provenance is recorded only for the humerus. Fauna from the deposit suggests an early Late Pleistocene age. ESR date estimates on three teeth found just above the humerus range from 90 to 125 ka. The site has yielded a Levalloiso-Mousterian lithic industry. The human crania are inferred to date to between 130 and 190 ka. These human fossils have been suggested to have Neanderthal affinities and are described as morphologically archaic, although foreshadowing modern humans. Cranial capacity of Jebel Irhoud I is 1,305 ml.

Salé

The base and rear of a braincase plus a partial left maxilla and a natural endocranial cast were found by quarry workers from dune deposits ~1.5 km from the coast at el-Hamra, Douar Caid bel Aroussi, Morocco. A 400 ka date seems plausible based on the local geological context. There are no associated archaeological deposits. The human skull is fairly small and tall with a capacity of 880 ml. It is broadest across the supramastoid regions which are slightly swollen. The temporal line is quite high and arches up slightly. The temporal squama is very short, but for its length it is quite high. The styloid process is thin. A rather large stylomastoid foramen lies between the styloid process and the base of the mastoid process. A hind view shows the cranial wall to be short and quite vertical. The transition from occipital to nuchal plane is rounded. The cranial bone is thick. Pathological thickening of the midsection of the frontal extends back over the bregma. The first and second upper molars apparently have thick post-cingulum running down the side of the metacone to the small hypocone region.

Singa

The calvaria were found in calcrete deposits exposed on the west bank of the Blue Nile, some 46 km downstream from Singa, and ~320 km south of Khartoum, eastern Sudan. An early Late Pleistocene date was inferred based on the fauna recovered at Singa. U-Th dating of the calcrete adherent to the cranium gave a result indicating the minimum date for the fossil to be 133 ± 2 ka. The human calvaria might even have been associated with the final Acheulean. The human skull is relatively long and moderately high, with a short frontal rise that is fairly steep. The broadest part of the skull is across the parietal eminences. The temporal squama is relatively long and not very high. The parietomastoid suture is long and horizontal, and the parietal notch is very shallow and open. The mastoid process is very small, thin, and short. The supramastoid crest is distinct. The wall of the left auditory meatus is pathologically thickened. The temporal fossa is undifferentiated from the infratemporal fossa. A top view shows the supraorbital margin to be relatively straight, retreating moderately from the glabellar region; postorbital constriction is fairly strong. In general, the cranial bone is thin, except for thickening in the region of the externally, quite swollen, parietal tuberosities. Cranial capacity is estimated at 1,550–1,600 ml. The supraorbital tori are not very thick. The orbital roof is shallow.

Ndutu

The partial adult cranium was found from the lake margin sediments along western side of Lake Ndutu, at western end of Olduvai Gorge, northern Tanzania. The date is probably in the order of 400 ka or about 200 ka based on correlation with different volcanic tuffs in the region. Handaxes have been found at the site that were almost certainly from the same horizon as the human cranium. Reconstruction shows the braincase is small, short, broad, and quite low. Cranial capacity is 1,100 ml. The transition from occipital to nuchal planes is rounded. A hind view of the vault is almost square in outline. The broadest point would have been across the supramastoid crest. Diploe is thick, inner and

outer tables are quite thin. The preserved left supraorbital torus is moderately thick. The posttoral surface is slightly depressed. The temporal squama is relatively long, probably arched and high. The mastoid processes are very stout. The supramastoid crests are moderate. The parietomastoid suture is relatively long and horizontal. There is a large wormian bone at the lambda region. Cerebellar fossae are larger and shallower than the cerebral fossae. The interorbital region would have been quite broad. On the left side, the anterior root of the zygomatic arch originates rather low, not too far above the alveolar margin. It appears that the anterior extent of the zygomatic arch faces more or less forward. Both left premolars have two distinct roots that probably bifurcated close to the neck.

Florisbad

The human fossils were found from spring deposit about 45 km northwest of Bloemfontein, South Africa. The sedimentary sequence consists of "peat" layers. Human and animal fossils were found at the level of lowest peat layer, Peat 1, for which U-series date is over 100 ka. In all levels below Peat 3, general Middle Stone Age artifacts have been reported. The partial calvaria are high and rounded. The frontal recedes somewhat directly from the supraorbital margin, with only a hint of a supratoral plane. The temporal line is low. A top view shows the glabellar region protrudes forward. The supraorbital margin is quite thick in the medial portion and thinner in the lateral portion. There is something of a break centrally between the medial and lateral portions of the torus. The orbital roof is very shallow and concave. The infero-lateral corner of the orbit is not sharply defined. The interorbital region is moderately wide. The cranial bone is thick with very thick diploe and extensive porotic hyperostosis, as well as large number of healed lesions, including pathological drainage or vascular tracts. A couple of large puncture marks and some scratch-like marks may reflect carnivore activity. The partial facial bone shows that the inferior margin of the anterior root of the zygomatic arch oriented forward and directly out sideways. The third cranial fragment also has thick inner and outer tables and diploe.

Guomde

The cranial fragments were found on the surface of the Guomde Formation southeast of Ileret, on the northern sector of the east shore of Lake Turkana, northern Kenya. No archaeological findings have been reported for this site. The specimen KNM-ER 3884 represents the rear of a skull reconstructed from many individual pieces, plus a reconstructed maxilla with all the teeth, and the anterior part of a frontal. The cranial capacity is estimated to be 1,400 ml. The supraorbital tori are double arched and uniformly thick from side to side. There is no distinct supratoral sulcus or plane. Postorbital constriction is minimal. Stylomastoid foramen lies close to the base of a thin styloid process on the left side but far lateral to it on right side. The mastoid process is relatively thin. Canine fossa is not identifiable.

Eliye Springs (West Turkana)

The human cranium is a surface found near the freshwater Eliye Springs, on the southwestern shore of Lake Turkana, Kenya. No artifacts have been found. The neurocranium is large and high, with a cranial volume of more than 1,300 cc. In side view, the frontal rises fairly steep, the transition between the occipital and nuchal planes is somewhat angular. The temporal line is an obviously high curve. The temporal squama is rather long and very high. The demarcation between the temporal and infratemporal fossae is quite clear. The parietal notch is fairly deep and narrow. Postorbital constriction is weak. The frontal sinus is very large. The interorbital region is extremely wide. The nasal bones are broad. The left orbital roof is shallow. The nasal cavity is relatively small.

Ngaloba

The human fossils consist of a fairly complete calvaria with a maxilla and part of the nasal region. They were found on the surface of the Serengeti Plains of northern Tanzania, about 40 km south of Olduvai Gorge. U-series analyses on bone indicate the age ranging between 129 and 108 ka. A Middle Stone Age assemblage has been found from the Ngaloba Beds,

both in situ and on the surface. The vault is narrow, with a long frontal. The supraorbital tori are thick, without a posttoral groove. The postorbital constriction is very weak. The transition from the occipital to the nuchal planes is rounded. The occipital plane appears "bunned" because the nuchal plane undercuts it strongly. There is neither a clearly defined occipital torus nor a well-defined external occipital protuberance. A posterior view shows the braincase forms a smoothly rounded curve. A small circular depression on the left parietal near the lambdoid suture is probably of pathological origin. The temporal squama is quite high, and the upper border is quite arched. The temporal and infratemporal fossae are separated by an angle in the alisphenoid. The tympanic plate is very thick. There is a supramastoid swelling instead of a crest. The mastoid process is medial-laterally narrow and not very projecting. The styloid process is relatively thick and is situated medially and in front of the large stylomastoid foramen. The cranial capacity was estimated to be 1,367 cc. The vault bone is quite thick, especially around the midline and in the occipital region. The interorbital region is quite broad. The naso-alveolar clivus is straight, moderate in length and angles slightly out and down. The junction between the maxillary body and the zygomatic process of the maxilla is fairly high above the alveolar margin. The lower border of the zygomatic process forms a sharp angle with the maxillary body. The right P1-M1 and left M1-M3 are preserved, none were very large.

Lake Eyasi

A partial cranium and other cranial fragments were found on the surface at an open-air site on the northeastern shore of Lake Eyasi, near Mumba Hill, northern Tanzania. They are believed to be of late Middle Pleistocene or early Late Pleistocene age. The archaeological context is uncertain. It may be of a terminal Middle Stone Age, or earliest Middle Stone Age. The skull is long and low with large brow ridges. The occipital is very thick, angle between nuchal and occipital planes is quite obtuse. The angle between the occipital and nuchal planes is quite obtuse. The left cerebral fossa is large and deep, whereas the left cerebellar fossa is not as deep as the cerebral fossa. A larger mandibular fragment has a moderately deep symphyseal profile, in which the anterior surface angles back to the inferior margin, producing a low bulge. There are traces of a low keel above the bulge. A slight depression exists under the root of the lateral incisor. The thickest part of the symphysis is quite far above the inferior margin. The genial pit is shallow and broad. Small mental foramen lies quite high up below septum between two premolars. A much smaller mandibular fragment is confined to the symphyseal region. A low broad keel descends from the region below two median incisors, quickly broadens into a very wide triangular elevation, that becomes very salient closer to the inferior margin. Shallow depressions lie on either side of the keel. The postincisal plane is vertical. The thickest part of the symphysis is close to the inferior margin. Digastric fossae are very small.

Saldanha

The calvaria and fragment of mandibular ramus were found on the surface some 24 km east of Saldana Bay, Northern Cape, South Africa. The fauna from the same general area is said to be of early Middle Pleistocene age. Stone artifacts said to be of Late Acheulean have been found from the same general area. The braincase is large, long, and low. The widest part is in the supramastoid region. The cranial capacity is 1,225 ml. The squamosal suture may have been shallowly curved for most of its length. The occipital and nuchal planes form an angle. Along the junction of these planes, the bone bulges in a distinct horizontal torus with a small groove above and undercutting below. The cranial bone is moderately thick. The postorbital constriction is distinct but not exaggerated. The brow ridges curve strongly and smoothly back from the midline. The ridge is very thick especially at the middle of the orbits. The orbital roof is shallowly concave. The interorbital region is quite broad.

Despite the fact that archaic *Homo sapiens* has been considered a meaningless taxon by some paleoanthropologists, it has been a useful one in dealing with human evolution. As shown in the above descriptions, it has a rather broad diversity in morphology which exhibits a mosaic of archaic and more advanced traits. A few of these fossils have even been considered as belonging to *Homo erectus* or *Homo heidelbergensis*. Some of the morphological features of some specimens might reflect the transition between earlier populations (the paleospecies, *Homo erectus* and *Homo heidelbergensis*) and anatomically modern *Homo sapiens* or probably resulted from interbreeding between the paleospecies, *Homo erectus*, *Homo heidelbergensis*, *and Homo rhodesiensis*. Generally speaking, the lithics associated with archaic *Homo sapiens* of China are of Mode I technique, while the stone artifacts associated with the African archaic *Homo sapiens* are Acheulean, Levalloiso-Mousterian, or Middle Stone Age.

Cross-References

- ▶ Dali, Archaeology of
- ▶ *Homo erectus*
- ▶ *Homo heidelbergensis*
- ▶ *Homo sapiens*
- ▶ Human Evolution: Multiregional Origins
- ▶ Lithic Technology, Paleolithic
- ▶ Zhoukoudian, Archaeology of

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Architectural Sites: Monitoring

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Introduction

Monitoring is a crucial component of integrated site management planning, whereby, along with maintenance, it comprises one of the main policies that follow the stage of assessment and analysis of a site (Demas 2002: 45; Walton 2003: 6). The monitoring of architectural structures is not an end by itself, but is an important step in diagnosing the problems facing a structure, which would help in setting up appropriate interventions to remedy the situation. Hence, depending on the specificities of a site, the approach for monitoring its condition is established accordingly.

Definition

Architectural sites are those that comprise architectural elements or structures, which are typically referred to as archaeological sites and could date back to ancient times. Monitoring of these sites includes gathering data related to its condition over a period of time in order to understand the changes that occur on it as well as the factors that impact its condition. Issues related to the sites conservation, exposure, and visitor accessibility are factors that impact its long-term condition. Assessment of these issues helps to establish actions that are necessary for ensuring a site's conservation.

Key Issues/Current Debates/Future Directions/Examples

Monitoring is considered a significant step within a comprehensive process that aims at ensuring the sustainable conservation of a site. It follows assessing its existing physical condition and, often, should precede planning for designing

and executing the appropriate interventions. Condition assessment is critical to establishing the baseline data that is necessary to monitor future changes to a site (Demas 2002: 39).

Monitoring programs can impact the way a site is managed. They help identify threats and risks at a particular site and hence provide the necessary criteria for designing priority actions in terms of mitigation and intervention measures. Additionally, such programs may potentially impact visitation at a site, in terms of numbers of visitors allowed at a certain hour, the paths that the visitors take, and, sometimes, even taking the decision to close off a site from visitation. Therefore, on the basis of a site's condition, the decision for the need and type of monitoring program would be considered and may precede any intervention measures. All of these factors should be considered when planning the management of a site, which also includes the tourism management aspect.

The Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO World Heritage Center 2012) stresses the necessity of having a set of "key indicators" to be used in monitoring the state of conservation of properties. These indicators would be used to provide updated information on the condition of sites and are numerical when possible. The choice of indicators would depend on the nature of the site. Examples could be the percentage of buildings requiring urgent intervention, the degree of movement in a building, or the rate of increase or decrease of an encroachment at a particular site (UNESCO World Heritage Center 2012: 111). Moreover, the ICOMOS Charter on "Principles for the Analysis, Conservation and Structural Restoration of Architectural Heritage" (ICOMOS 2003) states that the quantitative approach to diagnosis is carried out on the basis of monitoring, in addition to testing and analysis. Hence, monitoring can be considered as being critical to ensuring appropriate site management planning.

Prior to initiating a site's monitoring activity, a specific methodology should be devised based on the specifics of the site and its condition status. Walton (2003: 9-16) mentions a number of methods used for monitoring the condition of archaeological sites in New Zealand. These comprise a review of existing previous records that can be used to compare a site's previous situation with the current one; the preparation of forms that can be used as a checklist to assess the current condition and the causes of damages that occur; mapping, which is crucial to assess and monitor condition; and photographic recording.

Monitoring of architectural sites implies the monitoring of its built features, which can include its standing structure of walls and roofs, its foundations, and its finishing materials or decorative surfaces that it comprises. Finishing materials and decorative surfaces would include constituents such as tile cladding, stucco, and wall paintings.

The methodology for monitoring architectural sites may include visual inspection, survey and documentation, and the quantitative recording of specific data. However, prior to the collection of monitoring data, it would be pertinent to acquire the baseline information (Walton 2003: 8), upon which the future periodic monitoring would depend. The baseline data provides the necessary information on the existing condition of the structure and its features and helps to establish the main features to be monitored. It also establishes the criteria and methodology for monitoring. Sometimes, existing available records help to assess the state of conservation of structures by analyzing the rate of its deterioration, if any, and could lead to understanding the causes that might have led to that state. Accordingly, the methodology for monitoring can be devised, which would help in determining the future actions to be undertaken in order ensure its future conservation (Demas 2002: 39). However, in order to ensure a certain level of consistency in the collection of monitoring data, forms are often used, which include an outline structure for the registration of specific information.

The decision concerning what should be monitored depends on the condition assessment carried out and the causes of damages identified. For example, at the World Heritage Site of Petra, the impact of visitors was noted as one of the possible factors for the erosion of sandstone

monuments. Hence, two areas in Petra were monitored over a period of 10 years by Tom Paradise, who found that a factor of erosion can be due to human contact (Responsible Tourism n.d.). Such assessments have now been developed by linking them within a geographic information system (GIS) that can be used as a monitoring tool, whereby information was obtained and mapped out with tourist numbers and movement at the site, in order to assess and understand their impact along the paths they took (Paradise 2012).

In fact, GIS systems are increasingly being used as a tool for the management of sites, including their monitoring. GIS applications allow the collection and referencing of information and ensure the regular monitoring of monuments (Tantillo 2007).

In recent years, a number of modern techniques have been developed to acquire quantitative data for accurately monitoring the changes occurring on the condition of architectural elements. For example, the monitoring of monuments and decorative surfaces through an active stereo vision system that provides the possibility for acquiring accurate chromatic measurement of 3-D surfaces of a feature has been developed (Grattoni et al. 2002: 383-90).

Particularly, with regard to architectural sites, cracks can be an important indicator of the condition of a structure, and hence the monitoring of crack movement would help in determining a building's stability. For monitoring the movement of cracks, telltales and sensors can be used, which are sometimes connected to automated data loggers. Based on the results acquired, the information is analyzed and diagnosis is thus carried out. This is a necessary step prior to designing any remedial interventions.

Other methodologies for the monitoring of decay on architectural surfaces may include regular sampling and testing, as, for example, in a procedure for measuring gypsum efflorescence on surfaces undergoing capillary rise to monitor decay resulting from salt crystallization on wall paintings (Zehnder 1996: 1669-78), which allows to determine the extent and rate of deterioration, and can define whether a decay activity had ceased following specific treatments and interventions.

Monitoring helps not only to detect the changes which occur on architectural features and buildings but also to identify the potential threats that could be of an intrinsic nature, that is, within the structure itself or those which are considered as external. All such information would help to establish a set of conservation interventions that would help in remedying the situation and arresting potential threats. Nevertheless, the process of monitoring does not end at that stage. Quite often, and while the execution of interventions is carried out, monitoring might be necessary, especially when interventions are related to structural issues. Also, following the execution of conservation work, the monitoring methodology should be revised on the basis of the changes that have occurred and the new condition status. Hence, monitoring should be perceived as an ongoing process that is carried out according to an established methodology and is continuously revised in accordance with a site's condition and current needs.

Cross-References

- ▶ Aerial Archaeology
- ▶ Conservation and Management of Archaeological Sites
- ▶ Cultural Heritage Management Technology and Training
- ▶ Cultural Heritage Site Damage Assessment
- ▶ Nonstructural Sites: Monitoring

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Architecture, Roman

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Introduction

One of the most tangible remains of the Roman Empire is its distinct architecture: with complete buildings still standing in every corner of the empire, the Romans have quite rightly received fame as master builders and engineers. They revolutionized the art of building through experimentation and innovation, two talents Pliny the Elder already describes as innate to their culture (Pliny, *HN* 36.101; Boethius & Ward-Perkins 1970: 3). This entry will not focus on enumerating building types, which recently have been majestically treated by Pierre Gros (1996 and 2001), or building materials and construction techniques, of which the standard publication is still that of Jean-Pierre Adam (1984). Instead, it considers a handful of specific developments and processes that created the architectural style that we now interpret as properly Roman.

Definition

A subject as large as "Roman architecture" has had many interpretations in the past and can be difficult to define with precision. In the broadest terms, it could pertain to any structure that was built in the city of Rome or by the Romans, and in such a case the account would have to start in the tenth century BCE, when the first Iron Age huts appear on the Palatine Hill. Furthermore, the first monumental architecture in the city, in the sixth century BCE, is entirely Etruscan in style. It was, however, submitted to Greek and Hellenistic influences during the fourth and third centuries BCE and further innovation under Augustus to finally find its own unique form. The identification of "Roman architecture" adopted in this entry is that specific style that has its origins in and around Rome in the third century BCE, with roots in foreign architectural practices, but which through experimentation and innovation developed into a style that can be considered truly Roman.

Historical Background

The further Hellenization of the Etrusco-Italic architecture in central Italy during the second and first centuries BCE and its resulting hybrid styles were eventually known as "*consuetudo Italica*," a term used by Vitruvius (V.11.1), the most famous of Roman architects. It is in this

architectural tradition that he composed his treatise *De Architectura Libri Decem* (Ten Books on Architecture), the only surviving architecture manual from antiquity and, as far as we know, the first to consider architecture in general. Previous works, only known through citations in his text, were all Greek and related only to specific orders or buildings. Vitruvius himself, on the other hand, wrote a wide-ranging architectural manual, which not only enumerates building types and rules of thumb for their construction but also provides information on the ideal education and talents of architects, their duties and responsibilities, and their social status. As such, his treatise can be seen as the first to provide a historical narrative regarding the art of architecture.

Writing during the reign of Augustus (27 BCE to CE 14), he dedicated his book in the later years of the first century BCE, when new forms of architecture started to take shape following the application of new building materials, the growing confidence in architectural know-how, and the development of a new ideology (see below). As said, his work displays a thorough knowledge of Greek building practices and a certain partiality to conservative Republican traditions: he frequently refers to the writings of Greek architects, and his chapter on temple design is almost entirely embedded in Greek tradition. He furthermore ignores marble as a building material or the use of the Corinthian order in its developed Augustan form, both of which novelties were becoming standard practices in Rome by the time of his writing. Elsewhere, however, he clearly distinguishes between Roman and Greek architectural forms, for example, for theaters and domestic architecture. Such seeming contradictions between his writing and contemporary practice have made some scholars question Vitruvius' applicability to the field of Roman architecture, but in other's eyes, this trait has made him all the more valuable, as his work perfectly describes the crossroads that architectural practice found itself in at the close of the first century BCE (Anderson 1997: 3–15, esp. 5; Rowland & Howe 1999: 8–18).

Key Issues

It would be quite impossible here to give a complete overview of what Roman architecture was and encompassed, and for a thorough overview, one should still consult the unsurpassed *Etruscan and Roman architecture* (Boethius & Ward-Perkins 1970). Rather, in this section, I will focus on the different mechanisms at play before and after Vitruvius, explaining why architecture developed as it did and why we still recognize buildings as "Roman" while they are thousands of miles apart:

(a) Experimentation and innovation: building materials and techniques
(b) Organization and specialization: the "mechanization" of the trade
(c) The Augustan Revolution
(d) Imitation and emulation: Roman architecture in the provinces

Experimentation and Innovation: Building Materials and Techniques

After the Punic wars in Italy, the moralist rejections of the Greek influence of the late third and second centuries BCE could not prevent the luxuries that Romans encountered in the Hellenistic kingdoms from permeating into every aspect of daily life. Rome embraced a significant influx of architects from the East – a move noticeable for centuries as many architects still had Greek names – but did not fail to produce skilled architects itself: in 174 BCE, the Seleucid king Antiochus IV commissioned Decimus Cossutius, an architect from Rome, to complete the long-unfinished Olympieion at Athens (Gros 1983: 434; Anderson 1997: 22). The Roman drive for innovation was immediately visible as Cossutius changed the temple's style from Doric to Corinthian and the building material from local limestone to Pentelic marble. As Cossutius came from an influential family of architects, it is not unthinkable that he and this project in turn influenced architecture at Rome itself: there, the very first marble Corinthian temple, the Temple of Jupiter Stator in the Circus Flaminius, known from literary sources, was built only shortly afterwards, in 146 BCE, by the Greek architect

Hermodorus of Salamis for Caecilius Metellus Macedonicus. It was followed at the end of the century by the earliest surviving marble Corinthian temple in Rome, the round temple by the Tiber.

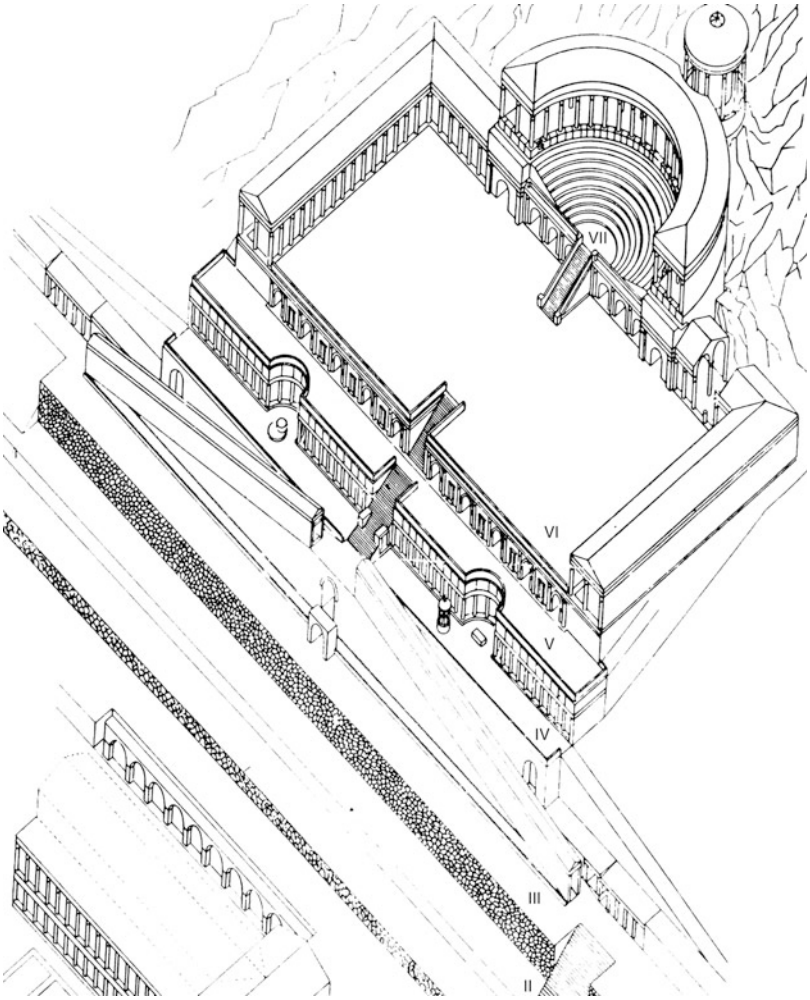
This constant exchange of people and ideas between the Greek and Roman spheres led to further experimentation with arch and vault, two concepts never fully explored by previous cultures. Sometime during the latter half of the second century BCE, a completely new type of arch was successfully built within the new city walls of Falerii Novi that would then be commonly used until the early Empire (Boethius & Ward-Perkins 1970: 101–2). It is but an example of this bold experimentation that caused the Romans to achieve supremacy in building. While they probably learned the arch from the Etruscans, its potential was only realized under Hellenistic influence, and the increasing pressure for new building types (most of which originate from or start being built in this period, such as theaters, basilicas, baths, and warehouses), as well as important innovations in the composition of mortar, made them eventual experts of vaulting techniques. Mortar was used for walls as early as the third century BCE, but the real innovation lay in the addition of a new type of volcanic sand, pozzolana – its name revealing its origins near Puteoli in the Bay of Naples – to create a type of concrete which was not only stronger than the previous mortar but also waterproof and could cure underwater (MacDonald 1965: 3–5).

As confidence in this new substance grew, the Romans started to use it for the natural expansion of the arch, the barrel vault, and subsequently many other types of vaulting. Early surviving examples of the new technique show its success (the second century BCE vaults of the Stabian Baths in Pompeii are a good example), but perhaps the most important step in the barrel vault's development occurred when the new techniques were used for the substructures and buttresses of a specific group of sanctuaries in Latium: the Sanctuary of Fortuna Primigenia at Palestrina (Fig. 1), of Hercules Victor at Tibur, of Juno at Gabii, of Jupiter Anxur at Terracina, and the Tabularium, recently identified as the terrace for such a sanctuary in Rome. All date from the late second century BCE to the early first century BCE (Coarelli 1987, 2010: 129; Lancaster 2005: 5). Unmistakably based on the Hellenistic sanctuaries in the East, for instance those of Asklepios at Kos or of Athena at Lindos (Rhodes), they are very distinctly Roman in character, not only through this novel use of materials and vaulting techniques but also by the way in which they altered the landscape.

While their Greek precedents were built on terraces on natural substructures in dugout hillsides, using the curves of that landscape, as at Kos and Lindos, Romans used concrete, arches, and vaults to artificially alter – and ultimately, in their eyes, enhance – the landscape, implementing strict axes and symmetries and building upwards (Boethius & Ward-Perkins 1970: 122). The technological possibilities that architects acquired from these Latial sanctuaries made it possible for the Romans to build, in 55 BCE, the Theater of Pompey, the first completely freestanding stone theater in Rome, which used the same arching and vaulting techniques, though with updated materials. Further studies lent a profound understanding of building materials and paved the way for bold projects like the Domus Aurea, the Markets of Trajan, and the sophisticated design of the dome of the Pantheon. The deliberate choice to use different types of aggregate in the concrete of the building and dome, so the weight decreases as the height increases, was experimented on in the earlier Baths of Trajan, but perfected in the Pantheon (Fig. 2), ultimately contributing to the fact that the building is still standing today. It was subsequently used for the largest vaults and domes, as at the Baths of Caracalla, the Baths of Diocletian, and the Temple of Minerva Medica (Lancaster 2005: 158–61).

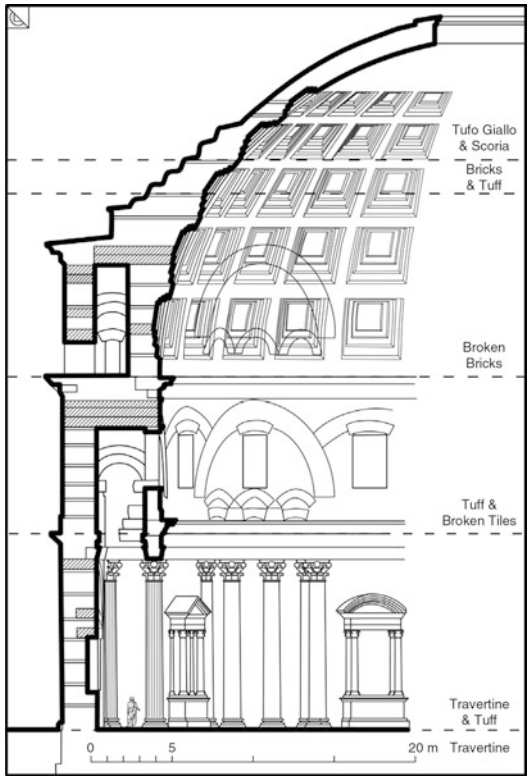
Organization and Specialization: The "Mechanization" of the Trade

Key to the development of new techniques and building types is not only the drive for experimentation and a thorough understanding of the capacities of one's building materials but also the availability of resources, their potential for easy



Architecture, Roman, Fig. 1 The Sanctuary of Fortuna Primigenia at Palestrina (Boethius & Ward-Perkins 1970: 142, Fig. 78)

handling on-site, and most of all, an established and well-organized framework in which to operate. Unfortunately, there is a distinct lack of ancient sources on the actual on-site duties of the architect, contractor, or other master builder in the Roman period, even with the survival of Vitruvius' handbook. We are better informed about the Greek Classical Period, when architects were mentioned in the publicly displayed building contracts for major temples. For a long time, the *architekton* was an occasional occupation, only required for large projects such as temples and stoas, which were only commissioned once every generation (Coulton 1995: 27–9). In the Hellenistic Period, the emergence of the new monumental building types and the wealth of individual patrons and new kingdoms, rather than the *polis* as commissioner, gave rise to architect becoming a proper full-time profession, sometimes under permanent patronage. Ironically, such craft specialization also brought with it the anonymity of the architect (but not yet a loss of prestige), as from then on and continuing into the Roman period, the most important name to remain attached to a building was that of the patron. Good examples are the Attalid kings at Pergamon, Pompey and his Theater, Agrippa and his Pantheon, or Maxentius and his basilica. And thus, to identify Roman architects of the late Republic, we depend mainly on evidence from tombstones and other inscriptions or passing references in Cicero, Vitruvius, and other



Architecture, Roman, Fig. 2 A section of the Pantheon (Lancaster 2005: 62, Fig. 46)

contemporary writers. Generally, it appears that, especially but not exclusively for small construction projects, architects were at the same time designer, master builder, contractor, and on-site supervisor site (Gros 1983: 431, 452).

With the specialization of the job also came a specialization of the trade. Construction sites became much better organized, with both unskilled labor and highly skilled workmen (*fabri*) contracted for specific tasks. Among these, one would find the *mensores* or surveyors to set out the site, *fabritignuarii* to build the walls, the *tectores* as plasterers, and the *redemptor* – the contractor – to supervise. The Roman building trade was organized with military precision: the guild of builders (the *collegium* of the *fabritignuarii*) at Ostia had reached 350 members by the end of the second century CE; in Rome it had around 1,350 members at the same time. Ordinary members were called the "body of booted soldiers" and were divided into 16 cohorts in Ostia, 60 in Rome, each headed by a *decurio*, while the patron of the *collegium* was a *praefectus*. What is most surprising, however, is that the 350 members of the guild in CE 198 were men of high status: patrons themselves or at least contractors, architects, and heads of "firms" who could afford to pay the entrance fee. This shows that the entire body of builders must have been significantly larger, even at a relatively small town like Ostia. There can be no doubt that by the end of the second century CE, building must have been a very lucrative business with a possible 20,000 people active at any one time in Rome alone (DeLaine 1997: 197–201, 2000: 121, 132), which must have been a continuous building site for the majority of two centuries.

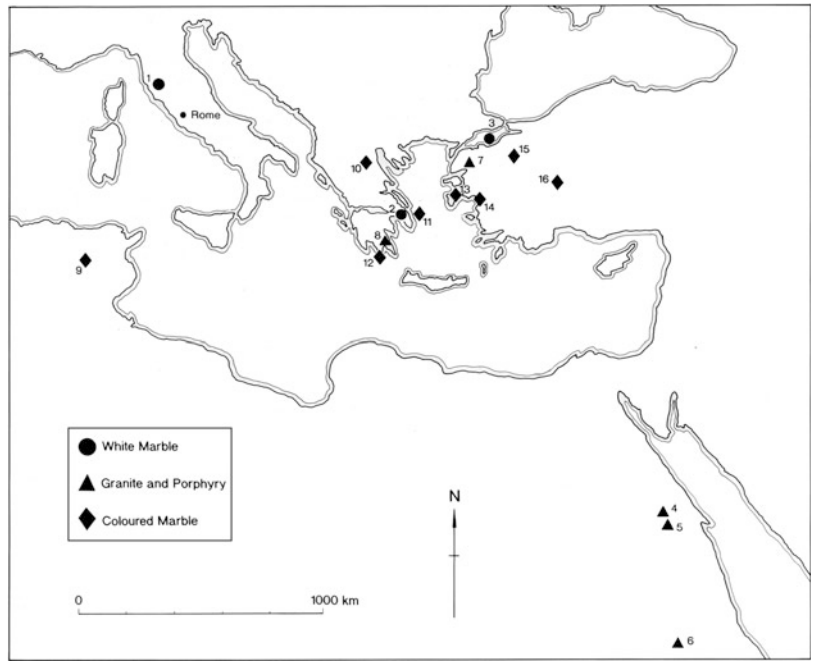
Advantages of such a military organization are obvious: ultimately, it would lead to more uniform construction techniques as well as a quick output rate. Another important change that led to these developments took place with the invention of Roman concrete, as set out above: concrete walls needed an outer facing, and a standardization of the process would mean faster and stronger building. Vitruvius (II.8.1–4) tells us about two facing techniques of his time: the old-fashioned *opus incertum*, in which tufa blocks of irregular size were fitted into an irregular pattern, and the then new *opus reticulatum*, where square-faced tufa blocks were placed in diagonal lines (Fig. 3). The Latial sanctuaries still show *opus incertum* in their walls, but reticulate took over soon afterwards and it is fair to say that it created a shift in Roman building practice: for the first time in the building trade, it is possible to speak of mass production. Since all reticulate blocks were the same shape and size, they could be mass-produced by organized teams of stone cutters, possibly even slaves. This had several consequences: specific skill was needed at the quarry to cut the reticulate blocks, as opposed to the irregular-sized *incertum* blocks, and the mason's time to place the blocks while building walls was reduced significantly. This complete mechanization of the construction site led to the decline in the little prestige that the *architectus* had enjoyed during the late Republic, and in the early Empire his job was basically

Architecture, Roman, Fig. 3 Examples of *opus incertum* in the Sanctuary of Jupiter Anxur in Terracina, of early *opus reticulatum* in the Theater of Pompey in Rome, and of developed *opus reticulatum* in the Baths of the Trinacria in Ostia, Italy (photos by author)

reduced to that of the *redemptor* or contractor (Torelli 1995: 227–230). The only exceptions are, unsurprisingly perhaps, architects that can be linked to specific emperors and designing, rather than executing, grand imperial projects in the first two centuries CE: Celer and Severus for Nero, Rabirius for Domitian, Apollodorus of Damascus for Trajan, and Hadrian himself (for their careers, see Anderson 1997: 52–67).

As the standardization and mechanization continued, we notice the appearance of specialized "ateliers," where building materials could be ordered and bought prefabricated, as opposed to custom commissioned per new project. Nowhere is this more visible than in the use of fired brick and marble. Fired bricks were first used in the early first century BCE and retained the standard sizes given to them then, hence the uniformity one can detect in Roman brick buildings that are still standing. But not only were their size and triangular shape standardized; occasionally also signs of a mechanized production process are visible from stamps that carry the name of either the owner (of the brickyards or *figlinae*) or the maker. In the late first century CE and firmly from CE110 onwards, bricks were more regularly stamped with date and names of the owner, of the brickyard, and sometimes even of the slave that made them. These owners were part of the elite, but over time (and definitely by the beginning of the second century CE), most brickyards became the property of the imperial family, causing further uniformity in production and acquisition processes (DeLaine 2000: 134).

Around this time, the same thing happened to the marble trade. The Romans' first acquaintance with the stone occurred via the marble statues and architectural elements that were looted as war booty from Greece and the East in the second century BCE. Its popularity grew quickly, and already Caesar, under whom the quarries for white Carrara marble were opened up, started taxing marble as a luxury good. Unlike the Greeks, however, Romans especially favored colored marbles for decorative purposes, almost all of which were quarried outside of Italy (Fig. 4). Triggered by the annexation of Egypt as Augustus' personal property, including its quarries of red porphyry and gray and pink granite, the potential economic benefits were soon realized and by the middle of the second century, almost all the major quarries in the provinces entered the hands of the imperial family. With this monopoly came a first significant reorganization of the marble trade, now overseen by imperial officials, and the processes of extraction, transportation, and sale were rigorously controlled and inspected. At a later stage, production (and accompanying revenue) was even further increased by the focus on mass production of half-finished products (e.g., sarcophagi) and on the creation of stocks, rather than on individual orders and individual building projects. Exploitation of the quarries reached new heights because



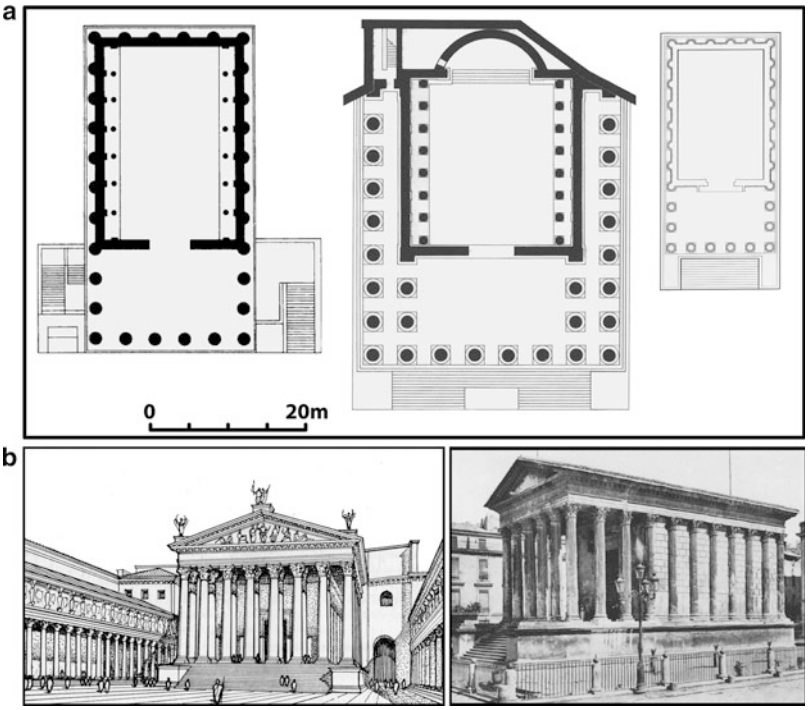
Architecture, Roman, Fig. 4 Map of the main marble quarries in the Roman Empire (DeLaine 1997: 95, Fig. 54): *1*. Luna, *2*. Pentelic, *3*. Proconnesian, *4*. red porphyry, *5*. Mons Claudianus granite, *6*. Aswan granite, *7*. Troad granite, *8*. green porphyry (*serpentino*), *9*. Numidian (*giallo antico*), *10*. Thessalian (*verde antico*), *11*. Carystian (*cipollino*), *12*. *rosso antico*, *13*. Chian (*portasanta*), *14*. *Africano*, *15*. *breccia corallina*, *16*. Dokimeion (*pavonazzetto*)

of these changes: it is estimated that between 100 and 160 CE, the quarries at Dokimeion, Turkey, produced over 500,000 m^3 of marble (Waelkens 1990: 61–72). Long-distance trade in decorative stones on this scale remained unique prior to the modern period.

The Augustan Revolution

After two centuries of building in the newly created Hellenistic-Italic way, the reign of Augustus gave rise to the development of a new decorative program in Rome, which from there spread throughout the Roman world and ultimately defined what we still recognize today as "Roman." This was not a total break with what went on before: the same building types continued to be built, while building techniques continued to develop along the lines explored above. But it is obvious from Augustus' testament, the *Res Gestae Divi Augusti*, that he invested heavily in architecture, cleverly using it as another – successful – propagandistic tool and part of the implementation of an official visual language in his reorganization of Roman society, which he applied to every aspect of daily life, from coins to wall paintings to silver drinking cups (Zanker 1987). In order to legitimize his rule, Augustus needed to exhibit certain continuity between the old Republic and the new order and particularly achieved this through architecture: by evoking a partly Greek classical past in a new jacket, Augustus confirmed that Rome culturally equaled, if not surpassed, Greece.

This architectural innovation deliberately focused on specific building types, most notably temples and theaters. Early instances of the new style can be found at the Temple of Apollo Palatinus (36–28 BCE) and the Temple of Apollo Sosianus (almost contemporary and identical in execution), but already immediately after, it found its characteristic incarnation in the Temple of Mars Ultor (started in the 30s BCE) in the Forum of Augustus, dedicated in 2 BCE (Fig. 5). Many characteristics of its design and decoration became the norm and embodiment of the new Augustan architecture: it was completely built from Carrara marble (not just marble-clad); it incorporated the Romans' predilection for frontal views (as opposed to the Greek viewability from all sides), in this case by a *peripteros sine postico* plan (i.e., with columns only on three sides); it rose on a high podium (an incorporated



Architecture, Roman, Fig. 5 (**a**) Comparative plans of the Temple of Apollo Sosianus, Temple of Mars Ultor, and the Maison Carrée (Stamper 2005: 120, Figs. 89, and 133, Fig. 97); (**b**) reconstruction of the Temple of Mars Ultor (Boethius & Ward-Perkins 1970: 190, Fig. 85) and a photo of the Maison Carrée (Zanker 1987: 256, Fig. 201)

Italic custom); and above all, its Corinthian order had been transformed into the developed Roman Corinthian, which among other minutiae included a heavy focus on acanthus leaves (which became omnipresent in Augustan art) and a new type of cornice enriched with modillions and coffering, finally giving the Corinthian order its own cornice, which it never had in Greece (Gros 1996: 145–47; Wilson Jones 2000: 139–42). Furthermore, whereas before the outside appearance of a temple needed visually to be the most impressive (following Greek and Hellenistic customs, as one still sees at the sanctuary of Fortuna at Palestrina), now the interior grew in importance and was decorated accordingly, with different types of lavish colored marbles for both flooring and the multistoried columnar displays along the walls. It is likely that in the new visual imagery, the different marble types were representations of the different geographical regions they came from, by then all Roman provinces. In short, the use of multicolored marbles stood symbol for the wealth, breadth, and power of the Roman Empire under Augustus or, even, the *Pax Augusta*.

Apart from temples, theaters also became the carriers of the new Augustan ideology. The Senate had only recently allowed the construction of permanent theaters in Rome, and thus they had a lot of potential to allow for innovation and manipulation. In the Campus Martius, Augustus constructed no less than three theaters (of Marcellus, of Balbus, and a thorough restoration of that of Pompey), together with other places for entertainment, the Saepta Julia and the amphitheater of Marcus Scaurus, in all of which he frequently mixed with the people (Zanker 1987: 151–57). Although this was a less subtle display of propaganda, it obviously pleased the people and the success of the theater was exported to every outpost of the empire; together with temples, they proved to be perfect vehicles for the dissemination of the Augustan ideology, and in one of those instances where Vitruvius (V, 3–9) seems to have been favorable of contemporary

developments in architecture, he devotes a disproportionate amount of text on the Roman theater.

Imitation and Emulation: Roman Architecture in the Provinces

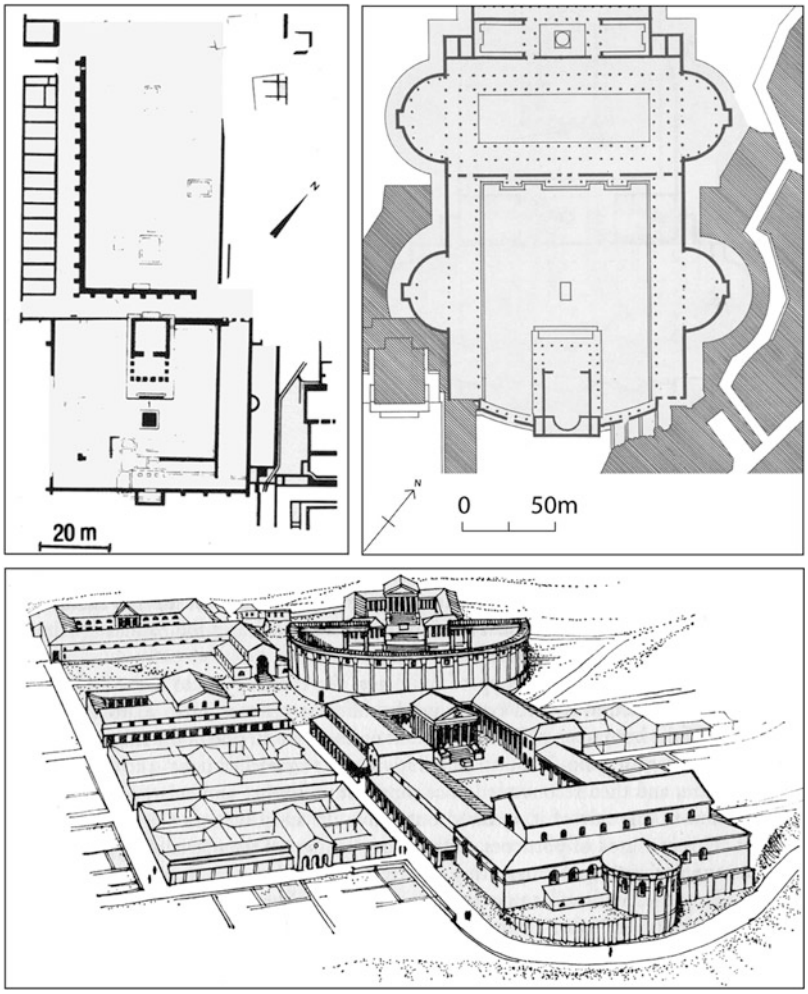
It is therefore not surprising to see the same architectural developments arise outside of Italy during the principate of Augustus. Before this time, Rome had only marginally, if at all, been involved in the architecture of the provinces. In the East (Greece, Asia Minor, the eastern Balkans, and Cyrenaica), a sophisticated, Hellenistic architectural tradition had existed for centuries, while in the West (Spain, Gaul, western Germany, Britain, and western North Africa), architectural traditions were poor and one could argue that any sign of monumentality was lacking. It is only to be expected that local influences and traditions continued to reverberate through the Roman occupation, but it is quite an achievement that today, we would instantly recognize cities or buildings as Roman from their architectural remains, even if they were located thousands of miles apart and had significantly different cultural backgrounds.

Both Spain and the south of France (*Gallia Narbonensis*), although part of the Roman Empire since 206 and 121 BCE, respectively, only received a distinctive monumentalization in their architecture from Augustus onwards, and it is noteworthy that the early examples seem to have been directly inspired by what went on in Rome: the Maison Carrée at Nîmes (Fig. 5), the temple to Augustus and Livia at Vienne, and the temple to Rome and Augustus at Barcelona were all based directly on the Temple of Mars Ultor. At Nîmes, the decoration is even so similar to that of the Ara Pacis, the other Augustan propaganda monument in the Campus Martius in Rome, that the same architect and/or workmen are believed to have worked on it. This influence from Rome continued: in Italica (Spain), birthplace of Trajan and Hadrian, Hadrian built the Traianeum, modeled on the same temple, while at Avenches (Switzerland), an almost exact copy to the Forum of Peace of Vespasian was built in Flavian times (Gros 1996: 151–59, 170, 184).

That there was much room for regional experimentation and other cultural influences, however, is clear from case studies on the so-called forum-basilica complex. This building type, in which the forum was lined with a basilica on one side and the main temple axially laid out lengthwise, could first be found at Silchester (United Kingdom), Lugdunum Convenarum (Saint-Bertrand-de-Comminges, France), and Baelo Claudia (Spain) in the first century CE, not just imitating but also improving and standardizing the model of the Italian forum. After the transformation, it was exported back into Rome to find its ultimate translation into the Forum of Trajan, only to be copied again in the provinces, as at Augusta Raurica (Augst, Switzerland) (Gros 1996: 220–3; Fig. 6).

In North Africa, where a limited monumental architectural tradition had existed before, a much more hybrid style emerged, as not two but three cultural spheres came together: Roman, Berber, and Punic. Here, Roman-style temples could be dedicated to indigenous deities and vice versa, but decorative details often remained Punic in style. A representative example can be found at Lepcis Magna, when between CE14 and 19, a temple to Rome and Augustus was built. Its Ionic order, heart-shaped angle piers, and wooden architraves were all remnants of an indigenous Punic tradition, but at the same time, the temple was peripteral *sine postico*, approachable from the front only, and rested on a tall, vaulted podium with flanking stairs (Boethius & Ward-Perkins 1970: 466–67).

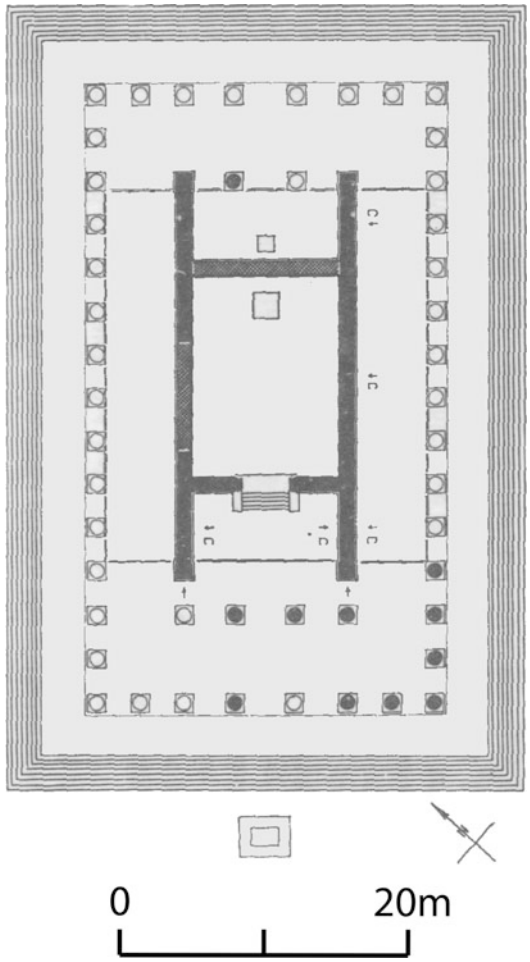
Asia Minor, the wealthiest of the Eastern provinces, tells a different picture altogether. The province of Asia, though already an early "conquest" (it was given to Rome by the last king of Pergamon in 133 BCE), kept its architecture quite comfortably rooted in the Hellenistic tradition for more than another 200 years. Roman influences only started to trickle down slowly and in a piecemeal manner in the Augustan era. The Temple of Augustus and Rome at Ancyra was so rooted in Hellenistic fashion that it was once considered to have been built in the second century BCE (Fig. 7), while the contemporary Temple of Augustus and Men at Pisidian Antioch



Architecture, Roman, Fig. 6 Plans of the forum-basilica complex at Lugdunum Convenarum (Bedon et al. 1988: 218) and of Trajan's Forum in Rome according to R. Meneghini (after Stamper 2005: 177, Fig. 133) and reconstruction of the complex at Augusta Raurica (Boethius & Ward-Perkins 1970: 343, Fig. 131)

(but not the surrounding portico) followed the styles laid out at Rome, down to the details of the acanthus leaves. From Flavian times onwards, more hybrid structures with heavy influences from both backgrounds emerged. The Temple of Domitian at Ephesus and the Antonine Sanctuary of Zeus at Aizanoi are Ionic pseudodipteral temples (which pretend to have two rows of surrounding columns, but only have one), similar in style to the temple at Ancyra, but both were raised on a high podium (Boethius & Ward-Perkins 1970: 389–92; Lyttelton 1987). When pure Roman buildings arose, they are often directly linked to imperial involvement: an example is the Sanctuary of Asklepios Soter in Pergamon, the patron of which, Lucius Cuspius Pactumeius Rufinus, Hadrian met and befriended on his first visit to the city in CE124. It is likely that the sanctuary was dedicated in CE 129, on Hadrian's second visit, by which time it also included an exact half-scale copy of the Pantheon in Rome (Gros 1996: 182–183). By CE 142, Rufinus had achieved his goal of becoming consul in Rome.

This reluctance to take over Roman architecture wholesale probably lay at the base of the emergence of a specific type of architecture now commonly referred to as "marble style." The abundant availability of marble in the provinces of Greece, Asia Minor, and North Africa; the



Architecture, Roman, Fig. 7 Plan of the Temple of Augustus and Rome at Ankara (Akurgal 1973: 285, Fig. 118)

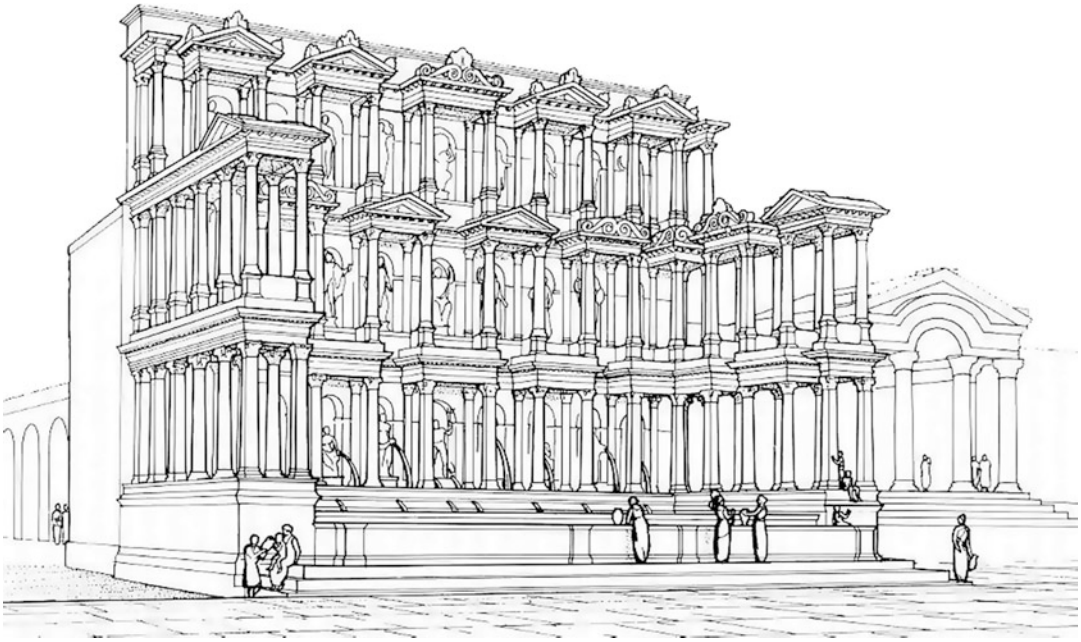
emergence of a rich elite in late Flavian and early Trajanic times; and the desire to compete not only between cities but also for political positions in Rome gave rise to a construction frenzy of monumental buildings for public use. While Rome was still turned to for inspiration, the style is very much a provincial emulation of what was contemporary custom in Italy. Based on the stage buildings of theaters in Rome (especially those of Scaurus [Pliny *HN* 34.36] and of Pompey), spectacular columnar facades of multiple orders and multiple marble types now started to appear in other buildings: monumental fountains or *nymphaea* (e.g., Olympia, Miletus [Fig. 8], Ephesus, Perge, Lepcis Magna), honorific arches (e.g., Lepcis Magna, Perge, the Arch of Hadrian at Athens), bath buildings (where a central room with this feature is now often called "Marmorsaal," e.g., Sardis and the Harbour Baths at Ephesus), and other public buildings (e.g., the Library of Celsus at Ephesus). It was only exported into Rome at a later stage, perhaps not coincidentally when under Septimius Severus (CE 193–211), the emperor from Lepcis Magna, a monumental fountain at the foot of the Palatine, called the Septizonium, was constructed in this style (Boethius & Ward-Perkins 1970: 403–6).

Conclusion

It is clear that these four "drivers" can explain most of the development in the architecture in the Roman Empire. While stronger local influences survived in some places and unique variations exist everywhere, overall this consistent style of forms was established which today allows us to recognize structures all over Europe, North Africa, and the Middle East as part of the same architectural tradition.

Future Directions

Still acutely lacking in architectural studies is a thorough examination of the non-Etruscan, local Italic traditions in Italy at the advent of and during the Hellenization of the architecture. This transition has never been fully documented and the standard work on Hellenistic buildings of Italy is now over a century old (Delbruck 1907). More positively, recent decades (1990s and 2000s) have seen a still continuing shift of focus from the 1960s and 1970s increase in books on urbanism and building types to the neglected field of the constructional aspects of Roman architecture, including detailed studies on the way building sites were organized and on identifying individual groups of builders in the same building or town (e.g., DeLaine 1997; Lancaster 2005). New excavations, as well as never-executed detailed studies of even the most famous monuments, will contribute heavily to this research in the coming years.



Architecture, Roman, Fig. 8 Reconstruction drawing of the *nymphaeum* at Miletus (Boethius &Ward-Perkins 1970: 404, Fig. 153)

Cross-References

- ▶ Amphitheater
- ▶ Fortifications, Archaeology of
- ▶ Topography of Rome
- ▶ Urban Planning, Roman
- ▶ Western Roman Provinces, Archaeology of the

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Archival Research and Historical Archaeology

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Introduction

> Historical archaeology is a multi-disciplinary field that shares a special relationship with the formal disciplines of anthropology and history, focuses its attention on the post-prehistoric past, and seeks to understand the global nature of modern life (Orser 2004: 19).

Few archaeologists would have self-identified as a "historical archaeologist" before 1960 (Harrington 1952, 1955). In that year Stanley South started the Conference on Historic Sites Archaeology in conjunction with the Southeast Archaeological Conference. Later, in 1967, the Society for Historical Archaeology was founded. Yet, by that date, there had already been more than a century of what has been termed "text-aided archaeology" (Little 1992) in the Old World on Biblical, Chinese, Egyptian, Greek, Roman, and more recent medieval and postmedieval sites, and in the New World on ancient Mayan and early modern colonial sites in both terrestrial and underwater contexts. Most of these early endeavors were conducted with an eye toward sites associated with elites and were focused on historic preservation and site interpretation, that is, to provide artifacts for display and evidence for reconstruction. Over time these evolved into numerous subfields (e.g., classical, medieval, maritime) while retaining their focus was on the post-prehistoric or historic, literate societies (Fontana 1965; Schuyler 1970). In the United States the historic preservation movement created an interest in sites of the historic period starting at such renowned sites as Williamsburg and Jamestown in Virginia and Fort Necessity in Pennsylvania.

In English-speaking North America the focus on the birth of the early modern global economy steadily began. Methodologically, "historical" archaeologists draw equally on both archaeological and documentary records to consider the processes associated with cultural continuity and change in the face of modernization and in giving a voice to those who were largely mute in the documentary record – women, people of color, children, and the poor. In 1977, the publication of South's method and theory book brought historical archaeology into a reliance on empirical patterns and systematic analysis of archaeological materials. Today historical archaeologists use the methods of history, anthropology, and archaeology to study the past. That is, to paraphrase Schuyler (1977), they use the written word, spoken word, observed behavior, and preserved behavior in their research.

Definition

Archives, simply put, are repositories in which public records or other primary historical records are stored. This may range from the great national archives such as the National Archives in the UK (http://www.nationalarchives.gov.uk/), formerly known as the Public Records Office located in Kew outside of London; the US National Archives and Records Administration (http://www.archives.gov/) located adjacent to the Capitol building in Washington, DC; the French Archives nationales, especially the overseas territories division

(*Archives nationales d'outre mer*) (http://www.archivesnationales.culture.gouv.fr/); or the Archivo General de Indias in Seville (http://www.mcu.es/archivos/MC/AGI/index.html) where documents pertaining to four centuries of Spanish exploration and colonial administration are housed. Smaller repositories may focus on businesses (e.g., Hudson Bay Company Archives in Winnipeg), labor (e.g., George Meany Memorial Archives in Silver Spring, Maryland), the lives of specific individuals (e.g., Ludwig Beethoven at the Ira F. Brilliant Center for Beethoven Studies at San Jose State University in California), or places (e.g., the Louisbourg Institute of Cape Breton University; Santa Barbara Mission Archive-Library). In several European countries, there can be regionally run archives – in the England, for instance, each county has its own records office which holds archives especially pertaining to county matters, although not exclusively so. Regional and even local libraries may also have archival holdings. Sometimes primary documents are published such as those relating to French seventeenth-century trade items in the Illinois country (Pease & Werner 1934) or invoices for the Presidio of Santa Barbara (Perissinotto 1998). These provide researchers and students with real-world "touchstones" for the material culture of the fur trade or the Spanish colonial frontier, respectively.

The "written word" can include contemporary plans and insurance maps; newspapers; vital records concerning such matters as deaths, burials, marriages, and baptisms; deeds; probate inventories; census data; ethnohistorical and geographical accounts; and quantifiable documentary evidence including those relating to the value of exports, port activity, custom's duties, and expenditures for defense. All are especially useful for situating people and their associated settlements within the larger culture and world economy. For example, invoices, ledger books, reports, and eyewitness accounts have been used to identify artifacts and features found at Spanish California mission and presidio sites (Skowronek & Thompson 2006) and have been used to create ethnohistories of Native Peoples in the region (e.g., Hoover 1977).

Other forms of useful documentary evidence include contemporary letters and bureaucratic reports. From piracy and related economic concerns to diet and disease, documents have enormous descriptive value for the picture they paint of a community and the concerns of portions of the populace. Additionally, these reports and letters may contain information on the construction and condition of buildings and vessels. This information might be used to chronicle building phases of a structure or to identify a shipwreck on the basis of the presence or absence of certain aspects of material culture. HMS *Fowey*, lost off the Cape of Florida in 1748, was identified using a combination of court martial proceedings and other primary documents using this technique (Skowronek & Fischer 2009). While documentary evidence can provide a revealing look at the options and choices available to past peoples, they do have limitations which often can be addressed by an analysis of the presence or absence of material evidence. For example, in the sixteenth-century letters from Santa Elena and St. Augustine in the Florida colony, there were complaints that when it came to diet only "vermin and scum" were available to sustain the communities. In fact, study of faunal and floral evidence demonstrates that a wide variety of both domesticated and wild comestibles were available to the settlers (Reitz & Scarry 1985). Other sixteenth-century Spanish communities vociferously complained of seemingly endless attacks by pirates or a continuing problem of smuggling. Study of the material culture from these sites demonstrates that role of piracy and smuggling was overblown in these documents and by subsequent researchers. In fact, the presumed contraband formed a rather insignificant part of the material record, and the vast majority of what was found may well have arrived through fully legal avenues of trade (Skowronek 1992).

Oral history, once a mainstay of history, fell out of favor at the end of the nineteenth century among those studying the West and its colonies. By that time the written word was considered to be the absolute and definitive primary source of information on the past. With a growing number of archives and publishing outlets, historians and political leaders of the era saw any form of non-written material as a lesser and weaker form of evidence associated with preliterate societies and

illiterate peoples. As a result oral history passed into the realm of anthropologists and folklorists. By the last third of the twentieth century, social historians began to turn back to oral histories and the evidence provided by other social scientists to study the past. Oral history can fill in the gaps on particular subjects about which there is little or no information. Oral history can complement both the documentary and archaeological records with human experience and perception (Newland 1997). One of the early landmark projects in the USA which demonstrated the strength of the various avenues of inquiry was conducted at the Mott Farm in Rhode Island (Brown 1978). This study combined documentary history, oral history, and archaeology to more clearly illuminate a 300-year-long picture of human-land interactions. The farm, dating from the seventeenth century, was owned by the Mott family to just before the turn of the twentieth century. For the next century, another family lived on the property renting a portion of the home to a series of families. Brown's study included the traditional study of primary documents associated with the Mott family which provided information on how that family economically fared in their 200 years on the property. This included study of tax records, probates, and personal records. While similar documents were available for the twentieth-century occupants, these were supplemented with oral histories conducted with surviving members of those families. From these, information on trash disposal, outhouse location, and other usually forgotten aspects of life were recorded and later confirmed in the archaeological record.

Key Issues

Scholars continue to struggle over the primacy of the material, written, and spoken records. Documents may be overvalued in the face of contradictory material evidence. Documents may be unsystematically and uncritically used. Oral histories and ethnographic and ethnohistorical accounts associated with the direct historic approach to studying the past may be taken as unchanging traditions. Finally, there are continuing misperceptions regarding the nature of "science" and "history" as being separate and not comparable (Feinman 1997). What this means in the study of the past is that documents should neither be used uncritically nor given precedence over material culture. Rather, historical analysis should be conducted in a systematic and scientific manner which contextualizes the documentary and material records against both the regional and larger global communities in which they were created. Both are likely to have what Michel-Rolph Trouillot (1995) has termed "mentions" and "silences," and what is left out of a written or material record is often as informative as what has been included.

Some 50 years have passed since the use of documentary evidence in archaeology was formalized under the umbrella of historical archaeology. The founders of the field were trained as prehistorians in anthropology programs. Their first forays, and those of many of their students, into this endeavor were poorly received by their colleagues and historians as being neither history nor science. Now, a new generation of historical archaeologists has taken to the field versed in the social sciences and humanities and questioning the ideas promoted in the culture history, processual, and post-processual approaches. Today the archaeological, ethnographic, documentary, and spoken records are powerful methodologies for the examination of history through the lens of historical archaeology (Little 2007). By using these complementary and nonexclusive data sets a more accurate and unbiased view of past peoples, and their associated cultures may be discerned by those willing to undertake an interdisciplinary open-minded approach to understanding the past.

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Arctic Ocean and Bering Sea: Maritime Archaeology

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Introduction and Definition

Physical Geography, Oceanography, and Climate

The Arctic Ocean is a unique place, with no analogue elsewhere on the planet. As the world's largest confined ocean, its permanent sea-ice

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 1 Map of the Arctic Ocean and Bering Sea (Image courtesy of Arctic Biodiversity Data Center)

cover creates a hostile and difficult environment for human research and occupation, but is a crucial component of global climate and the ecology of the world ocean. The region's oceanographic characteristics, climate regime, and human adaptations are not matched by any other, and these factors have been emphasized in recent years as indicators of global warming bring dramatic changes to the Arctic.

Oceanographers consider the Arctic Ocean and its bordering seas to be the body of water surrounding the North Pole and bordered by Europe, Siberia, Alaska, Canada, and Greenland, occupying an area of approximately 14 million km^2 (Fig. 1). Major island groups are found off the European and Siberian coasts (Svalbard, Franz Josef Land, Novaya Zemlya, Severnaya Zemlya, and the New Siberian Islands) and throughout Canada's Arctic archipelago. Bordering seas are the Barents, Kara, Laptev, East Siberian, Chukchi, Beaufort, Greenland, and Norwegian Seas. Broad and shallow continental shelves extend from the European and Siberian coasts and beneath the Chukchi Sea, but are narrower and deeper off

Greenland and North America (approximately 30 % of the surface area of the Arctic Ocean is underlain by continental shelves). Maximum depths are attained in the two main subbasins of the Arctic Basin (the Eurasian and Canadian, with depths of c. 4,200 and 3,800 m, respectively). The Arctic Ocean is connected to the North Atlantic Ocean through Baffin Bay and the Greenland and Norwegian Seas and to the Bering Sea and North Pacific Ocean through Bering Strait. The largest rivers flowing into the Arctic Ocean are the Ob, Yenisei, Lena (Siberia), and the Mackenzie (Canada).

The Bering Sea is bounded by Siberia on the west, Alaska to the east, and the Aleutian Islands chain to the south. The Bering Sea has its own special oceanographic characteristics, being neither Arctic nor temperate, with a fairly free exchange of water through the Aleutian arc with the North Pacific and a quite restricted exchange with the Arctic Ocean through the narrow and shallow Bering Strait (c. 85 km wide and 45 m deep). In a typical winter sea ice extends south to the Pribilof Islands, but retreats north past Bering Strait during the summer. The Bering Sea is one of the most productive marine ecosystems on earth, especially along its extensive continental shelves.

The Arctic climate zone can be defined in a number of different ways. Two of the most prevalent are by latitude (above 66.56° N, the "Arctic Circle") and by temperature (the region bounded by the 10° C summer isotherm) (both shown in Fig. 1). The climate of the Arctic is characterized by strong seasonality: long, cold, and dark winters and short summers with long daylight hours (Nuttall & Callaghan 2000). The climate of the ocean itself is shaped by the year-round presence of the Arctic pack ice and by the physical processes of freezing and thawing of river, lake, and sea ice. The presence of ice cover has major influences on physical and biological processes within the ocean and atmosphere, as well as implications for human use and occupation. The Arctic Ocean is almost entirely ice-covered during the winter, while minimum ice extent is attained in late summer. However, Arctic sea-ice cover has undergone significant changes in the past two decades, with five record minima attained between 2001 and 2007 and a small expansion in 2008–2011, but with the lowest value ever recorded in September 2012. The trend is towards shorter ice-cover seasons and thinner ice cover in general. These data have raised speculation that the Arctic Ocean may see entirely ice-free summers as soon as 2030 (Stroeve et al. 2012). Rapidly changing climate conditions in the Arctic have important ramifications for human presence and research, as well as the archaeological record of the region.

Historical Background

Exploration and settlement of the Arctic is a very recent endeavor in terms of overall human history, coming essentially at the tail end of over a million years of human dispersal from Africa. In the later Pleistocene, between approximately 45,000 and 25,000 years ago, modern humans expanded north and east across Eurasia into new regions. These previously unexplored habitats included Siberia up to approximately 60° N (and potentially further on a seasonal basis). These areas were, however, largely abandoned during the peak of the Last Glacial Maximum (LGM, c. 20,000–18,000 years ago) (Hoffecker 2005). In Western Europe, the Fenno-Scandinavian glaciers began to retreat around 12,000 BCE, and the earliest occupations of northern Norway are dated to c. 10,000 BP. Many of the regional cultures arising in Scandinavia during the Mesolithic show a clear orientation towards maritime subsistence. The vast expanse of Northern Eurasia was also reoccupied during the climatic amelioration following LGM, with a variety of Late Pleistocene and Early Holocene cultures arising across most of Siberia.

The growth of polar ice caps and continental glaciations during the Pleistocene resulted in sea levels lowered as much as 120 m below those of the modern era. During much of the Middle and Late Pleistocene, the shallow continental shelf between Siberia and Alaska was thus exposed as dry land. The exposed land connection is often referred to as the "Bering Land Bridge," and the

region from eastern Siberia to the Yukon Territory, encompassing the now-submerged Bering Land Bridge, is called "Beringia" (Hadleigh West 1996).

The existence of a land bridge between Asia and North America (and adjacent areas of exposed continental shelf) is of paramount importance for understanding theories of human colonization of the Americas. Although the possibility of a maritime migration has been proposed (Dixon 1999), prevailing theories favor an overland route for the first humans in North America. The oldest archaeological sites in Alaska date to c. 15,000 BP, and by c. 4,500 BP Paleo-Eskimo peoples had settled in north Greenland.

Successful settlement of the Arctic was dependent on a number of specialized technologies and adaptations, especially those designed and used for maritime subsistence (such as skin boats and toggling harpoons). Tools such as the needle (for use in tailored clothing and sewing skin boat covers) were prerequisites for survival in the Arctic. Equally important was a deep and intense knowledge of the Arctic marine environment, especially sea ice. A succession of cultures can be seen across the North American Arctic, from Paleo-Eskimo to Dorset and finally Thule peoples. The Thule migration from Alaska across the Canadian Arctic to Greenland around 1300 CE is remarkable for its speed and distance – nearly 4,000 km from Bering Strait to Greenland, occurring over a single generation, and possibly over just a few seasons! One possible impetus for this "dash across the top of the world" may have been trade in metals and other goods with Norse inhabitants of Greenland. Archaeological investigations of sites in Canada and Greenland show undoubted contact between Norse and indigenous inhabitants of the Arctic. The cultural affiliation of the people who encountered the Norse in Newfoundland and Labrador is not certain, but in the northern areas they were met by Thule Eskimos – the ancestors of modern Inuit peoples. The nature of these interactions is a fascinating topic, explored by archaeologists in Canada and Greenland (see Fitzhugh & Ward 2000; Maschner et al. 2009).

The oldest maritime sites in the Arctic are camps and settlements of prehistoric maritime cultures. The faunal remains discovered in these sites suggest use of a wide variety of maritime resources: from intertidal mollusks and fish to seals, walrus, and whales. Construction of reliable watercraft was both a necessity and a challenge in the treeless circumpolar environment. Most indigenous peoples in the coastal Arctic used skin boats: open (umiaks) and decked (kayaks). The frames of both umiaks and kayaks were constructed of driftwood and covered, as a rule, with marine mammal skins. Ivory, bone, or antler frame members were also occasionally used, and in some cultures the cover was made of caribou and even polar bear skins. The frames were lashed with baleen and sinew.

The overall chronology of skin boat development in circumpolar regions remains uncertain. As a key element of subsistence, skin boat technology has arguably been used since the very beginning of human population in the region. Recent maritime migration theories suggest that skin boats might have been a vehicle of human expansion across Beringia c. 20,000–10,000 BP (Dixon 1999). The oldest archaeological evidence for skin boats is a wooden rib from a kayak-like vessel excavated at the 4,000-year-old Saqqaq site, West Greenland. Two-thousand-year-old ivory models from the Ekven cemetery near East Cape, Siberia, represent both umiaks and kayaks. Birch bark miniatures of umiaks and kayaks as well as fragments of skin boat frames from the Miyowagh and Hillside sites on St. Lawrence Island in the Bering Strait are within the same date range. Skin boat parts were recorded at the Birnirk site in the vicinity of Point Barrow (500–1300 CE), at the Deering site in Kotzebue Sound (821–1200 CE), at the Qilalukan site on Baffin Island, and in cave sites on Kagamil and Kanaga Islands in the Aleutian chain (890–1667 CE). On Labrador, remains of kayak frames and paddles have been discovered in late prehistoric/early contact period graves at various sites. Skin boat frame finds have also been recorded in archaeological sites of both west and east Greenland (Gulløv 1997). All archaeological skin boat components have been

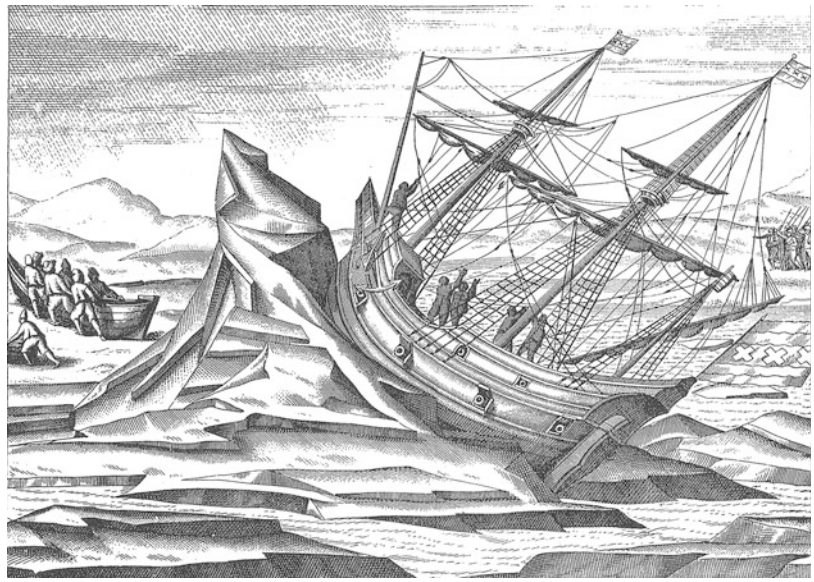
found in terrestrial sites; no underwater remains have been discovered to date. The presence of boat fragments in house remains and middens indicates reuse of wooden components and suggests a ritualistic significance of skin watercraft. Ethnographic data show that fragments of both kayaks and umiaks were kept as amulets ensuring prosperity and long life. In Greenland, ivory line holders from old kayaks were worn as protective charms on amulet belts. Stem and stern posts were often taken from older, dilapidated vessels and used in the construction of new boats, thus transferring the expertise of the previous generation in both physical and metaphysical senses. Boat elements among grave finds may also indicate that skin boats were considered necessary in the afterlife of the deceased.

Although important, all these finds provide only fragmentary information about the constructional details of circumpolar skin boats. Intact skin boat assemblages are rare in the circumpolar archaeological record. About one third of a kayak frame with associated implements was discovered in 1921 in Washington Land, north Greenland. Found on a hill slope, 40 m. above the sea, the kayak had been put there for future use sometime in the sixteenth or seventeenth century. The Pearyland umiak, the oldest complete circumpolar skin boat known today from the archaeological record, was deposited in similar circumstances (Fig. 2). Discovered by a Danish expedition to Pearyland, northeast Greenland, in 1949, it dates to the fifteenth century CE (Petersen 1986). Iron fasteners and an oak timber indicate that the makers of Pearyland umiak were in contact with the Norse. Contact with nonnative explorers, settlers, and whalers in the Arctic had significant impacts on many aspects of indigenous life, including watercraft. Shifts in technology and subsistence resulting from newly introduced materials and trading opportunities, as well as from the decline of human and whale populations, changed skin boat construction and use. Today only a handful of native communities in the circumpolar north maintain traditional skin boat building.

The historical exploration of the Arctic is a topic that has fascinated the public (especially

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 2 Pearyland umiak (Photo by Justin Hays)

the race for "firsts" in polar exploration and achievement). The history of Arctic exploration by European nations has its roots in the sixteenth-century push for easier and more direct routes between Europe and Asia. Three routes were considered or attempted at various times: a route directly across the Arctic Ocean, the "Northwest Passage" through the Davis Strait and the Canadian Arctic Archipelago, and the "Northeast Passage" along the northern coasts of Scandinavia and Eurasia. Numerous expeditions, including those of Martin Frobisher (1576–1578), John Davis (1585), and William Baffin (1616), ventured into the eastern Arctic in search of routes across the top of North America (Delgado 1999). The Northeast Passage was also tried, for example, by Willem Barentsz in 1596. Others attempted to find the western terminus of the Northwest Passage by sailing through Bering Strait (i.e., James Cook, in 1778). Various traces of these expeditions, including remains of vessels, camps, and gravesites, have been investigated by archaeologists in the high Arctic.



Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 3 Image by Gerrit de Veer illustrating the wrecking of Willem Barentsz's vessel on Novaya Zemlya in 1596

The first attempt to find a sea route from Europe to Asia via the Northwest Passage was undertaken by Martin Frobisher in 1576–1578. Frobisher reached Baffin Bay and established a camp on Baffin Island, where the expedition prospected for gold. Frobisher's account is among the earliest written records of European-Inuit interaction. The Frobisher camp on Baffin Island has been excavated by joint Smithsonian Institution/Canadian Museum of Civilization project (the "Meta Incognita" project). The project also collected Inuit oral traditions relating to the Frobisher expedition (McGhee 2001).

Among the earliest attempts to sail the Northeast Passage was the voyage undertaken by Dutchman Willem Barentsz in 1596. Barentsz and his crew were forced to spend a winter on the northeastern tip of the island of Novaya Zemlya after their ship was crushed by ice in the Kara Sea (Fig. 3). Barentsz himself died during the trip, and the survivors among his crew returned to Amsterdam via Russia. The site of Barentsz's camp on Novaya Zemlya was apparently untouched for over 200 years, but has been visited several times since then – initially by other mariners and finally by collectors and enthusiasts. A number of artifacts thus found their way into museum collections, mostly the Rijksmuseum in Amsterdam and the Arctic and Antarctic Museum in St. Petersburg. Most of the recovered objects pertain to shipboard life of the late sixteenth century, well preserved by the cold climate. An archaeological survey of the site, undertaken in 1992 by a joint Dutch-Russian team, found little but wooden foundations of a house built of driftwood and ship's timbers by Barentsz and his crew (Hacquebord 1995).

Despite high costs and complicated logistics, underwater investigations have also been carried out in the Arctic. The first substantive underwater archaeology in the Arctic was a survey of the vessel *Maud*, a three-masted wooden schooner built in Asker, Norway, in 1917 for polar explorer Roald Amundsen. Amundsen, who had been the first person to pass through the Northwest Passage in the sloop *Gjoa*, intended to reach the North Pole by freezing the ship in sea ice and drifting north. *Maud* was custom-built for his proposed Arctic research. Amundsen sailed from Norway in July of 1918, headed for the Northeast Passage. By mid-September of 1918, *Maud* was frozen in the ice in the Laptev Sea. When *Maud* finally broke free in late summer of 1919, Amundsen was able to sail for only 11 days before freezing in again for the winter, this time near the mouth of the Kolyma River. After breaking free in the summer of 1920, Amundsen and his crew were able to pass through Bering Strait

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 4 The remains of *Maud*, Cambridge Bay, Canada (Photo courtesy of Parks Canada)

and put into Nome, Alaska. *Maud* was thus the second vessel to navigate the Northeast Passage (after N.A. Nordenskjold's *Vega*), and Amundsen became the first to pass through both the Northeast and Northwest Passages. Amundsen made two more attempts to freeze *Maud* in pack ice and drift to the pole, but was thwarted each time, and the project eventually ran out of funds. *Maud* was seized by creditors in Seattle in 1922 and sold at auction to the Hudson's Bay Company. The new owners renamed the vessel *Baymaud* and sent it to resupply company outposts in the Western Arctic.

In late 1927 the vessel froze in the ice at Cambridge Bay (Victoria Island). Shortly thereafter a leak developed that required repair facilities not available in the Arctic, and the vessel sank at its moorings in 1930. An underwater site inspection undertaken in 1996 determined that while the lower hull is substantially sound, much of the upper structure has degraded, largely due to ice action. The weather deck, except at the bow, is nearly completely destroyed, and the upper hull sides have been significantly broken down (Delgado 1997) (Fig. 4). *Maud* is officially owned by the Norwegian town of Asker, which bought the wreck from the Hudson's Bay Company in 1990. Representatives from Asker have proposed refloating the vessel for transport to Norway, there to be restored and opened as a museum. Although an export license was granted by Canadian authorities in early 2012, questions of both funding and hull integrity remain to be solved.

Among the most sought-after underwater targets in the Arctic are those connected with the voyage and attempted rescue of the Franklin Expedition. In May of 1845, British Royal Navy ships HMS *Erebus* and HMS *Terror*, under the command of Sir John Franklin, departed England on a much-publicized expedition in search of a viable Northwest Passage route from Europe to Asia. Both vessels were reinforced for operation in the ice, and both had already seen service in previous Arctic voyages. Provisions were taken for a voyage of up to 3 years duration, as the expedition expected to overwinter on their passage. Both ships became trapped in ice in late 1846 in the Canadian archipelago. Franklin himself died in 1847, along with at least 23 crew members. The remainder of the crew abandoned the vessels and attempted an overland escape. None survived, and the vessels were lost to the ice.

After several years with no word or sign of Franklin, rescue operations were mounted. In 1850 the Royal Navy dispatched Captain Robert McClure with 66 men in HMS *Investigator*. McClure's orders were to round South America, pass through Bering Strait, and search for Franklin at the western end of the supposed

Northwest Passage. Once in the Western Arctic, McClure recognized Melville Island and realized that he had connected with parts of the archipelago previously reached from the east. After freezing in at Mercy Bay on Banks Island, the crew endured two harrowing winters before abandoning the ship and sledging east. McClure and his crew were eventually rescued by other Royal Navy ships and on their return to England were credited with the official discovery of the Northwest Passage.

The remains of HMS *Investigator* as well as the graves of three crew members were located in 2010 by a Parks Canada expedition. The wreck and associated debris field, initially located using side-scan sonar, rest in shallow water with the hull bottom buried in sediment. The hull appears to be substantially intact, although masts, rigging, and bulwarks have collapsed (likely as a consequence of damage from winter sea ice). Divers documented the vessel and recovered diagnostic artifacts and samples during a follow-up expedition in the summer of 2011 (Fig. 5). Franklin's vessels (*Erebus* and *Terror*) have never been located, although remains and well-preserved graves of numerous crew members have been identified on Beechey Island and elsewhere in the central Canadian Arctic. *Erebus* and *Terror* have been designated a Canadian National Historic Site (the only such "undiscovered" national historic site) due to the significance of Franklin's voyage and the importance of the two ships in the history of Arctic exploration and navigation (Parks Canada n.d.). Several other wrecks have been identified in Canadian Arctic waters (notably *Albany* and *Discovery* (1720) in Hudson's Bay and *Breadalbane* (1853) in Lancaster Sound). All three are in excellent condition, owing to depth or landforms which have protected them from serious damage from sea ice.

The whaling industry followed close on the heels of the polar explorers and also left remains for archaeology. Whalers were active in the Greenland and Barents Seas by the early seventeenth century, although commercial whaling in the Western Arctic began only in 1848. Over the next century, more than 2,700 whaling voyages were made into Arctic waters at the cost of more than 150 ships lost and the near extinction of the bowhead whale (Bockstoce 1986). Occasionally entire whaling fleets would be lost. In 1871, for example, almost the entire Yankee whaling fleet was trapped in the ice in the Chukchi Sea. Thirty-one ships were crushed and destroyed in this single incident. A project focusing on the wrecks of 1871 fleet, undertaken in 2005–2008, documented extensive wreckage and artifacts washed up along the shore of northwestern Alaska (Fig. 6). However, diver surveys of side-scan sonar targets were unable to identify in situ remains.

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 5 Parks Canada archaeologists document HMS *Investigator* (Photo courtesy of Parks Canada)

Underwater investigations are somewhat rarer along the Russian coast of the Arctic Ocean, although numerous wrecks are known historically. One significant wreck, the steam vessel *Chelyuskin*, was located in 2006 in the Chukchi Sea and declared an archaeological site. The *Chelyuskin*, a freighter that sailed eastbound from Murmansk in 1933 to prove the viability of transiting the

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 6 1871 Whaling fleet wreckage near Wainwright, Alaska (Photo by Pete McConnell)

Northeast Passage, was caught in sea ice, crushed, and sank off the northern coast of the Chukotka Peninsula. The vessel was located with sonar in 2006 and subsequently visited by divers; the ship's identity was confirmed by recovered pieces sent to the shipbuilder for authentication.

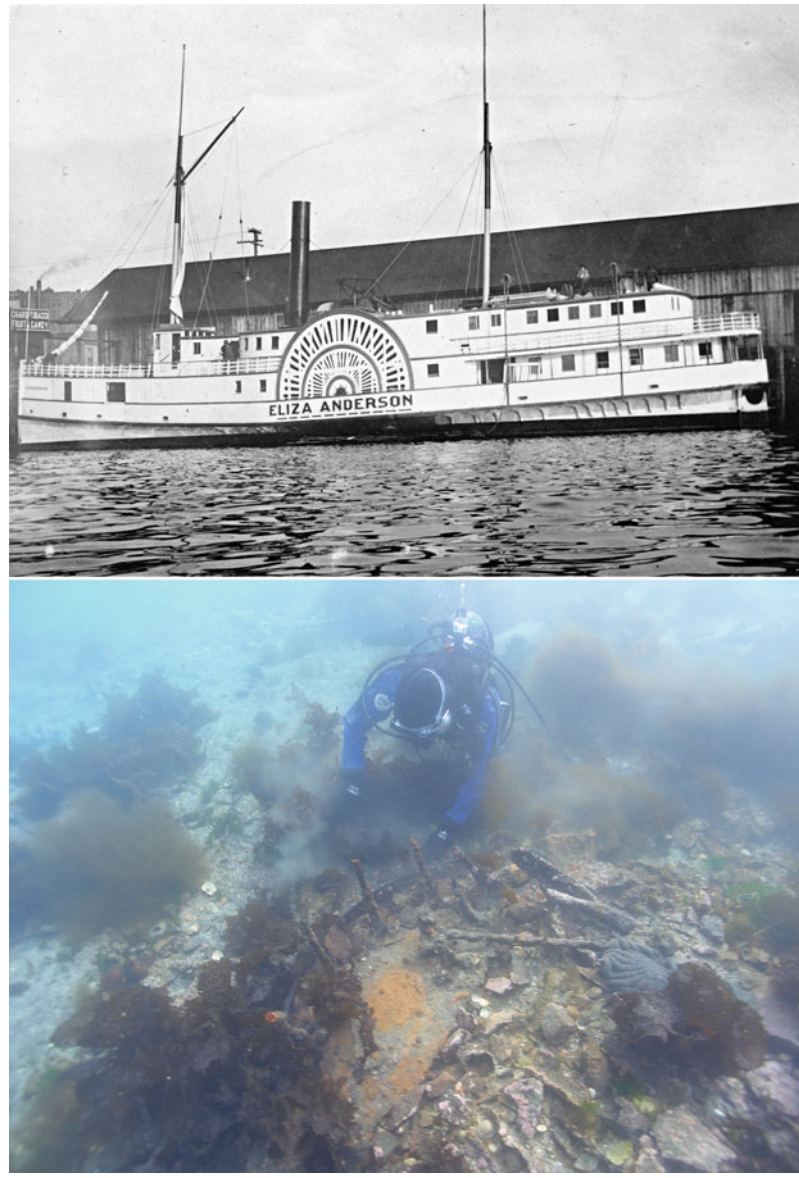
Whaling stations and other early "Arctic frontier resource" settlements on Svalbard have also been subjects of investigation, primarily by Dutch and Norwegian researchers. Svalbard (Spitsbergen) was discovered by Willem Barentsz in 1596, while searching for a Northeast Passage route to Asia. The Englishman Henry Hudson, while serving in the Dutch East India Company, reported many whales in the area, and commercial whaling started in 1611. Shore stations were established by English and Dutch whaling enterprises throughout the Svalbard archipelago as well as on Jan Mayen Island. Large furnaces were built to render whale blubber and wooden houses to lodge personnel. Although most whaling stations were abandoned by the early eighteenth century, mineral prospecting and mining camps soon took their place. Archaeological investigations of early camps and stations on Svalbard reflect not only the resource exploitation that followed the "Heroic Age of Polar Exploration" but also the subsequent geopolitical motives for establishing and maintaining settlements in the Arctic (Hacquebord & Avango 2009).

In contrast to the Arctic Ocean, maritime and underwater archaeology in the Bering Sea is in a state of complete infancy. Very few investigations have been attempted, despite the potential for significant cultural resources. One of the most significant projects to date is the joint Russian-Danish excavation of the campsite of Vitus Bering, on Bering Island. Bering and his crew shipwrecked on the island, at the western end of the Aleutian chain, in 1741 when returning from Alaska to Siberia. The investigation found ship's guns and timbers and identified the grave of Bering himself, who died and was buried during the sojourn on the island (Len'kov et al. 1992).

The only substantive underwater project undertaken so far in the Bering Sea is the investigation of a side-wheel steamship, *Eliza Anderson*, which wrecked at Dutch Harbor (Unalaska Island), in 1899. The vessel, in a worn and decrepit state, had been hastily outfitted to bring prospectors north from Seattle during the Klondike Gold Rush. The wreck was identified and surveyed in 2006 (Fig. 7).

Key Issues/Current Debates

There is currently no articulated comprehensive theory of Arctic maritime archaeology – partly due to gaps in scientific knowledge of the Arctic



Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 7 Above: The steamer *Eliza Anderson*; Below: Remains of the *Eliza Anderson* at Dutch Harbor, Alaska (Photo by David McMahan)

in general. Despite years of study by dedicated scientists, many basic questions remain to be answered. For example, we still do not have a definitive sea-level history for the Bering Strait or Arctic continental shelves, and bathymetry is patchy at best. The development of theoretical approaches to terrestrial archaeology in the Arctic has moved at a faster pace (i.e., Blankholm 2009; Westerdahl 2010), with several specialist journals dedicated to anthropological questions of the region. Regional maritime adaptations are regularly mentioned, although seldom analyzed in a circumpolar context. One reason for the lack of a more comprehensive theoretical approach may be due to a deficiency of truly multidisciplinary investigations; an accurate understanding of the full range of Arctic sites and formation processes requires the participation of not only a range of archaeological specialists but also marine and sedimentary geologists, oceanographers, cold-climate ecology scientists, and native tradition bearers.

Underwater site formation processes specifically may require a much broader assimilation of geophysical knowledge than heretofore assembled. For example, coastal erosion dynamics, vegetation regimes, and other ecological parameters are unlike those of any other region on earth and require investigation and definition. However, the most complex element of the Arctic maritime environment (and potentially most significant for the preservation of submerged cultural remains) is the cyclical growth and movement of sea ice.

Ice formation and extent along Arctic coasts is seasonally variable. Ice formation generally begins in October and reaches an annual maximum in February or March; melting begins in May or June and pack ice retreats during July and August. Most of the Arctic continental shelf is therefore under ice cover for 7–10 months each year. Pack ice is subject to immense wind fields, generated over a large area. The convergence of fields of moving pack ice (or pack ice impacting with shorefast ice) results in linear deformation features called pressure ridges. The intense pressures eventually build up ice masses both above the water's surface (ice sails) and below (ice keels). Ice gouging occurs where ice keels are driven into the seabed and are moved by the accumulated energies of the encompassing pack ice structure. The resulting furrows or tracks in the seafloor are called ice gouges or ice scour (Wadhams 2000). Ice grounding and gouging is common in all Arctic coastal waters, from the sea's edge to considerable depths. Deep gouges tend to produce high flanking ridges to either side, creating combined vertical relief of up to 8 m. The highest gouge densities are in water between 20 and 40 m deep, as are maximum gouge depths. Gouges in water deeper than about 55 m are assumed by some researchers to be relict from periods of lower sea level, as modern ice features do not generally have keels extending beyond 60 m deep.

No comprehensive study has been undertaken regarding the potential effects of ice gouging on submerged archaeological sites and the consequent ramifications for site formation processes. Regarding the Chukchi Sea, the US Minerals Management Service has concluded that "shipwrecks are likely to have survived in the area, especially those that may be at a depth beyond intensive ice gouging" (MMS 2007). Archaeological investigations of historic period shipwrecks near Wainwright on the Alaskan Chukchi coast found considerable amounts of nineteenth-century wreckage in the beach and intertidal zones, presumably gouged from the seafloor and washed ashore. Investigations of shipwrecks in the Canadian Arctic have similarly concluded that wrecks would survive only if protected from pack ice. When considering the potential for archaeological resources along the Arctic Ocean margins, the effects of the ocean's dynamic and complex environmental processes must be taken into account (Fig. 8).

International Perspectives

Since the earliest European attempts to find northern sea routes to Asia and claim Arctic lands, the region has been a focus of geopolitical maneuvering and intrigue. The situation has only intensified as climate change opens Arctic waters and resource exploration increases. While there is a regular high-level intergovernmental forum of Arctic nations (the Arctic Council), many issues remain to be resolved. Maritime borders are unsettled or in dispute. As of 2011 not a single Arctic nation had ratified the United Nations Convention on the Protection of the Underwater Cultural Heritage (and several were actively opposed to the convention). International collaboration on scientific projects is common in the Arctic, but it remains to be seen whether such cooperation will be extended in the future to underwater archaeological investigations.

Future Directions

Archaeology in the Arctic Ocean faces two major interrelated sets of challenges in the near future: climate change and human impacts. As described in a recent article by Hans Peter Blankholm (2009), much recent concern and attention has been focused on environmental and ecological

Arctic Ocean and Bering Sea: Maritime Archaeology, Fig. 8 Sunset over sea ice near Qaanaaq, Greenland (Photo courtesy of Andy Mahoney and the US National Snow and Ice Data Center)

implications of climate change, while culture-historical issues have been relatively neglected. However, archaeological resources, both terrestrial and submerged, will undoubtedly be affected by changes now occurring in the Arctic.

The warming climate is resulting in pronounced reductions in sea ice, seasonal snow, permafrost, and glacial features, with a corresponding shift in landscape processes. What does this mean for archaeological resources in the affected areas? Continuing widespread loss of discontinuous permafrost and increase in the active layer of remaining permafrost will trigger erosion and subsidence of ice-rich landscapes and change local and regional hydrologic processes. Coastlines are increasingly exposed to wave action and storm surge. Direct impacts from coastal erosion as well as the loss of stable preservation (frozen site matrices) will be varying degrees of resource exposure, degradation, and destruction of buried/frozen cultural material. The effects on submerged archaeological sites are less clear, although reduced sea ice may result in reduced potential for damage from ice scour.

The other major factor likely to impact Arctic archaeological resources (especially in a submerged environment) is a dramatically increased human presence in the region. Approximately four million people currently live in the Arctic. Increased accessibility and intensified resource exploitation will likely bring a larger number of people into the far north. Oil and gas drilling on Arctic continental shelves is already intensifying in Alaska's Chukchi and Beaufort Seas, Norway's Barents Sea, and elsewhere. Impact to submerged archaeological sites is possible from extraction and transportation facilities, pipelines, and related infrastructure. Reduced sea ice will create opportunities for increased open-water transportation (especially cargo shipping but also cruise tourism) (Nuttall & Callaghan 2000). As the Arctic enters this uncertain phase, protection and responsible investigation of the region's cultural heritage is a key concern.

Cross-References

- ▶ Greenland: Approaches to Historical Norse Archaeology
- ▶ Indigenous Archaeologies
- ▶ Indigenous Peoples, Working with and for
- ▶ Maritime Landscapes
- ▶ Maritime History
- ▶ Parks Canada: Historical Archaeology
- ▶ Peopling of the Americas
- ▶ Polar Exploration Archaeology (North)
- ▶ Submerged Prehistoric Landscapes
- ▶ Underwater Archaeology

▶ Underwater Cultural Heritage: International Law Regime
▶ Underwater Sites in Archaeological Conservation and Preservation

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Argentina: Maritime Archaeology

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Introduction

Despite its long-standing tradition in archaeology and its vast maritime littoral and other waterways, the study of the relationship between humans and water through material remains has not had much development in Argentina.

The traditional focus has been in pre-Hispanic societies, either nomadic or sedentary, and almost exclusively from a land perspective. The few cases when water was considered within the cultural system under study was usually triggered by the presence of artifacts (like harpoons or other fishing devices) or ecofacts (such as fish, shellfish, or sea mammals remains) in the archaeological record. Until recently topics such as navigation and watercrafts per se, whether prehistoric or more recent, have been almost absent in the Argentinean archaeological research projects. Let alone venturing into the water to study submerged archaeological remains of any sort.

Since the mid-1990s, however, the fields of maritime and underwater archaeology have been steadily growing, leading to a number of research projects and various other activities dealing with the country's underwater cultural heritage.

Definition

As the discipline of maritime archaeology continues to develop, so does its definition and the debate on the various topics of study it can comprise (Catsambis et al. 2011). In general terms, however, it could be defined as the study, through material remains, of past human cultures in their relation with the sea and occasionally with inland waters. Typical examples of the latter have to do with seafaring, given that oceans, rivers, and lakes are frequently connected and are navigated without distinction.

It is in that broad sense that the concept of maritime archaeology is used in this entry. Besides, although ships are not the only subjects of study, they were chosen to be the focus here not only because of their direct association with water but also because they are good representatives of maritime archaeology in Argentina.

Historical Background

Prior to the development of maritime and underwater archaeology with scientific standards, there had been various instances in which submerged archaeological remains were dealt with (see Elkin 2002; Ciarlo 2008). In the first decades of the twentieth century, they mostly had to do with isolated finds of shipwreck elements which ended up in museum or private collections, in most cases lacking contextual information.

By the 1970s archaeologist Jorge Fernández became involved in the extraction of a wooden canoe from a lake in Patagonia by guiding from the surface the work performed by professional divers and by later describing and interpreting the find (Fernández 1978).

The 1980s was characterized by several activities conducted by an ICOMOS-Argentina working group, mainly comprised by architects-divers, who had the initiative of building capacity

in underwater archaeology techniques (see Elkin 2002). The main project in which this group became involved was the survey of the British sloop of war HMS *Swift*, sank in Puerto Deseado – currently Santa Cruz Province – in 1770, and which had been discovered by local divers in the early 1980s. The work was focused on the in situ recording of the hull structure as well as the excavation of some artifacts (Murray 1993; García Cano 1998).

In the early 1990s a nonprofit organization called Fundación Albenga, directed by Architect J. García Cano, continued to work at the *Swift* site undertaking nonintrusive surveys (García Cano 1996).

The mid-1990s represents a major turning point in the discipline, with the simultaneous birth of two research teams in which archaeologists-divers played a leading role. One of the teams, known as PROAS for the acronym of *Programa de Arqueología Subacuática*, is based at the National Institute of Anthropology in Buenos Aires, under the direction of this author. The other one is based at the National University of Rosario (Santa Fe Province), under the direction of Mónica Valentini. Both groups have been very active since then – sometimes working in partnership with other institutions – and they usually involve specialists from other fields who contribute to the interdisciplinary aspects of the projects. Additionally, both teams have not only been conducting archaeological research but also implementing many initiatives related to raising awareness on the protection of underwater cultural heritage and contributing to capacity building at different levels (Elkin 2003; Valentini 2003).

Key Issues

This section presents the main ongoing or recent archaeological projects in maritime archaeology for which published data is already available. Figure 1 shows the geographic location of each of the case studies.

Studies on Navigation in Patagonian Lakes

The ethnographic and historical record of the Patagonian lakes, rivers, and maritime shorelines (on both sides of the Andes) provides descriptions on three main types of canoes made of local tree species which were used at the time of contact with European explorers, missionaries, and settlers. One was the *dalca*, made of sawn wooden planks and which could be dismantled to be transported on land. Another type was made of sawn bark planks and was mostly used by the Yamanas and Alakaluf in the southermost tip of the continent; these groups mainly travelled along maritime waterways connecting the numerous islands and fjords around Tierra del Fuego. The third type of canoe, called *huampo* or *huampu* in some regions, was dug out from a single tree trunk with the aid of fire and initially using lithic and occasionally shell-made tools, later replaced by metal ones.

As stated earlier, back in the 1970s archaeologist Jorge Fernandez was the first one to address the study of a wooden canoe. It was dug out from a single trunk of a beech tree and was recovered from the Nahuel Huapi Lake close to the city of Bariloche. Since, aside from the use of fire, there was evidence of the use of metal tools in its manufacture and traces of metal corrosion, it was chronologically attributed to a period between the mid-seventeenth and late nineteenth century (Fernandez 1978).

Fernández continued to study and compare various other canoes of this type found by different people in the Andean lakes of Northwest Patagonia, also taking into account historical, ethnographic, and geographic information in his research. On that basis, combined with early archaeological evidence in an island in the Nahuel Huapi Lake which cannot be reached without some watercraft device, he concludes that the seafaring tradition in the region (including the rivers and lakes on the western side of the Andes) must date from prehistoric times (Fernandez 1997).

The topic of the Patagonian lake district seafaring has been addressed more recently by other researchers, in Argentina especially by Romina Braicovich (Braicovich 2006; Braicovich & Caracotche 2008). She studied a number of dugout canoes found in the Nahuel Huapi Lake, including some of the ones previously studied by Fernández (Fig. 2). She concludes that all of them

Argentina: Maritime Archaeology, Fig. 1 Map of Argentina with the location of the areas, sites, and projects mentioned in this entry. *a* Nahuel Huapi Lake, *b* Zencity wrecksite, *c* Reta wrecksite, *d* Valdés Peninsula, *e* HMS *Swift* wrecksite, *f* *Hoorn* wrecksite, *g* Monte León National Park, and *h* Atlantic coast of Tierra del Fuego

Argentina: Maritime Archaeology, Fig. 2 Dugout canoe known as *Canoa Correntoso* extracted in 1968 from the Nahuel Huapi Lake, close to the town of Villa La Angostura (Photograph from the Historical Museum Archive, Villa La Angostura, Neuquén)

probably belonged to local people who lived in the area between the late 1800 and the early decades of 1900 (Braicovich 2004 in Braicovich 2006: 62-3). However, like Fernandez and like Hajduk (Hajduk 1997 in Hajduk & Valentini 2002), she also points out the existence of rock paintings and radiocarbon datings of c. 2000 BP in Victoria Island in the Nahuel Huapi Lake, which suggest that the local aboriginal groups had been navigating in that area since much earlier times (Braicovich 2006: 55-6).

Far away from the Patagonian lake district, similar indirect evidence of seafaring comes from Isla de los Estados (Staten Island), east of Tierra del Fuego in the South Atlantic Ocean. The island has an archaeological record which goes back to 2700 BP, although no boat remains from those times were found yet (Borrero 2001).

Studies on Shipwreck Sites in the Río de la Plata and the Atlantic Ocean Coast

The Zencity Shipwreck

This site consists of a wooden ship found in 2008 in the city of Buenos Aires, in the riverfront district of Puerto Madero, a place where many landfills have taken place particularly after a harbor was built in the late nineteenth century.

The find took place during the excavations for an urban development construction complex called Zencity. The recording and excavation of the site was therefore conducted as rescue archaeology within a period of 90 days, as a Project of the Dirección de Patrimonio e Instituto Histórico of the Ministry of Culture of the City of Buenos Aires. A recent publication by M. Valentini and J. García Cano (Valentini & García Cano 2011) provides a summary of the main results achieved so far in the archaeological research of this site.

The Zencity wreck was a medium-sized (no more than 30 m of deck length) vessel, with a complete hold from bow to stern, and a design which optimized the use of stowage space. The in situ recording of hull and artifacts was done with the aid of the computer software PhotoModeler, which allows a 2D and 3D digital reconstruction.

The combination of the constructive characteristics of the ship and the analysis of the archaeological remains indicate it was a Spanish merchant ship which arrived to the city of Buenos Aires in the second half of the eighteenth century. Preliminary dendrochronological dating of various oak timbers places the ship's construction in the mid-eighteenth century.

The hull was made of European oak, which suggests the vessel was built in the northern region of Spain, where oak forests were available. This northern Spain shipbuilding tradition, known as Cantabrian tradition, made an intensive use of oak trees and produced vessels which were highly sought after due to their resistance, durability, and strength.

Regarding the artifact collection, the most abundant items are ceramic containers known as *botijas* (olive jars), which were found in the stowage sectors of the ship's hold (Fig. 3). Over 200 *botijas* of different sizes were found, both

Argentina: Maritime Archaeology,
Fig. 3 Some of the botijas found in the Zencity wreck (Photograph courtesy of Mónica P. Valentini and Javier García Cano)

complete and fragmented. They all have a cone-shaped base and lack handles, a practical shape for sea transportation. There is evidence of wheel throwing for the manufacture of the body, while the neck could be finished by hand. Some of these *botijas* were found sealed with a stopper in place and with olive seeds inside.

The *botijas* from the Zencity wreck represent one of the largest collections in Argentina of this type of container. It was used in the oceanic trade between Spain and the port of Buenos Aires in colonial times and played an essential role in the transportation and storage of products for this remote region of the Spanish empire.

Other type of artifacts found in the site includes metal fittings such as wrought iron tacks, nails, and bolts, all of them consistent with the Spanish manufacture techniques reported for the period, as well as different types of smoking clay pipes, most of them fragmented. The rest of the collection comprises various metal, wood, and ceramic artifacts, as well as animal bone remains.

The hull structure of the ship was reburied in a nearby location that provides similar environmental conditions to the ones which had preserved the ship for so long. It was then covered with various layers of geotextiles and other materials which contribute to its preservation. The reburial site is monitored by constant soundings in precise locations which allow the control of variables such as humidity, salts, oxygen, and acidity.

As it is the case with other former European maritime powers, the study of merchant ships has been often neglected in comparison with warships built by or for the state, and the Zencity wreck presents an excellent opportunity to shed light on the topic.

The Reta Shipwreck

Reta is a seaside resort located nearly 600 km south of the city of Buenos Aires. Due to the presence of an unidentified wooden wreck located on the beach above the intertidal zone, in 2002 a joint team from the University of Rosario and the *Fundación Albenga* conducted a survey and excavation of the site (Fig. 4) that revealed a nearly 30-m-long structure. Subsequent metallographic and chemical studies made on samples of plates and tacks from the metal sheathing showed that the first consisted of a copper-zinc alloy (60 % and 40 %, respectively), which was patented by Muntz in 1832 and soon became of general use (Lorusso et al. 2003). On the basis of the survey and research, the authors have concluded that the ship very probably dates from the late nineteenth century (Valentini 2003).

Argentina: Maritime Archaeology,
Fig. 4 Survey of the Reta wrecksite (Photograph courtesy of Mónica P. Valentini and Javier García Cano)

The Peninsula Valdés Project

The Valdés Peninsula in Chubut Province is a UNESCO World Natural Heritage site, featuring a spectacular marine wildlife. The nearby city of Puerto Madryn, gateway to the peninsula, is also the main scuba-diving destination in Argentina, offering a number of activities including shipwreck diving.

The context summarized above seemed to provide a good platform for developing public awareness and public outreach initiatives. With that general goal in mind, the PROAS team started a pilot project in the Madryn-Valdés area which comprised a preliminary survey of existing shipwrecks (both historic and modern), followed by a more detailed in situ recording and investigation of selected sites. In the long term, the Madryn-Valdés Project is expected to contribute to the development of cultural tourism in the area.

The first field seasons and archival research conducted in the initial stages of the project revealed the presence of some 30 shipwrecks and ship-related sites in the area, six of which were selected on the basis of their historical, archaeological, and/or touristic significance (Elkin & Murray 2008). The site that has been studied more thoroughly to date will be described below.

Bahía Galenses 2 (BG2) consists of the remains of an unidentified wooden vessel located in one of the Southern beaches of Puerto Madryn city. Lying in the intertidal zone, it consists of a 28-m-long section of a hull that was becoming increasingly exposed to the elements. A preliminary nonintrusive survey suggested that the original vessel may have been built in the eighteenth or nineteenth century.

With the goal of conducting a more specific assessment of the cultural and chronological affiliation of this wreck, two archaeological field seasons were carried out in 2006 (Fig. 5). The work consisted of the following (Murray et al. 2009):

- Completing a site plan of the exposed structure
- Digging several test pits around the perimeter in order to better understand the nature and position of the structure
- Excavating three cross section trenches in the middle and end sectors of the site (considered potentially diagnostic)
- Surveying diagnostic features of the structure
- Taking samples of the wooden structure, metal fittings, and any other material that could contribute to its understanding

The archaeological research revealed that the structure is part of a wooden-sailing ship,

Argentina: Maritime Archaeology, Fig. 5 Recording of structural components of BG2 site

probably a merchant or fishing vessel of 300–500 t burden, which could have sank due to a fire possibly around the mid-nineteenth century. Botanical taxonomic analysis indicated that European and American wood were used in the construction. Interestingly, the archaeological evidence seems to coincide with historical documentation that indicates the presence of a shipwreck in the area by the time the first Welsh settlers arrived, as well as with the reported salvage of wood from such wreck by the Welsh (Coronato 1997). This inference is based on the fact that some of the buried timbers show evidence of non-recent cutting with an axe or a similar sharp-edge tool. Further botanical and chemical analyses will be conducted for BG-2 seeking a better understanding of this wrecksite.

The HMS Swift

HMS *Swift* was a British sloop of war lost in 1770 after striking a sunken rock in the Deseado estuary, Santa Cruz Province, Southern Argentina.

The site was discovered in 1982 by local divers from Puerto Deseado at a depth of 18 m within what is nowadays the commercial harbor area. After several interventions in the site during the 1980s and early 1990s – mainly by the aforementioned ICOMOS-Argentina working group – since 1998 the archaeological research has been conducted by the underwater archaeology team of the National Institute of Anthropology.

The *Swift* is characterized by its outstanding preservation, constituting one of the most complete archaeological examples of an eighteenth-century Royal Navy sloop worldwide. This is mainly due to the anaerobic conditions created by the fine-grained sediment that covers the archaeological remains. It is estimated that about 60 % of the original wooden hull structure is preserved and the archaeological assemblage comprises a great variety of artifacts made of ceramic, metal, glass, wood, stone, and bone. Other organic remains have been found too, mostly associated with clothing, food, and rigging. During a field season conducted in 2005–2006, a complete human skeleton was unexpectedly discovered.

The general goal of the project was to record in situ as much of the hull structure as possible and to excavate selected sectors of the ship in order to address the main research themes under study: ship construction, contemporary technologies, relationship between material culture and status, diet, site formation processes, and, due to the finding of human remains, health and other bioanthropological topics. Along 15 field seasons conducted to date, significant progress has been accomplished (Elkin et al. 2007, 2011).

Regarding the study of the ship construction, the main results indicate that significant alterations have taken place in the rigging and the decks layout, probably with the purpose of adapting the vessel to transoceanic sailing and other aspects of its service.

The technological characteristics of the ship itself and the artifact collection is, in general terms, consistent with what was standard for the cultural and chronological period under study.

As for the relationship between material culture and status, despite the presence of Chinese export porcelain and other high-quality and elaborate artifacts associated with the officers, some other items they used, including furniture and personal belongings, were made quite coarsely or lacking decorative traits. It is worth noting, nonetheless, that some of the furniture was provided by the British Admiralty and would not necessarily reflect the officers' choice. Regarding the ordinary seamen, to date only a few artifacts can be associated to them. These mainly consist of leather shoes, wooden bowls or parts of them, and glass beer-type bottles.

The food remains found in the site allowed concluding that the diet was quite varied, including fruit and vegetables – although not necessarily fresh – and complemented with local resources such as penguin eggs.

The study of site formation processes revealed a significant attack of marine borers both in some sectors of the main deck of the ship and in some of the artifacts, the latter located at different depths within the sediment matrix. The characteristics of the tunnels correspond to those made by molluscs, although no living or dead specimens which could allow their precise taxonomic identification were found.

The discovery of human remains in the site opened a new line of research within the project, initially based on the hypothesis that they corresponded to one of the three men reported as dead after the sinking, two of which were private marines.

The bones correspond to a male individual, around 25 years of age (range 17–34), measuring 1.67 m of height, probably right handed, and with an overall good health. In turn, the analyses of several elements which were found in association with the skeleton such as buttons, buckles, and fragments of leather corresponding to spatterdashes indicated that the person found in the site must have been wearing a uniform of some sort. Additionally, chemical studies conducted on traces of cloth attached to the upper body revealed it was red wool like the jackets which were worn only by the marines.

On a parallel research strand, DNA was extracted from selected bone samples taken from the archaeological skeleton. However, the fact that it is mitochondrial DNA – only transmitted by females – poses considerable challenges in the tracking down of relatives. Nonetheless, genealogical studies will be conducted in an attempt to identify the skeleton found in the *Swift* site at an individual level.

The 2010 field season at the *Swift* allowed investigating the topic of health on board by means of excavating a compartmented wooden chest full of what seemed to be medicinal items. Most of the containers correspond to pharmaceutical vials of the time, an interpretation which is already being supported by the analyses of some of the contents (Edwards & Maier 2011 in Elkin et al. 2011). These include substances such as pure mercury – believed to cure syphilis – and extracts of natural substances which could have been used for treating various ailments.

The Hoorn

In the early seventeenth century, Dutch merchants Jacob Le Maire and Willem C. Schouten engaged in a major sea voyage in search of a new passage to the Spice Islands. Shortly after crossing the Atlantic Ocean, the two vessels of the expedition entered into the Deseado estuary, and one of them, the *Hoorn*, accidentally caught fire and was lost while being careened on the shore in 1615.

A bilateral research project conducted by Argentinean and Dutch archaeologists (Damián Vainstub and Cristian Murray, from PROAS-Argentina and Martijn Manders, from the National Service for Archaeological Heritage (ROB) of Holland) began in 2003 with the goal of locating and studying the remains of the vessel. The combination of a thorough review of various historical sources, an analysis of the coastal geomorphology, and some surveys along selected coastal zones allowed to locate the wrecksite. A few elements from the *Hoorn* were found on an intertidal pebble beach, although no structural remains of the ship could be seen. The main archaeological evidence comprised allochthonous rocks interpreted as ballast materials, various ceramic shards from the

chronological and cultural context under study, and melted metallic fragments made of pewter and brass alloys, silver, and lead (some of which contained carbon fragments and seeds inside), which surely resulted from the fire on board (Murray et al. 2007).

Subsequent side-scan sonar and magnetometer (Fig. 6) surveys, combined with selected scuba diving, focused on the adjacent seabed. This allowed the location of ferrous concretions which were later X-rayed, revealing the impressions of corroded iron artifacts such as nails, fittings, and bolts (Murray et al. 2007, 2008).

No hull remains were found underwater or on land, probably due to the combination of the dynamic environment of the location and to salvage activities that must have taken place along several centuries.

Despite the relatively few archaeological remains from the *Hoorn* that have survived, it is the earliest identified shipwreck site in Argentina to date.

Argentina: Maritime Archaeology, Fig. 6 Analyzing the images of the side-scan sonar survey in the Hoorn project

The Monte León Project

Monte León is a national park located in Santa Cruz Province, being the first one in the country's national parks system to include an ocean coastline and which stretches along some 40 km.

Although the entire Patagonian coast has been intensively explored – and eventually colonized – from the sixteenth century onwards, from the maritime history point of view, the central coast of Santa Cruz Province, where the Park is located, has an additional appeal: one of the vessels of Hernando de Magallanes, the Nao *Santiago*, was lost in the area in 1520, in the context of the renowned voyage around the world carried out between CE 1519 and 1522.

Partly due to this situation, which causes periodical amateur expeditions in seek of the famous wreck, but also with the more general goal of assessing the maritime heritage of the park, the PROAS team was requested to conduct a coastal field survey.

After an initial compilation of various sources which could shed light on the potential nature and location of archaeological remains related to seafaring in the region (including, of course, historical documents related to Magellan's expedition), two seasons were carried out in the park in 2006 and 2007, respectively.

The archaeological surveys were conducted along the intertidal zone, which not only was the most reasonable one for a baseline study but also because it was the one in which the various documents analyzed in relation to Magellan's expedition suggested that the *Santiago* was lost.

During both field trips, interviews with local people were conducted and the recording of materials previously extracted from the area took place.

Although no remains were found of the *Santiago* (nor any vessel from the period), the archaeological survey of the coast of the Monte León National Park revealed the presence of at least two wooden shipwrecks. Both of these probably date from the second half of the nineteenth century, both are between 300 and 500 t burden, and one of them was built with European woods (Elkin 2011). It is expected that future research will allow testing some hypotheses regarding which specific vessels the archaeological remains belong to.

The Atlantic Coast of Tierra del Fuego Project

The archipelago of Tierra del Fuego and surrounding islands is located at the southermost part of the Americas, and it is characterized by

quite challenging navigation conditions. Prior to the opening of the Panama Canal in 1914, seafaring between the Atlantic and Pacific oceans required facing the rough waters of the region, leaving behind a large number of shipwrecks which are reported in various historical accounts.

In 2010 the *Museo del Fin del Mundo*, based in the city of Ushuaia, set forth an archaeological project which includes the goal of locating remains of historical shipwrecks along the Atlantic coast of Tierra del Fuego island and conducting preliminary surveys on them. The first field season allowed to locate around 20 sites consisting of various types of shipwreck remains (Vázquez et al. 2010).

Future Directions

Along a decade and a half of development, and thanks to the aid of more experienced countries that have provided theoretical and practical training in maritime and underwater archaeology, Argentina is now quite well positioned in the field. Little by little the specialty is also attracting younger generations of students and graduates who engage in various activities such as courses, underwater and coastal work, and even in the production of university-level dissertations despite the fact that to date there are no regular academic courses run in maritime or underwater archaeology.

The awareness regarding the importance and fragility of the underwater cultural heritage is also increasing within the sport diving community and the general public. The Argentinean professionals who work in maritime archaeology periodically carry out courses, lectures, mass media interviews, and other activities that contribute to that goal.

Regrettably, however, the human and financial resources not only in Argentina but in the whole South American region are still too scarce to implement anything but small-scale projects, even without excavation. Additionally, the field of conservation of waterlogged materials is almost inexistent.

As for management, the national legislation provides a blanket protection for all underwater archaeological sites of at least 100 years of age, but due to the aforementioned scarcity of resources, the effective protection and management of such heritage is still far from becoming a reality. In the meantime, a central goal at the national government level is the development of a register of underwater cultural heritage sites, which will eventually be integrated into an archaeological register hosted at the National Institute of Anthropology. So far the data – obtained in the vast majority from written and oral sources – has been compiled either in the form of simple spreadsheets or in a database in access format. The next step will consist of starting to use GIS tools that can provide cross-references between the data and specific geographical locations. In turn, this will allow defining areas with greater or lesser potential for underwater cultural heritage and optimizing the planning and implementation of archaeological surveys. The use of remote sensing techniques, still very seldom used in the country, would certainly contribute to achieve such goal.

Last but not least, in 2010 Argentina ratified the UNESCO Convention on Underwater Cultural Heritage. Such a significant political step, combined with the existing basis of professionals and avocationals engaged in maritime and underwater archaeology, led to believe that the field will continue to grow and so will the knowledge of the maritime past of the nation.

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► Convention on the Protection of the Underwater Cultural Heritage (2001)
► Underwater Archaeology

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Arnold, Bettina

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Basic Biographical Information

Bettina Arnold obtained her B.A. in Archaeology from Yale University in 1983 and her M.A. and Ph.D. degrees in Anthropology from Harvard University in 1986 and 1991, respectively. She is Professor of Anthropology at the University of Wisconsin-Milwaukee, where she was the Co-Director of the Center for Celtic Studies from 2000 to 2009 as well as the Coordinator of the Museum Studies Graduate Program from 1996 to 2012. Her area of expertise is the pre-Roman European Iron Age, but in the course of her career she has participated in archaeological projects ranging from the Middle Bronze Age through the early medieval period in western Europe.

Major Accomplishments

Since 1999 she has co-directed an excavation project in southwest-Germany focused on the burial record of the early Iron Age Heuneburg hillfort and its environs; two burial mounds associated with this site were excavated by the Landscape of Ancestors project between 1999 and 2002. Finds from those excavations were featured in *Die Welt der Kelten: Zentren der Macht - Kostbarkeiten der Kunst*, a major exhibition in Stuttgart in 2012–2013. Her work has been directed toward the following specific research topics: the archaeological interpretation and analysis of complex societies, particularly as reflected in mortuary contexts; material culture as a symbolic system and a means of communicating social relationships; the archaeological interpretation of prehistoric gender configurations in burial contexts; and the socio-political history of archaeology and museum collecting, especially their involvement in identity construction in nineteenth and twentieth century nationalist and ethnic movements in Europe and the United States. She published a groundbreaking article on the use and abuse of archaeology for political purposes in Nazi Germany in *Antiquity* in 1990 that has been reprinted repeatedly since first appearing. In addition to founding and acting as Editor of the on-line peer-reviewed journal *e-Keltoi*, she is a member of numerous editorial boards, including the History of Archaeology series for Oxford University Press and the History of Archaeology Commission of the UISPP.

Cross-References

▶ Engendered Archaeologies
▶ Erasure of the Past
▶ Gender, Feminist, and Queer Archaeologies: European Perspective
▶ Museums and Memory Experiences
▶ Nationalism and Archaeology
▶ Popular Culture and Archaeology

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Arqueologia Industrial

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Basic Information

Arqueologia Industrial is a biannual peer-reviewed academic journal published by the Portuguese Society for Industrial Heritage (Associação Portuguesa para o Património Industrial), which is the Portuguese National Representative of The International Committee for the Conservation of the Industrial Heritage (TICCIH), with the support of the River Ave Valley Textile Industry Museum, edited by José Manuel Lopes Cordeiro (Minho University, Braga, Portugal). *Arqueologia Industrial* publishes scholarly research, essays, and reviews of books published in the field of industrial archaeology and its museology.

Recent issues published articles on archaeological works in a lime kiln at Madeira Island, the social and urban space of Vista Alegre Porcelain Factory, or the archaeology of a Brazilian iron mill (seventeenth-eighteenth centuries). The debate on the creation of an international heritage charter on industrial heritage by ICOMOS with the cooperation of TICCIH was also discussed in current issues. Future directions will seek to address issues of industrial landscapes, reuse of industrial heritage, and the use of industrial heritage for tourism purposes.

Official website: http://www.museudaindustriatextil.org.

Major Impact

The first issue of *Arqueologia Industrial* was published in 1987, as a newsletter of the Industrial Archaeology Program of the University of Minho Archaeology Unit. Two numbers were published in 1987 and 1988. The aim was to create a periodical that would meet the interest on industrial archaeology which then began to assert themselves in Portugal. The success of this initiative led to transform the newsletter into a scientific journal, allowing a deeper approach of their subject. After finding a sponsor, the journal restarted its publication in 1993 with its second series, under the project of the River Ave Valley Textile Industry Museum, being published jointly by the Industrial Archaeology Program and the Vila Nova de Famalicão County Council, on a biannual publication frequency, but corresponding to a double issue. Unfortunately, due to several difficulties, the journal was forced to stop its publication, returning with its third series in 1997, under the project of the Oporto Museum of Science and Industry, and published two numbers, also on a biannual frequency. Due to the extinction of the Museum project, it was necessary to find another

editor, to allow its continuity. The solution was found in 2005, and the fourth series has been published jointly by the Portuguese Society for Industrial Heritage (TICCIH Portugal) and the River Ave Valley Textile Industry Museum, again with the sponsorship of the Vila Nova de Famalicão County Council. It has been published regularly ever since, maintaining the biannual frequency (a double issue), extending its contents also to research on Brazil's industrial archaeology.

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Basic Biographical Information

Güven Arsebük was born in Istanbul in 1936. He graduated from Robert's College and, inspired by his high school literature teacher, decided to study archaeology. At this time there were two different certificate programs: in prehistory and classical archaeology in the Archaeology Department of Istanbul University. Arsebük graduated from the prehistory program in 1962.

In 1963 and 1964, during his military service, he translated L.S.B. Leakey's *Adam's Ancestors: The Evolution of Man and His Culture* into Turkish. Following his military duty, he went to the University of Tubingen to study anthropology, genetics, Paleolithic, prehistory, and ethnology education for a year under the Thyssen scholarship. On return to Turkey he was assigned to Istanbul University as professorial assistant in 1966.

With a Fulbright scholarship he took lectures at the University of Chicago including human evolution from F. Clark Howell, science of Paleolithic ages from L. Freeman, Pleistocene geography from K. Butzer, and prehistory from Robert J. Braidwood. He received his M.A. in 1964.

Arsebük was promoted to associate professor in 1981, becoming a professor in 1990 following the publication of his book *Human and Evolution*.

Major Accomplishments

Arsebük is considered one of the pioneering archaeologists who developed anthropological and archaeological methods on the "human"-based approach. He, for the first time in Turkish archaeological tradition, examined an archaeological subject using an anthropological method in his Ph.D. dissertation titled "The Relations Problematic Between Karas Type and Dark Burnished Ware Pottery in Altınova."

After his undergraduate study he participated in many excavations and projects such as the 1958 Side excavations led by Arif Müfid Mansel, following on from 1959 to 1961 Hattuşa directed by Kurt Bittel. Arsebük also participated in the salvage and conservation project for ancient monuments of Lower Euphrates and Keban. As well, with Ufuk Esin, he worked on the Tepecik, Tülintepe, and Değirmentepe excavations.

Güven Arsebük led an international team in excavations between 1988 and 1990, revealing the oldest Paleolithic settlement in Turkey to date. The Yarımburgaz Cave, located in the Küçükçekmece district in İstanbul, was dated from 400,000 to 150,000 BP.

Güven Arsebük served as a representative of Istanbul University's Faculty of Literature for UNESCO from 1990 to 1993. He is a board member of the American Research Institute in Turkey, a member of the American Association of Physical Anthropology in New York, a founder and member of the Turkish Institute of Archaeology, a member of the Germen Institute of Archaeology, and a member of New York Academy of Sciences and of the Turkish Academy of Sciences.

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Art Studies: Normative Approaches

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Introduction and Definition

The theoretical proposals that search for regularities, or "norms," in different materials of the archaeological record have been very important since the beginnings of archaeology and are still foundations for current scientific research. Nevertheless, their success, failure, or relative advantages have been marked by the different interpretations that each theoretical approach has applied to the regularities found in the archaeological record.

For the archaeology of art, throughout the history of the discipline, various normative approaches have been developed, some with applications for portable art and others for rock art. These have varied according to particular situations in different academic contexts.

In the USA the normative approaches have been more linked to the general concepts of the "Culture-History School," which in its North American trend adopted particular features which differentiated it from similar approaches in other parts of the world. In this case, it was intimately linked to "normative theory" (sensu Binford 1965), which has applied fundamentally to portable art research, particularly in the study of pottery designs, looking for recurrent features that would allow the definition of "ceramic styles."

On the other hand, in Europe, the search for regularities in terms of shared norms has been

more related to postulates based on Structuralism, Semiotics and Cognition, and has been specifically applied to Paleolithic parietal art research.

Historical Background

Normativism Inspired in the "Culture-History School"

In spite of the fact that the "Culture-History School" has had great influence in the development of archaeology, both in Europe and America, in its specific relation to the archaeology of art, the North American branch of this school has been more prominent, particularly in respect to portable art and monumental art.

In North America the Culture-History School is best represented by the work of Whilley and Phillips (1958), in which "cultural areas" were defined for the American continent and "chronological-cultural periods" were proposed to tackle the pre-Hispanic occupation of the continent. The characterization of the areas and the periods was carried out from an inductive epistemology which held the notion that "culture" was a "mental norm" shared by the members of a society.

Such a notion starts from a passive vision of material culture, considering it as an expression of such mental norms. The temporal-spatial distribution of material culture with specific features was taken as an indicator of presence-absence of the "bearers of such norms," and these were understood as "archaeological cultures."

Art did not escape such conception, being interpreted as the materialization of ideas, and stylistic standardization as the graphic and concrete expression of cultural norms based on such ideas. Thus conceived, art in all its forms was taken as an indicator relevant to identify archaeological cultures, which helped in the characterization of periods and cultural areas.

The definition of "artistic styles" was carried out through the detailed description of designs and techniques of portable art and pottery (rock art was practically omitted from this and other theoretical frameworks of the American trend). After that, and following the identification of recurrent features, "styles" were defined, which were in turn associated, via induction, to a "culture" and to a "people."

Such "artistic styles" were considered as reflexes of cultural and symbolic norms of such people, whose members were seen as their "passive bearers." In sum, art was conceived as a passive means of expression of ideas, understood as "mental cultural norms."

These conceptions have had a great influence in the development of archaeology and a great part of the systematization of knowledge about American archaeology managed today has been established on its grounds.

In spite of these contributions, later theoretical proposals such as the New Archaeology have strongly criticized these conceptions and their results. In effect, Binford (1965, 2001) wrote a history of the development of "normativism" in North American archaeology, pointing out its important limitations and emphasizing that one of its more important flaws is to hinder the analysis of variability in the archaeological record.

In spite of the theoretical clash between the "normative theory" (sensu Binford) and Processualism-New Archaeology, there has been a great influence of the former over the latter. In effect, Lyman and O'Brien (2004) consider that as an alternative, many of the normative propositions are crystallized when they are explicitly used in the interpretations of the data generated by the New Archaeology followers. Thus, in relation to the archaeology of art, authors such as Deetz, Hill, Longacre, and Whallon (among other New Archaeology followers) developed studies of ceramic designs, and, when analyzing them statistically, they identified design groups which they interpreted as elements which were culturally and normatively significant (Lyman & O'Brien 2004).

Proposals Based on Structuralism, Semiotics, and Cognition

While in North American archaeology the "normative theory" was being developed, it was confronted with the "New Archaeology," and both were being applied in the archaeology of

art, particularly in portable art analyses. Simultaneously, in Europe other theoretical lines were being applied, particularly to analyze rock art.

In effect, postulates based on Structuralism, Semiotics, and Cognition started to be used towards the early 1960s, in order to face the study of European Paleolithic parietal art.

Such tenets, influenced by rationalist French thought, were applied mainly by Laming Emperaire (1962) and Leroi Gourhan (1965) to the study and interpretation of Paleolithic parietal art, considering that:

(a) It was the product of the projection of mental structures, crystallized in artistic creation.
(b) Such mental structures were organized through binary oppositions (proposed by Saussure's linguistics and Levi Strauss's structuralism).
(c) This was recognizable in rock art through the spatial distribution of specific motifs, which was not random but rather structured via determined oppositions and associations.

Taking these considerations into account, recurrences in motifs and their associations in specific places of the sites were searched for, interpreting them as symbolic expressions of myths, expressed via graphic forms, and which were spatially structured through dual associations (*mythograms*).

Specific combinations between motifs and with the bedrock topography entailed a specific meaning, whose analysis should be tackled considering them as the significant symbol associations and not as anecdotal tales of real or imaginary events. Such different combinations would have different meanings according to their topographic-iconographic structuration.

The analysis of these different topo-iconographical combinations should be carried out as if they were "grammatical structures," trying to access the underlying "syntax" or "grammatical code." Such analysis tended to access the knowledge of the "composition rules" which were implicit to the distribution of specific rock art motifs in specific bedrock locations, avoiding a literal interpretation or an exclusively symbolic interpretation, given that their deep meaning was actually lost.

Once the "composition rules" were identified, each of the two aforementioned authors carried out different structuralist analyses, focusing their attention on specific associations observed between animal figures and abstract designs of supposed sexual content. Each one constructed stylistic schemes using, also, elements of other theoretical approaches: such as diachronic cultural evolutionism and culture-history normativism, interpreting differently the nature of such recurrent combinations.

Such free interpretation within the same theoretical position, together with the identification of patterns which could not just be ascribed to a single "visual grammar," or to a specific "mythogram," is some of the main problems faced by this theoretical proposal.

Today, this proposal has been entirely discarded in terms of its interpretive aspects, but some of its contributions still persist and are mainly referred to methodological lines which provide relevant information, such as:

1. The search for chronological indicators in the combination of stratigraphic information with the assessment of superimpositions in art, the analysis of variations in techniques, and in stylistic conventions through time
2. The identification of the persistence of more than one "artistic style or stage" in relation to the duration of determined "lithic industry" found in an excavation
3. The interest for the study of the socioeconomic aspects of rock art production, as much as its social uses in the past, postulating that such aspects could only be accessible through the identification of recurrent patterns which are verifiable in the archaeological record

Problems, Contributions, and Perspectives from Normative Approaches

The proposals and applications of these normative theoretical frameworks need to be analyzed in the particular historical-academic contexts in which they were created and used. Only then can they be properly assessed in terms of their problems and contributions to current research.

Firstly, in the two mentioned cases, a great interest in *developing methodological tools* is observed: these are particularly oriented towards ways of tackling time and space in the analysis of different types of material culture related to portable art and rock art production. To this end, "periods" and "cultural areas" were established within American normative approaches, and "stages" and/or "styles" were defined within the French structuralism with cognitive-semiotic roots. This is understandable in these moments of history of archaeological research, in which absolute dating methods were lacking to date materials in the archaeological record (C14 dating was only available from 1955 onwards); thus, the priority was to have chronological referent for art's relative chronology and for its spatial distribution.

With the development of radiocarbon dating technique, and with the ample possibility of its use in excavated archaeological materials, around 1960 the urgent need to establish chronologies via relative methods diminished, although its importance did not (and does not) disappear, both for excavated materials and also, mainly, for most of rock art research.

In turn, the attempts to develop interpretive tools for regularities observed in the archaeological record were also product of particular situations of the trajectories of each of these theoretical proposals. Thus, *American normativism* was inclined to develop typological analyses, in order to observe similarities and differences in artifact types and complexes, with the end of identifying "archaeological cultures" and to determine limits among them. Established in this manner, each formal variation detected in the artifacts was interpreted as a chronological indicator. Such proposal was considered from the 1970s as a theory about "cultural transmission" in time and space. For this reason it was criticized, claiming that it ignored the great variability of the archaeological record, which was the product of intra- and intergroup differences in "cultural systems." Such criticism emphasized that the main wrong belief of normativism was to assume that archaeological societies were internally homogenous, in their organizational aspects and in their actions, leaving open and unexplained a possible explanation of the great internal variability documented for past and present societies (Binford 2001: 12).

The theoretical approaches based on *French Structuralism*, *Semiotics*, *and Cognition* frameworks, in spite of also having relative chronology as one of their main aims, they attempted a deeper kind of interpretation, trying not only to access the abovementioned "rules of grammatical visual composition" understood as a code of communication represented in parietal art but also proposed a complex explanation of symbolic character. Such explanation considered that the conceptual scheme of thought of prehistoric societies was based on dichotomies manifested in the recurrent associations of motifs which represented opposed principles of sexual nature, which identified a specific animal (horse or bison) with a specific abstract motif (lineal or figure) with a male or female principle, and which, associated to another animal, characterized with the opposed sexual character, formed a composition scheme. From this assumption they drew the conclusion of the existence of a male–female dualism in the representations, forming inextricable associations between topic and symbolism, which organized the ideological world of the Paleolithic societies. Such explanation was extremely criticized a posteriori, and due to this the interpretation about animal-sign sexual dichotomy was abandoned. Afterwards some of the most interesting ideas of this framework were pinpointed as useful, such as the importance given to context, the introduction of questions about the social organization of the art producers, and the interpretation of motifs as possible ethnic markers.

Key Issues/Current Debates

The search for recurrent regularities in the archaeological record, be it of artifacts, of designs, and/or structure features, remains the basis of archaeological research. On the grounds of such regularities, "categories," "types," "styles," "classes," and many other categories

used to "order" the apparent "chaos" in the past material record have been developed and used. In fact, as Gnecco and Langebaek (2006) state, such a kind of "organizing" thought, which they term "typological thought," is our guide, a lense through which we categorize the world around us (plants, peers, emotions, etc.), but although we cannot live without "typological thought," we can in fact escape from its tyranny. These authors (Gnecco & Langebaek 2006) understand "tyranny" as the inherent limitation to reduce the great world variability to manageable and narrow proportions, and they propose that to escape from such tyranny, it is necessary to:

(a) Accept that the already constructed typologies order the world does not mean that the world only fits in them and that we cannot invent new categories, new ways of interpretation, new analytical avenues.
(b) Remember that typologies have an unnecessary tendency towards universalization, which the scientific abuse of typologies gave them a universal character which is not part of their definition, given that typologies are only universal if the theory that builds them needs them to be.
(c) Understand that the typological tyranny essentializes and is ahistoric because it empties all categories of time and space.
(d) Recognize that typologies, as any other social product, do not escape from ideological struggle, and, for this reason, they are not neutral constructions but power mechanisms. In this sense, typological reasoning is, also, a political theory.

In respect of this latter point, the example proposed by Gnecco and Langebaek (2006) is very clear, since they stress that the bases for evolutionism were established on social typologies (savagery, barbarism, civilization) which translate cultural differences into temporal hierarchies, while such hierarchies supported the ideology on which the European colonial expansion was based during the nineteenth century. Hence, such process converted social typologies not in disciplinary findings but in mechanisms of colonial domination whose typological tyranny is hidden with arguments of objective neutrality.

These authors also assert that, in fact, the generalization of typological thought appears almost next to the formal origin of archaeology as a discipline and coincides historically with the formation of the nation-states and the nineteenth-century colonial expansion, which fostered ideologically the classical evolutionism which held the existence of cultural hierarchies. Later, following the same perspective, towards the 1960s, archaeological theory adopted neo-evolutionist typologies about society, which have had a great importance in the interpretations of the human social past. In fact, these have been used in a prescriptive manner, leading the archaeologists to be more interested in "confirming" the existence of types from a few cultural traces than to try to develop imaginative interpretations, sensitive to local contexts, inquiring into different dimensions of social life. Thus the tyranny of typological thought has reduced the interpretive spectrum in a dramatic manner (Gnecco & Langebaek 2006: ix-x).

For these reasons, the cited authors propose that, although typologies are inevitable (since they create nets of meaning in which symbols make sense), their "tyranny" can be faced in archaeological practice if they are used from a *critical*, *heuristic* perspective (as means to reach alternative and suggestive interpretations and not as ultimate and definitive ends) and not in a *prescriptive* manner (instead of using them as threads that need to be followed, they have to be used as constitutive parts of complex and connective weaves) (Gnecco & Langebaek 2006: ix-x).

International Perspectives and Future Directions

Following the considerations done by the previously cited authors, it can be said that it is important to (a) discern *recurrent patterns* in the archaeological record and (b) be *cautious* and have *ample criteria* when proposing interpretations about them.

In fact, the existence of regularities in the archaeological record, be they defined as "artifact types," "patterns of element associations,"

"recurrent features," etc., are the tip of the iceberg to make complex questions about past societies. The way in which these questions are asked and the ways designed to answer them will be the key to their success or failure when applying them as a significant research method.

With the archaeology of art, this is particularly important given that graphic designs offer a wide range of interpretive possibilities. In fact, beyond the abuses committed in terms of establishing "styles" in the traditional manner when studying portable art or rock art in different parts of the world, a wider approach to the analysis of these very same items can allow to ask more complex and varied questions about the societies that produced them.

To do so, it is important to open lines of inquiry that take into account "variability" at the time to interpret regularities observed in the archaeological record and its changes, searching for causal factors among them. In this sense the analysis of variability must always have three basic instances: (a) temporal variation (different chronology), (b) spatial variation (different society), and (c) intra-society variation (different function/s). This is applicable both to portable art and rock art, but they do require different approaches.

In effect, portable art has the same features than any other artifact, with the addition of bearing graphic representations. Therefore it can be analyzed with the same methods applied to study the archaeological record in general, adding some specific strategies to analyze its designs.

Rock art, instead, is different because the plastic representations have been made on top of natural media, without any "object" or artifact to bear them. This situation has led rock art to be left aside from archaeological research (mainly in the North American school), particularly because given it is not embedded in a sedimentary matrix, its relative chronological ascription was very difficult, and, until recently, its absolute dating was impossible; otherwise, it was studied from non-archaeological approaches but recurring to other disciplines (fundamentally in Europe, such as in France and Spain).

However, in other countries, interesting archaeological approaches to rock art have been developed. It is interesting to mention here that such countries are not central places in terms of archaeological theory and/or method development, and among them it is worth mentioning the cases of Australia and Argentina. Australia has greatly contributed to the development of "informed methods" (sensu Chippindale & Nash 2004), following the great number of works carried out in areas where Aboriginal communities still have direct links to the production – use – meaning of rock art. Argentina, in turn, has developed more in relation to the "formal methods" (sensu Chippindale & Nash 2004).

In effect, Gradin (1978) proposed an integral method for rock art analysis that attempts to differentiate rock art production in particular regions (space), through an archaeological sequence (time) and in correlation with different human groups (culture). Such an approach considers that rock art has to be studied at regional scale, articulating information from excavated sites and from rock art sites. He proposes the consideration of three fundamental aspects in rock art analysis:

(a) Topography: *spatial* location (position, accessibility, visibility, specific rock surfaces selection, etc.)
(b) Representation: rock art production processes as *material culture* (topic selection, graphic mode in which it is produced, techniques, etc.)
(c) Chronology: its position in the regional archaeological sequence (superimpositions, fallen rocks with rock art contained in datable sediments, etc.) to assess their consecutive production through time

With these criteria he developed analytical units (motifs, stylistic groups, stylistic modalities, etc.), and their presence-absence observation, spatial or temporal recurrence, etc., allowed him to establish rock art sequences in Argentinean Patagonia. His model was applied by other authors to specific areas of Northwest Argentina.

In spite of the fact that this methodology, which is very useful to establish regional

sequences, focuses mainly on temporal variability (a common situation in most part of archaeological typologies), its usefulness can be significantly widened if it is complemented by other approaches.

Rock art taphonomy (sensu Chippindale & Nash 2004) points out that "differential survival" of rock art images is a critical issue. This variable, however, presents serious difficulties when trying to estimate "comparative arts of survival" required to estimate the postdepositional processes – via natural or human agents – which could affect rock art at the scale of motif, site, area, or region. For this reason, it is important to take into account:

A. When analyzing the incidence of *natural processes*, assess:
   (a) The possibility of complete destruction of sites due to causes such as mass erosion or redeposition, typical of specific geological processes
   (b) The state of conservation of sites with current archaeological visibility, considering:
      1. Bedrock composition, surface processes (exfoliation, biotic growth, accretions, etc.)
      2. Degree of exposure to natural mechanical weathering agents (solar, wind, rain erosion, etc.)
      3. Features of the bedrock protection (e.g., drip line)
      4. Cardinal orientation of the site
      5. Natural agents acting locally and extension of their potential or real damage, among many other factors

B. When analyzing the incidence of human agents, conceived as the actions carried out after the production of rock art representations at a given moment of the sequence, it is important to assess:
   1. The production of new motifs superimposed to others previously made
   2. Events of repainting or reengraving
   3. Use of part of previous motifs to create new ones
   4. Premeditated total or partial destruction
   5. Total or partial cover with sediment or constructions product of later uses of the site

Rock art functions entail that the causal factors due to which rock art representations were created are fundamental variables to be assessed during research.

A-As noted above, the focus placed in the chronological appreciation of rock art resulted, in most cases, in the consideration that observed variation in a specific attribute ("type") assemblage was considered to have been caused by changes through time. This has been detrimental to the assessment of functional variation in rock art production.

B-Functional variation is understood as the diversity of representations that may have been made by the same society in a single moment of the sequence, due to different factors and for different purposes (sacred sites vs. domestic sites; male sites vs. female sites; territorial marks vs. aggregation sites, among many other possibilities). To assess the possible function that specific rock art representations may have had is critical at the moment of proposing interpretive approaches to it.

Both the considerations about *taphonomy* and about *function* are intimately connected with the considerations about *chronology*. In fact, to attempt the inference of a relative production sequence of rock art in a specific region, it is essential to assess both the possible differential occurrence of rock art due to postdepositional variables, as much as the existence of diverse types of rock art representations due to functional variables in specific chronological segments. Such interconnection is so vital that an erroneous assessment of any of these variables can lead to an erroneous estimation of the others.

Taking this into account, the construction of regional relative sequences becomes more complex since it not only requires the consideration of more variables but also of more research questions. Nevertheless, their construction is still a fundamental tool for rock art studies since it is a key to frame rock art in time and space, in order to articulate them with the general regional archaeological sequence.

Nowadays, even counting in some cases with the possibility of obtaining absolute dates with AMS, it is crucial to count first with a

well-established relative sequence, given that this sequence is the guide to the sampling process to date specific relevant motifs within such sequence. This procedure reduces the number of samples to date (avoiding unnecessary destruction), increases the strategy efficiency (covering the whole sequence and/or functional variables), and saves time and economic and professional resources.

Thus, the importance given the development of *regional rock art sequences*, taking into account all the mentioned variables, makes it possible to answer more complex research questions, thus putting the evidence provided by the archaeology of art in a privileged place within the regional studies of past societies.

Cross-References

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- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Binford, Lewis R. (Theory)
- ▶ Laming-Emperaire, Annette
- ▶ Leroi-Gourhan, André
- ▶ South American Rock Art
- ▶ Style: Its Role in the Archaeology of Art
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Art, Paleolithic

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Introduction

Around 100,000 BP (before present), a new class of artifacts began to appear at archaeological sites in Africa and the Middle East. These items included pierced marine shells probably worn as personal adornment (e.g., Qafzeh, Israel; Oued Djebbana, Algeria) as well as pieces of bone and ochre that display deliberate nonfigurative markings (e.g., Klasies, South Africa; Pinnacle Point, South Africa; Blombos, South Africa). Additionally, the presence of red ochre and related materials to prepare this pigment (e.g., Blombos, South Africa) is present in Africa and the Middle East. These artifacts are often cited as the earliest evidence for the "creative explosion" associated with the *Homo sapiens* species, but until 40,000 BP, these potential examples of symbolic behavior remain infrequent and confined to portable objects. Around 40,000–60,000 BP, the frequency of symbolic artifacts increases. This is correlated with the spread of modern humans across the Old World. Around this time, rock art and sculptural art emerged. Paleolithic art is generally divided into three main categories:

1. Parietal art: Also known as rock art, this category includes all paintings, engravings, drawings, and stencils (Davidson 1997: 125) found on immovable surfaces such as the

walls, floors, and ceilings of rockshelters and caves. There is also some evidence in Europe of parietal art having been created in open-air settings (e.g., the engravings at Fornols-Haut in France and the Coa River Valley in Portugal). Due to taphonomic processes such as wind and rain, these outdoor decorated locations have generally not survived.

The majority of the paintings were done with either red or black paint, most commonly produced using red ochre and charcoal, respectively. However, there are also some sites where the mineral manganese oxide was used to create the black color. Other less common colors include yellow and brown (also derived from ochre) and in rare instances white paintings made using kaolin clay have been identified. Preparation was required to produce the paints, including the grinding of the pigments and the use of formulas created by mixing the color component with binders (e.g., water, urine, animal fat) and extenders (e.g., feldspar, biotite, talc, clay). Engravings were done using either a tool to mark the stone, or in cases where the surface included softer materials such as clay, a finger was sometimes used to create the image. The creation of drawings involves the use of dry material in the form of ochre crayons or charcoal sticks as opposed to the use of liquid paint formulas. Stencils refer primarily to the creation of negative hands, which were produced by a method known as spit painting, where the paint or raw pigments were blown over a hand placed against the surface in order to leave an outline.

2. Portable art: This subcategory includes all portable artifacts found at Paleolithic sites that incorporate a symbolic or artistic element. This includes everything from weapons or tools that have been embellished or decorated (e.g., atlatls) to plaques or pebbles that have been painted or engraved as well as the large number of figurines that have been found at sites across Europasia. The materials used to make these portable objects include but are not limited to stone, bone, antler, ivory, and clay.
3. Personal adornment: Most of these pieces are found in elaborated burials and appear to have been worn as jewelry. These artifacts are differentiated from the portable art by being items specifically produced to adorn the human body in some manner. The most common materials used to make these ornaments are pierced teeth, marine shells, ivory, and bone. Large numbers of ivory beads have also been recovered, many of which bear evidence of having been sewn onto clothing and headwear (e.g., the three elaborate burials from an Upper Paleolithic site in Sungir, Russia).

Paleolithic art can be divided into two categories: figurative imagery, which is defined as identifiable art and most often refers to animal and human depictions, and nonfigurative imagery, which includes all abstract or geometric images not easily identifiable as being real-world objects or entities. One type of imagery that appears to be absent at nearly all rock art sites older than 10,000 BP is landscape (e.g., trees, mountains, or rivers) as well as images of everyday life including structures such as housing. Even though the art found in different global regions is varied, there are several overarching themes that are identifiable at sites worldwide:

1. Animal imagery: While the specific subject matter might be determined by the environment in which the art is being produced (e.g., mammoths in Europe, kangaroos in Australia, eland in South Africa), the inclusion of animal imagery at rock art sites and on portable objects is almost universal. At Paleolithic rock art sites across Europe, animal imagery is usually the dominant theme (e.g., horse, bison, mammoth, ibex, deer), and many of the portable art pieces also include animals in their decoration.
2. Human imagery: Images of humans whether they are accurate representations or more stylized descriptions are also found at rock art sites globally. In some cases, these representations have been categorized as being therianthropic, appearing to portray a human-animal hybrid (e.g., the sorcerer at Les Trois-Freres, France). They are also found occasionally on portable

Art, Paleolithic, Fig. 1 Megaloceros, ibex, and human with protruding spears – Cougnac, France (Photo by J. Clottes)

objects. In Europe in particular, there is an entire collection of human figurines from the Paleolithic period (see discussion about these figurines in the "How Old is the Art?" section below). The inclusion of human images at rock art sites varies widely between regions, with them being fairly unusual at European sites but more common at contemporaneous sites in Australia.

3. Abstract imagery: Also known as geometric signs, these images include everything from simple dots and lines to more complex geometric shapes such as tectiforms or scalariforms (see Fig. 1). Geometric signs are found at rock art sites around the world, and in regions such as Europe, these abstract images outnumber the figurative representations at most Paleolithic sites (Bahn & Vertut 1997: 166). These markings are also found on many portable art objects, including items of personal adornment. While this category is often defined as including all images that are not recognizable as items from the mundane world, it has been argued that some of these markings could in fact represent weapons, tools, or other physical manifestations of human behavior (Figs. 2–4).

Art, Paleolithic, Fig. 2 "The sorcerer" – therianthropic figure – Gabillou, France (Photo by J. Clottes)

Art, Paleolithic, Fig. 3 Panel of geometric signs – Niaux, France (Photo by J. Clottes)

Art, Paleolithic, Fig. 4 Panel of hand stencils – Gargas, France (Photo by J. Clottes)

4. Hand imagery: This is ubiquitous in rock art and includes negative hand stencils, positive handprints, and stylized hands. Negative hand stencils are created when a hand is placed against a flat surface such as a cave wall and pigment is blown around it. When the hand is removed, a negative outline of the hand remains. Positive handprints are created when pigment is applied directly to the palm and the fingers of the hand, and the hand is then placed against a flat surface. Stylized hands are freehand drawings which often include abstract images. Hand imagery is subdivided into its own category as it cannot be presupposed that the intention of the Paleolithic artist was to reduce the representation of a human to a handprint or that a handprint could represent an entire human.

Definition

In its broadest sense, the term Paleolithic art encompasses all deliberately modified surfaces and artifacts created prior to 10,000 BP that were thought to have been produced with symbolic

intent. Traditionally Paleolithic art has been identified with symbolic artifacts and images found at archaeological sites from the Upper Paleolithic period in Europe, dating roughly between 10,000 and 40,000 BP. However, this expression is also sometimes used as a blanket term to refer to all parietal art, portable art, and personal adornment found globally and dated before the end of the Pleistocene period (before 10,000 BP). This art is generally associated with modern humans, though there are several artifacts from Europe that have been identified as being produced by Neanderthals (e.g., a necklace from the French site of Arcy-sur-Cure). There has even been recent speculation that some of the oldest art may have been created by Neanderthals, though this remains to be proven.

Historical Background

The discovery and acceptance of Paleolithic art was a gradual process that took place over the course of the nineteenth century. Beginning in the 1820s, portable art objects started being excavated at sites across Europe. Some of the earliest discoveries were in France, where they were believed to be of Celtic origin. It was not until the 1860s that the notion of these artifacts being from the Ice Age was proposed. This was partially due to a greater acceptance of geological chronologies of the earth, as well as discoveries of these objects in archaeological layers with ancient tools and extinct animal species (Bahn & Vertut 1997: 14).

While the recognition and incorporation of portable artifacts and items of personal adornment into the archaeological literature was fairly straightforward, the same cannot be said for the parietal art. The idea that art of this caliber could have been made by such "primitive savages" was hard for many of the Paleolithic archaeologists of the nineteenth century to accept, and it was not until the very end of the 1800s that parietal art was officially incorporated into the category of Paleolithic art (Bahn & Vertut 1997: 20). For example, in 1878 some wall engravings covered in calcite were noted at the site of Chabot in France along with the discovery of Paleolithic tools. While these were thought to be prehistoric in origin, the concept of this behavior being a regular occurrence took much longer to be accepted and was for the meantime ignored. At that time, Paleolithic archaeologists refused to believe that the bison paintings on the ceiling of Altamira in Spain, first discovered in 1879, could have been made by ancient humans due to their level of sophistication. However, as more and more parietal art was discovered, including sites where the images on portable art objects matched those on the walls, scholars finally came to accept the age of the art. By the early 1900s, many studies had been initiated to investigate this phenomenon further.

Key Issues/Current Debates

How Old Is the Art?

As previously mentioned, deciding which objects should be incorporated into the category of Paleolithic art was problematic in the past and is still a source of contention today. In fact, the term "Paleolithic" refers to tool industries found only in Europe, not those of Africa, Asia, or Australia. For this reason, many archaeologists prefer to use the term Pleistocene art. Instead of referring to archaeological materials from a particular region, the Pleistocene is a worldwide geological epoch that coincides with the last Ice Age and is thus a more inclusive term. The Pleistocene begins around 1.75 million years ago and ends around 10,000 years before the present. The emergence of art varies across the globe, but becomes abundant in the Old World around 35,000 years ago.

Africa: The earliest images from Africa come from the cape of South Africa in the form of abstract markings on different mediums. Engraved bones are present at Blombos Cave and Klasies River Caves. Engraved ochre is also present at Blombos Cave. The previously mentioned objects all date to around 70,000 years old. Around 60,000 years ago, inscribed ostrich shells are present at

sites such as Diepkloof Rockshelter. These objects were created during a period known as the Middle Stone Age (MSA). The MSA is preceded by the Early Stone Age and is followed by the Late Stone Age. Objects from the Middle Stone Age have been notoriously difficult to date as radiocarbon dating only extends to 40,000 years, and potassium/argon dating cannot be used on materials younger than 500,000 years old (McBrearty & Brooks 2000). Therefore, depending on the context, detailed stratigraphic knowledge must be combined with other dating methods such as argon/argon, infrared-stimulated luminescence, thermoluminescence, or optically stimulated luminescence. Figurative images are present on ochre slabs at Apollo 11, in Namibia and Nswatugi, Zimbabwe, and date to the late MSA, around 27,000–25,000 years ago. Figurative imagery may have an earlier origin, as ochre "pencils" were discovered at Klasies River dating to over 100,000 years and at Howiesons Poort to 65–80ka. Hematite "pencils" have been dated to 100,000+ years at Border Cave, South Africa. Additionally, unlike Europe, Africa lacks large limestone caves that have favorable conditions for preserving rock art (McBrearty & Brooks 2000).

Australia: Pleistocene art in Australia is difficult to date as much of the imagery was created in open-air settings and charcoal was not used. At present, archaeologists are only able to date charcoal and cannot directly date ochre. It is also challenging to numerically date engravings on a rock in contrast to objects that have been buried. Images in Australian art are diverse and include geometric signs, animals, humans, finger fluting, handprints, and chimeras. The oldest "art" in Australia comes in the form of cupules, circular depressions that are created on a rock surface. Cupules at Pilbara Northern Queensland, Turtle Rock, and Sandy Creek are thought to be at least 30,000 years old (Bednarik 2010). In terms of geometric forms, circular shapes on a bolder in Spear Hill/Abydos are dated to 20,000–27,000 thousand years ago with older symbols found in the surrounding vicinity (Bednarik 2010). Finger fluting at the Gallus site dates to at least 20,000 years. While much of the parietal art is difficult to date, relative chronologies have placed the artwork in a late Pleistocene/early Holocene time frame.

Asia: Although Pleistocene art is present in Asia, it has received little attention by archaeologists outside of Asia. As in Australia, cupules are arguably the oldest "art" found in Asia. In India, at Auditorium Cave a cupule with a line running along part of the edge was dated to the Acheulian (Bednarik 1994). As in other regions, statuettes and two-dimensional images were also created. An ostrich eggshell with engravings was found at Patna, India, and dated to 25,000 years before present. At Longgu Cave in China, an antler with geometric engravings was filled with red pigment and dated to approximately 13,000 years old. Recently multiple petroglyphs have been discovered in the South of India in the Kurnool and include naturalistic images of humans and animals. These images are dated to at least 10,000 BP. However, the objects that have received the most attention are the anthropomorphic and animal figurines from Mal'ta and Buret', Siberia. These ivory figurines date to around 23,000 years old.

Europe: The Paleolithic period of Europe can be divided into three major subdivisions: lower, middle, and upper. Each major subdivision can then be further divided. Both parietal and portable art emerge in Europe during the Upper Paleolithic. Specifically, the oldest rock art and figurines date to the Aurignacian industry, which begins in Europe approximately 40,000 years ago. Imagery continues to be created during the Gravettian industry (approximately 28,000–22,000 years ago). Common subjects include negative hands, geometric signs, and animals. Depictions of humans in European rock art are relatively rare, and animals such as horses, bison, and mammoths dominate cave walls. Although personal adornments are widespread by the Aurignacian, some archaeologists have argued that the ornaments from Grotte du Renne were created by Neanderthals in the Chatelperronian (for a critical view on this topic, see Higham et al. 2010). In regard to portable art, with the exception of the "Venus" of Hohle Fels and the "Venus" of Galgenberg, all of the

Aurignacian figurines are of animals. Starting with the Gravettian, an abundance of predominately female anthropomorphic figurines become widespread across Europe. Male figurines and those that lack secondary sexual characteristics can be found in collections at the following sites: Mal'ta, Kostenki I, and Dolní Věstonice. The anthropomorphic statuettes vary in size, material used, body position, stylistic features, and contextual details. The female figurines are commonly referred to as "mother goddesses" or "earth mothers," although evidence of a shared belief system has not been corroborated. Animal figurines were still created during the Gravettian and are found in abundance at Dolní Věstonice, Pavlov, Predmostí, Petrkovice, and Kostenki I, often in conjunction with female figurines (Bahn & Vertut 1997). Both animal and anthropomorphic statuettes continue to be created in the Magdalenian but become less realistic and instead are more stylized.

Who Made the Art?

The early interpretations of Paleolithic art reflected an androcentric bias in archaeology. It was commonplace to assume that the art had been made by men and small boys. One of the most prevalent of these interpretations focused on a male shaman producing rock art while in a trance. According to Bednarik (2008: 173), the shamanistic or totemistic interpretation of the rock art has remained popular theoretically because such interpretations add a greater "perceived value" or "worth" to the artwork. However, neither of these theoretical interpretations are scientifically testable, and the perpetuation of these androcentric interpretations further promotes an unsubstantiated bias in archaeology today (Sharpe & Van Gelder 2009: 324). A more current interpretation acknowledges that Paleolithic art was created by both males and females of varying ages. Preliminary studies employing the 2D:4D ratio (second to fourth digit) to determine sex from hand stencils have done so with a reasonable degree of probability. In addition, the presence of small handprints and footprints in caves such as Chauvet and Cosquer in France make it apparent that children were present and active within the caves as well. Regardless of age or sex, all of these interpretations have assumed that Paleolithic art was the product of anatomically modern humans alone. However, new uranium-series disequilibrium dates taken from calcite deposits overlying or underlying art found at a series of Spanish caves, most notably El Castillo, have turned this assumption on its head. With dates of up to 40,000 years, these finds suggest that Neanderthals could have also engaged in cave painting, but with modern humans already being in Europe by this time, it is hard to know who may have been the first parietal artists (Pike et al. 2012).

However, multiple personal adornments, colorants, and decorated bone tools were discovered in Châtelperronian levels at Grotte du Renne, Arcy-sur-Cure, France. This suggests that even if Neanderthals were not making cave art or mobile art, they were engaging in different artistic behaviors.

Why Did They Do the Art?

Since the discovery of the first portable and parietal art in Europe in the late 1800s, researchers have tried to understand why Paleolithic artists engaged in this behavior. "Art for art's sake" was a prominent theory of the nineteenth century referring to the belief that Paleolithic art had been created for decorative and aesthetic purposes only, but this theory has now largely been abandoned. Early functionalist theory relied heavily on ethnographies of "primitive" societies and correlating the need for food back to the images on the cave walls. The functionalist approach includes:

1. Hunting magic: This hypothesis was derived from ethnographies of modern hunter/gatherers who hunted with stone tools and produced rock art in order to enhance the success of their hunt. Animal imagery which includes "missiles," blood, and/or wounds has been used to support this theory. Other nonfigurative images have been interpreted as tracks and droppings to corroborate the theory that animal imagery was produced as a means of transmitting hunting knowledge.

2. Sympathetic magic: Like a "voodoo" doll, this theory relies on the concept that animals depicted in rock art influence animals in reality.
3. Fertility magic: This hypothesis was based on the discovery of pregnant and/or copulating imagery including the "precopulatory bison" of Tuc d'Audoubert, France, and the numerous "Venus" figurines.
4. Trophyism: This asserts that hunting was done as much out of necessity as it was to impress females. Animal imagery was produced by a male to impress a female with his hunting abilities and to ultimately increase his reproductive success.
5. Shamanism: This relies on the concept of a male shaman producing rock art while in a trance. Purported examples of shamanism in rock art include the "leaping cow" from Lascaux, France, the "sorcerer" from Les Trois-Freres, France, and the mammoth ivory half-man, half-lion figurine from Hohlenstein-Stadel, Germany.

Along with the above theories of meaning, there are also several major theoretical approaches that have been employed in the study of Paleolithic art; these include:

1. The *structuralist* movement was inspired by the linguistic works of Ferdinand de Saussure and first brought to popularity by the French anthropologist Claude Levi-Strauss. This approach rejected the "straight-line" development of art from simple to complex and from abstract to naturalistic. The creation of images were not unique artistic events, images were intentionally selected for by species type or abstract design, and they were created in specific locations within a particular site, in deliberate association to other images. Two of the main proponents of this approach within the field of Paleolithic art were Andre Leroi-Gourhan and Annette Laming-Emperaire.
2. Settlement archaeology developed out of the *processualist* movement and involved the study of the spatial distribution of human activities and particular occupations within a single room, house, overall site, or region where landscapes were passive backdrops. The focus was on demography, technology, how people used the land, and how the land constrained the people.
3. The *post-processualist* movement involves examining the social aspects, such as the material connection to the land and the human interaction with the land. Within this theoretical framework, there are three main ways that researchers have chosen to approach the art:
    1. Archaeology of place: Landscape was active and complex and recognized that cultural heritage was shaped through tradition and memory. People, places, and features are considered integral, and landscape is seen as shaping and being shaped by human experience.
    2. Social geography: This relies on the idea that Paleolithic peoples moved in and through the landscape and that a regional scale of analysis was required. While "meaning" may be culturally specific, the phenomenological approach or the conscious human experience of everyday life allows scholars to approach landscape and built locations, such as painted caves, as they were perceived, represented, and experienced by Paleolithic peoples.
    3. Pleistocene visual culture (Soffer & Conkey 1997) This relies on the argument that Paleolithic imagery is about materiality, meaning making and recognizing that Paleolithic peoples were active, social agents in constructing their world (Conkey 2009). The images they produced, in terms of materials, colors, shapes, placement, and association, are all part of creating meaning and are therefore integral to the larger picture.

Prehistoric Pornography?

As has been previously mentioned, the idea that adolescent boys created Paleolithic imagery may have influenced Guthrie's (2006) idea that the female statuettes and bas-reliefs were a form of prehistoric pornography. He argued that the mostly "naked" statuettes shared similar body proportions having small waists and broad hips; this is referred to as having a low waist-to-hip ratio. This body type is considered beautiful

cross-culturally and is also linked with fertility and overall health in females (Zaadstra et al. 1993; Singh & Singh 2006). However, upon analysis of the actual statuettes, Tripp and Schmidt (in press) found that the figurines actually share a high-average waist-to-hip ratio. This body type is not seen as attractive in modern populations and is linked to infertility and several mental and physical health conditions. Overall, the amount of diversity among the figurines in terms of style, contextual details, and materials makes it difficult to find a single explanation that can explain the earliest anthropomorphic art.

International Perspectives

At present, there is no one international means of rock art tourism and conservation, but rather, such decisions are made at each country's discretion. As a result, there is differential preservation of rock art around the world. In 1970, UNESCO created a set of guidelines for cultural tourism management and the preservation of World Heritage Sites with the intent to balance conservation efforts with providing cultural tourists with a meaningful experience through public education. South Africa's rock art sites receive around 240 million "cultural tourists" a year, and in consequence, the rock art is caught between the competing interests of impact assessors, who are concerned with the conservation, ethics, and ownership of the art, and those involved in the commodification, pricing, and promotion of the rock art as tourist attractions (Deacon 2006). The Dampier Archipelago of Australia contains the largest concentration of rock art in the world with an estimated million petroglyphs associated with other archaeological materials, such as shell middens and quarries. However, the archipelago has been threatened by years of development and industrialization, and it has led to the slow degradation of the rock art and the destruction of the cultural heritage over time (Mulvaney 2011). In 2007, the rock art paintings of the Sierra de San Francisco canyons of Baja California Sur, Mexico, were threatened despite the fact that they were on the UNESCO World Heritage List. Development of the land, in particular the plan to build roads through the canyons to create ease of access, threatened the art that had long been protected by its remoteness, the need for mules, and local guidance (Clottes 2008). In France, Lascaux Cave has long been endangered through the proliferation of a fungus initially brought on by the influx of tourists after the cave was first discovered. To save the art at Lascaux and Altamira in Spain, replicas of the caves were built which are open to the public. At other caves, controlled visitations, digital recordings, photographic archiving, and the production of virtual cave tours have all contributed to the preservation of the art. In all instances of rock art conservation, however, it is critical that we bear in mind that the greatest threat to the art is human in origin and that it is predominantly due to ignorance and a lack of interest (Clottes 2008).

Future Directions

Future directions in the study of Paleolithic art include incorporating theoretical background with innovative scientific techniques. Tosello and Fritz (2007), for example, experimented with a 3D scanner to record the imagery found on cave walls. This technology allows researchers the ability to record images in more precise detail. Investigators, for example, are able to scan images and screen out modern graffiti, darken lines that are deteriorating, and prevent the flattening of 3D images. They were also able to use this technology to analyze individual brushstrokes of two rhinoceros on the panel of horses in Chauvet Cave. Their results allowed them to make inferences about the intention, skill levels, and cognitive processes of the artist.

Since the antiquity of rock art was first proposed in Europe during the late 1800s, this continent, and in particular its western region, has held a preeminent place in the discipline. Europe has often been the benchmark against which other rock art is compared both in terms of stylistic analysis and temporal sequencing due

to the existing chronology of direct and indirect dates that have been collected from rock art sites. As interest and funding are directed towards the parietal art found in other parts of the world, it will be interesting to see how this affects the current assumption that the oldest art in the world is from W. Europe. Additionally, as dating methods improve, this will be able to ask more precise questions. As the many examples cited in this entry show, there are in fact sites from the Paleolithic period around the globe, and as new dating techniques are applied at these locations, we may find that the time line for the origins and dispersal of this behavior will need to be completely rewritten.

Cross-References

- ▶ Altamira and Paleolithic Cave Art of Northern Spain
- ▶ Australian Paleoart
- ▶ Bone Tools, Paleolithic
- ▶ Côa Valley Rock Art Sites
- ▶ Cognitive Evolution and Origins of Language and Speech
- ▶ Conkey, Margaret Wright
- ▶ Crimean Upper Paleolithic
- ▶ Cueva de las Manos, Río Pinturas Cave Art
- ▶ Davidson, Iain
- ▶ East Asia: Paleolithic
- ▶ Europe: Early Upper Paleolithic
- ▶ Europe: Paleolithic Art
- ▶ European Upper Paleolithic Rock Art: Sacredness, Sanctity, and Symbolism
- ▶ Glacial Advances in Asia, Europe, and North America
- ▶ *Homo sapiens*
- ▶ Iberian Mediterranean Basin: Rock Art
- ▶ Kostenki: Geography and Culture
- ▶ La Riera Cave: Geography and Culture
- ▶ Leroi-Gourhan, André
- ▶ Mobiliary Art, Paleolithic
- ▶ Paleoart Studies: Scientific Methods
- ▶ Rock Art Recording Methods: From Traditional to Digital
- ▶ Siega Verde Rock Art Sites
- ▶ Valcamonica Rock Art

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Ash: Geoarchaeology

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Introduction

Ash plays a significant role in archaeology both as a building block of stratigraphic accumulation and also as an alkaline source in taphonomic pathways. It is found all over the world and can be of considerable value in understanding cultural activity. Ash is a major component of many cave stratigraphies (e.g., Brochier 1983; Berna et al. 2012; Shahack Gross & Ayalon 2012), where leaching is minimal and occupation or animal stabling has occurred regularly throughout history. Ash also occurs at open-air sites under arid climatic regimes (Cremaschi & Trombino 1999), in pit fills where the shape and bulk of the deposit discourages dissolution, and in layers where the surrounding sediments are sufficiently alkaline (e.g., Canti 2007).

Definition

The word "ash" covers the remains of any burnt material and appears commonly in nineteenth- and early twentieth-century chemical analysis meaning "the component that cannot be oxidised." In practical parlance, however, it refers to the material left over from solid fuel fires. Archaeological ash can occasionally be the result of coal burning, particularly with the growth of industrial archaeology; however, in most cases, ash found in excavations results from the burning either of plant material or dung derived from herbivores. This entry will deal only with ash from plants and dung.

Historical Background

Although ash was reported from excavations throughout the twentieth century, it has only been studied analytically during the last 50 years or so. As with other aspects of archaeological science, early analytical studies did not approach the subject systematically, so an understanding was only built up slowly from individual pieces of work, such as the elemental analyses of ash mounds in central southern India (Zeuner 1959).

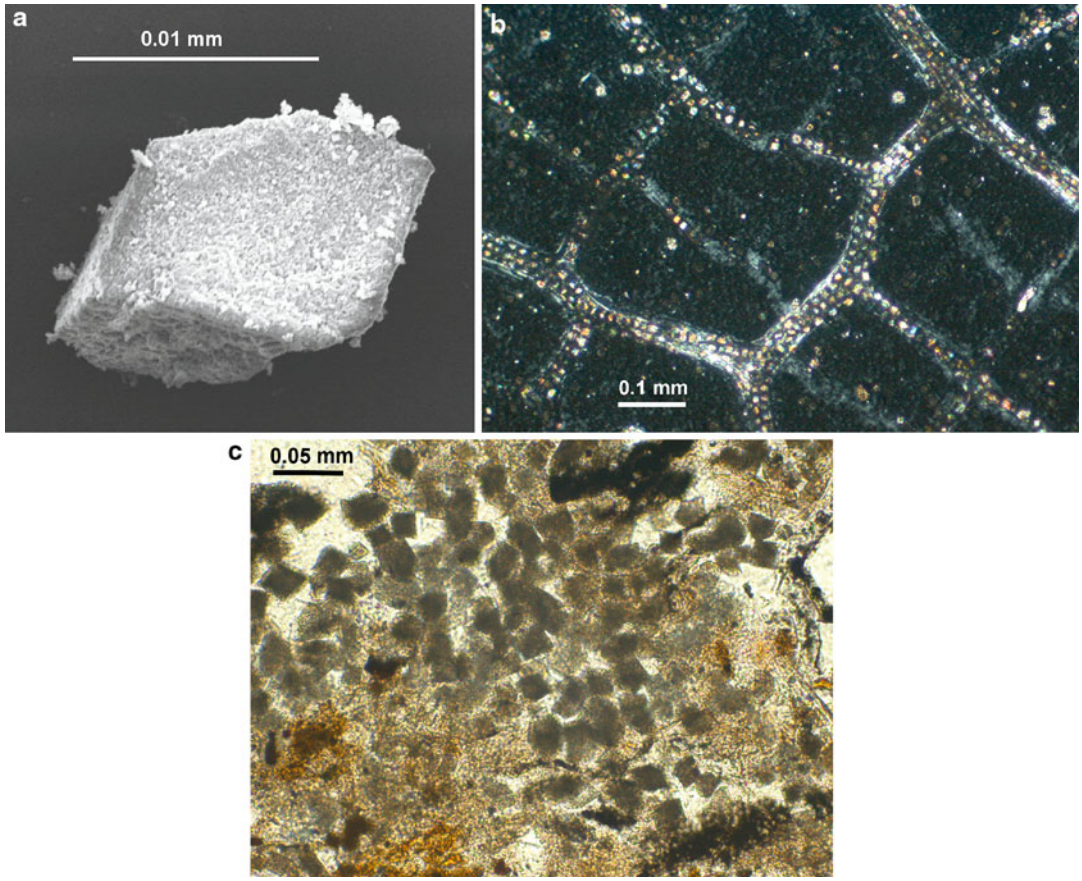
Folk (1973) was the first to indicate the true botanical origin of the calcium carbonate which forms a large part of many ash bodies, but this material and its relationship to the more siliceous ashes derived from grasses and herbivore dung (see below) was not fully understood until the work of Brochier (1983; 1996) and Brochier et al. (1992).

Subsequently, the major focus for published work on ash has been the diagenetic pathways in the Mediterranean and Middle Eastern caves. In these environments, ash, guano, and bone provide uniquely reactive contextual chemistry involving transformation pathways of numerous different phosphatic minerals, which enable valuable interpretations to be made both of the original inputs and the preservation of the environmental remains (Karkanas et al. 2000; Stiner et al. 2001).

Key Issues and Current Debates

What Is Ash?

Various parts of plants have been burnt throughout history by all cultures to produce heat.



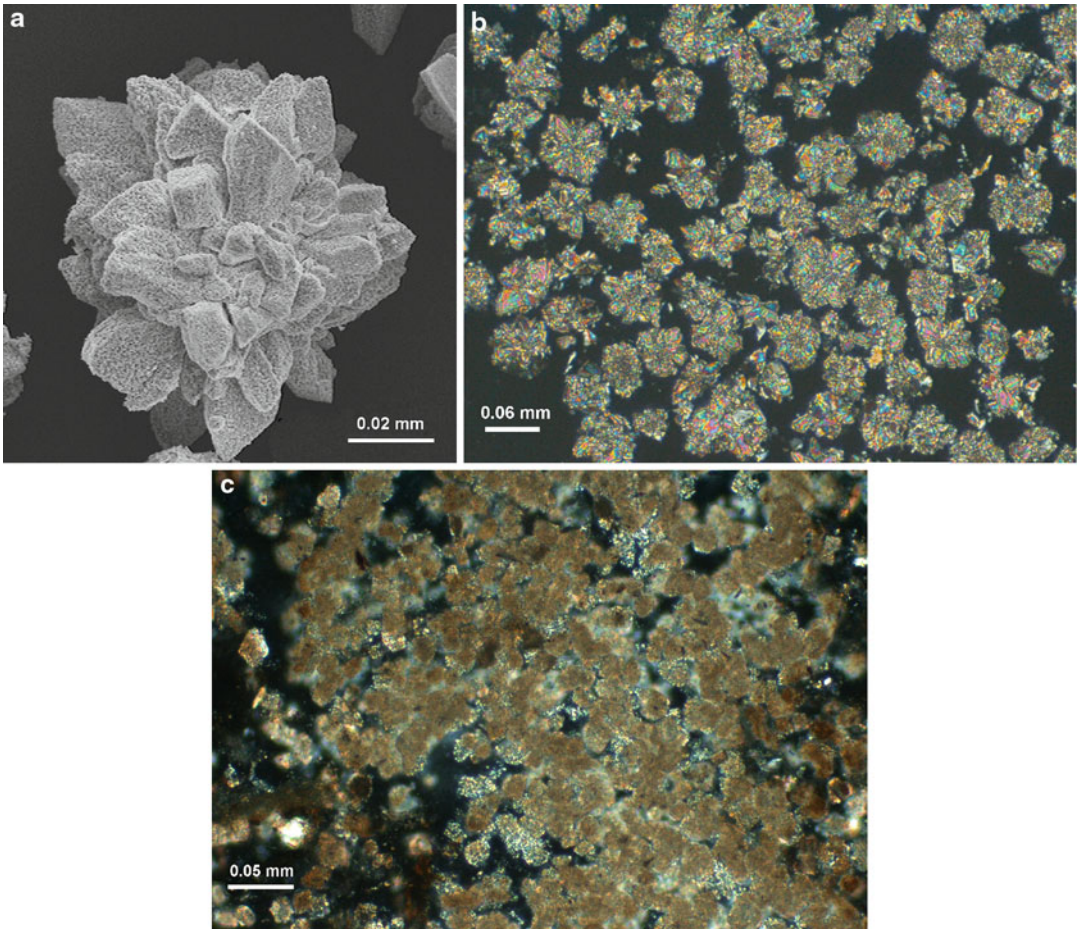
Ash: Geoarchaeology, Fig. 1 (**a**) Prismatic calcium oxalate crystal from *Laurus nobilis* (SEM photo), (**b**) prismatic crystals in leaf veins of *Quercus robur* (bleached whole leaf in crossed polarized light), (**c**) prismatic crystals converted to calcium carbonate in modern bonfire ash from mixed sources (plane polarized light)

The materials used can range from fine grasses to woody stems with leaves or logs from large trees. All these plant products are predominantly made of carbon-rich compound such as cellulose and lignin which burn away. However, they also contain a significant mix of mineral components that are left behind (either intact or modified) to become the ash layers found in archaeological excavations. The major mineral components are calcium carbonate (derived by burning from calcium oxalate crystals in the original plant) and silica which mostly comes through unchanged from phytoliths in or around plant cells.

The calcium oxalate crystals come in two major forms, both of which are preserved in the final ash body. The first of these is prismatic crystals, which form various rhomboidal shapes and commonly line the veins in leaves of numerous plant species (Fig. 1). The second is druses, which are aggregates of radially deployed crystals typically found lining veins or in the parenchymatous tissue (Fig. 2).

The shapes of the opaline silica remains are highly variable. Some form discrete bodies known as phytoliths, while others result from encrustation of the cells and retain a cellular shape after the organic remains have burned away (Fig. 3).

These compounds represent two major trends in plant mineralization. Some form of silica is present in most plant species but especially rich

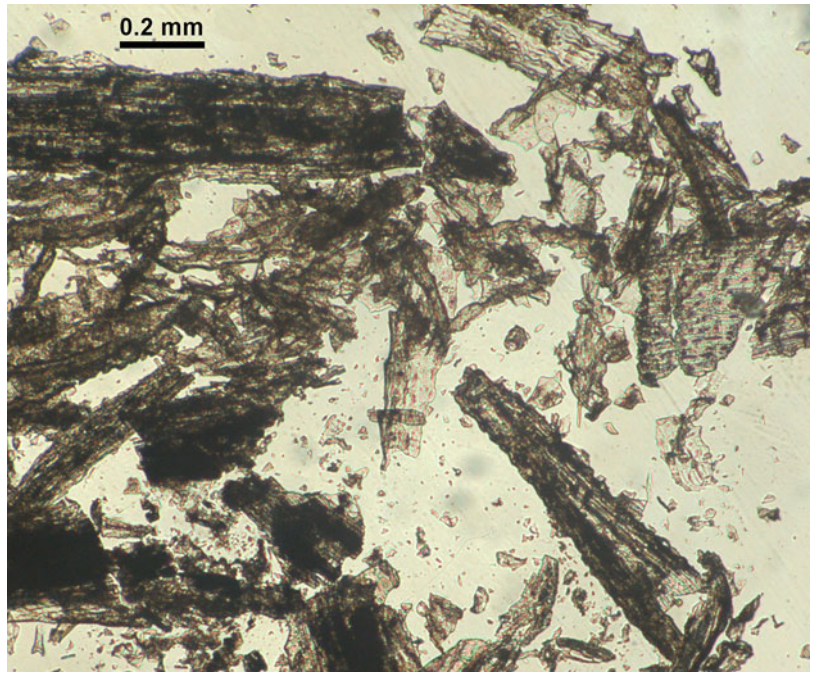


Ash: Geoarchaeology, Fig. 2 (**a**) Druse crystal from *Rheum raponticum* burnt at 700 °C (SEM photo), (**b**) druse calcium oxalate crystals from *Rheum raponticum* (crossed polarised light), (**c**) druse crystals converted to calcium carbonate in modern bonfire ash from mixed sources (plane polarized light)

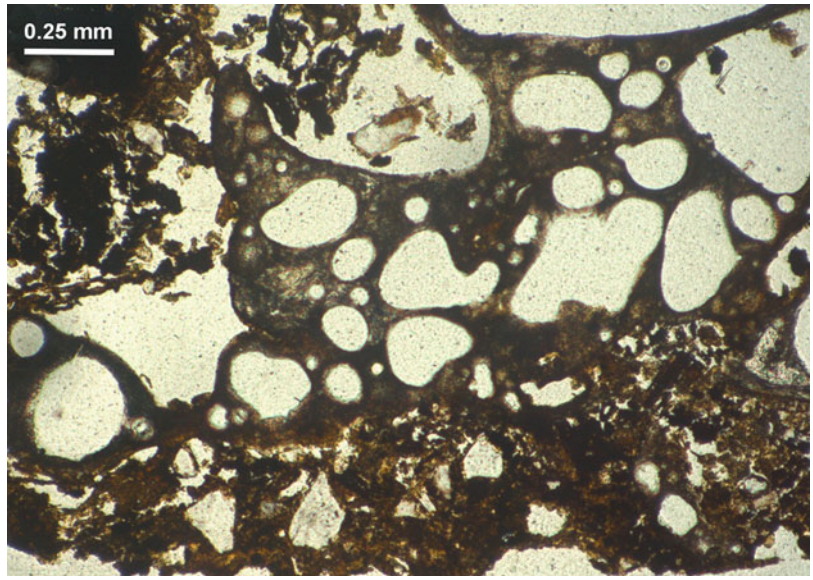
in the grasses; calcium oxalate is widespread in herbaceous plants and trees but is absent from the grasses. There are other mineral components in ash, and there are further complexities in the physiological and botanical relationships. A more complete discussion can be found in Canti (2003).

An additional modified form of ash occurs when some of these components become fused together. This happens when the ash contains a significant proportion of fluxing agents such as sodium and potassium which lower the melting point when mixed with silica (Robinson & Straker 1991). The results can vary from delicate crisp frameworks of the original plant silica through to lumps of glassy clinker-like material, sometimes vesicular (Fig. 4) due to gas bubbles developing in a liquid melt (Folk & Hoops 1982; Canti 2007).

Once ash has been fully mineralized, the resulting chemical mix has considerable value to people without access to modern chemicals. Careful species selection can make for worthwhile differences in the salts obtainable from ash – a fact still exploited by non-Western peoples today (see Lemonnier 1984). The chemical makeup is variable but is frequently of such a composition that it can be used to glaze ceramics, usually with small additions of clays or other oxides (Rogers 1991). A long tradition of



Ash: Geoarchaeology, Fig. 3 Silica remains of burnt *Equisetum* sp. (plane polarized light)



Ash: Geoarchaeology, Fig. 4 Vesicular ash melt from excavations in Woolmonger St., Northampton, UK (plane polarized light)

ash glazing built up in Asia over the last 1,000 years, producing some of the most exquisite ceramics (see Leach 1940). The melting characteristics of ash also made it one of the first major ingredients used in glass manufacturing (Turner 1956).

The predominant geographical location of ash research has been cave studies in calcareous Mediterranean rocks. In conjunction with the use of polarized light microscopy as a major analytical method, this has led to a particular emphasis being placed upon distinguishing geological

and pyrogenic calcium carbonate. The stratigraphy in these locations commonly contains both forms of calcium carbonate, and they are often difficult to tell apart under the microscope. Although the modified calcium oxalate crystals are easy to recognize intact, they can disintegrate or become compressed and sometimes recrystallized in such a way as to obscure the differences in origin.

Two approaches have been employed to try and achieve the desired distinction. Firstly, comparison of the different calcite peaks produced by infrared analysis can distinguish the main forms of calcite in sediments where recrystallization has not occurred (Regev et al. 2010). Secondly, examination of C and O isotopes distinguishes the sources because of the differences in the original isotopic composition of the plant matter, air, and limestone which form the inputs.

As well as successfully separating the ash from the rock, the isotopic approach has raised further questions by showing that the ash itself has different isotopic compositions (Shahack-Gross et al. 2008). These differences arise primarily from the fact that there are two distinct pathways to the formation of calcium carbonate from calcium oxalate. The first is a low-temperature (400–500 °C) transformation in which $CaCO_3$ forms directly by loss of CO, i.e., simply re-deploying the carbon already in the crystal (Dollimore 1987; Frost & Weier 2003, 2004). The carbon in the plant oxalate will be isotopically consistent with the fuel plant's photosynthetic pathway and will thus tend to fall into one of the well-known C3- or C4-type plant carbon groupings.

The second is the high-temperature transformation which goes through modification stages similar to traditional lime burning for mortar and plaster. At around 600–700 °C, carbon dioxide (CO_2) is given off leaving quicklime (CaO) which then hydrates to form calcium hydroxide $Ca(OH)_2$. Over time, this hydroxide absorbs atmospheric CO_2 to reform calcium carbonate ($CaCO_3$) again. A combination of these two pathways inevitably occurs in real fires, and the isotopic compositions of archaeological ash can thus be shown to reflect mixing lines involving the original plant matter, as well as atmospheric and geological inputs (Shahack-Gross & Ayalon 2012).

Folk (1973) pointed out the potential value of calcitic ash for radiocarbon dating based on the chemistry of this high-temperature transformation in which the carbonate from atmospheric sources would have a radiocarbon date the same as the atmosphere at the time of the fire. However, he did not allow for the low-temperature form of transformation in which calcium oxalate changes to calcium carbonate without atmospheric inputs. This type of transformation would lead to a radiocarbon date similar to the carbon in the original oxalate crystals, and thus be analogous to the "old wood effect" where charcoal used for dating a layer is found to be older than the formation of that layer.

In an effort to clarify the potential of plant ash for radiocarbon dating, Regev et al. (2011) burnt different plant materials of known radiocarbon characteristics at different temperatures and compared the results from the ash with the results from the original material. They found that, when burnt at low temperature (500 °C), the ash largely retained the original calcium oxalate radiocarbon concentration but with a slight shift towards atmospheric concentrations. As would be expected, all the material burnt at high temperature (900 °C) showed complete CO_2 exchange with the atmosphere. The mechanism for the low-temperature shift remains unknown.

International Perspectives

The high percentage of calcium carbonate that characterizes most ash means that its archaeological occurrence at outdoor sites is inevitably negatively correlated with rainfall and, apart from the wet tropics, tends towards a similar relationship with latitude as well. In more northerly climates, the calcareous component of ash is commonly leached away, and only the charcoal is left behind, attesting to its former presence. Sites on calcareous geology will retain ash where it gets sufficiently buried to be protected against leaching. These cases are sometimes deep pit fill deposits associated with domestic waste disposal or industrial installations

such as the corn drying ovens at Grateley, Hants, UK (Cunliffe & Poole 2008). Rare occurrences are sometimes found elsewhere, if enough alkaline material is present. At Flixborough, Humberside, UK, blown siliceous sand with only a minor calcareous component was deep enough to preserve ash in significant quantities, influencing the taphonomy at the site and retaining Anglo-Saxon bone layers in very good condition (Canti 2007).

Further south, ash deposits are more commonly found, and the analytical value can be high in situations where the burning of plant matter is accompanied by other lines of evidence. In particular, information from the more detailed botanical attribution of plant silica remains, and the concentrations of fecal spherulites (calcium carbonate remains from dung) can together stimulate deductions about industrial or agricultural activity. The Numidian layers at Althiburos in northern Tunisia, for example, were composed of ashy sediments that provided excavators with insights into the detail of animal keeping and domestic life (Portillo & Albert 2011). Concentrations of inflorescence or whole plant phytoliths, in association with fecal spherulites, provided information on feeding style and seasonality, while spherulites in oven ash showed the use of dung as fuel. At Atar Haroa, an Iron Age site in the Negev Highlands of Israel, Shahack-Gross and Finkelstein (2008) were similarly able to distinguish indoor ash deposits derived through dung and wood burning from external dung-only deposits by utilizing phytoliths and spherulite analysis.

Dung burning appears to be the central reason for the huge ash spreads that occur in parts of central Africa and southern India. These are mounds many meters high in some cases or covering hundreds of square meters in others. They contain elements of ordinary soil, ash, and fused ash – the latter being the reason for much analytical discussion (Zeuner 1959; Allchin 1963; Thy et al. 1995). Cattle dung was piled up at various times in history and prehistory and then deliberately or accidentally burned producing enough heat to cause fusion (see above).

Future Directions

If the shift towards atmospheric carbon shown by Regev et al. (2011) could be understood, it might open the way to using ash for radiocarbon dating. In practical application, there would still be the problem of diagenetic alteration, as ash in the presence of water can undergo calcium carbonate precipitation at any time between deposition and excavation, and that would be likely to introduce carbon from other sources. However, it could be possible to overcome this through careful sample selection, perhaps using microscopy or isotopic separation.

The greater detail recently made possible in the isotopic distinctions of ash types and their formation pathways clearly gives a new direction in the study of this remarkable material. As ever with archaeological science, the challenge remains in taking the laboratory understanding out to the field and using it to produce real interpretations among the indistinct or mixed contexts of real-life archaeological sites.

Cross-References

- ▶ Anthropogenic Sediments and Soils: Geoarchaeology
- ▶ Charcoal: Preservation and Conservation
- ▶ Environmental Archaeological Evidence: Preservation
- ▶ Site Formation Processes
- ▶ Taphonomy in Human Evolution

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Ashby, Thomas

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Basic Biographical Information

Thomas Ashby (1874–1931) was an archaeologist who specialized in the study of the topography of ancient Rome and its hinterland, the campagna romana. Born on October 14, 1874, he was the only child of Thomas and Rose Ashby, Quakers who owned a brewery in Staines, Middlesex. After Winchester College, Ashby won a scholarship to Christ Church, Oxford, studying ancient history, classics, and archaeology with Francis John Haverfield and J.L. Myres. He pursued a doctorate on Roman antiquities, exploring the hinterland of Rome in the company of the British and American Archaeological Society of Rome which included his father as well as the distinguished Italian archaeologist, Rodolfo Lanciani (1845–1929). He died while on a visit to London on May 15, 1931.

Major Accomplishments

In 1902, he became the first student of the British School at Rome, continuing this institutional association when he became the school's assistant director (1903–1906) and then its third and most distinguished director from 1906 to 1925. During his directorship, with Eugénie Strong as his assistant director from 1909 to 1925, he established the school as an academic force in Italy, overseeing the move to the present location in the Valle Giulia and winning critical operational support from the British government's newly founded British Academy in 1919. In 1924, the school's executive committee decided not to renew either Ashby or Strong after 1925 to the dismay of the academic community in Rome. Thereafter, Ashby, who had married May Price-Williams in 1922, moved to a small apartment in Rome, where he lived until his death in 1931.

Ashby was primarily a topographer of Rome and its hinterland during the Roman period. As an avid photographer and walker, he followed the Roman roads and aqueducts out of the ancient metropolis, mapping them as he did. He was also a serious bibliophile, assembling a significant library of post-Renaissance books about Rome and its hinterland. The most important of a prodigious number of publications included many essays and reports on the monuments in the campagna romana, which later formed the nucleus of his popular book, *The Roman Campagna in Classical Times* (Ashby 1927), and his encyclopedic, posthumous masterpiece, *The Aqueducts of Ancient Rome* (Ashby 1935). He also published important studies of metropolitan Rome such as a revision of Samuel B. Platner's *A Topographical Dictionary of Rome* (Platner & Ashby 1929) and *Turner's Visions of Rome* (Ashby 1925).

Ashby's interests were not confined to antiquity. This energetic scholar also studied Sardinian nuraghi and the prehistoric megalithic tombs of Malta and Gozo and wrote an ethnographic study on Italian life and folklore: *Some Italian Scenes and Festivals* (Ashby 1929). His collection of photographs, besides his archive of notes, remains an important source for the study of Italy before mechanized agriculture and of Rome as it was being made into a capital city. Deeply respected by his Italian contemporaries, this shy and serious scholar established a benchmark for topographic fieldwork in Italy that was not surpassed until the 1960s.

Cross-References

▶ Infrastructure in the Roman World: Roads and Aqueducts
▶ Topography of Rome

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Ashmore, Wendy

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Ashmore, Wendy, Fig. 1 Wendy Ashmore (Photo by Amy Goldenberg)

Basic Biographical Information

Archaeologist, anthropologist, and mentor, Wendy Ashmore was born on June 26, 1948 in Los Angeles, California. In the 1950s, at the height of McCarthyism, her family moved to Mexico City for a year. The experience fueled her interest in Mesoamerican studies. Educated at the University of California, Los Angeles (B.A. in Anthropology, 1969), and University of Pennsylvania (Ph.D. in Anthropology, 1981), she taught at Rutgers (1981–1992) and the University of Pennsylvania (1992–2000) before joining the faculty at the University of California, Riverside. She has carried out archaeological investigations of ancient Maya and neighboring Mesoamerican peoples in Guatemala (Quiriguá), Honduras (Gualjoquito, Copan), and Belize (Xunantunich). Notable in its appreciation for the significance of empirical data and their relationship with theory and practice, Ashmore's research led successively over the years to new ways of thinking about settlement patterns, the significance of households, civic planning, and their linkages with landscapes, cosmology, and gender. Paramount across all of these is the social use and understanding of space. By exposing the social contours of archaeological spaces, Ashmore's work led the way for nuanced studies of the diverse peoples that make up any past society (Fig. 1).

Major Accomplishments

Ashmore's initial research at Quiriguá (1975–1979) and Gualjoquito (1983–1986), the later codirected with Edward Schortman and Patricia Urban, were among the first studies of prehistoric settlements and households. Examining a 96 km^2 area adjoining and in the periphery of the Maya center of Quiriguá, Ashmore (1979, 2007) identified the varied lives of Quiriguá residents and how these resonated with broader social and political dynamics.

Ashmore's pioneering research in settlement and household archaeology in the 1970s and 1980s helped elevate these studies to their now central position in archaeology. In two seminal volumes, *Lowland Maya Settlement Patterns* (1981) and *Household and Community in the Mesoamerican Past* (1988, coedited with Richard Wilk), she and her colleagues synthesized past

research, defined relevant social constructs and their archaeological correlates, and suggested fruitful avenues for future scholarship. These volumes remain defining statements; they set the stage for the post-1980s explosion of settlement and household studies in Mesoamerica and beyond that allowed archaeologists to expose the lives of the full range of people in ancient societies.

Archaeological theory in the 1990s was framed by a strong dichotomy. In broad brushstrokes, American processual archaeology, espousing a scientific epistemology grounded in cultural materialism, neoevolutionism, and cultural ecology, was contrasted with European postprocessual archaeology, which favored historical explanations, employing hermeneutic and critical epistemologies to understand symbolic and ideological aspects of past societies. Ashmore's research played an important role in bridging these two poles. By critically thinking through the concept of social process – a concept with roots in processual archaeology – Ashmore was able to show how the archaeological record was simultaneously material and conceptual and part of an ongoing construction of its inhabitants in a manner that was convincing to processualists and postprocessualists.

Ashmore's Copan North Group Project (1988–1989) was pivotal in crystallizing such an approach. Through detailed excavation and analysis of architecture, iconography, artifacts, and burials at Copan's North Group, she demonstrated that the Classic Maya expressed ideational beliefs through material and spatial forms that were accessible to archaeologists. In her groundbreaking article "Site Planning Principles and Concepts of Directionality among the Ancient Maya" (1991) and in many subsequent articles and book chapters in English and Spanish, Ashmore's work in spatial archaeology has shown that how people organize and conceptualize space, shapes and is shaped by society and social action (e.g., Ashmore 1998; Ashmore & Sabloff 2002).

This larger project led to another field defining work: *Archaeologies of Landscape* (1999, coedited with Bernard Knapp), a volume in which themes that Ashmore previously developed within Mesoamerican archaeology were applied to studies from around the world. Later, Ashmore (2006) brought landscape archaeology into productive concert with gender studies by illustrating how gender and landscapes can be co-constituting.

Bringing together previous interests, as the Archaeology Division of the American Anthropological Association's Distinguished Lecturer in 2000, she developed an approach to socializing the spaces of the archaeological record demonstrating how spaces, places, and landscapes are cultural domains that are lived and experienced differently by people across their lives. This lecture "'Decisions and Dispositions': Socializing Spatial Archaeology" later published in *American Anthropologist* (2002) illustrated that by socializing spatial analysis, archaeologists could reveal people's materialized "decisions and dispositions" throughout the life histories of the places they study.

Her long-standing interest in invigorating, rather than silencing, the varied voices in archaeological thought came together in an edited volume *Voices in American Archaeology* (2010, coedited with Dorothy Lippert and Barbara Mills). This volume brought into dialogue diverse voices of the discipline to consider the political and professional implications of archaeology and its future.

For Ashmore, research and scholarship always entailed pedagogy and mentorship. Prominently seen in the Xunantunich Archaeological Project (1991–1997), codirected with Richard Leventhal, she developed research as a vehicle for her students. Through regional settlement, household, and community survey and excavation in the environs of the polity capital of Xunantunich, Ashmore and her students explored the social, political, and ideational underpinnings of life in the region as Xunantunich rose and fell (e.g., Ashmore 2010).

Respected as a teacher and colleague, Ashmore has received numerous teaching and service awards. Her role as a mentor extends beyond her students and colleagues to

a broader arena through two textbooks – *Discovering our Past* and *Archaeology* – used in classrooms national and internationally (Sharer & Ashmore 2003; Ashmore & Sharer 2010). The former has been translated into Chinese and Polish.

Since the 1970s, Ashmore has employed theoretically sophisticated methodologies and problem formulations to provide increasingly textured interpretations and understandings of the evidence, the society, and even the methodology itself. Throughout her career, she has defined significant new fields of archaeology from settlement and household to landscape studies and reformulated fieldwork to expose the peripheries of sites and explore ideational domains. These contributions have been accompanied by increasingly nuanced interpretations and understandings of the diverse and changing social structures of Mesoamerican societies. Her work influenced even her critics due to its considerable attention to empirical evidence.

Cross-References

- ▶ Gender, Feminist, and Queer Archaeologies: USA Perspective
- ▶ Landscape Archaeology
- ▶ Maya Geography and Culture: Ancient and Contemporary
- ▶ Mesoamerica: Complex Society Development

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Asian Paleolithic Association (APA)

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Basic Information

The Asian Paleolithic Association (APA) is an international organization which aims at

promoting and enhancing the academic communication of Paleolithic Archaeological and Paleoanthropological research in Asia. In 2007, an agreement was made by the representatives from Russia, China, Japan, and Korea, which addressed the establishment of an association on Paleolithic research in Asia and the adjacent area. The title *Asian Paleolithic Association* was for the first time proposed in this agreement. In June of 2008, during the *International Symposium Commemorating the Centennial Anniversary of Academician A.P. Okladnikov – The Current Issues of Paleolithic Studies in Asia and Contiguous Regions*, held in Novosibirsk of Russia, scholars from Russia, China, Japan, Korea, North America, and European countries reached an agreement of officially setting up this organization. This meeting was thus proposed as the inaugural conference and the first annual meeting of APA.

Each member country of the APA, referring to Russia, China, Japan, and Korea, keeps an independent, equal, and reciprocal relationship. The annual meeting is held in these four countries, in turn, each year or 2 years. There is no independent secretariat system; however, each country will serve two representatives who would be in charge of the task force for the preparation process for the annual meeting.

In October 19–23, 2009, the second annual meeting *International Symposium on Paleoanthropology in Commemoration of the 80th Anniversary of the Discovery of the First Skull of Peking Man* was held in Beijing, China. In October 10–15, 2010, the third annual meeting was held in Gongju, Korea. In November 25–30, 2011, the fourth annual meeting *Symposium on the Emergence and Diversity of Modern Human Behavior in Palaeolithic Asia* was held in Tokyo, Japan. And in 2012, the fifth annual meeting was held in Russia.

Major Impact

This organization is young but flourishing. Since its naissance, the research and the academic communication of Paleolithic archaeology in Asia has been strongly activated. During the past four annual meetings, representatives have presented various topics including the origin of early *Homo*, the origin of modern humans, the migration of early *Homo* and early modern humans, and the varieties and communication of different Paleolithic complexes, lithic analyses, taphonomy and zooarchaeology in prehistoric contexts, paleoanthropology, paleoenvironmental archaeology, and so forth. More technologies and scientific methods have been applied in these fields and brought more clues and evidence for archaeology in Asia. APA would behave as the driving and cohesive force and continue to promote and enhance these research fields in the future.

Cross-References

- ▶ East Asia: Paleolithic
- ▶ Human Evolution: Theory and Progress
- ▶ Lithic Technology, Paleolithic
- ▶ South Asia: Paleolithic

Askarov, Akhmadali A.

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Basic Biographical Information

Askarov Akhmadali Askarovich (born in 1935) (Fig. 1) is an academic with the Academy of Science of Uzbekistan, a doctor of historical sciences, and professor in ancient history of Central Asia. He is an organizer of archaeological science in Uzbekistan.

Askarov, Akhmadali A., Fig. 1 A.A. Askarov

After graduating from the historical faculty at the State Pedagogical Institute in Tashkent in 1957, A.A. Askarov worked as a teacher in the middle school. From 1958 to 1961 he studied at the postgraduate school in Leningrad's Department of the Institute of Archaeology, under the scientific supervisor of Professor M.P. Gryaznov. In 1963 he defended a thesis on the theme "Lower Reaches of Zeravshan River in Bronze Age." In 1977 he was awarded the degree of doctor of historical sciences for the thesis "Bronze Age of Southern Uzbekistan: to the Problem of Development of Local Centres of Ancient-Eastern Civilizations."

A.A. Askarov has been a scientific fellow since 1961. Since 1966 he has been deputy of director of Institute of History and Archaeology of Uzbekistan USSR and since 1970 director of the Institute of Archaeology of Uzbekistan.

Major Accomplishments

The scientific interests of A.A. Askarov have focused on prehistorical archaeology – the histories of ancient tribes of Bronze and Early Iron times. Askarov has participated actively in works of significant large expeditions (Baikal, Krasnoyarsk, Makhandarian, Sud-Turkmenistan), led by such famous Russian scientists as M.P. Gryaznov, Y.G. Gulyamov, and V.M. Masson. A.A. Askarov has led the Surkhandarya Complex Expedition since 1970.

A.A. Askarov has made an enormous contribution to research into the history and spiritual culture of the ancient steppe tribes of Southern Asia. He has elaborated an archaeological periodization for development of the steppe tribes's cultures of Bronze and Early Iron times for Lower Reaches of Zeravshan River. In addition, he has reconstructed the whole history of tribes and settlements for this region in the second millennium BCE.

A.A. Askarov has been conducting significant researches in Uzbekistan for about 40 years. His achievements are well recognized in the study of proto-urban civilization, the genesis of urbanization, the transformation of primitive-communal cultures, and the formation of an early-class society through the archaeological materials. He has prepared and published more than 300 works, including 12 monographs and two tutorial books. A number of these works were published abroad. One of the monographs is dedicated to the ancient agricultural civilization of Southern Uzbekistan "Kuchuk-Tepe" and was presented to the world by the publishing house of Institute of Archaeology in Berlin. Askarov is one of the authors of the six-volume *History of Civilization of Central Asia*, produced by UNESCO. Under his editing, 13 volumes of the series *History of Material Culture of Uzbekistan*, ten monographs, and numerous of booklets in Uzbek language were published.

For many years, A.A. Askarov conducted stationary excavations and planigraphical investigations of monuments of antiquity in Uzbekistan. Thanks to his field studies and discoveries, the existence of an earlier unknown South Uzbekistan center of Ancient Bactrian Civilization was proved. The Ancient Bactrian Centre was uncovered and comprehensively characterized by Askarov. Based on his scrutiny of the Sapalli Culture sites (Sapallitepa and Djarkutan sites), he defined a historical place of these objects in the cultural system of Ancient East and in wide context of intercultural relations of neighboring cultures and civilizations.

Askarov's unique discoveries have important historical meaning, including him finding of silk, bast, and cotton tissues in burials of Sepallitepa. This contributed to proving that the production of natural cotton and silk in Uzbekistan was started in the Bronze Age. He was one of the first who raised the question that the territory of Uzbekistan may have been one of the homelands of silk weaving and cotton weaving.

Askarov's discovery of the cult center – the Temple of Fire in Djarkutan – provided important evidence on the genesis of a Zoroastrian ideology during the late Bronze Age. Research into this unique complex provided an opportunity to track sources of Zoroastrian doctrine and to obtain new dates (second half of second millennium BCE) for the appearance of the cult of fire in the history of Zoroastrianism.

The history of irrigated agriculture in Uzbekistan has become more ancient by a thousand years due to the rich archaeological material uncovered in long-term field investigations by A.A. Askarov. The great merit of Askarov's investigations lies with his research into the culture of late molding painted pottery. His study demonstrated that the carriers of this tradition were local tribes of the end of the second and beginning of the first millennium BCE. These tribes were transitioning to agriculture under the influence of more developed ancient urbanistic and agricultural communities of the south.

The numerous archaeological discoveries were done thanks to Askarov; his publications have been recognized with world scientific community as significant contributions in study of early history of Central Asian Civilizations. The results of these researches are widely used not only as theoretical works but have entered into the scientific and pedagogical programs of universities.

Cross-References

- ▶ Burial Archaeology and the Soviet Era
- ▶ Ceramics as Dating Tool in Historical Archaeology
- ▶ Fortifications, Archaeology of
- ▶ Gryaznov, Mikhail P.
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Asses/Donkeys: Domestication

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Basic Species Information

Ancient African wild asses (*Equus africanus* Fitzinger, 1857) are the wild ancestors of

donkeys (Beja-Pereira et al. 2004; Kimura et al. 2011). There are two living subspecies of African wild asses, Somali wild asses (*Equus africanus somaliensis* Noack, 1884; Synonym: *E. a. somalicus* Sclater, 1884) and Nubian wild asses (*Equus africanus africanus* von Heuglin and Fitzinger, 1866). Somali wild asses or Dibokali are critically endangered (Moehlman et al. 2008). Nubian wild asses of Sudan and the Eritrean Red Sea Hills may now be extinct (Kimura et al. 2011; Moehlman et al. 2008). Atlas wild asses (taxonomy unclear so-called *Equus africanus atlanticus*) were distributed in northwestern Africa until Roman times.

Somali wild asses have shiny grayish coats; white muzzles, belly, and legs; and dark stripes on their lower legs. They do not have dark shoulder-crosses (Moehlman et al. 2008). In contrast, Nubian wild asses have variable shoulder-crosses and no leg-stripes. African rock art and Roman mosaics suggest that Atlas wild asses had both leg-stripes and shoulder-crosses (Marshall 2007). African wild asses are desert adapted, and in keeping with this, domestic donkeys have labile metabolic rates and water sparing mechanisms. Domestic donkeys are predominantly gray with a bold shoulder-cross and no leg-stripes. Although considerable regional variability exists, donkey coat colors are not greatly varied and breed diversity is minimal.

Genetic research has shown that there are two mitochondrial haplogroups of domestic donkeys worldwide, referred to as Clade I and Clade II, and that variability is greatest in northeastern Africa (Beja-Pereira et al. 2004). On the basis of these data, the distribution of ancient cattle herders across northeast Africa and linguistic evidence from northeast Africa, scholars have argued that Saharan pastoralists domesticated donkeys – perhaps more than once (Blench 2000; Beja-Pereira et al. 2004; Marshall 2007). Similarities in mitochondrial haplotypes demonstrate that the ancient Nubian wild ass is the ancestor of Clade I donkeys. Indeed, some of the haplotypes of historic Nubian wild asses sampled from the Sahara and Sudan are identical to those of modern donkeys of Clade I, suggesting that they may be related to the ancestral populations from which the wild ass was domesticated (Kimura et al. 2011). It is yet unclear, however, which historical population of African wild ass was the maternal ancestor of Clade II donkeys. Analysis of 440 bases of the mitochondrial control region showed that Somali wild asses are separated from Clade II donkeys by at least 12 mutations, and to date, ancient DNA has not been recovered from Atlas wild asses (Kimura et al. 2011). Coalescence analysis suggests, however, that the divergence among ancient Nubian wild asses, Somali wild asses, and the ancestor of Clade II donkeys goes back ~100,000 years and that maternal domestication processes were operating on at least two ancient populations or subspecies.

Domestic donkeys occur in archaeological sites as early as >5,000 years ago in Southwestern Asia, and as a result, this has also been suggested as a region of domestication (Vila 2006). To date, however, there is no clear evidence that the African wild ass existed in southwestern Asia prior to the Holocene (Marshall 2007; Kimura et al. 2011). Nevertheless, Asia was an important center for ceremonial and trade-based use of donkeys (Vila 2006). Genetic data demonstrate that the wild ass of the region, the onager (*Equus hemionus*), was not an ancestor of the donkey (Beja-Pereira et al. 2004). Ancient texts and osteological analyses indicate, however, that Sumerians bred their donkeys with wild onagers and that these hybrids were used to pull chariots (Vila 2006; Weber 2008). Subsequently, female horses were bred with male donkeys to produce another hybrid – the mule. Mules are stronger than donkeys and still used today, but they are not fertile and do not produce offspring.

Domestication of the donkey was slow and complex. This process was influenced by the behavior of African wild asses and by use of donkeys for transport rather than for meat (Marshall & Weissbrod 2011). African wild asses do not fit traditional profiles for

domestication; they have a fission-fusion social system with long-term bonds only between females and their foals (Moehlman et al. 2008; Marshall & Weissbrod 2011). Dibokali breed well in captivity but, in keeping with their social organization, display fewer affiliative behaviors than more social equids such as horses. As a result of behavior and management patterns, donkeys in Africa and Asia are seldom intentionally bred (Marshall & Weissbrod 2011) and have many characteristics of their wild ancestors. Nevertheless, donkeys are more social than wild asses and breed younger. Like other domestic animals, donkeys are also smaller and have proportionally smaller brains than their wild ancestors. Donkeys did not decline in size, however, until late in the domestication process (Rossel et al. 2008).

Archaeology suggests that donkeys were domesticated by 6,000–5,000 years ago. Egyptian sites of Maadi and El Omari date to ~4500 BCE and Abydos to 3000 BCE. Domestic donkeys were present in southwest Asia by >3000 BCE (Vila 2006). At Abydos, animals buried in a royal mortuary complex were skeletally indistinguishable from African wild ass, but vertebral and limb pathologies demonstrated that they were used for transport (Rossel et al. 2008). Research on modern pastoralist donkey management has helped to explain selection during donkey domestication by showing that herders value donkeys with the size, strength, and hardiness of their wild ancestor (Marshall & Weissbrod 2011). There is little impetus for controlled breeding and reasons to counteract the effects of selection in anthropogenic environments and genetic drift by breeding domestic donkeys with wild asses. As transport animals, early donkeys played a major role in the creation of ancient trade routes in northeast Africa and Asia, were ritually and politically significant, and played an important role in the development of mobile African herding societies. Donkeys are widely relied on today for household transport and trade in arid and poorer regions of the world (Rossel et al. 2008).

Cross-References

- ▶ African Stone Age
- ▶ Animal Domestication and Pastoralism: Socio-Environmental Contexts
- ▶ Animal Paleopathology
- ▶ Domestication: Definition and Overview
- ▶ East and Southern African Neolithic: Geography and Overview
- ▶ Genetics of Animal Domestication: Recent Advances
- ▶ Horses: Domestication
- ▶ Zooarchaeology

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Association for Environmental Archaeology (AEA)

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Basic Information

The Association for Environmental Archaeology (AEA) (www.envarch.net) (Fig. 1) is an international organization that promotes the study of human interactions with environments through archaeology and related disciplines. The AEA was originally established in 1979 to encourage communication between workers in environmental archaeology in the UK but has since become more international in its outlook – around one-quarter of its approximately 400 members currently live outside the UK, mostly in Europe, but also in the USA, Canada, Asia, and Australia. Members' interests are wide ranging, including archaeobotany, zooarchaeology (both vertebrate and invertebrate), geoarchaeology, paleoecology, and biological anthropology, as well as related fields, such as ancient economies. Membership is open to all, including university, museum, government, and commercially based workers, as well as research students and nonprofessionals with an interest in environmental archaeology. In addition to individual membership, institutional membership is also available. Honorary members are appointed on occasion to recognize persons who have made a major contribution towards the aims of the Association.

Association for Environmental Archaeology (AEA), Fig. 1 Logo of the Association for Environmental Archaeology

Major Impact

The AEA is the one of the largest organizations of environmental archaeologists in the world. A major output is its international peer-reviewed journal, *Environmental Archaeology: The Journal of Human Palaeoecology*, which is currently published triannually and sent to all members (www.maney.co.uk/index.php/journals/env). The journal contains papers on a variety of aspects of environmental archaeology, including methodology, synthesis, and theory. The journal publishes substantial research papers as well as shorter reports that focus upon new techniques, philosophical discussions, current controversies, and suggestions for promising directions of research. Critical reviews of recent academic publications are also published in a book reviews section. Maney Publishing took over publication of the journal in 2006; prior to this, the journal was published by Oxbow Books. The current AEA journal, *Environmental Archaeology*, was launched in 1997. The previous journal of the AEA was *Circaea*, of which 12 volumes were published between 1983 and 1996. All volumes of *Environmental Archaeology* and *Circaea* are currently available online to AEA members.

Two AEA meetings are held annually, which are open to all: a 1-day meeting and a major conference. These meetings are designed to keep members up to date with recent advances and new approaches in environmental archaeology. Meeting locations in recent years include Britain, the Netherlands, Denmark,

Poland, Ireland, Germany, and Japan. The 1-day meeting often includes short papers on work in progress and provides an opportunity for research students to present data. Papers presented at the annual conference are often more substantial and focused on a particular theme. In the past, conference proceedings have been published in monograph form, including volumes on the environmental archaeology of industry (Murphy & Wiltshire 2002), human settlement and marginality (Coles & Mills 1998), taphonomy (Huntley & Stallibrass 2000), and economies and environments in the North Atlantic region (Housley & Coles 2004). Collections of papers from conferences have also appeared as special issues of the journal, for example, *Worlds Apart? Human Settlement and Biota of Islands* (*Environmental Archaeology* 9(2)). In recent years, the AEA established a seminar series, which sponsors and publicizes individual seminars at different institutions throughout the UK on any aspect of environmental archaeology. The AEA also administers the "John Evans prize", an annual competition for the best undergraduate and postgraduate dissertations on any aspect of environmental archaeology, which is open to students across the world.

The AEA newsletter is published quarterly each year, and together with the website, they keep members informed about relevant meetings and conferences, recent publications in environmental archaeology, job opportunities, and external websites and organizations. An AEA Discussion List entitled ENV-ARCH has been established via JISCmail to encourage members from a variety of backgrounds to pose questions and discuss their work in a wider forum. The AEA has also published working papers on the teaching of environmental archaeology in UK higher education and on environmental archaeology and archaeological evaluations in England, which are available from the AEA website.

The affairs of the AEA are governed by its constitution and handled by a Management Committee, which consists of an elected chair, secretary, and treasurer, 12 ordinary elected members, and two student representative elected members. The Managing Committee may also co-opt members to serve as membership secretary, representative of the journal editorship, representative of the newsletter editor, and manager of the JISCmail list.

Cross-References

- ▶ Agrarian Landscapes: Environmental Archaeological Studies
- ▶ Agroforestry: Environmental Archaeological Approaches
- ▶ Archaeobotany
- ▶ Archaeology and the Emergence of Fields: Environmental
- ▶ Environmental Archaeology and Conservation
- ▶ Geometric Morphometrics and Environmental Archaeology
- ▶ Historical Ecology and Environmental Archaeology
- ▶ Hominin Paleoecology and Environmental Archaeology
- ▶ People as Agents of Environmental Change
- ▶ Standardization, Storage, and Dissemination of Environmental Archaeological Data
- ▶ Strategic Environmental Archaeology Database (SEAD)
- ▶ Zooarchaeology

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Association for Industrial Archaeology (AIA)

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Basic Information

The Association for Industrial Archaeology (AIA) grew out of a number of conferences organized at the University of Bath in the UK in the early 1970s. Since its first formal meeting in 1973, AIA has since grown to become the foremost national organization for people who share an interest in the UK's industrial archaeology and industrial heritage. From the beginning, it has been an organization in which the amateur and the professional meet. Although the discipline of industrial archaeology was first championed by the Council for British Archaeology (CBA) and supported by many professional archaeologists, the early recording work on industrial sites was carried out by volunteers and they still form the main body of the association. Much of the recording was carried out by groups of people in the individual counties, and the AIA, early in its existence, decided to introduce a category of membership for affiliated societies, and so the AIA represents a far larger number of people than its individual membership, amounting to several thousand. The AIA holds an annual meeting for members of its affiliated societies as well as inviting them to its annual conference.

The AIA recognizes high standards of survey, interpretation, and publication by a number of awards to both professional and amateurs each year, as well as making grants for the restoration of industrial sites by volunteers. An international refereed journal, *Industrial Archaeology Review,* has been produced twice a year since 1977. Members receive an illustrated newsletter four times a year as well as a gazetteer of industrial sites in whichever region the annual conference is held: now numbering over 30, these provide a useful list of sites of industrial interest in the UK. Further details concerning these and other activities can be found on the association's website: http://industrial-archaeology.org/. The AIA's liaison office is based at the Ironbridge Institute, Ironbridge Gorge Museum, Coalbrookdale, UK. The association has a governing council elected on an annual basis. At the time of writing, the association's chairman is Mark Sissons, the secretary is David de Haan, and treasurer is John Jones. The current honorary president is Professor Marilyn Palmer, and former incumbents include Tom Rolt, Professor Angus Buchanan, and Sir Neil Cossons, several of whom now serve as honorary vice-presidents.

Major Impact

The AIA has always tried to champion the cause of industrial archaeology and the industrial heritage at the national level and has worked closely both with the CBA and with national organizations such as English Heritage, Historic Scotland, and Cadw. In 1991, the AIA launched a pamphlet, *Industrial Archaeology: Working for the Future*, which was essentially an examination of the scope of industrial archaeology and a set of research priorities, with recommendations for urgent action. These found their way unto various strategy documents produced by English Heritage. This was supplemented in 1993 by a research project, the Index Record of Industrial Sites, aimed at the creation of a national database of industrial sites, which *inter alia* produced a set of terms for the components of such sites. These were incorporated into the national Thesaurus of Monument Types as well as being used locally to record industrial sites into county sites and monument records. Further efforts were made to influence national strategies in industrial archaeology in several ways, especially by a conference resulting in the publication of a research strategy in 2005, *Understanding the Workplace: a Research Framework for Industrial Archaeology in Britain.* The AIA has also, for many years, run a seminar for professional

archaeologists on current research and thinking in industrial archaeology prior to its annual conference. Specific topics for this seminar have included the defense heritage, urban regeneration and the adaptive reuse of industrial buildings, and the recording and excavation of twentieth-century sites. Between 2008 and 2011, the AIA, in conjunction with the CBA, ran 11 training schools in each of the English Heritage regions in an effort to train those who had responsibility for local planning to understand the significant features of industrial sites and structures so that these could be retained in the process of adaptive re-use. This resulted in a further publication, *Industrial Archaeology: A Handbook* (Palmer et al. 2012).

Cross-References

- ▶ Contemporary Past, Archaeology of the
- ▶ Historical Metallurgy Society Ltd.
- ▶ Industrial Archaeology
- ▶ Industrial Heritage Association of Ireland (IHAI)
- ▶ Ironbridge Gorge Museum Trust (IGMT)
- ▶ Ironbridge Institute
- ▶ Museo Nacional de los Ferrocarriles Mexicanos
- ▶ Palmer, Marilyn
- ▶ Society for Industrial Archeology (SIA)

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Association Internationale pour l'Histoire du Verre (AIHV)

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Basic Information

The Association Internationale pour l'Histoire du Verre (AIHV) was founded by Joseph Philippe in 1956 as the Journées Internationales d'Histoire du Verre. He was then the Director of the Musée Curtius in Liège, Belgium, and he organized the first congress of the AIHV, which was held in that city in 1958. Seventeen congresses have been held, at about 3-year intervals, since that time, in Leyden, Damascus, Ravenna–Venice, Prague, Cologne, Berlin–Leipzig, London–Liverpool, Nancy, Madrid–Segovia, Basel, Vienna, Amsterdam, Venice–Milan, New York City–Corning, London, Antwerp, and Thessaloniki. The 19th congress took place September 17–21 in Piran, Slovenia, followed by a post-congress tour September 22–23 to Croatia.

Major Impact

In addition to hearing about new research in glass, congress participants can view special exhibitions and visit museums, galleries, and private collections. The congresses also provide AIHV members an opportunity to meet their colleagues from other countries. Those members include several hundred archaeologists, art historians, artists, collectors, museum curators, *graduate students, scientists, and researchers from more than 30 countries*. Papers presented at AIHV congresses are published in the organization's *Annales*. From 1958 to 1983, the association also published bulletins that included information about glass collections in various countries, usually where the congresses were located.

The AIHV was reorganized in 1983, when it adopted its current name. It is now governed by

statutes under Dutch law as it was headquartered in the Netherlands at that time. The president and the board of directors are elected for 3-year terms. The general secretary is appointed by the board and serves as long as he or she is willing. The official languages are English, German, and French, and papers may be presented in any of these languages at the congresses. For other communications to members, only French and English are employed.

Membership in the AIHV is open to all. Students are admitted free of charge. For all others, the annual subscription fee includes a copy of the *Annales*.

Cross-References

- ▶ Corning Museum of Glass
- ▶ Glass: Conservation and Preservation

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Atalay, Sonya

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Basic Biographical Information

Dr. Sonya Atalay is a Native American (Anishinabe-Ojibwe) anthropologist and archaeologist and a prominent advocate for community-based and participatory research (CBPR). Dr. Atalay is one of the first of her people to undertake tertiary studies in archaeology.

Atalay grew up in Michigan. She completed her B.A. in Anthropology and Classical Archaeology at the University of Michigan, Ann Arbor, in 1991. In 1997 Atalay first undertook field excavations at the site of Çatalhöyük in Turkey, analyzing clay and ceramics to investigate prehistoric cooking practices. She completed her M.A. in Anthropology at the University of California, Berkeley, in 1998.

In 2003, Atalay obtained her Ph.D. in Anthropology at UC Berkeley. Subsequently, she has been awarded the positions of UC Berkeley President's Postdoctoral Fellow (2003–2005) and Stanford University's NSF Postdoctoral Scholar (2005–2007). From 2007 to 2012, Dr. Atalay held the role of Assistant Professor in the Department of Anthropology at Indiana University as well as Adjunct Assistant Professor in American Studies, Near Eastern Languages and Cultures, and Central and Eurasian Studies. She is currently Assistant Professor at the University of Massachusetts, Amherst, in Anthropology and the Commonwealth Honors College.

Dr. Atalay is a member of the Society for American Archaeology, the American Anthropological Association, the World Archaeological Congress and the Native American and Indigenous Studies Association. She has served as Chair of the Society for American Archaeology Committee on Native American Relations, as well as the Society for American Archaeology Indigenous Populations Interest Group. She was one of the founding board members of the Coalition for Indigenous Archaeology. Dr. Atalay is also a first degree Midewiwin of the Three Fires Midewiwin Society, concerned with maintaining traditional knowledge and spiritual teachings of the Anishinabe people.

Major Accomplishments

Dr. Sonya Atalay has made important and inventive contributions to the field of community archaeology. She began working at Çatalhöyük analyzing clay materials (Atalay 2005) but became increasingly interested in broadening the local community's involvement on-site. In 2005, Dr. Atalay launched the Çatalhöyük community-based participatory research (CBPR) program (Atalay 2012). Instead of only employing local residents as excavation labor and ethnographic informers, Atalay's new project sought to engage locals on an equal level to the archaeologists, as collaborators and research partners.

With local communities consulted about the sorts of participation they desire, the Çatalhöyük CBPR project has grown to include an annual festival, a theater group, production of comic books and newsletters, and archaeological lab-guide training for local children and teens. Particular effort has been put into increasing archaeological and scientific literacy among local communities, which has led to opportunities for internship positions and joint authorship for locals. Dr. Atalay characterizes her approach to community archaeology as being "by and with" local communities, instead of "on and for" (Atalay 2010).

Dr. Atalay seeks to demonstrate that community archaeology methods are applicable worldwide. To this end she has worked in collaboration with a number of Native American communities in Michigan and Indiana. Dr. Atalay has worked with the Sullivan County American Indian Council to produce geographical and oral history surveys of the Waapaahsiki Siipiiwi Mound in Fairbanks, Indiana. This project includes the development of an interpretive walking trail around the mound to help protect the site and educate visitors. Since 2009, Dr. Atalay has assisted an initiative by the Ziibiwing Center of the Saginaw Chippewa Indian Tribe of Michigan to protect the Sanilac petroglyphs site. This involves seeking protection not only for the fragile petroglyphs themselves but also for the indigenous intellectual property they represent. The project has been funded as a case study by the Intellectual Property Issues in Cultural Heritage project (IPinCH). Dr. Atalay is assisting with the implementation of a tribal management plan to ensure that traditional owners decide how investigations of the site are conducted, as well as how widely documentation of this sacred knowledge may be shared.

A significant focus of Dr. Atalay's work has been on the decolonization of archaeology. Invited to guest-edit an issue of *American Indian Quarterly*, Dr. Atalay featured articles on the subject of decolonization and offered her own critique of the National Museum of the American Indian and its approach to presentation (Atalay 2006). Since 2004, Dr. Atalay has researched issues of cultural preservation and repatriation surrounding the Native American Graves Protection and Repatriation Act (NAGPRA). This includes investigation of human remains classified as "culturally unidentifiable" as well as Dr. Atalay's role as Coprincipal Investigator for the Stone Street Recovery and Mitigation Project. She has worked with the Saginaw Chippewa Indian Tribe towards documenting ancestral remains held by the University of Michigan, with the ultimate aim of repatriation due to begin in late 2012. Dr. Atalay was appointed to NAGPRA's review committee in 2009.

From 2007 to the present, Dr. Atalay has taught undergraduate and graduate classes in Anthropology at Indiana University, topics ranging from food archaeology to NAGPRA and CBPR methods. In keeping with her commitment to making academic work more widely accessible, she has also made many presentations on public archaeology for school-aged children.

Cross-References

- ▶ Çatalhöyük Archaeological Site
- ▶ Decolonization in Archaeological Theory
- ▶ Indigenous Intellectual Property Issues in Archaeology
- ▶ Native American Graves Protection and Repatriation Act (NAGPRA), USA

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Atlantic Ocean: Maritime Archaeology

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Introduction

Maritime archaeologists have never conceived of the Atlantic as a unified subject for study in the same way that Atlantic world historians have. While much maritime archaeological work has been done beneath the surface of the Atlantic Ocean, those doing the projects have typically pursued them in reference to their own particular research interests and questions rather than seeing such research as part of a unified approach to understanding the maritime development of the Atlantic world. Consequently, the maritime archaeology conducted in the Atlantic consists of a mix of scholarship focusing on many diverse geographical and temporal areas. This is no doubt influenced by the vast size that the Atlantic covers. Its waters flow across two hemispheres and connect four continents; from prehistory to the present, many cultures have utilized Atlantic waters for subsistence, transportation, trade, and warfare. Despite the lack of a unified approach, however, the maritime archaeology of the Atlantic can be seen as contributing to scholarly understanding of several significant research areas. Key research themes that maritime archaeologists have addressed using Atlantic sites include the study of ships of exploration, the impact of global commerce and warfare during the past 500 years, and the protection of underwater cultural heritage from treasure hunting. In recent years, Atlantic sites have also been used to examine significant emerging perspectives such as deepwater archaeology, prehistoric underwater archaeology, and maritime cultural landscapes.

Key Issues and Current Debates

Shipwrecks from the Age of Exploration

The Spanish and Portuguese were leaders in the field of global exploration, and shipwrecks from the Atlantic have contributed greatly to the understanding of early Iberian global seafaring. The earliest known European shipwreck site in the New World is the Molasses Reef wreck from the Turks & Caicos Islands, which sank in the early 1500s. This wreck and the slightly later Highborn Cay shipwreck from the Bahamas are typically included in discussions of Caribbean sites, but both actually lie in the Atlantic Basin. Because of their early dates, the Molasses Reef and Highborn Cay shipwrecks are significant finds, but in both cases, archaeologists did not arrive on the scene until after the sites had been damaged by treasure hunters (a pervasive problem in Atlantic maritime archaeology that will be discussed in greater detail later in this entry). Formal archaeological work at the Molasses Reef site began in 1982 under an Institute of Nautical Archaeology (INA) team led by Donald Keith (Keith et al. 1984). Excavations conducted from 1982 to 1986 revealed that the vessel was armed with at least 18 swivel guns and personal weapons such as crossbows, *arquebuses* (shoulder-fired guns), *harquebuts* (hand cannons), and cast iron grenades. A pair of

bombardetas were aboard, but were not fitted for use at the time of sinking (Keith 1988: 60-63). Additional artillery included one *cerbatana*, a carriage-mounted gun. Items of ship's equipment from the site include one anchor, an axe head, a lead-sounding weight, and a possible pump valve. Ceramic sherds from olive jars, storage pots, bowls, and basins were also present. As a whole, the ordnance and artifact assemblage suggests a Spanish origin for the vessel. Alternatively, analysis has shown that much of the ballast came from Lisbon, Portugal, so the ship may have been Portuguese instead (Lamb 1988). Unfortunately, only about 2 % of the ship's hull remained; extant timbers suggest a vessel about 20 m long and 5–6 m in beam (Oertling 1989a).

The Highborn Cay wreck (Keith 1988: 59-60; Oertling 1989b; Smith et al. 1985) was discovered by divers in 1965 and subjected to salvage in the late 1960s. Archaeologists became interested in the site in the 1980s, after noting similarities between the artifacts from this site and those from the Molasses Reef wreck. Excavations were begun in 1986 and soon revealed a vessel similar in size to the Molasses Reef vessel, but with much better hull preservation. Fragments of the ship's backbone, including the keel, stem, and keelson, which included a mast step, were preserved. Other surviving timbers included frames, outer hull planking, ceiling (interior) planking, and footwales (longitudinal timbers on the interior that provide strength at the turn of the bilge). The ship was armed with at least 2 *bombardetas* and 13 swivel guns. Few ceramics were found; these include sherds from a bowl and a small pitcher. Likewise, only one personal artifact, a knife handle, was discovered. The paucity of personal artifacts and the fact that two of the three anchors discovered at the site seem to have been deployed at the time of sinking have led to the interpretation that the ship sank at anchor and that the crew had sufficient time to take their possessions with them when they abandoned the vessel. It seems possible, however, that some personal possessions may have been removed by salvors before archaeological excavations began.

The site of Red Bay, Labrador, Canada, provides some of the best evidence for early Iberian contact with the New World (Grenier et al. 2007). In the sixteenth century, Red Bay was utilized by Basque seafarers pursuing whales. The Basque had a whaling tradition that dates back to at least the twelfth century, but by the early modern period, stocks of whales off the European coast had been heavily depleted. With the discovery of the New World, intrepid Basque sailors soon began exploiting whales on the far shore of the Atlantic. From July through October, pods of right whales migrate through the Straits of Belle Isle. Red Bay, located close by, provided an ideal anchorage for fleets hunting these whales. Archaeological excavations on the shores of Red Bay in 1977 first provided evidence for tryworks used to render whale oil, while archival research in Spain revealed that several whaling vessels had been lost in the bay. Following the clues provided by the archives, in 1978 archaeologists discovered the remains of one such vessel, believed to be the galleon *San Juan*, which sank in 1565. Subsequent archaeological fieldwork has revealed three other galleons, along with the remnants of whaleboats. The Red Bay site complex is particularly significant for the details that it provides about life aboard whaling ships and rendering operations ashore, as well as for the information provided about Iberian ship construction, as the cold waters preserved the hulls to a greater extent than is commonly found on wrecks from lower latitudes. The Red Bay archaeological project is also noteworthy for its methodology. The hull of *San Juan* was excavated, dismantled, brought ashore, and recorded in great detail, then reburied on the bottom. Returning the timbers to the seabed obviated the need for costly, long-term conservation of the hull remains yet provided for their protection.

Another significant early Iberian vessel is the Western Ledge Reef wreck from Bermuda (Watts 1993). This shipwreck, which dates to about 1600, was discovered in 1964 and salvaged periodically until the late 1980s. From 1988 to 1991, East Carolina University and the Bermuda Maritime Museum recorded and excavated

the site. Artifacts include cannon, versos, a bronze bell, navigational dividers, and sherds from olive jars, pitchers, and colono ware. The latter, along with bones from a white-tailed deer, indicate that the Western Ledge vessel had probably been to North America and was likely returning to Europe when it struck Bermuda's reef. The artifacts indicate that the ship was probably Spanish. A significant portion of the hull, including parts of the keel, keelson with mast step, sternpost, stern knee, frames, outer hull planking, ceiling planking, and transom planking, was preserved. The hull remains were deemed significant enough to raise and conserve; at the time of this writing, the hull timbers are undergoing analysis and reconstruction.

The Azores Islands served as a critical waymark for Iberian vessels returning to Europe from both the New World and the East Indies. In the 1990s, archaeologists began a program to document and preserve the Azores' maritime heritage. A key focus of this program has been Iberian ships from the Age of Exploration. Investigations at Angra Bay, Terceira Island, revealed several shipwrecks. One of these, designated Angra D, represents the substantially preserved hull of a large Iberian vessel from about 1600 (Garcia & Monteiro 2001). The ship was probably close to 40 m in length, with a beam of about 8 m, and displaced approximately 700–800 t. Surviving timbers include the entire keel and keelson, the sternpost assembly, the main mast step, nine riders, numerous frames, outer hull planking, footwales, ceiling planking, and stanchions. The vessel lay on one side, with the result that parts of deck beams, which are often not preserved, were buried by overburden and thus survived. Rope and a double block provide evidence for the rigging; other artifacts provide abundant testimony to shipboard life. These include wicker baskets and barrel staves, combs, a religious figurine, a thimble, and pins. Chinese porcelain compliments the ubiquitous olive jars in the ship's ceramic assemblage. Bones from cow, chicken, and fish, along with almonds, raisins, and corn, testify to the crew's diet.

Although extent of hull preservation varies widely among the Iberian wrecks from the Atlantic Ocean, these, taken in concert with other Iberian vessel finds from the Caribbean, Gulf of Mexico, Great Britain, and continental Europe, have revealed enough about construction details to allow Oertling (2005) to postulate an "Atlantic tradition" vessel type. This consists of a package of 11 constructional features that seem common to fifteenth- and sixteenth-century Iberian vessels. Significant among these are the use of dovetailed mortise and tenon joints at the intersection of floors and first futtocks, a feature that provides the most readily identifiable indication that a wreck is Iberian. Another feature that can be used to readily identify Iberian vessels is a mast step formed from an enlarged section of the keelson and supported by lateral buttresses on either side. Iberian-Atlantic tradition vessels also feature preassembled central frames (the number varies based on the size of the ship) that indicate that Iberian naval architects were able to plan the shape of the central part of the hull before construction (Castro 2007), a significant advance over earlier European shipbuilding methods. Other significant features of this tradition include Y-shaped frames at the stern and keelsons notched to fit over the tops of the floor timbers.

A significant question concerning Iberian shipbuilding is whether or not archaeological sites can be used to identify particular types of vessels known from historical records. Atlantic sites such as Red Bay have proved critical in identifying galleons, as there is a good deal of certainty that the wrecks discovered there are those of historically known vessels such as the *San Juan*. Other types remain elusive. The caravel was one of the most important Age of Exploration ships; these small vessels were ideal for exploring unknown waters. Two of Columbus' vessels, *Nina* and *Pinta*, were caravels, and Vasco de Gama also employed them in his successful voyage to India. The evidence indicates that Iberian vessels shared the majority of their constructional details in common, despite size, so it does not seem possible to identify caravels on the basis of construction. Based on size, however, three of the Atlantic wrecks, the Molasses Reef, Highborn Cay, and Western Ledge Reef shipwrecks, offer

tantalizing candidates for caravels. Future research may be able to solve this puzzle.

While Iberian vessels dominate the Age of Exploration shipwrecks investigated in the Atlantic, one significant early English site has also been excavated. This is the remains of the *Sea Venture*, which wrecked in Bermuda in the summer of 1609 while en route to the Jamestown colony (Wingood 1982; Adams 1985). Very little is known about early seventeenth-century English ship construction, and *Sea Venture*'s hull provides much needed archaeological evidence. About 15.5 m of the keel survived, with additional evidence to indicate that it was originally approximately 22 m long. At its forward end, part of the keel to stem scarf remains. The size of keel indicates that *Sea Venture* was probably originally around 30 m long on deck, which agrees well with historical records that state that the ship was of 100 t. Fragments of eighteen frames, including floor timbers and futtocks, survive. Remains of deadwood, outer hull planking, ceiling planking, and sleepers (like footwales, these were longitudinal timbers that provided support at the turn of the bilge) were also recorded. In addition to the information it provides about seventeenth-century English ship construction, the *Sea Venture* excavation is also notable for the careful attention to stratigraphy (Adams 1985: 279-284), something not seen on many underwater excavations.

Global Commerce and Warfare

The Age of Exploration laid the groundwork for European expansion. Over the past five centuries, European colonization and commerce, along with their attendant warfare, shaped the world in which we live today. It is no exaggeration to say that today's globalization is merely the most recent aspect of a phenomenon that began 500 years ago. During that time, the Atlantic Ocean has served as a key highway for European expansion, and maritime archaeologists have investigated numerous sites that provide evidence for this.

The Spanish and Portuguese were leaders in the Age of Exploration, a key goal of which was the growth of commerce. In the seventeenth century, Portuguese merchant vessels transited the Atlantic on their way to bring back the wealth of the East Indies. The wreck of one such vessel has been investigated in detail by archaeologists. This vessel, the nau *Nossa Senhora dos Mártires*, sank at the mouth of the Tagus River, Portugal, in September 1606 on its return voyage from India (Castro 2003, 2005). The ship was carrying a cargo of peppercorns, many of which were salvaged soon after it sank, along with much of the ship's armament, fittings, and stores. The site was subjected to further damage in the 1980s, when sport divers looted the wreck. Archaeological excavations from 1996 to 1997, however, revealed that much valuable information remained. The presence of a large quantity of peppercorns provided evidence for the wreck's identity and its cargo. The ship's equipment, including three astrolabes, dividers, and sounding leads, were also recovered. Asian pottery in the form of Chinese, Burmese, and Japanese ceramics hints at the details on cross-cultural contacts that shipwrecks such as this can offer. The Pepper Wreck is also valuable for the data that it provides about seventeenth-century Portuguese ship construction and design. Analysis of the surviving hull structure, which includes a portion of the bottom forward of amidships, combined with historical shipbuilding treatises and iconography, allowed Castro to create a reconstruction of the ship's original shape and dimensions. Further research will include the construction of models to test hull strength and hydrodynamic properties (Castro & Fonseca 2006). Recently, another possible Portuguese East Indiaman has been investigated at Oranjemund, Namibia. This site is located in a high-energy environment just offshore. Investigations in 2008 revealed portions of the ship's hull and tin, lead, and copper ingots. Numerous personal artifacts were also found. Coins from the wreck suggest that the ship sank shortly after 1525; based on this, the vessel has been tentatively identified as the Indiaman *Bom Jesus*, lost on its outbound voyage in 1533 (Werz 2010). Additional research is planned for the near future.

The Oranjemund Shipwreck highlights the potential that the southern Atlantic coast of Africa holds for examining European merchant vessels lost while voyaging to or returning from Asia. In addition to Portuguese vessels, Dutch East Indiamen regularly followed a similar route around the Cape of Good Hope. One of the first VOC ships to be investigated in South African waters was the *Meresteyn*, lost in 1702 at Saldanha Bay, north of Cape Town. Unfortunately for archaeology, the site was looted following its discovery in 1971. Archaeologists did, however, have the opportunity to record some artifacts before they were auctioned (Marsden 1976). These consist primarily of small arms equipment and personal possessions which, lacking context, provide little in the way of data regarding life aboard the ship. Cases such as the looting of the *Meresteyn* helped increase public awareness of the need to protect historic shipwrecks in South Africa. When sport divers discovered two other VOC shipwrecks, those of the *Oosterland* and *Waddinxveen*, at Table Bay in the 1980s, they reported them to the appropriate authorities. As a result, archaeologists had the opportunity to examine these ships, which were sunk in a storm in May 1697 while on their return voyage to Europe. To date, scholarly research has included interdisciplinary investigations by archaeologists, oceanographers, geologists, botanists, and other specialists (Werz 2009).

One of the best VOC shipwreck sites in Atlantic waters is that of the *Mauritius*, which sank in the Gulf of Guinea on its return voyage in 1609 (L'Hour et al. 1990). The wreck was discovered in 1985 and excavated in 1986. Excavations revealed that a section of the hull, approximately 15 m × 6 m, survived. Extant structure includes portions of the keel, 24 floors, 22 first futtocks, outer hull planking, ceiling planking, and pine sheathing that once protected the outer hull. Evidence for timbers that have now vanished is preserved as well; for example, bolts protruding into the interior at the floor – first futtock overlap – show that the ship originally had footwales to provide extra strength at the turn of the bilge. *Mauritius*' hull is significant because it provides an example of a double-planked East Indiaman. The inner layer of hull planking was treenailed to the frames, while the outer layer was fastened to the inner with nails. Lead sheathing was sandwiched between the two layers of planking. About 122 t of zinc ingots, peppercorns, and Chinese porcelain provide evidence for the types of cargo transported back to Europe aboard a returning Indiaman.

At least seven VOC wrecks have been identified in British waters; of these, five can be considered to be Atlantic sites. The Dutch East Indiamen *Lastdrager* (1653), *Kennemerland* (1664), and *De Liefde* (1711) were all lost in the Shetland Islands. The bow section of *Lastdrager* was salvaged in the 1970s and some 3,000 artifacts recovered (Stenuit 1974), but unfortunately, these were sold at auction and so lost to scholarly examination. The *Kennemerland* site was the subject of a long-term study by the noted British maritime archaeologist Keith Muckelroy (Muckelroy 1978). Muckelroy's analyses focused on determining the types of information that could be contained within highly scattered wreck sites, along with developing methodologies for the best ways to study such sites. Muckelroy also utilized the *Kennemerland* site in a seminal examination of formation processes at underwater sites. Like *Kennemerland*, *De Liefde* represents a scattered wreck site. Excavations in the 1960s, however, revealed a highly varied collection of artifacts, including gold, silver, and copper coins, small arms, ceramics, utensils, and personal items (Bax & Martin 1974). The wreck of the VOC ship *Adelaar*, which sank in the Outer Hebrides Islands in 1728, has also been investigated (Martin 2005). Like the wrecks in the Shetlands, the *Adelaar* site was highly scattered due to the dynamic nature of the wreck site. As at the *Kennemerland* site, however, investigations revealed that meaningful archaeological patterns were still present. These sites have helped to counter the argument advanced by treasure hunters that shipwrecks located in dynamic environments cannot provide useful archaeological data and thus should be allowed to be salvaged. A final VOC shipwreck in British Atlantic waters, the *Hollandia*, wrecked in the Isles of Scilly

in 1743. The site was located in 1971 and subsequent excavations undertaken (Cowan et al. 1975). *Hollandia* was outward bound when it went down, and the finds from the wreck include over 35,000 silver coins. Marsden (1978) has discussed the significance of the finds of coinage from outward-bound VOC ships such as *Hollandia*, *De Liefde*, and *Amsterdam* (which wrecked near Hastings in 1749). Far from being merely treasure, the coins from the sites such as these provide evidence for a key economic system in eighteenth-century Europe. The Dutch East India Company paid for Asian goods with coinage that they had to secure in turn primarily from Spanish sources in the New World. Marsden shows that further study of VOC shipwrecks is needed in order to illuminate the complex economic interactions that enabled this system to work. Marsden's study offers strong evidence for the need to examine coinage from shipwreck sites archaeologically rather than viewing it simply for its monetary value.

Atlantic global commerce included not only goods but also the unfortunate transportation of human cargoes. It is estimated that more than ten million Africans were forcibly transported across the Atlantic and sold into slavery in the New World. Maritime archaeologists have yet to investigate this trade to the same degree as historians. One site that is currently undergoing study is the slave ship *Trouvadore*, which wrecked in 1841 off East Caicos in the Turks and Caicos Islands (Leshikar-Denton 2010a: 638). When it sank, *Trouvadore* was carrying nearly 200 African slaves; the majority of these landed safely on the Turks and Caicos Islands, where many descendants live to this day. The *Trouvadore* site was discovered in 2004 and has been investigated by Ships of Discovery and the Turks & Caicos National Museum. Site interpretation involves working with the local islanders to investigate, interpret, and present a site that may provide key for shedding light on a dark chapter in maritime history.

European expansion was accompanied by naval warfare, as nations sought to build empires, protect trade, and threaten the commerce of rivals. Maritime scholars have examined the archaeology of Atlantic naval warfare at numerous sites. Wrecks from the 1588 Spanish Armada (Martin & Parker 1999) have revealed how the Spanish fleet suffered from a variety of problems, such as inferior cannon that were not well-suited to warfare at sea. Other significant Atlantic naval sites investigated through maritime archaeology include the British frigate *Dartmouth* (Adams 1974), HMS *Maidstone* (de Maisoneuve 1992), and the CSS *Alabama* (Watts 2007). To date, most studies of warships have been site specific and concerned largely with examining famous vessels. Sites such as the Spanish vessel *Salvador*, however, which was lost off the coast of Uruguay in 1812 while transporting troops to quell a revolt (Nasti 2001), highlight the potential that maritime archaeology has for addressing issues such as colonialism, which has significance to the wider field of archaeology.

Treasure Hunting and Heritage Protection

While looting of archaeological sites on land remains a problem throughout the world, nowhere is this problem more apparent than on underwater sites. Since the beginning of the field, maritime archaeologists have waged a constant struggle with treasure hunters who seek to exploit underwater sites for commercial gain, on the one hand, and a public that often does not understand the distinction between legitimate archaeology and treasure salvage or the need to protect underwater archaeological sites on the other hand. While destruction of underwater sites by treasure hunting is a worldwide problem, some of the key battles, and some of the most recent developments concerning the protection of underwater cultural resources, have occurred in the Atlantic. Many of the wrecks discussed above were looted before archaeologists arrived on the scene. In other cases, treasure salvors have been granted legal access to shipwrecks, and thus the exploitation and dispersal of these sites has occurred perfectly legally. One such case from the Atlantic Ocean is the pirate vessel *Whydah*, which sank off Cape Cod, Massachusetts, in 1717. Despite the attempts of authorities to provide for proper archaeological procedures, the *Whydah* episode resulted in a debacle,

as archaeologists were not able to perform their duties to satisfactory standards (Elia 1992).

The problem of treasure hunting has been complicated by the difficulty in finding a legal framework to protect underwater archaeological sites. The 1982 Law of the Sea Convention specifies that coastal states have control over cultural resources located in their Territorial Seas (up to 12 nautical miles from the coast) and Contiguous Zones (up to 24 nautical miles). Beyond this, coastal states may claim rights to an Exclusive Economic Zone that extends out to 200 nautical miles; some nations have also claimed rights out to the limits of the continental shelf. In these areas, however, the Law of the Sea provides no explicit protection for cultural resources. Thus, any archaeological sites beyond 24 nm have no legal protection under the Law of the Sea and can be exploited by anyone with the capability to do so. Technological developments in deep sea exploration have made these deepwater sites ever more accessible to treasure hunters. In 1987, for example, the Columbus-America Discovery Group led by Tommy Thompson discovered the wreck of the steamship *Central America*, which lay some 200 miles off the coast of South Carolina in approximately 2,400 m (8,000 ft) of water (Kinder 2009). ROVs were used to locate and subsequently salvage the wreck, which went down in a storm in 1857 while carrying 21 t of gold. Salvage efforts recovered an estimated $100–150 million in gold, along with myriad other artifacts. Although the salvagers specifically stated that scientific knowledge was one of the goals of the project, this has yet to materialize; instead, the recovered gold is offered for sale. A similar story comes from another Atlantic shipwreck, the steamer *Republic*, which sank about 100 miles off the coast of Georgia in 1865 with a cargo of gold and silver coins (Vesilind 2005). The wreck was discovered in 2003 by US-based Odyssey Marine Exploration, Inc., who salvaged an estimated $75 million in coinage from the site. Like the *Central America* salvors, Odyssey claims to be conducting archaeological research, but it is clear that commercial exploitation remains the company's chief goal; Odyssey offers *Republic* artifacts, including coins, bottles, and chunks of coal, for sale on its website. Whether or not such groups record and publish sites to archaeological standards, the commercial nature of these enterprises contradicts the ethical principles of archaeological bodies such as the Society for Historical Archaeology (SHA) and Society for American Archaeology (SAA).

Projects such as the *Central America* and *Republic* have been allowed to occur because, until recently, there was no legal framework for preventing the exploitation of underwater sites located beneath the high seas. This bleak picture for the future of Atlantic maritime archaeology, however, has been lessened somewhat in recent years by the adoption of the 2001 UNESCO Convention on the Protection of the Underwater Cultural Heritage (Leshikar-Denton 2010b). The Convention entered into force in January 2009, when 20 nations had signed it. To date, 40 nations, including 16 that border the Atlantic, have signed the Convention. The 2001 Convention provides standards for the protection of underwater cultural heritage, defined as "all traces of human existence having a cultural, historical, or archaeological character which have been partially or totally underwater, periodically or continuously, for at least 100 years." Unlike the Law of the Sea Convention, the 2001 UNESCO Convention thus embraces the protection of all underwater sites, regardless of geographical location. It remains to be seen how well the Convention can be enforced on the high seas, but the agreement is a definite step forward in cooperation between nations to protect submerged cultural resources. The Convention also contains standards for the proper study of underwater resources; these include properly trained maritime archaeologists, a preference for in situ preservation and noninvasive methodologies, and a prohibition against exploiting underwater sites for commercial gain. Some notable maritime nations, such as the United States and the United Kingdom, are not signatories, but in the case of the former, government cultural resources managers are finding ways to implement the Convention's rules into their policies (Varmer et al. 2010).

Another way to protect underwater cultural heritage is by designating special geographical areas as protected zones. The United States' National Marine Sanctuaries Act provides a model for such legislation. The NMSA provides for the protection of natural and cultural resources in certain designated areas. At each sanctuary, officials are responsible for inventorying and managing shipwrecks and other submerged cultural resources located within the bounds of each sanctuary. The first sanctuary officially designated under the NMSA was the USS *Monitor* National Marine Sanctuary, designated to protect the site of that Civil War ironclad shipwreck off the coast of North Carolina in 1975. Two others, Gray's Reef National Marine Sanctuary (1981) and Stellwagen Bank National Marine Sanctuary (1992), have been created off the US Atlantic seaboard. The NMS program represents a highly effective strategy for preserving maritime heritage for future generations.

Future Directions

Maritime archaeological work in the Atlantic Ocean to date has been primarily focused on the topics discussed above, but as the field of maritime archaeology evolves, new perspectives continually emerge.

Deepwater Archaeology

Given the amount of maritime traffic throughout history, deepwater fieldwork will no doubt become an important part of future maritime archaeological work in the Atlantic. The discovery of the world's most famous shipwreck, the RMS *Titanic*, in 1985 at a depth of 3,800 m (c. 12,500 ft) sparked worldwide interest but has resulted in little archaeological work to date. As the wreck lies in international waters, rights to the wreck were granted to RMS Titanic Inc., which has subsequently conducted salvage operations at the site. According to the company's website (rmstitanic.net), more than 5,000 artifacts have been raised. This work, along with that of other salvage companies, has resulted in damage to parts of the site and the removal of artifacts without proper archaeological recording and with little regard for site preservation issues. Pleas by archaeologists finally resulted in collaboration between RMS Titanic, the Institute of Nautical Archaeology (INA), the National Oceanic and Atmospheric Administration office of National Marine Sanctuaries, the National Park Service's Submerged Resources Center, Woods Hole Oceanographic Institute, and other groups (Delgado 2010). Under the archaeological direction of maritime archaeologist James Delgado, RMS Titanic mounted an expedition in 2010 to map the *Titanic* site using sonar and 3D optical imagery. This information will be used to develop the first archaeological plan of the entire wreck site.

Issues raised by the *Titanic* experience – site access, resource sustainability, and site management – will apply to other deepwater archaeology projects in the Atlantic for years to come. Already, other famous shipwreck sites, such as the World War II German battleship *Bismarck* and HMS *Hood*, have been located, and more discoveries are sure to follow. Maritime archaeologists have not yet reached a consensus regarding how best to conduct deepwater research. Treasure salvors argue that such research cannot be performed by archaeologists because of the skills, expenses, and equipment involved and have thus pushed for collaboration between commercial salvage companies and archaeologists. These claims have been elegantly countered, however, by maritime archaeologist Jonathan Adams (2007), who notes that cooperation is incompatible because archaeologists are bound by ethical standards not to exploit artifacts for commercial gain and because archaeologists do indeed have the potential to carry out deepwater projects. Adams cites successful deepwater archaeological work in the Mediterranean and Black Seas in support of his arguments and urges archaeologists to integrate future deepwater research into the types of international research and management plans advocated by the 2001 UNESCO Convention. This seems the most sensible course. A key goal for deepwater

research in the Atlantic is for maritime archaeologists to convince the public, who often do not understand the differences between treasure hunters and archaeologists, that deepwater shipwrecks represent finite resources that should be managed for the benefit of all rather than being exploited for the profit of a few.

Prehistoric Underwater Archaeology

In recent decades archaeologists have come to realize that much valuable data concerning prehistoric habitation sites and the spread of humans around the globe lies under water. Eustatic sea level rise at the end of the Pleistocene resulted in the inundation of many prehistoric coastal sites, which now lie submerged on the continental shelves. Until recently, most interest in submerged prehistoric sites has come from prehistoric terrestrial archaeologists. Maritime archaeologists, with their specialized knowledge in underwater archaeological methodology and access to high-tech underwater surveying equipment, however, have the potential to make significant contributions to the study of submerged prehistoric settlements and coastal migration routes. To date, most such research in the Atlantic has been conducted off the coasts of North America and Europe (Benjamin et al. 2011; Gusick & Faught 2011). Such research typically has two main thrusts: (1) the reconstruction of submerged paleolandscapes and (2) the identification of paleoshorelines. A primary goal is to develop predictive models for locating submerged prehistoric sites, which can then be studied using underwater archaeological techniques. Because of the nature of this work, research into submerged prehistoric landscapes typically involves interdisciplinary collaboration between maritime archaeologists and other specialists such as geoarchaeologists, marine scientists, and geologists. In the coming years, research into this area should help refine scholarly understanding of issues such as the peopling of the Americas.

Maritime Cultural Landscapes

The last two decades of maritime archaeology have witnessed a surge of interest in the "maritime cultural landscape" approach, an idea promulgated by Swedish maritime archaeologist Christer Westerdahl (1992). The maritime cultural landscape approach advocates studying shipwrecks as part of the cultural systems that produced them rather than as isolated sites. Such an approach is well-suited to future work in the Atlantic basin, which consists of a mosaic of diverse, overlapping, interconnected systems. Several recent projects in the Atlantic serve as guideposts for future work in looking beyond shipwrecks to wider cultural processes. One innovative study utilized data from the sloop of war HMS *Swift*, lost off the coast of Patagonia, Argentina, in 1770, to examine British actions in a colonial context (Dellino-Musgrave 2006). The study used artifacts excavated from the wreck site, primarily pottery, to illuminate the ways that material culture was used to express status relations and maintain a sense of "Britishness" in a colonial setting. Archaeologist Richard Gould, long a proponent of using shipwrecks to examine cultural processes, has interpreted the wreck of the nineteenth-century barque *North Carolina* as a possible crime scene (Gould 2005). *North Carolina* went aground on Bermuda under suspicious circumstances on January 1, 1880. Archaeological fieldwork revealed discrepancies between the material culture evidence and historical accounts of the sinking. Gould concludes that these may represent evidence that the vessel was deliberately wrecked, possibly with the intent to collect insurance money. A final recent project that takes maritime archaeological interpretation beyond the site is the study of the *H.L. Hunley* and USS *Housatonic* naval battlefield (Conlin & Russell 2006). In 1864, *Hunley* sank *Housatonic* in the Atlantic Ocean just off Charleston, South Carolina, becoming the first submarine to sink an enemy vessel in combat. Unfortunately for the crew of the *Hunley*, the submarine sank soon after fatally damaging the union warship. Following its discovery in 1995, the *Hunley* was raised; as part of the overall research project, the *Housatonic* and surrounding area have been examined as well. Maritime archaeologists utilized methodology adapted from that pioneered by historical archaeologists on

battlefield sites such as the Little Bighorn. This approach views the entire site as a landscape, the features and artifacts of which can reveal information regarding the progress of the battle. In this case, the battlefield survey helped provide a greater understanding of the engagement between *Hunley* and *Housatonic* than that provided solely by historical accounts.

Cross-References

- ▶ Caribbean Maritime Archaeology
- ▶ Maritime Landscapes
- ▶ Pacific Ocean: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ Society of the Ship
- ▶ Submerged Prehistoric Landscapes

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Atlantic World: Historical Archaeology

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Introduction

Archaeologists have only recently begun to identify their research as part of Atlantic studies (see Kelso 2010) despite the Atlantic World being a central focus of the subfield of historical archaeology since its inception. This being the case, the research carried out by archaeologists of the Atlantic World has been, and continues to be categorized under a number of studies falling within several discrete subfields, such as colonial, indigenous, contact era, African Diaspora, New World, and a host of other "archaeologies," within the larger field of historical archaeology in the Americas, parts of Western Europe, and West and Southern Africa. Because a specific "Archaeology of the Atlantic World" was a distinct research focus in the early years of historical archaeology, defining it now requires an examination of a number of disparate research agendas.

These early explorations were conducted at sites such as Jamestown and Williamsburg, known and memorialized for their strong associations with the founding of the United States as well as European expansion and settlement in the New World. Those archaeologists that did use the term "Atlantic World" sought to designate a specific time frame within the larger field of historical archaeology, rather than a particular

subject matter or research agenda. As the field of historical archaeology was developing, emphasis was placed on defining this historical period, characterized by both European contact and settlement of the Americas, beginning at the end of the fifteenth century, with the voyages of Columbus, and extending into the present. It can be argued that much of Historical Archaeology was, and remains largely Atlantic World archaeology and this is primarily due to the subject's early thematic focus and its strong emphasis on trans-Atlantic interactions. This is not only seen in both early and current research at Jamestown and Williamsburg, but in some of the earliest investigations in the Caribbean as well (see Deagan in Kelso 2010). Just as the discipline of historical archaeology had trouble defining its subject in the early days, those explicitly studying the Atlantic World have had similar difficulties including the denotation of discrete regional and temporal boundaries, although these debates have largely been the domain of historians (Bailyn 2005).

Definition

An immediate predecessor of the industrial age, the Atlantic World era is concurrently referred to as the "post-medieval," "early modern," and "capitalist world" by historical archaeologists depending on their own national background and training. A single, explicit definition of what the Atlantic World was is not possible, largely as a result of the number of areas and powers involved in trans-Atlantic commerce over the course of roughly four centuries. While there is no single, all-encompassing definition of the scope, size, and period of the Atlantic World, those studies attempting to define a general framework have largely fallen under the purview of historians (Bailyn 2005). Most historians of Atlantic history agree that "during a significant chunk of time, extending at least from 1500 through 1800, the Atlantic World—which is to say, Western Europe, the Americas, and West Africa—was sufficiently integrated. . ." (Coclanis 2007: 113), thus requiring an integrative research agenda that highlights the connections, responses, and consequences of this integration in a unitary fashion. Following this definition, in the broadest sense, the period of the Atlantic World begins the mid-fifteenth century with European exploration in West Africa and ends sometime in the mid- to late nineteenth century with the advent of the industrial age in Europe, in addition to the period of abolition of slavery in the Americas. As a historical concept, the term "Atlantic World," therefore, refers to those regions with a shore on the Atlantic Ocean and their historical interconnectedness or integration, through maritime exchange that brought about cultural encounters and in turn the mass movement of peoples between these areas. The latter was spearheaded by European efforts at commerce and colonization, initially in Africa and later in the Americas, including the early period of indentured servitude in the Caribbean and Chesapeake for example, followed by the era of the trans-Atlantic slave trade throughout the Atlantic sphere.

In the most basic geographical sense, the Atlantic World comprises all coastal regions of Europe, Africa, and the Americas physically connected by the Atlantic Ocean. Additionally, the areas of the Americas and Africa that are often included in studies of the Atlantic World by researchers may include associated interior regions, but are limited by historical incorporation into various European colonial ventures. Attempts to restrict the geographical and temporal boundaries of this period are further complicated by the various stages of Atlantic development tied to the dominance of successive European powers throughout its existence. The initial period begins with Portuguese ventures in West Africa culminating with their rivalry with the Spanish in South America. Immediately on their heels were the Dutch, English, and French as well as an array of smaller players, such as the Danes, all seeking their own territories in Africa and the Caribbean, as well as in continental North and South America. Thus, within the Atlantic World researchers have highlighted a series of smaller "Atlantics" tied to European nationalistic ventures culminating

in colonial boundaries. This is most aggressively seen in the English-French rivalry in the Caribbean and West Africa.

Historical Background

Historical archaeology of the Atlantic World began with historic sites archaeology in the United States in the mid-twentieth century. Drawing on the earlier definitions of J. C. Harrington and Bernard Fontana, who were among the pioneers in this field, Robert Schuyler (1970: 84) later defined the field's focus as "the expansion of European culture into the non-European world starting in the fifteenth century and ending with either, industrialization or the present, depending on local conditions." Some of the first historical sites investigated in the United States were in Virginia, for example Jamestown, and represented some of the earliest moments of English commercial expansion. Even though Schuyler (1970: 85) states that the field's subject matter may begin as early as 1415, with the "Portuguese penetration of Africa," he addresses the fluid nature of this period noting that the regions subject to European expansion geographically "fluctuated from decade to decade," and the fact that the bulk of the initial studies classified as historic sites archaeology were carried out in the United States, and more particularly the southeast (e.g., the work of Ivor Noël Hume in Virginia). Hence, as a field, historical archaeology began with an emphasis on European exploration in the New World demonstrating a distinctly Americanist perspective (Gilchrist 2005). These early projects highlighted the United States' beginnings and the experience of settlers and colonists in a foreign land, yet specifically addressing their successes, failures, and resourcefulness in creating the larger Atlantic World.

This early perspective led to an emphasis on the English Atlantic sphere, while little attention was given to other European groups or indigenous communities (Deagan 1982: 161-2).

Another definition addressing historical archaeology's focus in the Atlantic World era was presented by James Deetz. While Americanist in perspective, this definition is slightly less eurocentric in nature. In it the author describes the field as "the archaeology of the spread of European cultures throughout the world since the fifteenth century, and its impact on the indigenous people" (Deetz 1977: 5).

In the revised text, Deetz (1996: 5 emphasis added) altered the latter half of this statement to read "and *their* impact on *and interaction with the cultures of indigenous peoples*." This amended statement recognizes that both "European" and "indigenous" people are not monolithic entities, and as such, there were multiple experiences of contact and interaction throughout the Atlantic era. Additionally, it reflects a growing trend within historical archaeology to define a more global subject matter thus opening a dialogue between archaeologists in the Americas, Europe, and parts of Africa (e.g., Falk 1991).

The emergence of historical archaeology in Europe postdates studies in the United States, even though the subject matter roughly corresponds with the era of the Atlantic trade, including its regional focus in the United Kingdom. Its designation as "Post Medieval" has had a tendency to marginalize its practitioners from the larger debates within global historical archaeology (Gilchrist 2005: 330), resulting in the gradual integration of the two perspectives. Attempts have been made to unite the field around investigations that largely fall within Atlantic studies (e.g., Egan & Michael 1999). Here again, the experience of the European has been the primary focus of study, as well as the impact and introduction of new commodities from the Americas and West Africa on European society.

Key Issues and Current Debates

Research within historical archaeology has moved from the sites of major events and influential men, like the homes of Thomas Jefferson, George Washington, and James Madison, to include the local or everyday lives of the invisible masses residing on these properties, as well as within urban spaces, examining topics of race, ethnicity, gender, and

economic marginalization through multi-scalar perspectives. In fact, many of the debates that permeate historical archaeology as a whole are magnified within those focusing on the Atlantic era, notably those surrounding race or racialization (e.g., Orser 1996). This is also reflected in current research being carried out within Atlantic World studies as a whole. More specifically, there is an emphasis on indigenous experiences and successes within the Atlantic. This is seen in studies of Native American communities when approached from an indigenous rather than a settler's perspective (Blanton & King 2004) and in investigations of indigenous trading communities in West Africa (DeCorse 2001).

Archaeologists have also followed the lead of Atlantic historians in defining the various "Atlantics" that coexisted. These are defined by a group of people sharing ethnic or national origins, a region, or a nation and its colonial or mercantile empire. Likewise, the indigenous spheres of interaction are also receiving greater attention. The most explicit example of this is the recent attempt to construct a dialogue between historical archaeologists working on Atlantic period sites in Africa and contemporary African Diaspora sites in the Americas (Ogundiran & Falola 2007). Most importantly, archaeological investigations of Atlantic era sites in West Africa have significantly increased since the 1990s (e.g., DeCorse 2001; Monroe & Ogundiran 2012). Other attempts at defining various Atlantics along nationalistic or imperial lines are less overt, but nonetheless can be found in studies of the Irish (Orser 1996: 89-105; Horning in Kelso 2010), for example. Regional approaches that examine multiple peoples include those focusing on North America and South America, with a particular emphasis on Brazil as part of an Iberian Atlantic (e.g., Funari 2006; Deagan in Kelso 2010), or the Caribbean and its British and French regions (e.g., Kelly & Hardy 2011). In addition to terrestrial investigations, maritime archaeologists working within historical archaeology have investigated a number of Atlantic era sites in the United States (the *Le Belle* by Texas A&M), the Caribbean (most famously Port Royal Jamaica), and more recently in Africa including Ghana (The *Elmina* wreck by Syracuse University) and South Africa (George Washington University's collaborative Southern African Slave Wrecks Project).

Beyond attempts to investigate regions or types of Atlantics, the approach taken by archaeologists considers a range of analytical models primarily aimed at understanding identity within specific socioeconomic spheres of interaction. This includes the work by Stephan Silliman on the northeastern Pequot in the United States, which presents a new perspective on the colonial experience. This and other works investigate what it means to be "indigenous" and how this changes through the course of the Atlantic World era. These issues are addressed utilizing theories of memory and highlighting the lived experience of everyday life by drawing on practice and agency theories.

International Perspectives

The large geographical expanse, involvement of multiple communities, and emphasized relationships between native and European communities have prompted historians and historical archaeologists to approach the Atlantic World in a variety of ways. Though drawing primarily on geographical positioning, the connections formed between these regions through maritime travel, colonialism, and immigration manifested in strong political and cultural ties formed through commerce and exploration. The earliest archaeological excavations carried out within the historical archaeology context, or historic sites archaeology as it was originally named, were conducted at sites tied to discovery and early settlement by Europeans in the United States like Plymouth, Massachusetts and Williamsburg, Virginia. In general, historical archaeology has been defined by its practitioners by its subject matter – namely, sites of European contact in the New World. While the former view of the Atlantic is consequently created from a New World perspective tied to mercantile conquest, in British archaeology this period falls under the umbrella of post-medieval studies including the development of the plantation system in Ireland in the seventeenth century (see Horning in Kelso 2010).

In reaction to the restrictive nature of the Americanist-driven definition of the field, archaeologists have identified this period as a subject for historical archaeologists who employ concepts that are much more global in nature, such as the notions of the "Modern" (Johnson 1995) or "Capitalist" (Orser 1996) World. Both conceptions incorporate the period of the Atlantic World, though each extends the subject matter of the field into the late nineteenth and twentieth century. The emphasis on the spread of capitalism put forth in Matthew Johnson's (1995) and Charles Orser's (1996) formulations is in line with the idea of a modern world-system, originally formulated by Immanuel Wallerstein (1974), that emerged as a result of European trans-Atlantic commerce. All of these research agendas have been criticized for their Eurocentric bias and particularly the emphasis they place on European experiences in, and their conquering of, the New World and parts of western and southern Africa. This includes the expansion of capitalism – deemed a European invention – and the decline of local polities in the Americas and in Africa. The recognition that maritime exploration did create the Atlantic, many argue, should not overshadow the experiences of local communities throughout the Americas and Africa in creating the Atlantic World. It is this point that historical archaeologists have been grappling with since they began to define the focus of their field.

To some extent, studies of culture contact and colonial encounters in the United States represent a move away from a focus on European settlement toward an understanding of the impact of this on indigenous populations. As Deetz indicates, this was a key topic of inquiry in historical archaeology and many of the early studies argued for a loss of native culture. More recently, emphasis has shifted to include consideration of indigenous responses and reactions within colonial encounters in more active terms, through acts of resistance, cultural resilience, and hybridity. Furthermore, archaeologists from Europe, parts of Africa, the Caribbean, and Brazil in addition to the United States have begun to examine local interpretations of the capitalist system driving the Atlantic World. A prominent example of the shift away from the "European experience" within the United States is the subfield of African Diaspora archaeology which focuses on sites associated with populations of African descent in the Americas (and even some in Africa). African Diaspora archaeology's subject matter begins with the trans-Atlantic slave trade and continues into the twentieth century, yet the period that falls under the purview of the Atlantic World is usually considered to begin with the initial arrival of Africans in Maryland and Virginia in the seventeenth century and ends with the abolition of slavery in different areas of the Americas (see Fennell, Chan, Weik, Hauser, and Schávelzon in Ogundiran & Falola 2007). Outside of the United States, various Caribbean Islands have received equal attention with a particular emphasis on plantations and maroon sites (see Haviser 1999) as well as spheres of African-European interaction in West and South Africa (see Monroe, Stahl, and Ogundiran in Ogundiran & Falola 2007; see Schrire in Falk 1991; DeCorse 2001).

Future Directions

Currently, Atlantic World archaeology is coming into its own. This is evidenced by the increase in sessions at the *Society for Historical Archaeology* annual meetings explicitly addressing the topic, such as the 2009 session "The French Fishery in Newfoundland: The Trans-atlantic Landscape of an Atlantic Borderland," or the 2010 session "The Chesapeake in the Atlantic World." Most recently, the 2012 meeting included sessions entitled "African Diaspora in Global Context," "Atlantic Connections and New Dimensions of Archaeology at Maryland's Birthplace," and "Conflict and Violence in the Making of the Atlantic World." These examples represent a shift from identifying the Atlantic as a temporal period, to a more nuanced approach of connections and relationships between spaces and people. While the Atlantic World has been a topic of interest since the early days of historical archaeology, attempts to develop a pragmatic research agenda and gathering interested researchers for debate and discussion are still in

the formative stages (e.g., Kelso 2010 drawing on the 2007 Society for Historical Archaeology Plenary session "Old World, New World, Culture in Transformation").

As seen in the titles listed above, archaeologists are focusing on the connections between regions, and how these shaped local experiences in the Atlantic World. What remains to be seen is if a single Atlantic World archaeology will emerge from these inquiries, or if the field will remain dissipated within historical archaeology as a whole. What is clear, however, is that the growing interest in historical archaeology in the United Kingdom coupled with the increase of researchers focusing on Atlantic era sites in West Africa is driving the current rise in such investigations.

Cross-References

- ▶ African Diaspora Archaeology
- ▶ Brazil: Historical Archaeology
- ▶ Capitalism: Historical Archaeology
- ▶ Caribbean Historical Archaeology
- ▶ Colonial Encounters, Archaeology of
- ▶ Cross-Cultural Interaction Theories in Classical Archaeology
- ▶ Deetz, James (Historical Archaeology)
- ▶ Funari, Pedro Paulo A. (Indigenous Archaeology)
- ▶ Historic Jamestowne
- ▶ Modern World: Historical Archaeology
- ▶ Noël Hume, Ivor
- ▶ North America (USA): Historical Archaeology
- ▶ Orser, Jr., Charles E.
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- ▶ Southern Africa: Historical Archaeology
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Further Reading

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Basic Biographical Information

Valerie Jane Attenbrow, also known as Val Attenbrow, is an Australian Archaeologist and Museum Research Scientist at the Australian Museum. Her interests lie predominately in Australian Indigenous Archaeology related to variations in territorial occupation. She graduated in 1976 with an honors degree from the Department of Anthropology at Sydney University. Her Honors thesis examined the Aboriginal occupation of the far south coast of New South Wales, focusing specifically on the subsistence patterns of the Holocene period.

Once graduating, Attenbrow began working as a consultant archaeologist in the Cultural Resources Division of the New South Wales National Parks and Wildlife Service. During this period, and in conjunction with the salvage excavation program for the Mangrove Creek Dam, she began work on the Upper Mangrove Creek catchment area. The results of her excavations provided the necessary momentum for more research and fieldwork in the vicinity, which Attenbrow undertook as part of her Ph.D. at the University of Sydney.

Attenbrow also examined the Aboriginal occupation of Port Jackson and the surrounding Sydney region in 1987–1988 as part of a -grant-sponsored project initiated by Hunters Hill Municipal Council. It involved the review of historical documents from the late eighteenth and early nineteenth centuries pertaining to the descriptions of Aboriginal life (albeit not comprehensively) in and around Port Jackson and Botany Bay. Attenbrow began the Port Jackson Project in 1989, which she envisaged would correct the variation present in British records concerning the life and culture of the Aboriginal people in the area. The archaeological evidence she procured through excavations resulted in the development of far more reliable timeframes than the documented evidence, alone, could achieve.

Concurrently, Attenbrow began working for the Australian Museum in its Anthropology Division. Her research since then, which is based at the museum, has seen the completion of several large-scale and successful projects, including the Port Jackson Project and the publication of *Sydney's Aboriginal Past* (Attenbrow 2002). She is now a Principle Research Scientist in the Anthropology Unit, Research Branch of the museum. While at the museum, Attenbrow has continued to analyze excavated assemblages from Upper Mangrove Creek, Port Jackson, and those belonging to other museum collections.

Major Accomplishments

Val Attenbrow's career in archaeology has spanned over three decades and, despite being primarily focused on regional New South Wales, includes other notable contributions to the field of archaeology and a considerable number of published works in the form of books, journal articles, papers, and reviews. In fact, as of early 2011, Attenbrow had a total of 73 published works to her name, both as sole author and coauthor.

Sydney's Aboriginal Past (Attenbrow 2002) is considered to be Attenbrow's magnum opus and represents the culmination of much of her life's work. The book examines three time periods: pre-colonial (pre-1788), British colonization (at 1788), and early colonial (1788–1820), while the documents she examined in 1987–1988 pertaining to Port Jackson and Botany Bay provide the work's foundation. Within those three time periods, she examines, discusses, and clarifies various issues, including the variation present in British records of Aboriginal life, the array of Aboriginal languages and the barrier this created

between the indigenous population and the colonists, and the complex social structures of Aboriginal society. Attenbrow also used, her work in this area, to explore aspects of indigenous life ranging from how food and tools were obtained to the belief systems used in the area and how this affected personal adornment to the use of images and rock art, providing a thorough overview of Aboriginal life in the Port Jackson region.

Some of Attenbrow's other prominent works include *Upper Mangrove Creek catchment* (1988) and *Reduction Continuum and Tool Use* (2005) (coauthored with Peter Hiscock). Her latest publications include a chapter in "Trekking Shore: Changing Coastlines and the Antiquity of Coastal Settlement" entitled *The Role of Marine Resources in the Diet of Pre-Colonial Aboriginal People and Land Use Patters Around Port Jackson, Sydney, New South Wales* (2011). Attenbrow has also been the coeditor of "Australian Archaeology" with Betty Meehan (for volumes 30–35, published from 1989 to 1992) and the editor of "AA Short Reports" (for volumes 42–49, published from 1996 to 1999).

Attenbrow has received a Life Membership Award from the Australian Archaeological Association (AAA) in 2002 and was awarded the Mulvaney Book Award in 2004 by the AAA for her book *Sydney's Aboriginal Past* (2002). Consequently, Attenbrow has not only established herself as an insightful interpreter of Sydney's regional archaeological past but as one who has also contributed substantially to the broader understanding of Australia's Aboriginal past (White 2006).

Cross-References

- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Colonial Encounters, Archaeology of
- ▶ White, J. Peter

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Australasian Historical Archaeology

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Introduction

Australasian historical archaeology is a diverse field of archaeological techniques and knowledge focused around the settler societies of Australia and New Zealand. This appellation not only echoes a shared colonial past between the two countries but also demarcates a common disciplinary milieu, a milieu which has seen increased collaboration in recent decades. In the practice of Australasian archaeology, the subfield of historical archaeology commonly relates to the study of a period beginning with the arrival of the first Europeans who arrived with the intent of colonizing Australasia. However, the boundaries of the subfield are not always clear or uncontested and are subject to redefinition as new techniques are adopted and new understandings deployed. Maritime history constitutes an important part of the colonial story in Australasia, and maritime archaeology overlaps with historical archaeology owing to shared research methods and a similar

time frame (Burke & Smith 2007: 215). Therefore, any general consideration of Australasian historical archaeology must be undertaken alongside a consideration of Australasian maritime archaeology (Lawrence & Davies 2009: 629).

The colonial pasts of New Zealand and Australia stem from similar origins within the British diaspora, and these pasts are considerably intermingled, although the initial colonies can be readily understood to have differing populations, since Australia was a penal colony and New Zealand began as a settlement with free settlers. The first flow of population to the east coast of Australia in 1788 over 40 years before New Zealand was vigorously colonized also means a difference in the length of colonial development. Furthermore, each society and region in Australasia was radically altered by the response of Indigenous peoples to colonization. The range of Indigenous responses has resulted in widespread variation, not only between the two countries but also within them. It should also be understood that strong ties still exist between the history and current societies of the two countries. Most of New Zealand was part of the colony of New South Wales until 1825, and the flow of free settlers increased in Australia at around the same time that substantial levels of immigration began in New Zealand. Each country also pursued similar strategies of domination in an attempt to control and subjugate the Indigenous inhabitants of Australasia. The countries were drawn together more tightly through the nineteenth and twentieth centuries and their shared heritage, and geographical proximity has led to strong cultural similarities. Importantly, the diverse background of immigrants to Australasia from all over the world means that it has a broad multicultural composition.

Although there are a number of succinct and instructive descriptions of Australasian historical archaeology as a discrete entity (e.g., Lawrence & Karskens 2003; Lawrence & Davies 2009; Paterson & Heath 2009), the historical archaeology of Australia and New Zealand has not been subjected to a unified exhaustive analysis. This is as much a result of the distinctive development of the discipline within each country as it is of different frames of reference currently at work. A noticeable lack of a shared comprehensive self-reflection underscores a current effort within Australasian historical archaeology to implement studies of a broader geographical scope as a starting point for wider discussions. This effort is a sign of a growing regional "Australasian" consciousness fostered in part by the Australasian Society for Historical Archaeology (ASHA) and the Australasian Institute for Maritime Archaeology (AIMA).

Despite a group of studies undertaken in the early twentieth century in New Zealand by the anthropologist Elsdon Best, the discipline principally flourished throughout Australasia from the start of the 1960s. This began with an awakened understanding on behalf of scholars that the material culture of the historical period was useful in answering research questions, even if these questions were only a subordinate interest to their concerns about the ancient past. This academic awakening was soon spurred by changes occurring within wider society. In both countries, the burgeoning public interest in national history led to historical heritage receiving legislative protection from national and regional governments. This legislation encouraged the growth of professional historical archaeologists who were capable of meeting the new legal requirements for both government and private organizations. The growth of archaeological consultants within historical archaeology, and consequently the increase of reports intended for private consumption rather than publication, has led to the expansion of a considerable body of difficult to locate literature. Although there are some studies that have moved to change this, such as the work of the Archaeology of Sydney Research Group that promotes research and publications from consultant archaeologists as well as academics.

Statutory bodies in both Australia and New Zealand are responsible for the protection of historical archaeological heritage and of ensuring adequate standards in historical archaeological practice. This position is chiefly occupied in New Zealand by the New Zealand Historic Places Trust and in Australia by the Australian Heritage Council and smaller state bodies. Legislation

such as the *Resource Management Act 1991* and the *Historic Places Amendment Act 1975* in New Zealand and the *Environment Protection and Biodiversity Conservation Act 1999* and a variety of state acts in Australia provide statutory frameworks for the protection of historical heritage. There are also a number of non-statutory bodies like the National Trust, Australasian Society for Historical Archaeology (ASHA), Australian Institute for Maritime Archaeology (AIMA), Australian Archaeological Association, and the New Zealand Archaeological Association that promote the protection of historical archaeological heritage. Various local and community groups throughout Australasia also take an interest in protecting the historical archaeological heritage that they are most connected with.

Definition

Australasian historical archaeology is the study of the colonial past of Australia and New Zealand through the investigation of material culture. The time frame that is studied commonly extends from 1788 to the present day, and it can be seen that historical archaeology in Australasia is largely based on an event, the annexing of land by European colonists, rather than any nebulous criteria concerned with an arbitrary "documentary" threshold of historicity in society. The legislative and practical framework constructed around Australian and New Zealand territory means that the vast majority of Australasian historical archaeology is physically placed in Australasia.

The temporal focus of historical archaeology in Australasia is primarily from the beginning of serious colonization onward, although periods of exploration of the region by Europeans and interactions with Indonesian peoples occurring as far back as the beginning of the seventeenth century are often included. The Makassar seasonally visited the north coast of Australia in search of the *trepang* (sea cucumber) since at least the eighteenth century and the Dutch explorers left their material culture, often in the form of shipwrecks, along the west and north coasts of Australia since the seventeenth century. The sometimes implicit emphasis on the arrival of the colonizers often means that in practice, there is a sharp distinction drawn between Australasian historical and prehistoric archaeology, a distinction reinforced by legislation and cultural heritage management frameworks. This division is particularly the case in Australia but less so in New Zealand where historical period Māori sites were first investigated in order to better understand the precolonial past (Smith 1991: 8). This interest in Indigenous cultural continuity across the barrier of European colonization has been sustained throughout the history of New Zealand historical archaeology. Contrarily, only recently has there been an attempt to return an understanding of Indigenous Australian people to the historical landscape in Australia. This attempt has arisen largely from assertions by Indigenous Australians that their histories did not cease with the arrival of the colonists, rather than from a sudden outpouring of theoretical sophistication by archaeologists. This means that the temporal boundary between "prehistoric" and historical Australasia is far from fixed, even less so than the temporal boundary between precolonial and colonial Australasia, despite what has often been believed.

The spatial scope of Australasian historical archaeology is directed primarily to the mainland of Australia, Tasmania, the North and South Island of New Zealand, and a number of other islands scattered throughout the Pacific. Australia and New Zealand also lay claim to portions of the Antarctic and the material remnants of scientific exploration receives archaeological attention from both countries. The Australasian geopolitical area is critical to the practice of historical archaeology, and much research relies on government funding or government-backed regulators. Important archaeological sites spread throughout the world are associated with the history of the ANZACs, Australian and New Zealand soldiers who fought alongside one another in the First World War. The story of the ANZACs constitutes a history that is critical to centralizing and unifying national identities in

both countries, although many archaeological sites are located outside of Australasia. While the geopolitical boundaries of the Australasian region are important in maintaining and fostering the subfield, the global dispersal of Australasian historical archaeological sites means that the scope of Australasian historical archaeology is global.

Broad concepts like capitalism and immigration provide the bedrock of analysis in Australasian historical archaeology, yet it also makes use of a wide variety of more specific themes and categories to control and understand its data. These are somewhat arbitrary, and entirely open to question, these concepts help structure the investigation and provide a measure of comparison that is becoming more and more critical to the subfield. There are as many different categories of site "as there are different types of human behavior in the past" (Burke & Smith 2007: 196), yet a broad enumeration will give an idea of what comprises the regular subject of historical archaeological discourse in Australasia.

An important first step in the use of categories in Australasia is usually the sketching of cultural boundaries interior to Australasian society. This is largely to do with the broader area of knowledge that the site can then be placed in and the resultant ease of comparison that the framework of knowledge then provides (Smith 2004: 260). The rich multicultural background of Australasia means that the cultural groupings are many and varied, yet some examples of cultural groupings often deployed are Indigenous Australian, British, Chinese, Irish, Dutch, German, and Māori. An example of the multiplicity that is encountered once the above broad categories are investigated more closely is seen through the use of the concept of Indigenous Australian cultural identity in the analysis of the historical period. With hundreds of Aboriginal nations, each cultural group is distinct and possesses its own language or dialect and its own worldview. Further evidence of the mutability of these categories can be seen in work relating to Chinese immigrants in the Australasian goldfields in the nineteenth century. These immigrants tended to come from southern China's Guangdong province and their language was Cantonese rather than Mandarin. Selecting the right cultural framework with which to interpret results is often a matter of accurate historical research and the correct scale of analysis. Cultural categories such as these are often employed simultaneously with a variety of site types.

These site types cut across the broader category and tend to reflect the masculine occupations of the past to the exclusion of historical actors who were not adult males (Burke & Smith 2007: 208). Although this is true, when this typing is considered in the broadest possible fashion, a consideration of these types helps to flesh out any definition of Australasian historical archaeology, even if only to characterize the content of how the past is constructed by historical archaeologists in Australasia. A framework produced by Ilka Schacht (2010) for a thematic research framework in Australian archaeology provides a good starting place for this understanding, and Table 1 is a small selection of subjects and themes drawn from this work with the addition of some New Zealand examples.

The practice of historical archaeology in Australasia is typical of global historical archaeology, survey, excavation, and heritage management being chief activities undertaken by practitioners (Fig. 1). Research is conducted through the investigation of documentary evidence at the same time as archaeological evidence which includes standing structures alongside subsurface features and deposits. The majority of documentary evidence is usually available freely from government organizations throughout Australasia and can often be accessed through the Internet. Government requirements within each of the states of Australia and within New Zealand have different requirements for archaeologists and definitions of correct archaeological practices.

Historical Background

An incipient investigation of historical sites was evident in Australasia as early as 1921, yet it was only in the 1960s that systematic historical

Australasian Historical Archaeology, Table 1 A selection of subjects, themes, topics, and site types in Australasian historical archaeology, slightly modified and heavily abbreviated from Schacht (2010)

Examples of subjects	Examples of themes	Examples of sites
Settlement	Cross cultural encounters	Trading station, mission station, rockshelter, camp site, and rural estate
	Convicts and incarceration	Convict households, squatters' estates, prisons, female convict factories, and convict ships
Development	Defense	Battlefields, hangars, airfield bomb shelters, *Pa*, and searchlight bunkers
	Infrastructure and transport	Wreck site, shipyard, dry dock, road verge, tramway, and rail bridge
People and society	Status and class	Schools, churches, urban houses company offices, and cemeteries
	Ideology, cult, and religion	Churches, mosques, temples, Bora rings, cricket pitch, shrine, and town halls
Economy	Primary industries	Quarry, mine, farm, sealers camp, logging camp, and tryworks
	Consumption	Corner shop, urban house site, warehouse, wreck site, quay, and farmhouse

archaeological work began to be undertaken by academic and museological institutions. The first studies contained significant elements of post-contact, industrial, military, and, in Australia, maritime archaeology. Owing to a growing historical consciousness in Australasia, there was a broad enactment of legislation protecting historical heritage from the 1970s. This legislation spurred an increase in archaeological activity in Australia and New Zealand through the 1970s and 1980s, with the former country emphasizing the role of private consultants and the latter that of government-employed archaeologists (Smith 1991: 8; Lawrence & Davies 2011: 12). From the early 1990s, formal steps were taken to solidify the links between Australia and New Zealand, and studies with a wider regional focus were completed. The varied development of historical archaeology in Australasia has shaped the current debates and areas of concern within the discipline today.

The earliest form of historical archaeological thinking in Australasia was the investigation of colonial era Māori *Pa* and British military fortifications by the anthropologist Elsdon Best in New Zealand in the 1920s (Smith 1991: 6). Although relying heavily on historical sources and producing work of a primarily descriptive nature, Best dealt with sites from the colonial period and explained structural changes in Māori military fortifications (Smith 1991: 6).

In 1959, archaeologists in New Zealand excavated a series of deposits dating from the nineteenth century Māori site at Orongo Bay, Gisborne, deposits that were superposed over earlier prehistoric deposits (Smith 1991: 7). Later in 1959 and 1960, excavations were undertaken at the site of the British military's Paremata Barracks near Wellington (Smith 1991: 7). In New Zealand in the 1960s, investigation was focused mainly on post-contact Māori sites, and most of those conducting historical archaeology had received their training in prehistoric archaeology (Smith 1991: 8). During this decade, the New Zealand Archaeological Association began to include historical sites within its site recording scheme (Smith 1991: 8), marking an acknowledgement of the applicability of archaeological techniques to the colonial past. A project in New Zealand that was representative of the emphasis on the study of Māori sites in this decade was the Tongariro Power Development Project (Smith 1991: 8).

The predominance of a prehistoric and anthropological background for the emerging discipline of historical archaeology in New Zealand was not mirrored in Australia, where scholars were also drawn from diverse subject areas such as classical archaeology, history, and geography (Lawrence & Davies 2009: 629). As in New Zealand, a small number of small-scale early studies, primarily driven by historical research but that included elements of archaeological understanding, were undertaken from 1933 up until the 1960s (Paterson & Heath 2009: 113-14). The first substantial, and substantially excavation based, historical

Australasian Historical Archaeology, Fig. 1 Extensive excavations in Hobart at 15 Hunter Street, Sullivans Cove, showing the areas of excavation, interpretive signage, and nearby inn "The Drunken Admiral" that is of the same era as the excavated site. Historical standing structures, public interpretation and urban excavation are three key features of Australasian Historical Archaeology (Photograph taken by Anthony Jenner and courtesy and copyright of Austral Archaeology Pty Ltd.)

archaeological work in Australia was aimed at training postgraduate students in the University of Sydney, the University of Melbourne, and the Australian National University (Lawrence & Davies 2011: 12). Sites excavated as part of this original phase included Port Essington in the Northern Territory and the Irrawang Pottery in New South Wales (Paterson & Heath 2009: 114). The investigations at Irrawang Pottery in the second half of 1969 directed by Judy Birmingham formed a cornerstone of Australian historical archaeology, and industrial archaeology has since been a core focus of Australian historical archaeology (Fig. 2).

The 1970s saw a strengthening of the position of historical archaeology in Australasia, primarily though the passing of legislation protecting historical heritage and the growth of awareness of the importance of historical heritage among the Australasian public. In Australia, the decade opened with the founding of the Australian Society for Historical Archaeology in 1970 (Lawrence & Davies 2011: 14). Following this, the Hope Inquiry was appointed by the Federal Government in 1972 and 1974 to investigate historical heritage in Australia. It included two archaeologists in its appointments and led to the inclusion of historical archaeological places in the Register of the National Estate (Lawrence & Davies 2011: 13). The Register of the National Estate provided statutory protection for sites throughout Australia, and the inclusion of this marked the beginning of a series of localized legislative acts across the country aimed at protecting historical heritage. Undergraduate courses in historical archaeology were offered for the first time by Judy Birmingham at Sydney University in 1974. At around this time, the publication of historical archaeology regarding Australian sites widened in scope and increased in quantity. The publications included books, monographs, and articles dealing with site and artifact studies as well as maritime archaeology and heritage management (Paterson & Wilson 2000: 83). In 1977, the first archaeological excavation took place at Port Arthur, an early convict settlement of some size in Tasmania, and this place was to become a testing and training ground for Australian historical archaeology until the present day.

In New Zealand, there was the implementation of the *Historic Places Amendment Act* in 1975, guaranteeing the protection of sites over 100 years old, and the 1976 seminar by the New Zealand Archaeological Association that set out a conscious plan for promoting historical

Australasian Historical Archaeology, Fig. 2 Excavation at the Phoenix Foundry in South Australia unexpectedly revealed intact molding floors and large, elaborate casting molds. The footings for cranes that were used to move the molds into place can be seen as the white objects at the *top* and *bottom* of photograph (Photograph taken by Justin McCarthy and courtesy of and copyright of Austral Archaeology Pty Ltd.)

archaeology. Important archaeological studies were also undertaken during this time by Neville Ritchie in the Clutha Valley and Nigel Prickett at Taranaki (Smith 1991: 8). The Clutha Valley project produced the then largest and most detailed historical archaeological study undertaken in New Zealand, and it specifically focused on the archaeological remnants of the Chinese gold miners associated with the industrial history of the area. This survey marked the first substantial interest in the archaeology of the overseas Chinese in Australia Around the same time, Prickett had been investigating the fortifications remaining from the Taranaki wars of the 1860s and 1870s, the first extensive investigation that involved significant amounts of European heritage in New Zealand (Smith 1991: 8). These projects provided important training to the following generation of New Zealand historical archaeologists.

Although the awareness of the value of maritime sites in Australia was growing as a result of activities by amateur divers through the end of the 1960s, it was in the beginning of the 1970s that the first steps toward maritime archaeology were taken in the west of Australia. The practice of maritime archaeology in Australasia arose from the need to successfully manage a number of early Dutch wreck sites along the coast of Western Australia that had become subject to looting and harm (Gibbs 2004: 37). The Western Australian Maritime Museum led the early maritime investigations of the Dutch wrecks, carefully excavating four of them between 1973 and 1976 and displaying cannon, elements of the hull, and cargo from the ship *Batavia* (Lawrence & Davies 2009: 632). The excitement of the history associated with the wreck and the splendor of the cargo significantly raised the public profile of maritime archaeology in Australia. Over the coming decades, while the majority of academics showed considerable apathy in promoting the interests of maritime archaeology, the Western Australian Maritime Museum, in association with James Curtin University, trained the current generation of maritime archaeologists in Australia (Gibbs 2004: 37).

The 1980s saw the growth of consultants working in the private sector practicing historical archaeology in Australia, while in New Zealand, routine funding by government meant that a considerable number of historical archaeological publications appeared. As an indication of this, over 70 % of historical archaeological surveys were conducted for two government

Australasian Historical Archaeology,
Fig. 3 Precise excavation and recording in progress at Oihi Bay, New Zealand. With a Māori *Pa* and an early mission station Oihi Bay, it represents a significant contact site (Photograph courtesy of and copyright of Andrew Blanshard, Department of Conservation, New Zealand)

bodies: the Forest Survey and Lands and Survey (Smith 1991: 9). The bulk of sites dealt with during this time in New Zealand were industrial, primarily mining, but by the end of the decade, an increase in urban excavation meant that many more domestic sites were also being investigated. The investigation of Māori sites continued to be a staple of New Zealand archaeology through this period, while there was an increase in the investigation of maritime archaeology, beginning in the 1980s (Smith 1991: 9) (Fig. 3).

The situation in Australia was slightly different, as private consultants conducted a large share of the historical archaeological investigations and the foundations for historical archaeology established in academia in the 1970s were consolidated. Graham Connah began teaching historical archaeology at the University of New England in Armidale and Tim Murray at La Trobe occupied the nation's first position dedicated to historical archaeology (Lawrence & Davies 2011: 14). The "Little Lon" excavation in Melbourne, the Queens Theatre excavation in Adelaide, and the beginning of excavations in the Rocks in Sydney are examples of extensive urban excavations that began to occur throughout the cities of Australia as the legislation of the previous decade was enforced (Lawrence & Davies 2011: 14). Reports published during this time increased in sophistication and attention to detail, especially regarding the artifactual assemblages retrieved as part of the excavation.

The 1990s saw the coalescence of an Australasian historical archaeological consciousness and the formalization of the partnership between Australian and New Zealand archaeologists. This connection across the Tasman Sea had been building for some years since the growth of archaeology in each country. In 1990, the Australian Society for Historical Archaeology held a conference in New Zealand and two years later formally changed its name to the Australasian Society for Historical Archaeology, the name of its journal undergoing a similar change. Soon after in 1995, a joint conference was held with the Australian Institute of Maritime Archaeology, which, in 2001, also changed their title to incorporate Australasian. During this time, more appointments were made in Australian universities for positions relating to historical archaeology, and maritime archaeology began to be accepted in the academic establishment. Australia followed New Zealand in investigating Chinese heritage in this decade with a nationwide study (Ritchie 2003: 4). Maritime archaeology also began to lead the way in terms of creating studies with a broad geographical scope, such as the Archaeology of Whaling in Southern Australia and New Zealand project.

The first decade of the twentieth century saw for the first time cohesive trends across Australasia: the continued rise of consultant historical archaeologists in Australasia and a growth of regional projects undertaken by archaeologists in both countries. Alongside was a marked increase in the amount of historical excavation in New Zealand (Smith 2004: 257) and a practical concern with the absence of a thorough investigation of the Indigenous Australian colonial past (Harrison 2010: 90). This congruity between historical archaeological practitioners in the two countries has led to a tentative collaboration on practical projects and an even more tentative approach to theoretical issues.

Key Issues and Current Debates

Current debates in Australasian historical archaeology cover a wide range of areas, from the manner that archaeological findings might be communicated to society to ways of understanding and drawing out insight into the working of ethnicity, class, and gender from the archaeological record. Despite the recurrence of the same issues throughout Australasia and a forum for regional discussion, debates still tend to be localized in either Australia or New Zealand with the problems directed toward a national rather than Australasian basis. This mild form of parochialism arises from the value invested in historical archaeology as a tool of nation building as much as it does from the difference in the trajectories of disciplinary development between the countries.

A number of key issues in Australasian historical archaeology are shared between New Zealand and Australia, namely, concerns over a growth of a large body of unpublished archaeological research, questions about the appropriate scale to conduct studies, possibilities of establishing comparability between sites, and doubts about historical archaeology's role within wider society. Given the difference in the course of development of historical archaeology in the two countries, several critical issues are localized in each country but are still central to current understanding. An example of this is the role of post-contact archaeology in Australia, while in New Zealand, there is a distinct lack of development in the understanding of maritime historical archaeological sites (Carter & Dodd n.d.). The key issue of the appropriate scale that investigations may be conducted at is a core issue in understanding historical archaeology as it relates to the unity of Australasian historical archaeology as a whole.

A consistent issue across Australasia is the increasing creation of the reports of private consultants that are never offered for publication and therefore are not available to the public or to other archaeologists (Smith 2004; Connah 2007). In both Australia and New Zealand, this growth of unpublished, or gray, literature is often linked with the inability of historical archaeology to communicate its findings to the public. Therefore, this fuels concerns over the place of historical archaeology in wider society. In some ways, it is also seen to hamper the establishment of studies of appropriate scale in Australasia, as essential research that might otherwise be available has been withheld from the grasp of researchers (Connah 2007: 106). This is not always the case as the New Zealand Historic Places Trust maintains a library of thousands of online historical archaeological reports produced by consultants and government departments across Australia make reports available on request. Obversely, the monetary cost of subscription to quality historical archaeological journals or online databases often means that access is prohibited to consultants who are not affiliated with an academic institution.

The lack of explicit theory has often been commented on in Australasian historical archaeology (e.g., Murray 2002) and is often linked to the tension between consultant and academic practices noted above. The most serious attempt to systematically produce and apply a novel theory with a substantial data set thus far has been by Burke (1999) where an analysis of the structural relationship between capitalist ideology and historical architecture is undertaken on a regional basis. A concern with the theory and utility of artifact studies has also been an increasing issue in Australasian historical archaeology, and several papers over the last decade have begun

to address the difference between artifact cataloging and artifact analysis (e.g., Crook, Lawrence & Gibbs 2002), or the role of functional categories in analysis itself (Brooks 2005). These artifact studies represent a departure from North American artifactual models and a fast developing independent strand of archaeological theory and method.

The emphasis on post-contact Māori heritage in New Zealand historical archaeology has been continuous, while in Australia, the study of colonial British society eclipsed that of post-contact indigenous sites in the latter decades of the twentieth century. The recent attention paid to the Indigenous Australian experience of the colonial past, first by Indigenous Australians themselves and more recently by archaeologists, is "transforming the discipline from within" (Harrison 2010: 90). A number of studies have recently been published that reflect a departure from the typical subject matter of Australian historical archaeology and innovations in methods for the archaeological approach to the recent past (e.g., Byrne et al. 2001; Lydon 2009).

Although all these issues touch upon one another, a central problematic that binds most of these issues together is the struggle to introduce a broader scale to the analysis of projects. The comparison of artifact assemblages between sites needs proper frames of reference and coherent analysis, not just cataloging. Critically, as seen in the landmark works of Byrne et al. (2001), Lydon (2009), and Middleton (2008), studies of Australasian contact history benefit enormously from wider contextual studies. The idea of a cultural landscape has severe implications regarding scope and methodological procedure, the issues of which are yet to be completely drawn out. The problems presented by an increasing amount of gray literature leave gaps in the data accessible to larger-scale studies.

Future Directions

The key issues that are of concern to historical archaeologists in Australia and New Zealand have given rise to a number of clear future directions. The broadening of scope of historical archaeological studies to include broader regional spatial and temporal boundaries is one likely future direction. Developments in the understanding of historical assemblages will introduce more nuanced understandings of the meaning that is derived from particular sites. These directions call for new methodologies and theories to support the expansion in scale and sharpening of precision. Broad research frameworks, wide ranging but not exclusive themes, and more flexible artifact categories are all future possibilities.

The improvement of the manner in which historical archaeologists communicate with each other and the public is a necessary direction that must be taken in order to overcome a proliferation of wasted literature. The directions that this is likely to take are twofold: an increased community involvement in archaeological projects themselves and a clearer theoretical understanding of what is of importance to the people that archaeologists engage with. Lessons from contact archaeology will be of particular importance in this regard, for it has introduced a more nuanced and responsive positioning of archaeologists and communities than has previously existed. Therefore, of critical importance to the future of Australasian historical archaeology is openness; engagement with the requirements of regional, national, or local communities; and a growth in the awareness of archaeologists about their current and possible roles in creating the historical past.

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- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Australia: Domestic Archaeological and Heritage Management Law
- ▶ Australia: Maritime Archaeology
- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Australian Archaeology: Pioneers and Traditions
- ▶ Buildings Archaeology

- Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- Capitalism in Archaeological Theory
- Community Archaeology
- Connah, Graham
- Critical Historical Archaeology
- Decolonization in Archaeological Theory
- French Guiana: Archaeology and Minority Communities
- Indigenous Archaeologies: Australian Perspective
- Industrial Archaeology
- Interpretation in Archaeological Theory
- Labor Archaeology
- Missionization and Mission Archaeology in New Zealand and Australia
- Multicultural Archaeology
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Australasian Institute for Maritime Archaeology Inc. (AIMA)

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Basic Information

The Australasian Institute for Maritime Archaeology (AIMA) is an incorporated, not-for-profit organization, dedicated to the preservation of underwater cultural heritage. Based in Australia, it has sponsored work throughout Australia, Asia, and the Indian and the Pacific Ocean. AIMA's objectives are to support and undertake scientific research within the field of maritime archaeology and to publish the results of this work. AIMA is an incorporated body with a Constitution. All members must agree to abide by the Constitution and its accompanying Code of Ethics upon joining or renewing their membership. AIMA works closely with, and provides advice to, State, Territory, and Australian Federal Government on policy pertaining to underwater cultural heritage, such as the *Historic Shipwrecks Act 1976* and the *UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001*. The URL for AIMA is: http://www.aima-underwater.org.au.

Major Impact

In Australia, AIMA has supported important archaeological investigations on shipwreck sites, including *Batavia* (1629) in Western Australia; HMS *Sirius* wrecked at Norfolk Island; HMS *Pandora* (1791) off far north Queensland; *Sydney Cove* (1797) wrecked in Bass Strait, Tasmania; *Zanoni* (1867) in South Australia; and *City of Launceston* in Victoria (1865). AIMA plays an important role in the dissemination of maritime archaeological research. It has an active publications program, including a quarterly newsletter and an annual journal, the AIMA Bulletin, as well as special publication reports. AIMA also organizes an annual conference and provides scholarship money for members to conduct fieldwork and research.

AIMA plays an active role in international maritime archaeology. The organization strongly supports the *UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001* and is formally accredited by UNESCO as a nongovernment organization member of the Scientific and Technical Advisory Body to the State Parties to the Convention. AIMA also supports the work of the International Committee for Underwater Cultural

Heritage (ICUCH) with several of our members represented on the committee and holds an associate membership to the Advisory Council for Underwater Archaeology (ACUA). AIMA members have been involved in training programs in China, Thailand, Taiwan, and Sri Lanka. Joint cooperative projects to assist and support existing or developing maritime archaeological programs have been undertaken in Kenya, Oman, Sri Lanka, Malaysia, Indonesia, Thailand, the Philippines, the Solomon Islands, Korea, and Japan.

AIMA, in conjunction with the Nautical Archaeology Society (NAS – United Kingdom), teaches a four-part course on maritime archaeology. This internationally recognized course is currently run in the United Kingdom, South Africa, Canada, Micronesia, and the USA, among other places. The aim of this course is to introduce the methods and procedures used in maritime archaeology and to generate awareness of underwater cultural heritage preservation in Australia. On completion of each of the courses, students are awarded an AIMA/NAS certificate, which is internationally recognized.

AIMA often lobbies on issues of interest to its membership, such as amendments to underwater cultural heritage legislation in Australia and the region. It has formal ties with other archaeological organizations including the Australasian Society for Historical Archaeology and the Australian Archaeological Association with which it occasionally holds joint conferences.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Maritime Archaeological Organizations
- ▶ Underwater Archaeology

Further Reading

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Australasian Society for Historical Archaeology (ASHA)

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Basic Information

The Australasian Society for Historical Archaeology (ASHA) is an organization that represents historical archaeologists from Australia and New Zealand. It is primarily a society for the interchange of ideas and information related to specific sites, regional analyses, and global perspectives of historical archaeology within the archaeological community, the general public, the cultural heritage industry, and the different tiers of government in both countries. ASHA was founded in 1970 as the Australian Society for Historical Archaeology primarily by Sydney-based archaeologists, and it developed out of initiatives by the New South Wales National Trust and the University of Sydney. One of the leaders of this was Judy Birmingham of the University of Sydney (Lawrence 2006: 5) who was the first secretary and later President of ASHA. It held the first of its now annual conferences in Sydney in 1980. Since then, conferences have been held in all parts of Australia and New Zealand, including half way between the two on Norfolk Island. Joint conferences are often held with the Australasian Institute for Maritime Archaeology and occasionally with the Australian Archaeological Association. The ASHA website is at www.asha.org.au.

Major Impact

ASHA has always had an active publication record and has produced a members' newsletter since the beginning of the Association and started producing its journal, *The Australian Journal of Historical Archaeology*, in 1983, under the editorship of Graham Connah. The 1990 conference held in

Auckland acted to strengthen the ties between Australian and New Zealand historical archaeologists, leading to the change in the association's name to the Australasian Society for Historical Archaeology. This move was mirrored in a change in the journal's name with the publication of Volume 10 in 1992 as *Australasian Historical Archaeology*. ASHA also publishes monographs and landmark doctoral theses in separate publication series.

The ties between historical archaeologists of New Zealand and Australia are more than institutional as both countries share a similar history of British colonization and, for example, an early reliance on mining and pastoral industries, and dependence on the sea for transport, defense, and resources (such as whaling and sealing). Consequently, the research interests of ASHA members from both sides of the Tasman Sea often align. Most of the professional work of ASHA members though does not lie in academe or in museums; most work either in the cultural heritage industry or for the government bodies that regulate that industry. As such, it has always been ASHA's mission to make the results of this consultancy work available to the wider archaeological community and the general public. ASHA also promotes excellence in historical archaeology with an awards program that consists of the annual R. Ian Jack Award for Best Honours Thesis, Judy Birmingham Award for Best Historical Archaeology Consulting Report, Martin Davies Award for Best Public Archaeology Initiative, the biannual Maureen Byrne Award for Best Postgraduate Thesis, the quin-annual Graham Connah Award for Best Publication, and the occasional Ilma Powell Honorary Life Membership Award for Distinguished Service.

Cross-References

- ▶ Australasian Historical Archaeology
- ▶ Connah, Graham

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Australia and the Origins of Agriculture

Rupert Gerritsen
National Library of Australia, Canberra, ACT, Australia

Introduction

The advent of agriculture as a particular form of food production, along with animal domestication, marks the beginning of an unparalleled transformation in human affairs. The transition that took place, from hunter-gatherers to agriculturalists, underpinned the evolution of a number of great civilizations. Usually the development of agriculture based on rye, wheat, and barley in western Asia, and rice and millet in China, is identified as the archetype for the development of the first pristine agriculturally based societies in human history. Over time extensive investigations in a range of disciplines have been conducted in an endeavor to understand the phenomenon, investigations which have attempted to answer such basic questions as when, where, and how did it happen, and perhaps most importantly, why did it happen at all? More recently, it has been realized that developments in hunter-gather societies were more varied and complex than originally portrayed, and that different pathways and forms of "food production" were conceivable. Accordingly, other patterns of development have come to be recognized, one in particular involving the formation of distinctive, complex, socioeconomic, and sociopolitical structures. Societies exhibiting such characteristics are often labeled as "Complex Hunter-Gatherers" or "Affluent Foragers." However, this phenomenon has made the whole question of the origins of agriculture more complex.

Research into the location and timing of the "agricultural revolution" over the last 100 years or so has resulted in the determination, at least in proximate terms, of when and where such developments took place. In the process, it has become apparent that it was not a discrete event but

a circumstance that occurred independently in a number of different places at different times. However, some degree of consensus appears to have been reached in characterizing what happened – that certain groups managed to accomplish, unaided, the transition from hunting and gathering to farming (pristine development), apparently in the space of only a few centuries. The characterization of that transition does depend, however, on the paradigmatic viewpoint. Usually such explanations are framed in anthropological or economic terms, but the process has been described within a biological evolutionary framework.

Agriculture arose independently, or was adopted, at least once on all the inhabited continents, with the reputed exception of Australia. A variety of reasons have been put forward for this apparent anomaly, although it has recently been argued that agriculture was in fact practiced by a limited number of groups in two parts of Australia at the time that British colonization began (Gerritsen 2008). The evidence for relies principally on ethnohistorical and ethnographic information at the moment, rather than archaeology.

Definition

Australia is defined here as the modern political unit, which includes mainland or continental Australia, Tasmania and all offshore islands, and all the islands in Torres Strait, to within a few kilometers of the coast of mainland Papua New Guinea.

The Indigenous population of Australia is usually referred to generically as Indigenous Australians, and this embraces Torres Strait Islanders between the tip of Cape York and the south coast of Papua New Guinea, Aboriginal people of continental Australia, and the Tasmanians. Where Indigenous societies are discussed here, it is in the sense of "traditional" societies, their form at the time when initial contact with Europeans and other outsiders commenced, or began to have a significant influence.

A great variety of definitions of agriculture have been proposed. While it would appear from this that there is little definitional consensus, in behavioral terms, the principal elements appear to be propagation (sowing, planting, usually of "domesticates"), husbandry (soil preparation, maintenance of moisture and fertility, exclusion of competitors, protection from predators), harvesting, and finally storage. The scale or areal extent of these activities would also appear to be a significant factor, though not always explicitly stated.

Whatever definition of agriculture is considered, all consider deliberate planting as a central activity. One attribute that has been included in definitions of agriculture is the requirement that the crops being grown and harvested are "domesticated." However, this requirement has been widely challenged in recent times (Gerritsen 2008: 29-31). Many, but not all, cultivated food plants appear to undergo morphological [phenotypic] changes and/or speciation, some quite quickly, once they are systematically planted, and in so doing may become human-dependent. But intensive harvesting, without planting, may also produce some of those changes, while plants that are systematically harvested may not undergo genetic changes, which depends on the harvesting method as well as the plant's genetic responsiveness (Gerritsen 2008: 29-31, 38-41, 83-4). Moreover, it is becoming evident that in early agriculture, the crops being grown were wild, "undomesticated," crops. In southwest Asia, current evidence indicates wild, undomesticated or only partially domesticated cereals were being grown well into the Neolithic, the period when it is usually accepted agriculture was becoming, or had become, established (Gerritsen 2008: 31, 41, 74). Rice (*Oryza sativa*) is another case in point. It had been cultivated for at least 3000 years as "ancient cultivated rice," only becoming "domesticated" at the end of the Chinese Middle Neolithic (Gerritsen 2008: 31, 75, 83-4). Some have endeavored to distinguish this period as "pre-domestic agriculture" or "pre-domestic cultivation" (Gerritsen 2008: 30-1). The evidence indicates that initially agriculture took some time to become established as the predominant means of food production and even in the

latter part of the Pre-Pottery Neolithic B, from around 9800 cal. BP, hunting, fishing, and wild food procurement (such as nuts and lentils) still provided a substantial proportion of the food supply (Gerritsen 2008: 41).

Although not always explicitly stated, storage or conservation of the yield from crops that are grown is also a central feature of agricultural systems. While physical storage is usually seen in the case of seed, nut, and some tuber crops, it is a frequent practice with vegetatively reproduced staples, such as taro, sweet potatoes, and yams, for the tubers to be left in situ and harvested as needed.

In much of the writings and publications on the origins of agriculture, the term "Neolithic" is treated as almost being synonymous. Broadly speaking, as agriculture, or a mixed economy, such as animal husbandry and agriculture, starts to become the predominant mode of subsistence, permanent habitations, small permanent settlements, much higher levels of sedentism and systematic storage are evident. Although these characteristics emerge from the antecedent period, the Natufian in southwest Asia for example, they are strongly associated with all Neolithic cultures.

Often activities such as clearing, tilling, weeding, fertilizing, watering, and protection of crops are also included in the definition of agriculture. However, there are no systematic studies to support those generalizations and current evidence indicates that at least some may well be much later developments, refinements, or optimization behaviors adopted when agriculture had already become the dominant means of food production.

In summary, agriculture, particular early agriculture, must involve at least propagation (sowing and planting), some husbandry (soil preparation, maintenance of moisture and fertility, exclusion of competitors, protection from predators), harvesting, and finally storage on a significant scale.

Historical Background

The first documented contact Australia had with the outside world took place in March 1606, when a Dutch ship, the *Duyfken*, sailed down and charted 300 km of the western side of Cape York in Queensland, having contact with some of the Indigenous population, probably the Anggamudi or Wik peoples, as they did. In the following 164 years, most of Australia's coasts were unveiled to the outside world and in 1788, the British established a colony at Port Jackson (Sydney) on the east coast. In the succeeding decades, British colonies were established in many parts of Australia. Where these settlements took hold and expanded the Indigenous population was decimated by massacres, epidemics, loss of land, sources of traditional sustenance, and neglect. One of the justifications used for the expropriation of the continent and the dispossession of the Indigenous inhabitants was the claim that they did not till the land and therefore did not use it productively.

Since that time, evidence has come to light from a variety of sources that Indigenous Australians did plant and sow in traditional circumstances. This includes species of yam (*Dioscorea* spp.) in the Cape York region in Queensland – on east Cape York among the Umpila at Lockhart River and islands offshore, and among the Walmbaria and Mutumi of Flinders Island and the adjacent mainland – and west Cape York among the Wik-Mungkan and possibly the Tjungundji. Planting of yams has also been noted at Kalumburu in the very north of Western Australia. Hynes and Chase reported the Pama Malnkana of northern Queensland planted coconuts (*Cocos nucifera*), while the Uradhi of northern Cape York cultivated the sweet potato (*Ipomoea batatas*) prior to contact with Europeans. Noted Australian poet Dame Mary Gilmore claimed in the 1930s that she had participated in traditional planting of grass seeds, and native fruits such as *quandong* (*Santalum acuminatum*), with Wiradjuri companions as a young girl in central New South Wales in the early 1870s.

A number of other examples have come to light in recent times, often observed by anthropologists and ethnobotanists. The seeds of a perennial herb, *kurumi*, tentatively identified as *Tecticornia arborea*, were carefully scattered

in the cracks of the clay pan in the Western Desert of central Western Australia. In 1976, Kimber reported having observed planting in Central Australia of four different species, including two foods – "native fig" (*Ficus* sp.) and *yella* ("bush potato," *Ipomoea costata*). The practice of planting *Ipomoea* spp. has been reported elsewhere in Australia. Ethnobotanist Fiona Walsh also recorded that the Mardu, of the central north of the Western Desert, traditionally broadcast the seeds of "bush tomatoes" (*yalijarra – Solanum diversiflorum*), over burnt ground near their camp prior to rains. In all 19 species have been identified as having been planted by 21 different groups, many as a traditional practice (Gerritsen 2008: 19-23, 58-9) (Fig. 1).

Perhaps the earliest evidence that some Indigenous groups did sow and plant originated with Augustus Gregory, a noted explorer and Surveyor-General of Queensland, who had worked as a young surveyor in Western Australia. He reported in 1886 that in the 1850s, he had observed that the Nhanda of the Victoria District on the central west coast of Western Australia:

> never dug a yam without planting the crown in the same hole so that no diminution of food supply should result (Gregory 1886: 23).

Earlier, the first British explorers, led by Lt. (later Sir) George Grey, to pass through the Victoria District, in April 1839, had come across what appeared to be large yam grounds in the northern part of the Victoria District:

> April 4 1839: And as we wound along the native path my wonder augmented; the path increased in breadth and its beaten appearance, whilst along the side of it we found frequent wells, some of which were ten and twelve feet [3-4 m] deep, and were altogether executed in a superior manner. We now crossed the dry bed of a stream, and from that emerged upon a tract of light fertile soil quite overrun with warran [original emphasis] plants [the yam plant - Dioscorea hastifolia], the root of which is a favourite article of food with the natives. This was the first time we had seen this plant on our journey, and now for three and a half consecutive miles [5.6 kms] traversed a piece of land, literally perforated with holes the natives made to dig this root; indeed we could with difficulty walk across it on that account whilst the tract extended east and west as far as we could see (Grey 1841: 12).

The next day Grey's part encountered what appeared to be permanent settlements of considerable size on the banks of Hutt River:

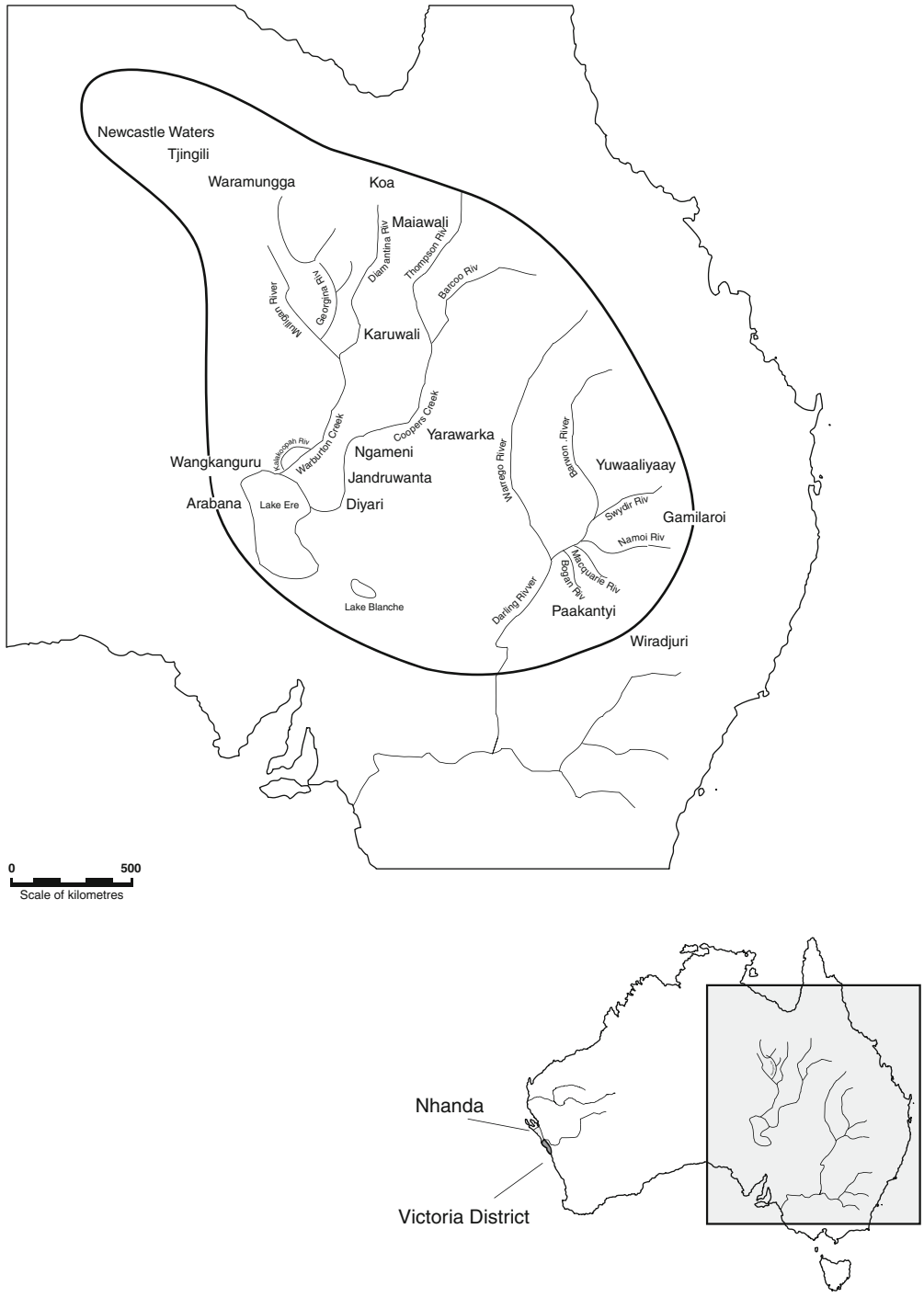
> Being unable to ford the river here, we followed it in a SE direction for two miles [3.2 kms], and in this distance passed two native villages, or, as the men termed them, towns - the huts of which they were composed differed from those in the southern districts, in being built, and very nicely plastered over the outside with clay, and clods of turf, so that although now uninhabited they were evidently intended for fixed places of residence (Grey 1841: 19).

As Grey proceeded, he came across other settlements. It would appear that yams were grown in the alluvial river valleys of a series of small rivers running through the Victoria District, such as the Arrowsmith River. Grey noted that "the whole of this valley is an extensive warran ground" (Grey 1841: 54).

The domiciles mentioned by Grey were described in greater detail by other explorers, and appear to have been dome-shaped, constructed with timbers about 15 cm in thickness, 1.8-m high, coated in clay, and capable of easily accommodating 10 or more people. Subsequent research indicated that there were at least four substantial, permanent, settlements in the Victoria District, the largest having had an estimated population of nearly 300, with the occupants evincing a high degree of sedentism (Gerritsen 2000; 2008: 34, 37-8, 77) (Fig. 2).

Based on the definition of agriculture – propagation, husbandry (watering from wells, Gerritsen 2008: 34-5), harvesting and storage (in-ground), of a significant extent – the Nhanda and their southern neighbors, the Amangu, were engaging in agriculture, as well as exhibiting many of the characteristics of a Neolithic society.

The second part of Australia where early agriculture was evolving at the time of contact is termed the "Corners Region," where the corners of New South Wales, South Australia, Queensland, and the Northern Territory meet. This does not appear to have been a unitary phenomenon as the area is generally quite arid. The pattern of development is linked to wide alluvial rivers and lakes, but as the region is drought-prone it was characterized by a "pulsation"



Australia and the Origins of Agriculture, Fig. 1 Map of the Corners Region, and the location of the Nhanda and Victoria District

Australia and the Origins of Agriculture, Fig. 2 Site of former village: Hutt River (Gerritsen 2002: 6)

pattern of exploitation. Many groups would live, often in settlements with permanent shelters, tethered to permanent watercourses, lagoons, or other water sources until rains fell, or a flood occurred. They would then rapidly disperse to take advantage of the bounty produced as the arid countryside sprang to life, only to retreat again to the more secure supplies of food and water as the country dried out.

Early explorers noted extensive stands of millet or distributions of ngardu in clay pans in numerous parts of the Corners Region. For example, explorer and Survey-General of New South Wales, Major Thomas Livingstone Mitchell, first noted on the lower-central Darling River in 1835 that,

> In the neighbourhood of our camp the grass had been pulled, to a great extent and piled in hay-ricks, so that the aspect of the desert was softened into the agreeable semblance of a hay field . . . we found the ricks or hay cocks extended for miles.... All the grass was of one kind, a new species of 'Panicum' related to 'P. effusum' . . . not a spike of it was left in the ground (Mitchell 1839: 237-8).

Similarly, on upper Coopers Creek in south west Queensland, Augustus Gregory had observed in 1864 that the Maiawali or Koa people,

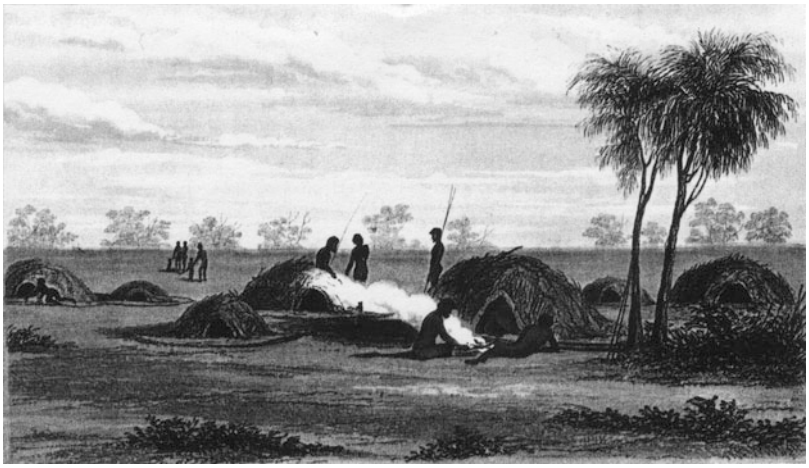
> reap a Panicum grass. Fields of 1,000 acres [400 hectares] are there met with growing this cereal. The natives cut it down by means of stone knives, cutting down the stalk half way, beat out the seed leaving the straw which is often met with in large heaps; they winnow by tossing seed and husk in the air, the wind carrying away the husks (Gregory 1887: 132).

A number of lines of evidence point to the sowing of this grass, *Panicum decompositum*, or its close relatives, known by a variety of Aboriginal names such as *tindil*, *cooly*, and *katoora*. This includes an account of a *katoora* planting ceremony by the Karuwali of southwest Queensland, numerous references in the *Markanjankula* myths of the Wongkanguru to clearing, tilling, and planting of grass seeds and ngardu, and an oral tradition about broadcast seeding of these in the region by an informant of Arabana descent (Gerritsen 2008: 60-1). In this account, a variety of groups in the Corners Region named would:

> chuck a bit there. Not much, you know. Wouldn't be a handful . . . a little bit, spread it you see - one seed there, one seed there, . . . chuck a little bit of dirt on, not too much though. And soon as the first rain comes . . . it will grow then (Kimber 1984: 16).

It would seem that there was a trade in these seeds, carried in specially made bags called *apwa*, weighing up to 23 kg (Gerritsen 2008: 60).

As soon as the British intruded into this region, they noted villages and large population concentrations. For example, on the upper-central



Australia and the Origins of Agriculture, Fig. 3 "Native Village in the Northern Interior" (Sturt 1849: 254)

Darling River early in February 1829, explorer Captain Charles Sturt reported:

> Early in the day we passed a group of seventy huts, capable of holding twelve to fifteen men each. They appeared to be permanent habitations, and all of them fronted the same point of the compass (Sturt 1833: 89).

Some 16 years later, close to the New South Wales/South Australian border, Sturt again struck upon another village. Composed of boughs and clay, each dwelling had a smaller one attached, as can be seen in a contemporary drawing (Fig. 3).

Some quite large structures were also observed by a number of explorers, some up to 27 m in circumference and capable of accommodating 30–40 people (Gerritsen 2008: 48). In addition, there were frequent references by explorers, surveyors, pioneers, and amateur ethnographers entering the region to "villages" and clusters of dwellings, as being "permanent," "well-built," "substantial," "clay-covered," or "multiroom" (Gerritsen 2008: 47-9, 66-7).

Population concentrations mentioned by those explorers and the like often reported encounters with groups of many hundreds, sometimes thousands, assembling, congregating, or residing in particular locations (Gerritsen 2008: 50-1). Alas there have been no specific archaeological studies of settlements in the region, although recent archaeological surveys report such things as "flaked stone" covering an area of three square kilometers on the banks of a large waterhole, Lake Idamea, in southwest Queensland and "vast numbers" of surface sites, some with "millions" of artifacts, in the Lake Eyre South region (Gerritsen 2008: 49, 67n327). These higher populations were supported not only by extensive cultivation of *Panic* grasses, ngardu, and "bush onions" (*Cyperus bulbosus*; Gerritsen 2008: 60) and collecting plant-derived foods and hunting, but surprisingly by fish traps, net fishing, and shellfish, as well as net hunting (Gerritsen 2008: 43-6). Analysis, in terms of matching observational and limited archaeological evidence with the known correlates of sedentism, also indicates the people in this region were clearly exhibiting higher levels of sedentism (Gerritsen 2008: 51-5, 63-9, 77-9).

"Direct" or "Proper" storage, as distinct from caching and stockpiling, was also a feature of the Corners Region, many examples have been identified (Gerritsen 2008: 55-8). Stores of grass and other seeds were often observed, packed in 45–50-kg skin bags and clay casings. Edible gum, in "vast quantities" (Sturt 1833: 118-9), fish meal, dried fruits, and many other consumables were also seemingly preserved and stored. The Diyari utilized seed grain pits (Gerritsen 2008: 56), and a drover, Ashwin, came across a Tjingili settlement in 1871, in the north of the Corners Region, with a larger structure in the center where it is estimated about 1 t of

grass seeds was stored (Gerritsen 2008: 57). The most likely explanation for the smaller structures associated with the dwellings depicted in Sturt's illustration of a "Native Village" is that these were storage structures (Gerritsen 2008: 57-8).

One of the fundamental changes which appears to take place when a society shifts from hunting and gathering to agriculture is a shift in the division of labor. While archaeological evidence of the division of labor in prehistory is limited, it is consistent with that ethnographically observed in hunter-gatherers, whereby men typically hunt while women collect plant foods and catch small game (Gerritsen 2008: 85-7). In both the Victoria District and the Corners Region, there is evidence of a shift in the division of labor, with men systematically engaging in planting, harvesting, parching, threshing, storing, and even preparing plant foods (Gerritsen 2008: 43, 88-90)

Key Issues/Current Debates

It had been the long-standing consensus that Australian and Tasmanian Aboriginal populations were nomadic hunter-gatherers. Consequently, the issue of why agriculture had not developed or been adopted in continental Australia and Tasmania was the subject of much theorizing and speculation. However, the growing realization that in traditional circumstances Indigenous Australians manipulated the environment in significant ways to enhance its productivity, particular through the use of fire, termed "firestick farming" (Jones 1969), and other forms of intervention, leading to the concept of "domiculture" (Hynes & Chase 1982) began to challenge these preconceptions. In concert with this, a growing body of archaeological evidence has been emerging that "intensification" had been in progress in Australia over the last 5,000 years (Lourandos 1997; Gerritsen 2008: 5-15). Evidence of an aquacultural economy, permanent dwellings and settlements, and a higher degree of sedentism in western Victoria also began to emerge in the 1970s. The traditional Aboriginal population here have accordingly been identified as Complex Hunter-Gatherers (Williams 1988), and the region is still under active investigation (Builth 2006; Richards 2011).

Most recently, the proposition that some groups actually practiced agriculture (Gerritsen 2008), and the extent of intervention in the environment, conceptualized as "farms without fences" (Gammage 2011: 281-304), has raised significant conceptual and definitional issues. These have brought to the fore questions concerning the characterization of agriculture, and the distinction between agricultural systems and the procurement practices of Complex Hunter-Gatherers/Affluent Foragers. Hallam (2011: 125) thus questions whether it is actually "meaningful to separate 'agriculture' as one unitary category throughout space and time?"

The interrelationship between agriculture and sedentism has also brought the issue of sedentism in traditional Indigenous Australian communities into sharp relief. Accounts of seemingly permanent dwellings and settlements, some reportedly quite large, had in the past simply been dismissed or treated as anomalies. The first systematic study of traditional Indigenous architecture by Memmot (2007) has provided a broader perspective, with some discussion on the interpretation of the observational evidence now occurring (e.g., Memmot 2007: xviii, 327, 331; Gerritsen 2011: 36-41).

Undoubtedly the question of agriculture in Australia, and attendant evidence of sedentism, will be a matter of ongoing debate. The debate is, however, likely to be as much about paradigms as about evidence. As can be seen, there has been already been a shift away from the universal characterization of traditional Indigenous culture as simple hunter-gatherers, but what are the alternatives, and can traditional Indigenous societies be described in unitary, generic, terms anyway?

International Perspectives

Since World War II, as information and evidence began to accumulate, a variety of theories

on the origins of agriculture were formulated. Braidwood's "hilly flanks" theory focused on population concentrating in the lower Zagros Mountains in the northern Fertile Crescent. Flannery's "edge theory," and Binford's "marginality theory," also saw population concentration as critical, driven by climate change. Explanations based on "population pressure" began with Boserup in 1965 and culminated with Cohen's *The Food Crisis in Prehistory* in 1977. Since that time, many variants of these theories have arisen. Shortly after Cohen published his work, Barbara Bender pioneered the innovative "social competition" class of explanations, an idea taken up by many researchers, particularly by Brian Hayden with his "competitive feasting" model. In the 1980s Ofer Bar-Yosef and his collaborators developed a cultural ecology explanation, the "Levantine Primacy Model," based on the idea that some areas were better favored with domesticable plants and animals than others. An idea first proposed by Darwin in 1868, "weed theories" have been frequently been espoused in the latter half of twentieth century, such as the "dump heap hypothesis" and Smith's "floodplain weed theory." These suggest that humans had inadvertently created habitats for weedy food plants which were then taken into cultivation. Most recently, Gerritsen (2008) has considered the question, with particular reference to Australia, in terms of economic development. This treats agriculture as a form of specialization arising from two factors – higher population densities and innovation rates in areas of higher net natural productivity, and long-term advantageous information acquisition at nodal points in communication, viewed as long-range scale-free networks.

Over the last 11,500 years, agriculture was independently developed in as many as 11 areas outside of Australia (Gerritsen 2008: 141-2). In endeavoring to provide an explanation for the origins of agriculture, the theoretical frameworks or models that have been proposed ought to be able to account for the all the occurrences of agriculture in terms of location and timing, to establish their validity. If the case for agriculture in Australia is supported, then it would provide an excellent opportunity to test those frameworks and models.

Future Directions

As yet there have been no archaeological investigations to directly test the hypothesis that the nominated groups in Australia were indeed engaging in agriculture. The evidence put forward by Gammage also points to the necessity for such studies to more broadly conceive and embrace landscape archaeology more fully. In concert with this, settlement archaeology could be a fruitful field of enquiry. Despite numerous historical accounts of Indigenous Australians living in permanent structures and settlements, outside of western Victoria (Williams 1988; Gerritsen 2000; Builth 2006), there have been no attempts to investigate such sites. Nevertheless, some recent efforts have focused on field work to at least identify the specific location of some reported settlement sites (Gerritsen 2000, 2002). While such issues could command some attention, given the constraints of limited archaeological resources, in a nation that covers a whole continent, with a range of other important priorities, progress may well be slow.

Cross-References

- ▶ Agricultural Practices: A Case Study from Papua New Guinea
- ▶ Agriculture: Definition and Overview
- ▶ Complex Hunter-Gatherers

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Australia, New Zealand, and Papua New Guinea: Museums

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Introduction

Museums across Australia, Aotearoa New Zealand, and Papua New Guinea are diverse and exist in a variety of settings. These countries share ancient geographic links and recent histories, yet each has differing cultures and landscapes. The museums of these nations also share a common colonial heritage, but each has different trajectories of development. They range from those which are federally, state, or territory funded, and operate in large cities, to those in small towns, universities, and not-for-profit and volunteer-managed organizations. The nature of their archaeological collections are equally as diverse, but reflect the three principal fields of archaeology undertaken in this region, Indigenous, historic, and maritime. However, the majority of objects held in collections are described as "ethnographic" and are chiefly materials from Indigenous nations across Oceania and Australia, mostly procured in the nineteenth century. There are also collections of archaeological assemblages derived from known contexts, such as excavated material and surface collections.

Undoubtedly, for many archaeologists, museums play the role of a repository for artifacts, kept for future post-excavation exhibition or analysis. To others, museum collections are centers of vast research potential. But more than this, museums are a visible means through which many societies affirm a role for themselves and their relationship to other cultures, to the past and the natural environment. This is not just in the sense of a physical building, but as a metaphor for the construction of a consensus notion of identity and behavior, and a collective memory. Museums in Australia, New Zealand,

and Papua New Guinea, like elsewhere, are, however, western constructions and as such can only reflect their societies and the Indigenous cultures within the boundaries from which they have emerged. As such, they are sites of continuing reappraisal and negotiation. They are also sites where archaeological material collected has been used and re-contextualized for purposes of nationalism, to illustrate social history and underscore political narratives, and even reconciliation. They are centers for debate over repatriation, and have moved from the role of collector and classifier to that of advocate and community center.

Definition

The focus of this entry is on museums in Australia, Aotearoa New Zealand, and Papua New Guinea that are engaged in the conservation and exhibition of heritage objects and artifacts, and hold collections of archaeological significance. At the core, they are defined by the frequently cited International Council of Museums (ICOM) definition (2007) as nonprofit, permanent institutions that primarily function to preserve, research, teach, and make objects and information accessible to the public. However, this entry also recognizes that there is a growing shift at the boundaries of what defines museums in this region. For example, a museum may be a keeping place, site, community space, or even a website. This is in part because museums in recent years across Australia, New Zealand, and Papua New Guinea have moved to develop more appropriate relationships with Indigenous communities, and recognize the right of Indigenous authority and control. This has affected the ways in which material is displayed, collected, and repatriated and how new spaces are created. Museums also reflect social change, and are increasingly reliant on new technologies. As such, the definition of a museum is moving from that of a repository to places of knowledge and custodianship, where there need not be any physical evidence of collections at all.

Historical Background

The development of museums in Australia, New Zealand, and Papua New Guinea is inextricably linked to their colonial pasts. At the heart of their foundations lie the philosophies of science, collecting, exploration, exhibition and Empire; hegemonies of primitive, of otherness. They were colonial museums, established by British, white, bourgeois professionals to assert their gentility, and, as MacKenzie (2009: 120) notes, to establish networking opportunities, clubs for like-minded scientific gentlemen and their interests in natural history. The first in Australia, founded in Sydney in 1845, was originally known as the Colonial Museum (now the Australian Museum) and was followed by the establishment of a plethora of others in the nineteenth century, including the Tasmanian Museum and Art Gallery (1852); the now Museum of Victoria (1854); the South Australian Museum (1861); the Queensland Museum (1862); and the Western Australian Museum (1891). Each colony, and then state, had its own government and its own museum.

The South Australian Museum exemplifies the deliberate exporting of museum as a symbol of a middle class "civilized" society and many of the characteristics of other Australian museums. Adelaide, which is a planned city (as opposed to penal colony), had its museum conceived as part of its original vision. When it was established in 1861, it needed to be filled, and in addition, the bourgeois of Adelaide needed to be on the world map. The exhibitions of "curiosities" were from the many Pacific and other "exotic" cultures. Such "relics" from other cultures became status symbols as discoveries were made on colonial frontiers. Across Australia, collectors were much more interested in obtaining artifacts from the Pacific Islands than Australia, and local Indigenous cultures were undervalued or seen as uninteresting. This legacy is reflected in the collection of most institutions, for example, the Australian Museum collection includes 60,000 artifacts from the South Pacific and 40,000 from Indigenous Australians (see http://australianmuseum.net.au). At the South

Australian Museum, displays about Indigenous Australian cultures did not take primacy until as late as the 1990s. In the nineteenth century, such emergent nations saw museums as places to display their identity, history, and conquests; subordinate classes and minorities were excluded by definition. Consequently, to visit a museum was to witness the power of the ruling culture.

In the 1880s, there was a shift to collect the "ethnography" of Aboriginal people, as well as the continued lust for Pacific material. This was in part a reflection of influential individuals and their interests, such as Edward C. Stirling at the South Australian Museum, George French-Angas and Pierson Ramsay at the Australian Museum, and Walter Baldwin-Spencer at the National Museum of Victoria (see MacKenzie 2009). At this time, there was a prevalent belief that Aboriginal people were a "dying race." The focus was on collection, rather than display, before these cultures became "extinct." This led to almost frenzied amassing of cultural material, stolen, looted, and traded from Indigenous communities, much of which was initially exported to the United Kingdom; "For at least the first 60 years of settlement, Australian scientists cheerfully and uncritically dispatched the most interesting specimens to the country most of them still called home" (Anderson & Reeves 1994: 83). In Adelaide, there were many Indigenous people living in the immediate area of the museum, these communities were plundered and then as exploration, rail and missionaries proceeded across the state into what now is the Northern Territory, this collecting continued at rapid pace. The South Australian Museum (like all other state museums) also has a significant collection of human remains (for a discussion see Fforde 2004). In 1956 their then curator boasted that their collection of skulls numbered over 1,000 (MacKenzie 2009: 169). Burial grounds such as that at Swanport, South Australia, were also looted.

The imbalance in power relations between colonizer and colonized is exemplified by this scurry for Indigenous artifacts and human remains and their subsequent trade and commodification. The collecting of Indigenous lithics across Australia commenced in around 1900 in a non-systematic fashion. Collecting tended to focus on highly recognizable stone artifact types, such as axes, grindstones, hammer stones, and on secret/sacred objects such as cylcons and tcheringas. The assemblage from the first formal Australian archaeological excavation undertaken at Ngaut Ngaut in 1927 is located at the South Australian Museum. Museums in Australia, however, failed to recognize the diversity and validity of different Indigenous nations with distinctive cultures and also the antiquity and sacredness of the artifacts they had amassed. This positioned museums as "agent" of the dominant white population and some museums still continue to hold on to cultural material, including that of a secret and sacred nature.

The origins of museums in Aotearoa New Zealand are not unlike that of Australia. The British Empire unfolded a network of colonial museums across the globe, and associations of scholarly and middle class scientific gentlemen similarly acquired and collected tokens from the "primitive" and the "dying" Maori. Many Maori sites were looted, including burials and sacred places, including marae (Hakiwai 2005). With the Treaty of Waitangi in 1840, there is a defined start date for British rule and the importation of culture. A small museum was first established in Auckland in 1850, then the Colonial Museum was founded in 1865 in Wellington (the first predecessor of the Te Papa Museum); subsequently, the Otago museum in 1868, and Christchurch in 1870 was established (see McCarthy 2011). Ethnographic collecting commenced immediately, in places such as Auckland where Maori populations were dense, and with the New Zealand wars in progress, obtaining cultural items was opportunistic and swift. The myth that the white settlement of New Zealand was more peaceful and civil than other colonies because of the Treaty of Waitangi can be contested by examining its colonial museums. Like Australia, land and cultural appropriation, acquisitions of human remains, and legacies of war and disease are evidenced in museum

collections. Observers such as McCarthy (2011) and MacKenzie (2009) both accept the collaboration of some British allied Maori groups in the acquisition of cultural material, even taonga (sacred material) and marae (sacred meeting houses) and their contents. The exhibition "Te Maori" (beginning in 1986) was a watershed for New Zealand museum practice and politics and has been characterized as the beginning of Maori decolonization, "Maori people were taking back control over the representation of their culture" (McCarthy 2011: 54). As a direct result of the "Te Maori" exhibition, Maori communities have subsequently been recognized in cultural protocols and guardianship, and involved in collaboration, consultation, and governance.

Most museums around the world contain at least one mask or other artifact from Papua New Guinea. Enormous numbers of Indigenous artifacts were collected by western scientists, missionaries, traders, and explorers visiting Papua New Guinea during the 1870s and 1880s. In this sense, the history of museums in Papua New Guinea differs – it was a center for material that were taken outside of the country, collected opportunistically and at a frenetic pace to fill museum display cases overseas (particularly Germany) up until World War Two. It was a destination for countless scientific expeditions (Gosden & Knowles 2001) but less for settlement and economic investment. The desire to establish a national museum in this country was comparably late. This may be because there was not a suitable or large enough permanent, middle class, white population to warrant the establishment of such an institution, as local Indigenous populations were not the target audience. Support was initiated by two governors, McGregor and Murray, and resulted in the enactment of the Antiquities Ordinance Act in 1913. Although this legislation showed clear intention to protect Papua New Guinea's cultural heritage for future generations, it was only in 1954 that an Act was passed to provide for the foundation of a public museum. The first National Museum was subsequently established in Port Moresby in 1959. In 1966, the J.K. McCarthy Museum, a branch of the National Museum, was established at Goroka in the Eastern Highlands Province. In 1969, the first Papua New Guinean, Lepani Watson, was appointed to serve on the Board of Trustees. Michael Somare was elected President of the National Museum's Board of Trustees in 1971. Four years later, G.N. Mosuwadoga became the first Papua New Guinean appointed as Director. In 1979, the Museum became officially known as the National Museum and Art Gallery of Papua New Guinea and houses and supports substantive anthropological and archaeological collections and research, "reinforcing an awareness that the culture and lifestyle of Papua New Guinea are as rich as those of any other country" (Wari 1980).

In Australia, the twentieth century also saw the slow rise of a national consciousness and identity. Arguably there is a still a broad lack of interest or knowledge of Australian history and particularly archaeology, pre- and post-European colonization. However, it was in the latter part of the twentieth century that a second wave of growth in museums occurred and stirred an interest in an Australian heritage. During these decades, new institutions were established, new buildings constructed, and collections increased. The 1960s saw a rapid growth in historical museums, predominately in the regional areas of Australia (Szerekes 2011). However, the dominant narrative presented was of pioneers and settlers, to the exclusion of both "ethnic" and Indigenous people. Change began to occur with the establishment of small museums by groups of post-World War two migrants in an attempt to continue and preserve their own cultural heritage and traditions. For example, the Ukrainian Museum opened in Adelaide in the late 1970s, run by the Ukrainian Women's Association to house their artifacts and archives. Likewise the Polish museum at Polish Hill River in the Clare Valley, where Poles had settled as early as 1838, was opened. These small institutions signify major shifts. The first, particularly among communities of non-Anglo backgrounds, declared that Australia was, in fact, a multicultural nation. It prompted non-Anglo-Australians to want to see themselves and their heritage being represented. Jewish people arrived in Australia along with the

British in 1788 on the First Fleet, but where was their story and material culture? It was not until 1982 that the Jewish Museum of Australia opened, followed 2 years later by the opening of the Holocaust Museum in Melbourne. Such a recent establishment is surprising, for Melbourne has the largest number of Jewish Holocaust survivors outside of Israel and the USA. In the same way, Chinese people have a long history of largely unacknowledged settlement in Australia but did not open a museum to tell their stories until 1985.

A second shift to occur in the 1970s was a questioning of gender hierarchies of representation in all aspects of Australian cultural life, including museums. At this time, the androcentric nature of Australian museum culture and displays was also challenged, for until then, the representation of women of all backgrounds and time periods was simply nonexistent (see Anderson 1990; Goodall 1990). A turning point for Australian museums was also the 1975 Piggot Report. This is primarily known for its support and recommendations for a new national museum to be constructed in Canberra, focusing on three themes or galleries: "Aboriginal man in Australia"; "European man in Australia"; and "the Australian environment and its interaction with the two named themes" (Piggot 1975: 71). The Report was also important in putting forward the case to display Aboriginal history across all major museums. Subsequently, the National Museum of Australia Act 1980 was developed and the National Museum of Australia was opened in 2001. The Council of Australian Museum Associations (CAMA) meanwhile developed a policy for museums and Indigenous communities. Previous Possessions, New Obligations (PPNO) was released in 1993, addressed all aspects of museum practice and acknowledged that Indigenous people had primary rights in respect of control and interpretation of their culture (and revised in 2005 as the Continuous Cultures, Ongoing Responsibilities policy document). By the late 1990s, every major museum in Australia had redeveloped its exhibitions of Indigenous cultural material, often in consultation with the communities they sought to represent. Similarly, museum philosophies significantly changed in New Zealand in the 1990s with the adoption of the principal of biculturalism in museums (see Smith 2006; McCarthy 2011). The Museum of New Zealand Te Papa Tongarewa in Wellington was developed on the premise of biculturalism in its construction, management, and organization in an attempt to reconcile its Maori collections with colonial legacies. Since it opened in 1998, "Te Papa" has been popularly supported for its innovativeness in the areas of public access, bicultural history, and Maori authorship. Despite this, Te Papa perhaps still perpetuates an old museum paradigm – Maori cultural material attributed a sense of reverent, static history, while Pakeha (white people) are represented through sometimes superficial blockbuster displays.

Key Issues and Current Debates

It is evident that in museums across Australia, Papua New Guinea, and New Zealand, there have been important improvements made in the portrayal of cultural diversity. Although it is impossible to adjust modern moralities to the past, the message of museums has changed to one that tells the story of the fundamental place of Indigenous nations. Museums are for many, and particularly for tourists, they function as a site of first "contact" with an Indigenous culture. The increased emphasis on engaging and reconciling with Indigenous people has seen, for example, the repatriation of Indigenous human remains and cultural material. But a key issue remains – who are these museums for? Tourism Research Australia's 2009 survey of Cultural and Heritage Tourism in Australia found that international cultural and heritage visitors made up more than half (51 %) of all international visitors to Australia in 2009 and, of these, 57 % visited a museum. The most recent report by the Australian Bureau of Statistics (2009) estimated that there were 30.7 million annual museum admissions. What is missing from these reports is the percentage of visitors that were, for example, Indigenous Australians,

or Vietnamese Australians or Sudanese Australians. The percentage is likely to be small. In museum studies, there have been discourses on global, multicultural, post-colonial, post-modern, and reflexive representation (see Corsane 2005) but in a nutshell, museums *are* western institutions still largely *for* western educated visitors.

The issue of museum visitation is linked to the concept of what is "heritage" in Australia and New Zealand. Although a personally defined concept (see studies by Deakin University 2010 and Aplin 2002), consistently problematic in debates on heritage is that British colonial is what is commonly understood to be meant by the term. Through studying the attitudes of Asian Australians, Clark (2007) found that transnational migrants feel a strong attachment to local and global identities, but a weak attachment to the national identity. Her research found that pride was felt least in Australia's "history" compared to all other achievements and national symbols, such as sport or politics. This may be related to the fact that there were prevalent and legally entrenched racist attitudes toward Asians in Australian up until 1970, but this is not a scenario confined only to Asian Australians. The endorsement of particular cultural symbols by museums, and the larger social and political need to foster a sense of loyalty among migrants from culturally diverse backgrounds through a consensus notion of heritage (see Kofman 2005), which is British, are perhaps more subtle reasons. Szerekes (2011) observed of the National Museum of Australia that its "migration section" was "small, constrained and sometimes misleading and inaccurate." This is not to say that exhibitions should include such a multiplicity of interests as to incorrectly portray historical realities, but simply ones more precisely contextualized.

In Australia, there was also a heritage "movement" in the 1970s, largely focused on the conservation of historic buildings. As a consequence, federal and state legislation that followed saw the beginnings of Cultural Heritage Management and rescue archaeology. Since the 1970s, there has been a large growth in the excavation of archaeological sites across Australia, Papua New Guinea, and New Zealand. As a consequence, there are also a rapidly increasing number of artifacts and collections to be stored and conserved. The curation of the material retrieved from archaeological excavations is most often problematic and a major issue for museums and archaeologists themselves. Schacht (2008) identifies a "curation crisis" in the "inadequate recovery, documentation, and legislative protection of artefacts and in the insufficient resources for their storage, conservation, and management. This has resulted in threats to both the physical condition of excavated collections and their accessibility for research, thus impacting on their research significance." Artifacts recovered mostly make their way to museums, local governments, university laboratories, some with archaeologists themselves. They are a burden on storage and administration, and as pointed out by Robins as early as 1988 (Robins 1988), many archaeologists themselves also contribute to the chaos of museum collections due to an inadequate understanding of the role and function of a museum, which is not an infinite repository. Excavated material is often of archaeological merit, but of little monetary or aesthetic value. There is little incentive for museums to display such material – mundane, broken, and unremarkable. Most artifacts, once the excavation process is finalized, are not reused or displayed, but lie in boxes separated from context often with dubious documentation and conservation, perhaps with some cataloging. In Australian archaeology, there is greater emphasis on and interest in the process of fieldwork over theory, systems, and landscape over artifacts. There is a low level of training of archaeologists in terms of conservation in the responsibilities toward the collections they create "little recognition of the fact that the organisation, documentation and deposition of collections with a museum is an extension of the process of site management" (Robins 1988: 116).

The only guidelines in Australia to deal with the significance of artifacts are by the Heritage Collections Council of Australia (2001) which provides a framework for the assessment of individual objects, and identifies as primary criteria,

historical, aesthetic, and social or spiritual significance but not specifically characteristics of archaeological collections. Schacht (2008) argues that the debate in the archaeological literature has stressed the subjective nature of significance; however, this approach has led to archaeologists rarely identifying any significance of the artifact collections they excavate and manage, and has resulted in the underutilization of the collections in research. An additional issue is the gendered division of labor in this sector. According to data released by the Australian Bureau of Statistics (2009) for the same category of work, women are earning only 63 % as much as men. The museum sector also employs a greater number of women than men, and most artifact-based archaeology is undertaken by more women than men.

Across many museums artifacts are often left to speak for themselves in post-modern methods of display and can be ineffective in communicating the more nuanced and complex readings of history and cultural material. This is particularly problematic with artifacts from Indigenous archaeological sites with still hang in an uneasy space in traditional museums. To be able to understand the significance of an archaeologically recovered artifact, the museum visitor needs to have a shift in their understanding and ideas about the past, or a particular culture, and engage with those ideas. This may be easier for most museum visitors attending an exhibition of archaeology from Egypt or Europe – understanding the significance and meaning of a 2,000-year-old sword or necklace is easy and familiar. Viewing and understanding the significance of a 15,000-year-old grindstone or piece of ochre or Indigenous cultural material that is often presented as a bundle of curious, beautiful, unfamiliar objects from an unexplainable, distant past is difficult, unfamiliar, and intangible. Artifacts are often left mute, and for a non-archaeologist, their use or significance (apart from basic observations about function or style, such as in the case of, for example, a boomerang, or a series of 100 boomerangs) is simply elusive. Nor should the contexts be espoused with overt certitude by archaeologists. As pointed out by Stone (2005), archaeologists and curators still have problems in interpreting and displaying material to Indigenous people, but there are also issues in providing meaning to a broad public, a matter that can only be addressed by broader changes in terms of education and perceptions of the significance of the archaeology of Australia, as well as Papua New Guinea and New Zealand.

International Perspectives

The most significant and contested issue for museums in Australia, New Zealand, and Papua New Guinea, which has the greatest impacts on institutions internationally, is undoubtedly repatriation. The past 30 years has seen the emergence and growth of this issue, for the reason that there are likely to be thousands of human remains and sacred items scattered across museums from the United Kingdom and Germany to France and the United States of America. Human and cultural material was procured, acquired, looted, or stolen up until the 1930s (see Fforde 2004). The issue is driven by Indigenous communities and is largely dependent on the development of goodwill between the traditional owners, governments, and museums. In most cases, it involves lobbying overseas governments and institutions on the cultural significance of repatriation, and is supported by federal governments in Australia, New Zealand, and Papua New Guinea. Although most overseas institutions would argue that there is scientific value in continuing to research human remains, what little research has been undertaken was done without the permission of descendent communities. The retention of human remains by museums in Europe and North America against the wishes of claimants is perceived as a continuance of colonial oppression (Hubert & Fforde 2005: 111). Many institutions perpetuate a discourse of ownership, a perceived duty to retain an inheritance from the past for a research future, which is effectively a denial or devaluing of alternative cultural meaning.

In terms of Australian museums, repatriation is managed by eight collecting institutions and assistance is provided where necessary by the

National Museum of Australia and/or the relevant major state or territory museums to the federal Indigenous Repatriation Program, including research to establish the provenance of ancestral remains and the identification of overseas collections of ancestral remains and the holding of remains in temporary "keeping places." There have been over 1,000 repatriations to communities in Australia since 2000. Since 2003, New Zealand authorities have followed a policy of facilitating the repatriation of Māori ancestral remains from museums around the world (see Hole 2007). To date, Te Papa and its predecessor, the National Museum, has repatriated ancestral remains from twelve countries bringing home close to 322 skeletal remains and estimates that there are over 500 still awaiting return.

Future Directions

The presentation and recognition of the archaeology of Australia, New Zealand, and Papua New Guinea and the contribution that museums can make to this process is yet to be fully realized. The attitude and perhaps ignorance to the archaeology that occurs daily is probably best summed up by a question asked by an ABC journalist of TV host Tony Robinson of "Time Team" fame in when on a recent visit to Australia to promote his book on Australian history:

> In the Time Team series you're unearthing stuff that dates back as far as the Iron Age. Of course, Australia is a much younger country, and I wonder whether lack of brevity of history doesn't make for boredom to a certain extent? (Ali Moore, Lateline 21/11/2011).

Of course, the answer given was that Australia has some of the world's oldest archaeology, some more than 50,000 years old. The fault lies here with archaeologists, museum professionals, and education sectors in the failure to communicate broadly the meaning and nature of archaeology of this region, and that our own archaeology is not taught in schools. Museums have tended to focus on collections and exhibitions rather than on other aspects of museums' policies and programs such as education, community engagement, and public programs, as well as engagement with archaeologists. This is also linked to the fact that museum education programs have traditionally been oriented to supporting school curricula, and archaeology as part of the school curricula is yet to be realized. Perhaps future generations, educated with an understanding of their own regional archaeologies, will be able to comprehend the significance of a flake and a core just as well as a coin or hatchet.

Online access to collections complements such a change to both education and public programs. Many museum objects can be already be viewed online, for example, the Collections Australia Network is part of the Federated Open Search Project where it is possible to search the online collections of the Powerhouse Museum, Museum Victoria, National Museum of Australia, Picture Australia, NSW State Records and Libraries Australia via their website. There were 51.5 million unique online visits to Australian museums with a total of 127.3 million web pages viewed in 2007–08 (ABS). With increased access to the internet, better and continuously evolving technologies, online collections are certainly the future for museums. Changes in architecture have already taken place as a response to the changing role of the museum as a cultural center, rather than a repository for objects, such as Bunjilaka at the Melbourne Museum. Indeed, objects and collections may not be an essential focus of museums of the future.

Museums have traditionally conserved and classified, interpreted, and exhibited. The shift has already begun from the role of a classifier to one of advocate – in terms of social critique and the repatriation process. There is a shift in the role as custodian to one of stewardship, from preservation to one of cultural maintenance. Authority and authorial voices remain very important in this debate, especially in the context of collections that are archaeological or ethnographic in nature. Perhaps museums of the future may not be staffed with primarily white, tertiary educated professionals, but a workforce that is more reflective of the collections they hold and audiences they engage with. Positive change and development can also occur with proactive

and genuine community collaboration and interaction, be it with Indigenous communities or archaeologists that may result in enduring, valued, and meaningful museums.

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- ▶ Museums and Memory Experiences
- ▶ Royal Exhibition Building

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Australia: Cultural Heritage Management Education

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Introduction

Cultural heritage management (CHM) education is a vital component in managing cultural heritage resources, since it produces each new generation of professionals who work across its many allied fields. CHM education takes place at many levels and across many such fields in Australia, reflecting the breadth of the heritage industry as it is currently practiced. In Australia, as in other countries, CHM encompasses a wide range of specialist subfields, from built heritage (conservation or landscape architecture), materials conservation, and heritage planning, to museum studies, Indigenous heritage, archaeology, and professional history. This mosaic has created a complex system of educational opportunities for those seeking professional qualifications to practice and has also created its own particular suite of problems.

While such breadth is partly a strength, in that there are many formal and informal options for education across all sectors of the population, it is also a weakness, in that the field is highly fragmented, with few opportunities for coordination or collaboration, and a clear need for benchmarking, quality standards, and a national outlook on educational and skills needs. One recent study identified this fragmentation as the key problem preventing the sector from responding effectively to regional skills shortages, emerging priorities for skill development, or contributing to nationally significant research agendas and cultural and environmental challenges (Ireland et al. in press). No professional standards or accreditation relating to heritage education and training currently exist in Australia.

Key Issues

Current routes for CHM education in Australia follow a variety of formal and informal pathways. Formal paths are the various degrees, diplomas, or certificates offered through universities or Colleges of Technical and Further Education (TAFEs). Informal mechanisms are usually offered through various not-for-profit cultural heritage organizations (such as museums, the National Trust, or Conservation Volunteers Australia) or nongovernment statutory bodies, such as the Historic Houses Trust of NSW, or the Port Arthur Historic Site Management Authority. Informal training mechanisms usually aim to encourage a more general "culture of care" around heritage through *educating* the public in the conservation of heritage places, creating greater knowledge of heritage management issues or changing visitor behavior at heritage sites.

Formal Cultural Heritage Management Education in Australia

Australian higher education has traditionally been split across the university and TAFE sectors, with TAFEs being viewed as vocational (the government language for the training they offer is known as Vocational Education and Training, or VET), rather than academic. The gap between the two sectors is perhaps most clearly measured by the forms that heritage education within each typically takes. Heritage as offered through a TAFE College is typically only available as a module within a larger course on tourism, Aboriginal languages, guiding, or land management and conservation. The exceptions to this are more tailored courses in Indigenous heritage management designed by some universities and offered in conjunction with state government partners, usually in response to legislative changes that require particular skills. Heritage trades (i.e., stone masonry, thatching, traditional joinery or carpentry, and other craft-based skills) are also only available through TAFE, or through a traditional apprenticeship system (although only 2 % of apprentices learn heritage skills in this way,

Godden et al. 2010: 16). Current literature, however, points to such trades being in chronic shortage, due to the disappearing knowledge of heritage crafts, the advancing age of knowledgeable tradesmen and the lack of incentives for them to take on new apprentices. There are thus very few opportunities to pass on existing heritage trade knowledge and skills (Godden et al. 2010: 15-16).

At universities the traditional path remains a 3 year undergraduate plus 1 year Honors degree (usually a combination of coursework and thesis), although this, too, has been challenged in recent times. Major changes to the Australian education sector in the 1980s and overall increases in the proportion of the population seeking a higher degree qualification resulted in more students studying at tertiary institutions, and created broader scope for vocational courses in heritage to be introduced (Beck & Balme 2005: 32). Through the 1990s, changes happening outside the academy became relevant in driving a demand for CHM employment, creating increased demand for more and better skilled graduates and transforming the CHM education landscape in the process. The growing importance of Native Title-related work with the introduction of the Native Title Act 1993 (see also the entry on ▶ Cultural Heritage Management and the Colonial Culture in this encyclopedia), urban expansion in southeastern Australia and the mining boom in Western Australia have seen the numbers employed in the heritage sector grow substantially over the past 10 years, leading some universities to begin to address the former divergence between the training offered in a degree, the vocational training offered by TAFE, and apprenticeship-style opportunities to learn "on the job."

This is most obvious in the recent developments around graduate coursework programs. In 2005, a national survey of archaeologists identified a need for a vocationally oriented fourth year option (i.e., a graduate diploma) that was different to the traditional research-oriented Honors year. While isolated attempts to create graduate diploma degrees in heritage date back to the 1980s, several universities have responded more successfully to recent needs by developing vocationally oriented options that mix formal, informal, and "on the job" aspects of training. Recently, several universities have also become dual-sector institutions (i.e., both universities and TAFEs), allowing them to offer both degrees and VET training.

Informal Cultural Heritage Management Education in Australia

Raising public awareness of heritage as an important issue in Australian society is also an important heritage education goal. Public interest in heritage generally, and in some of the particular disciplines that study heritage, such as archaeology, is directly related to the social basis for cultural heritage management, since the key to successful management lies in collaborative work with communities, Traditional Owners, and other stakeholders. The two are combined most often through interpretive works on or about a site, or through public archaeology programs ("education through experience") built into the process or outcomes of cultural heritage management work. This can include open days, public site visits, and tours (see also the entries on ▶ Cultural Heritage Outreach and ▶ Cultural Heritage and Communities in this encyclopedia).

Large urban excavations in the 1990s at The Rocks in Sydney and Little Lonsdale Street in Melbourne, for example, both engaged hundreds of volunteers in public archaeological activities and education as part of the development work at these sites. The best long-term outcome of such projects is probably The Big Dig Archaeology Education Centre in The Rocks, which was purpose-built to provide an ongoing range of educational experiences in archaeology and the heritage of Sydney. Many other projects lead to smaller, more site specific, but no less valuable, informal educational outcomes, such as options for interpretation of particular sites.

In NSW, the public basis for CHM and resulting tools for public outreach have been codified more strongly through historic site legislation that often requires the incorporation of public education facets into cultural

heritage management plans, especially for state-significant historical archaeological sites. The work of the Heritage Branch of NSW has been devoted to promoting public awareness by building in various promotional mechanisms to standard archaeological and other consultancies.

The variety of, need for, and sustained interest in, cultural heritage management educational opportunities across Australia holds great potential for the future of managing our cultural heritage resources. Creating better links between universities, TAFEs, community organizations, and volunteer and vocational sectors will bring the disparate facets of CHM education closer together and mend some of the rifts that currently fragment it.

Cross-References

- ▶ Cultural Heritage and Communities
- ▶ Cultural Heritage Management and the Colonial Culture
- ▶ Cultural Heritage Outreach

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Further Reading

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Australia: Domestic Archaeological and Heritage Management Law

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Introduction

Heritage law in Australia is dynamic and challenging. It is closely connected to the broader framework of environmental planning, protection, and regulation. Australia's first heritage management legislation dates from the 1970s. It was enacted in response to the widespread public concern regarding the destruction and loss of many important natural and cultural places as the Australian urban landscape rapidly modernized during the 1960s and 1970s. Since that time, the theory, practice, and public interest in natural and cultural heritage conservation has changed considerably. It has evolved from an ad hoc community-driven movement focused on saving natural environments, historic places, and buildings through activism and protest to an increasingly complex multilevel system of heritage laws and procedures.

Australia has a federal system of governance. It is comprised of the Commonwealth, six states, and two mainland territories, each of which has its own statutes for heritage management. Urban planning, development, and heritage conservation are considered matters of interest to the states (Logan 2007). Yet, the demarcation of roles and responsibilities between the Commonwealth and the states and territories has been the subject of ongoing debate and review in many areas, including heritage management (Aplin 2002). The Council of the Australian Government Heads of Agreement for the Commonwealth and State Roles and Responsibilities for the Environment established a three-tier system for the management of heritage in Australia in 1997. As part of that Agreement, responsibility for listing, conserving, and managing heritage of national, state, and local significance is delegated to the

Commonwealth, the states and territories, and local governments, respectively (Productivity Commission 2006).

The multilevel system of heritage law is administered by various agencies and authorities and requires adherence to heritage conventions, charters, codes, manuals, and standards of practice that are primarily executed and evaluated by tertiary-educated heritage professionals and specialists. Reflecting the unique qualities and diversity of Australia's heritage, the legislative framework protects natural heritage, Aboriginal and Torres Strait Islander heritage (Indigenous), historic places, archaeology, historic shipwrecks, and industrial and movable heritage.

Definition

In recent years, understandings of what constitutes heritage in Australia have been influenced by increasing ethnic and cultural diversity, shifting public attitudes and broader trends in the field. As such, defining heritage and what it comprises is the subject of ongoing debate and refinement (Conroy 2007). Implementing new legislation is a significant practical undertaking and given the dynamic context, it is often difficult to ensure that heritage law reflects current definitions and community values.

Notwithstanding the energetic efforts of the National Trusts in the postwar period, in Australia, heritage came to political prominence through the concept of the National Estate. The "National Estate" was first coined in Australia by Prime Minister Gough Whitlam in 1972, following the example of the American President, John F. Kennedy (Veale et al. 2012). Initially, there was some imprecision in the use of the term, but by 1974 and the release of the *Report of National Estate*, it was defined as comprising the *natural and cultural environment, archaeological and scientific areas and cultural property which are of outstanding significance to the World, to the Nation or of aesthetic, historical, scientific, social, cultural, ecological or other special value to any part of the nation, including a region or locality that should be conserved, managed and presented for the benefit of the community* (Hope 1974).

In 1979, *The Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance* (the Burra Charter) was adopted. The Burra Charter established a series of best-practice conservation principles and processes that are underpinned by the central concept of cultural significance. Reflecting the definition of the National Estate, under Article 1.2 of the Burra Charter, cultural significance is defined as aesthetic, historic, scientific, social, or spiritual value for past, present, or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places, and related objects which may have a range of meanings for individuals and groups (Australia ICOMOS 1999). While the Charter has not been officially adopted in legislation, its principles and processes are evident in heritage management law throughout Australia.

Notwithstanding the influence of the Commonwealth and the Burra Charter, variation in the definitions used in Australian heritage law persists. These variations provide an indication as to what defines heritage in each jurisdiction. In most instances, legislation defines and protects Indigenous and non-Aboriginal (historic) places and objects separately. Typically, "heritage" is not specifically defined in the legislation; rather, a series of criteria are used to assess whether a place or item has sufficient cultural value or significance to be protected at local, state and territory, Commonwealth, or national levels. For example, the Heritage Acts in South Australia (SA), Victoria (Vic), Queensland (Qld), Tasmania, and Western Australia (WA) specify a place is of heritage significance if it can be demonstrated to satisfy one or more heritage criteria. Under the New South Wales (NSW) *Heritage Act 1977*, items of environmental heritage are protected. This definition includes natural places, as does the Australian Capital Territory's (ACT) *Heritage Act 2004*, which protects places of natural or cultural significance (Boer & Wiffen 2006). The *Heritage Conservation Act 1991* (Northern Territory NT) includes places and objects of social, aesthetic, or scientific value

and may include geology, fossils, archaeology, objects, buildings, precincts, works, relics, gardens, coastlines, landscapes, and ruins the *Heritage Act 1993* (SA) conserves places of cultural value, including places of geological and palaeontological significance.

Generally in Australian heritage law, a distinction is made between heritage places and archaeological objects and relics. Specific provisions to protect objects and relics are included in most heritage acts in Australia. Historic shipwrecks are defined as a special type of object which are protected by State and Territory legislation in conjunction with the Commonwealth *Historic Shipwrecks Act 1976* which protects wrecks and associated relics that are 75 years or older.

The *Victorian Heritage Act 1995* protects places and objects of significance to the State (excluding Aboriginal heritage). Under that Act, an archaeological relic is defined as any archaeological deposit; artifact, remains, or material evidence related to non-Aboriginal occupation that is 50 or more years old (*Victorian Heritage Act 1995* Section 3). Similarly, in NSW, under the *Heritage Act 1977* (NSW), a relic is any deposit, artifact, object, or material evidence that relates to the settlement of NSW not being Aboriginal settlement and is of State or local heritage significance (*Heritage Act 1977*). Until amended in 2001, the *National Parks and Wildlife Act 1974* also included provisions for the protection of relics, however, in that statute relics related to Aboriginal occupation. Unlike Victoria and NSW, in WA, under the *Heritage of Western Australia Act 1990* and the SA *Heritage Act 1993*, archaeological relics are not referred to, though in WA regard may be given to archaeological value when a place is being considered for entry onto the Register. In SA, a place of archaeological significance may be registered, and a permit is required to remove cultural artifacts from such places.

Across Australia, Indigenous heritage is variously defined. The definitions tend to reflect the different approaches that emerged when Indigenous heritage law was initially passed in the 1970s. In Northern Australia emphasis is placed on the protection of sacred sites and includes any land that is sacred to Aboriginal people or of significance according to Aboriginal tradition. Conversely, across Southern Australia, Indigenous heritage legislation was defined by reference to material evidence (relics or objects) related to Aboriginal occupation such stone artifacts, campsites, and hearths. For example, under the *Aboriginal Relics Act 1975*, Tasmania, a relic is defined as the physical remains of past Aboriginal occupation prior to 1876 and can include middens, stone arrangements, engravings, and rock art. Most definitions for relics and objects exclude those made for the purpose of sale. The assessment and protection of these types of evidence was and is still largely managed by archaeologists, whereas assessments in Northern Australia are predominately undertaken by anthropologists (Office of Environment and Heritage 2012). In NSW, under the *National Parks and Wildlife Act 1974*, Aboriginal objects and Aboriginal places of significance to Aboriginal people are protected. An Aboriginal place is defined in the Act as being a place that, in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture (Section 84 NPW Act 1974 (NSW)) *National Parks and Wildlife Act 1974*.

Historical Background

In Australia, heritage management law has had a relatively short history when compared to countries overseas. Despite this, heritage law and the periodic reforms demonstrate how the theory and practice of conservation has evolved and how major trends, public and private attitudes, interests, and pressures have been interpreted and applied to the legal framework for the identification, management, and protection of significant heritage places, objects and relics.

Heritage Legislation: Australian States and Territories

One of the earliest pieces of heritage legislation, the *Native and Historic Objects Heritage Protection Ordinance* was passed in 1955 in the NT

(North 2006). Elsewhere, in NSW, the *Crown Lands Consolidation Act 1913* included provisions for the establishment of reserves to protect Aboriginal art sites. Some years later, amendments to the *Local Government Act* in 1945 included provision for places or objects of historical or scientific interest to be preserved (NSW Heritage Office 2000). Yet across Australia, most heritage law dates from the 1970s and reflects the political response to the community's growing concerns about the destruction and loss of the historic and natural environment. The table below lists the main federal and state and territory heritage and related statutes in force at the time of writing (Table 1).

In 1974, Victoria led the other states and territories when the *Historic Buildings Preservation Act 1974*, which focused on protecting buildings of historic or architectural significance, was enacted. NSW had passed the *National Parks and Wildlife Act* (NPW Act) in 1967, the same year that the *Aboriginal and Historic Relics Preservation Act 1965 (SA)* came into force. Reflecting the American legislative model, the *NPW Act 1967* established the National Parks Service and a formal mechanism for the reservation of National Parks, State Parks, and Historic Sites; which were areas comprising buildings, objects, monuments, or events of national significance. In 1969, significant amendments were made to the *NPW Act*, and the objectives for cultural heritage broadened to include the conservation of objects, places, or features (including biological diversity) of cultural value within the landscape, including places, relics, and features of significance to Aboriginal people, and places of social value to the people of NSW, and places of historic, architectural, or scientific significance. Amendments to the *NPW Act* in 1974 created provisions for the gazettal of Aboriginal places which affords protection to places of cultural significance regardless of whether objects are present.

In NSW, with the passing of the *Heritage Act 1977* (NSW) and the *Environmental Planning and Assessment Act 1979 (NSW)*, heritage protection became part of an integrated system of

Australia: Domestic Archaeological and Heritage Management Law, Table 1 Commonwealth, state and territory heritage and planning legislation

Australian state or territory	Current heritage legislation
New South Wales	*National Parks and Wildlife Act 1974*
	Heritage Act 1977
	Environmental Planning and Assessment Act 1979
	Historic Houses Trust Act 1980
Queensland	*Newstead House Trust Act 1939*
	Queensland Heritage Act 1992
	Aboriginal Cultural Heritage Act 2003
	Torres Strait Islander Cultural Heritage Act 2003
	Cape York Peninsula Heritage Act 2007
	Sustainable Planning Act 2009
Victoria	*National Parks Act 1975*
	Planning and Environment Act 1987
	Victorian Heritage Act 1995
	Aboriginal Heritage Act 2006
Tasmania	*Aboriginal Relics Act 1975*
	Land Use Planning and Approvals Act 1993
	Historic Cultural Heritage Act 1995
Western Australia	*Aboriginal Heritage Act 1972*
	Maritime Archaeology Act 1973
	Heritage of Western Australia Act 1990
	Planning and Development Act 2005
Northern Territory	*Northern Territory Aboriginal Sacred Sites Act 2006*
	Heritage Conservation Act 1991
	Planning Act 2009
South Australia	*Historic Shipwrecks Act 1981*
	Aboriginal Heritage Act 1988
	Heritage Act 1993
	Development Act 1993
	Planning and Land Management Act 1988
Australian Capital Territory	*Heritage Act 2004*
	Planning and Development Act 2007
Commonwealth	*Historic Shipwrecks Act 1976*
	Aboriginal and Torres Strait Islander Protection Act 1984
	Protection of Movable Cultural Heritage Act 1986
	Environment Protection and Biodiversity Conservation Act 1999

planning and environmental management. Some states took considerably longer to legislate for heritage protection, most notably Qld and WA. Both states passed legislation almost a decade later than NSW due to the lack of political will and the economic power of the mining industry (Spearitt 2012). Tasmania, with its tangible convict heritage, was without formal heritage protection until 1995, yet with negligible urban development and growth, there was no imminent threat to heritage places. The first wave of legislation passed during the 1970s tended to focus on historic heritage, natural heritage was generally protected through national parks and reserves, Aboriginal heritage was afforded blanket protection, and consideration of movable heritage objects was typically overlooked (Marshall 2010).

The legislative mechanisms and regulations for heritage management in Australia play a crucial and central role in the management of Australia's heritage at local, state and territory, and national levels. In all jurisdictions, similar legislative and administrative systems have been established. While the extent to which heritage is managed and regulated under each act varies, essentially four main types of legislation are apparent (Pearson & Sullivan 1995). Firstly, there are acts that separately protect Indigenous and historic sites including cultural places, heritage, sites, and relics. Secondly, a number of acts manage heritage through land or site management. Examples include forestry, national parks, or historic houses legislation that typically includes provision for the conservation of heritage within the estate they manage. The *Historic Houses Act 1980* (NSW) provides for the care, control, and management of historic houses, and other buildings of historic importance is an example. One of the oldest acts of this type still in force is the *Newstead House Trust Act 1939* (Qld), which establishes a board of trustees for the Newstead House and for the conservation, education, enjoyment, and public access to Brisbane's oldest residence. Thirdly, land use planning legislation in most states and territories includes specific provisions that regulate development with regard to places of environmental heritage value. Finally, some acts such as the National Trust Acts establish the Trusts in each state and territory and provide for the preservation, maintenance of places of historical, artistic, and scientific interest and the compilation of registers of heritage places.

With regard to historic heritage legislation such as the *Heritage Act 1977* (NSW), *Heritage of Western Australia Act 1990* (WA), *Heritage Conservation Act 1991* (Northern Territory NT), *Queensland Heritage Act 1992* (Qld), *Heritage Act 1993* (SA), *Heritage Act 1995* (Vic), the *Historic Cultural Heritage Act 1995* (Tas), and the *Heritage Act 2004* (ACT), the objectives typically comprise maintaining and managing a heritage register, the establishment of a heritage council to provide advice to government, manage statutory listings, and review proposed changes to listed items; regulation and control over development affecting listed places, the preparation of guidelines, and standards for heritage practice; assistance with the provision of heritage advisory services to local councils; and funding to assist individuals and communities with the costs of conserving heritage.

It is in the area of Aboriginal and Torres Strait Islander heritage law that there is considerable variation between jurisdictions. NSW was the second government in Australia to enact legislation to protect Aboriginal heritage. Under the *NPW Act 1974* (NSW), it is an offence to harm an Aboriginal object or Aboriginal place. When the Act was passed, there was no requirement for Aboriginal people to be involved in determining or protecting their heritage. Recent changes such as the guidelines for Aboriginal consultation and the approaches mooted as part of the Aboriginal heritage law reform place much greater emphasis on Aboriginal involvement. This shift is apparent in other states and territories and reflects a heightened awareness of Australia's obligations under the 2007 United Nations Declaration of the Rights of Indigenous People, combined with the ongoing determination and advocacy of Aboriginal people to identify and conserve their heritage.

In South Australia, the *Aboriginal Heritage Act 1988* is the third such act in as many decades. It provides for the conservation of Aboriginal heritage through blanket protection for Aboriginal sites, objects, and remains. The Act provides for an Aboriginal Advisory Committee which goes some way toward recognizing the rights and role of Aboriginal people in heritage protection. The Act is currently under review, its effectiveness having been undermined by unsuitable administrative policies and procedures, alongside political and public apathy (Whiltshire & Wallis 2008). Principles that are part of the legislative review in SA, including the recognition of Aboriginal custodianship and enabling Aboriginal people to negotiate heritage agreements, indicate the current provisions related to Aboriginal involvement are outdated, particularly given the influence of the *Native Title Act 1992* (Cwlth) on heritage protection. In WA, the *Aboriginal Heritage Act 1972* is the primary statute protecting Aboriginal cultural heritage. It provides blanket protection for places and objects customarily used by or traditional to the original inhabitants of Australia or their descendants. The Act is currently under review and is widely regarded as having proved ineffective in protecting Aboriginal heritage. By contrast, in Victoria, the *Aboriginal Heritage Act 2006* has generally enhanced the protection of Aboriginal cultural heritage, provided greater certainty in the context of development and improved Aboriginal engagement in the process. The "efficacy and efficiency" of this Act is currently under review focused on a number of operational and substantive issues including the integration of cultural heritage management with land use planning, according respect and status to Aboriginal people, and penalties and enforcement (Department of Planning and Community Development 2012).

Federal Heritage Legislation

In 1973, Australia ratified the UNESCO World Heritage Convention, only the sixth nation to do so. This initiative, combined with the policy objective of the Whitlam Federal Labor Government from 1972 to 1975 to preserve and enhance the quality of the National Estate, established the fundamentals of the Australian heritage system. The 1974 Committee of Inquiry into National Estate, chaired by R. M. Hope (Hope Inquiry), helped define the concept of the National Estate which was eloquently summarized by the Tasmanian Premier, as the "the things we want to keep" (Australian Government Publishing Service 1974). The *Australian Heritage Commission Act 1975* was a key recommendation of the Hope Inquiry and the first Act of Parliament to protect heritage at Commonwealth level. The Act created the Australian Heritage Commission with responsibility for the identification, promotion, and conservation of Australia's National Estate and established the Register of the National Estate (RNE) an inventory of Australia's natural, historic, Aboriginal and Torres Strait Islander heritage which has special value for present and future generations. Aside from the lists of heritage places assembled by the various chapters of the National Trust, the RNE was Australia's first national heritage list included natural, Indigenous, and historic places. Any person was able to nominate a place for the Register. It reflected the community-driven, inclusive view of heritage that was a feature of the progressive new nationalism of the Labor Party under Gough Whitlam (Davison & McConville 1991).

Characterized by an ambitious political and social agenda, this period was arguably the highpoint for Australian heritage conservation. Similarly, the focus on Indigenous affairs intensified during this time, resulting in significant changes to legislation and policy at both federal and state levels. The *Commonwealth Aboriginal Land Rights (Northern Territory) Act 1976*, the *Aboriginal Heritage Protection Act 1972* (WA), and the *Northern Territory Aboriginal Sacred Sites Ordinance 1978* were passed. And while the Australian Heritage Commission's work on the Aboriginal National Estate was "tentative and slow," the understanding and appreciation of Indigenous cultural heritage burgeoned (Commonwealth of Australia 1985). The *Indigenous and Torres Strait Islander Act 1984* (Commonwealth) passed a decade later

reflected just how far the understanding of Aboriginal issues had come, particularly, how past dispossession and dispersal of the Aboriginal and Torres Strait Islander peoples and their present disadvantaged position in Australian society had impacted on Indigenous people. Under the Act, Indigenous people may apply to the Federal Minister for Environment to make a protective order over areas of significance where those areas are under threat of damage or destruction.

Since 1996, much of the political largess of the Whitlam Labor years has been eroded at federal level despite significant legislative and administrative reforms. The *Environment Protection Biodiversity and Conservation Act 1999* (EPBC Act) which repealed the AHC Act and the *World Heritage Places Conservation Act 1983* is the Commonwealth's principle heritage law. The EPBC Act (s. 528) defines "heritage value" as the place's natural and cultural environment having aesthetic, historic, or social significance, or other significance, for current and future generations of Australians. Included in the Act's objectives are the promotion and conservation of biodiversity, the protection and conservation of heritage, and assisting with the implementation of Australia's international environmental responsibilities such as those under the World Heritage Convention. Under the EPBC Act, Commonwealth environmental assessment processes are triggered by matters of national environmental significance. Such matters include the likely significant impact on world heritage values or any significant impact on the national heritage values of a place on the National Heritage List (NHL). Amendments to the EPBC Act in 2003 created the NHL and the Commonwealth Heritage List (CHL) and in so doing clarified that the role of the Commonwealth is to protect places of outstanding significance to the nation and places on Commonwealth-owned and administered land that are of significance. Following these changes to the EPBC Act, the Australian Heritage Council was established under the *Australian Heritage Council Act 2003*. This Council replaced the Australian Heritage Commission.

While strengthening the protective mechanisms for National and Commonwealth heritage, the EPBC Act simultaneously narrowed it. Under the concept of the National Estate, heritage was broad, community driven, and inclusive. At its height, the Register of the National Estate (RNE) included 13,000 places. Since the amendments creating the NHL and CHL were passed in 2003, fewer than 500 places have been listed on the NHL and CHL, a fraction of total number of places listed on the RNE. Led by the federal government, reform of Australia's national environmental law is underway. Reforms and reviews to other heritage statues, especially in the area of Indigenous heritage law are currently in progress in NSW, Western Australia, Victoria, and South Australia.

In the wake of funding cuts, sweeping public sector realignments and the prevalent view that heritage is a cost burden for owners and developers requiring complex assessment and approvals processes, the future of heritage protection law in Australia is uncertain.

Key Issues/Current Debates

Presently, there are a series of challenging issues and debates influencing heritage law and conservation practice in Australia. Climate change, environmental sustainability, urban development, mining, and economic growth in the context of global economic uncertainty and a lack of bipartisan government leadership on heritage have had an impact on heritage management and protection.

Current reforms to both Indigenous and historic heritage management frameworks and regulation provide evidence of the continuing process of change and refinement necessary to ensure approaches reflect community will and achieve conservation outcomes. Despite this, a growing sense of dissatisfaction with the government regarding its failure to provide strong leadership and direction for heritage management is evident. On the one hand, there is concern voiced by Indigenous people and others that current statutory mechanisms lack credibility

and effectiveness and are not sufficient to conserve our irreplaceable cultural heritage. On the other hand, some heritage owners (public and private) contend current heritage laws impose onerous cost burdens, restrict development, and provide little certainty in the statutory approval process.

With regard to Indigenous cultural heritage protection, there appears to be discontent and a heightened consciousness about the level of destruction and the lack of systematic and robust data. This is occurring at the same time that Indigenous people are demanding genuine engagement in decision-making about the management and conservation of their heritage. Moreover, the statutory focus and "blanket protection" of Indigenous archaeology within a system that is perceived to regulate destruction rather than protect culture and heritage has been challenged. The authority and validity of the scientific paradigms applied to Indigenous archaeology have also been questioned in a context where communities are endeavoring to achieve recognition and the conservation of deeper intangible values such as knowledge, song, and dance. Some legislative reforms have provided for the integrated assessment and protection of values, including intangible values and an increased level of community involvement. Yet, overwhelming heritage regulation and protection is still biased toward physical evidence and much archaeology continues to be practiced as an objective science based on the modernist processual model, in vogue when much of Australia's heritage legislation was enacted (Colley 2002). It could be argued, however, that the failure to deliver the protection of Aboriginal heritage is not entirely the result of flawed legislation but may be more due to the lack of political will and beleaguered public administration.

Reflecting broader influences in the field, the protection of cultural landscapes and intangible values has received considerable attention, and the scope of heritage continues to broaden. The widening definition of heritage and the increasing emphasis on intangibles such as language, story, and cultural practices raises challenges for Australian governments in developing appropriate legislative and protective management systems. This trend toward inclusivity is at odds with that of government, particularly at federal level, whereby the philosophy underlying the concept of the National Estate as a representation of our "full environmental and cultural history" has been rejected in favor of a system which protects a "few national jewels" (Yencken 2008).

International Perspectives

Australia is a signatory to many international charters and conventions and continues to play a prominent role in heritage internationally through the activities of ICOMOS.

Founded in 1976, Australia ICOMOS is a national chapter of ICOMOS International. In 1977, ICOMOS members met in the historic mining township of Burra, South Australia, and focused on preparing a version of the *International Charter for the Conservation and Restoration of Monuments and Sites* (the Venice Charter) which would be suitable for conservation practice in Australia. The *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (the Burra Charter) was adopted in 1979. The Burra Charter accepted the principles and philosophy of the Venice Charter but placed greater emphasis on the conservation of culturally significant heritage places rather than ancient monuments and buildings.

Members of Australia ICOMOS attend the triennial ICOMOS International General Assembly, and many Australian members have positions on ICOMOS International Scientific Committees including twentieth-century heritage, cultural landscape, archaeological heritage management, polar heritage, and interpretation and presentation to name a few. Presently, Australia has an elected member of the Executive Committee of ICOMOS International.

Future Directions

Australia's governance, combined with the framework of statues, land use planning and

management regimes, inventories, and registers, has resulted in cumbersome heritage management system. Generally, separate Acts still protect natural, Indigenous, and historic heritage. This frequently results in fragmented heritage assessments and inadequate protection that fails to acknowledge the complex and significant interrelationships that exist between nature, history, places, objects, values, and people.

In Indigenous heritage, trends include a greater emphasis on Indigenous engagement (especially native title owners and claimants) and a shift toward values-based assessment methodology, combined with steps toward proactive rather than a reactive system for heritage protection.

With regard to historic heritage, governments appear to be less willing to list heritage places where objections are raised. This approach follows the findings of the Productivity Commission 2006 report. Unless alternatives are explored such as tax incentives or advisory services, heritage is likely to continue to be perceived by some as an economic burden.

What has emerged as a key issue since the Council of Australian Governments clarified the role and responsibility for governments at federal, state, and local levels is just how vulnerable our heritage is particularly when government funding has declined appreciably and population growth, urban development, economic growth, and climate change continue apace (State of the Environment Committee 2011). In response to these ongoing and emerging threats, the future direction for heritage is dependent on political will and continuing community regard based on a shared understanding that heritage is our inheritance from the past and constitutes an important part of our cultural identity which is worth passing on to future generations.

In the 2011 State of the Environment Report, two key issues are identified that are determined to have the most significant impact on the integrity and future condition of Australia's heritage. Firstly, government will need to play a part in the preparation of heritage assessments that provide representative and adequate areas of protected land and comprehensive heritage listings. Secondly, and perhaps most importantly, governments, heritage places owners, and communities will have to manage places in response to the known and emerging threats and in the face of diminishing resources by adopting an approach that is based on the integration of and respect for different forms of knowledge (State of the Environment Committee 2011).

Perhaps the release of the Australian Heritage Strategy Public Consultation Paper in April 2012, with its accompanying series of essays, is evidence that the federal government may be committed to once again assuming a leadership, whether this is the case remains to be seen.

Cross-References

- ▶ Australasian Historical Archaeology
- ▶ Australasian Society for Historical Archaeology (ASHA)
- ▶ Australia's Archaeological Heritage
- ▶ Australia: Maritime Archaeology
- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)
- ▶ Gender, Feminist, and Queer Archaeologies: Australian Perspective
- ▶ Heritage and Archaeology
- ▶ Heritage Legislation, The Introduction of: Disciplining Through Law
- ▶ Heritage, Changing Views of: A Legal Perspective
- ▶ Heritage: History and Context
- ▶ Historical Archaeology
- ▶ Indigenous Archaeologies: Australian Perspective

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Australia: Indigenous Cultural Property Return

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Introduction

Although there are some earlier exceptions, the return of Aboriginal and Torres Strait Islander cultural property from museums in Australia has been a point of significant debate since the 1970s. Driven by the voice of Indigenous Australians and undertaken in often tense dialogue with museum professionals, anthropologists, and archaeologists (and these groups are not necessarily all mutually exclusive), the debate has led to significant development in museum ethics, policy, and practice in Australia, a change in the way that "ownership" of such items (and thus decision making about, or influence over, them) is viewed, and has consequently resulted in the return of some types of cultural property to Indigenous groups in this country (Turnbull & Pickering 2010; Pickering 2011). The Australian history of the return of Indigenous cultural property is an informative case study, as similar changes within the same time frame occurred in other countries with indigenous populations, such as New Zealand, the United States, and Canada, and because Aboriginal people were prominent in bringing the repatriation issue to international attention,

influencing policy change and instigating debate in a number of countries overseas (Fforde & Ormond Parker 2001; Simpson 2002).

Definition

Although there are particular legal definitions used in international conventions and national legislation, in its broadest meaning, the term "cultural property" encompasses any item which has been produced by a group or culture. The terms cultural "property," "heritage," "material," and "objects" are often interchangeable in common parlance, although the term "property" often implies concepts of ownership more than the others, and while intangible heritage is widely accepted as part of cultural "heritage," it is less frequently incorporated into definitions of cultural "property." However, definitions will vary depending upon cultural context and may differ particularly depending upon their use in legal instruments.

In the repatriation context in Australia, the particular emphasis in the return of cultural property has been upon human remains and objects of special significance (usually secret/sacred, ceremonial, and sometimes funerary objects). What is defined as "human remains" has also been a point of discussion and again can vary depending upon cultural context and museum policy. In particular, it has been debated whether remains which have been made into (or incorporated into) objects should, or should not, be considered as "the deceased" and thus be covered by relevant repatriation policy. What an institution may consider to be "human remains" may not necessarily accord with what a claimant community considers to be within this category. In addition, although the identification of the supply of copies (digital or otherwise) of images and sound recordings as "repatriation" by some institutions is arguably not strictly correct (as originals are not provided or, in cases such as sound recordings, were not removed), the program of holding establishments and community organizations to provide/acquire such items is also frequently considered to fall within the "return of cultural property" rubric and ethos and is (and has been) a significant movement in itself.

The majority of Indigenous cultural property in Australian museums has been acquired over the past 150 years. Before this time, such items were generally sent overseas. They were acquired by Australian state and regional museums and also by university departments, learned societies, and private collectors. Up until the Second World War, human remains were obtained largely for the purposes of studying racial difference and were taken from wherever the dead could be found. Collections include skeletal material in the great majority, most commonly crania, but soft tissue remains were also acquired. With the demise of race-based science in the postwar period, remains were increasingly placed in collecting institutions via archaeological excavation, with scientific interest increasingly focused on areas such as paleodemography and paleopathology. In Australia and North America, it was common for Indigenous human remains found by chance, say in the course of construction, to be placed in collecting institutions (often via the police or coroner) rather than to be reburied as European remains would have been if discovered in similar circumstances. It was an example of this type of differential treatment that led to the beginning of the reburial movement in the USA (Zimmerman 1989: 60-61).

Until at least the 1970s, the evidence that the acquisition of human remains by whatever means had been undertaken with the permission of kin or source communities (or even with their knowledge) is limited, if not completely absent. Indeed in the nineteenth century, there is enough evidence within the historical literature to show that collectors were aware that their activities were not supported by Aboriginal or Torres Strait Islander people, with clear instances of concern and opposition documented, as well as some examples of requests for return (Turnbull 1994). From the 1970s onwards, legislation has been adopted at State, Territory, and Federal level that is designed to protect Indigenous sites and significant cultural property from the type of acquisition and export practices that were so

common previously. Such legislation provides legal requirements for action, for example (which includes consultation with source communities), should human remains be discovered or objects be at threat of international export. Key pieces of Australian legislation are summarized in Table 1.

The development of policy and practice relating to the return of Aboriginal and Torres Strait Islander human remains and significant cultural material occurs to a degree in tandem, and their history is interlinked. However, there are significant differences, and for this reason, a brief, separate, history of each is provided here.

Australia: Indigenous Cultural Property Return, Table 1 Summary of Australian State, Territory, and Federal legislation providing protection for Aboriginal and Torres Strait Islander heritage, including sites, human remains, and objects (From www.environment.gov.au/heritage/laws/indigenous/index.html. Accessed 7 June 2012)

Jurisdiction	Principal Indigenous heritage legislation
Australian Capital Territory	*Heritage Act 2004*
	Heritage Objects Act 1991
New South Wales	*Heritage Act 1977*
	National Parks and Wildlife Amendment (Aboriginal Ownership) Act 1996
Northern Territory	*Aboriginal Sacred Sites Act 1989*
	Heritage Conservation Act 1991
Queensland	*Aboriginal Cultural Heritage Act 2003*
	Torres Strait Islander Cultural Heritage Act 2003
South Australia	*Aboriginal Heritage Act 1988*
Tasmania	*Aboriginal Relics Act 1975*
Victoria	*Aboriginal Heritage Act 2006*
	Heritage Act 1994
Western Australia	*Aboriginal Heritage Act 1972*
Federal	*The Aboriginal and Torres Strait Islander Heritage Protection Act 1984*
Federal	*Protection of Movable Cultural Heritage Act 1986*
Federal	*The Environment Protection and Biodiversity Conservation Act 1999*

Human Remains

With the exception of some early examples of requests for the return of remains that have been documented in the nineteenth and early twentieth centuries, in Australia, the start of the campaign for the return of human remains in collecting institutions and those newly discovered through construction can be traced to the late 1960s. Aboriginal law and that of Torres Strait Islander people holds that the deceased must be interred with appropriate ceremony on their traditional country and people have a responsibility to ensure that this occurs, with the potential for serious consequences if it does not. Circumstances of the removal and scientific use of remains have also been voiced as a matter of deep concern, particularly in relation to the role that racial science has played in the colonial process (Hubert 1989). Respect for the wishes of the dead was a primary consideration voiced by those at the forefront of the campaign for the return of Aboriginal remains, such as the Foundation for Aboriginal and Islander Research Action (FAIRA) and the Tasmanian Aboriginal Centre (TAC) (e.g., Weatherall 1989; Mansell 1990; TAC 2001). Those who argued in support of the retention of remains did so on the basis of scientific importance and the loss of knowledge that would result if they were reburied (e.g., Mulvaney 1991). However, the history of the reburial movement traces an increasing shift in museum and disciplinary ethics, policy, and practice away from this stance to one that continued to recognize the scientific importance of remains but recognized also the preeminent right of Indigenous Australians to determine the future of their ancestral remains whether housed in museum collections or newly discovered (Webb 1987; Fforde & Hubert 2006; Pickering 2011).

By the early 1970s, some Australian museums were beginning to change their policies regarding the accession and curation of human remains, including resolution to no longer accept newly discovered Aboriginal remains without express permission from the source community, and to remove remains from display. This decade also

witnessed the first examples of the return of remains to communities, such as that in 1976 by the Australian Institute for Aboriginal Studies (AIAS – now the Australian Institute for Aboriginal and Torres Strait Islander Studies (AIATSIS)) of skeletal remains discovered in a Melbourne garage, to the appropriate community on Groote Eylandt. However, the most significant event to occur during this period was the return of Truganini's remains to the Tasmanian Aboriginal community in 1974 following decades of campaigning by this community and their supporters. Truganini is a famous Tasmanian Aboriginal woman in history whose stated wish for her bones not to become part of a museum collection was recorded by the Reverend H.D. Atkinson in 1869. Despite this, her remains were dug up shortly after her funeral and were later placed on display in the Tasmanian Museum (now the Tasmanian Museum and Art Gallery). A history of the eventually successful attempts to have Truganini's remains returned to the Tasmanian Aboriginal community and her wishes respected can be found in Ryan (1981).

In the 1980s, Aboriginal campaigns for the return of remains from institutions in Australia achieved notable successes, including government support and the amendment of legislation that might restrict museums from deaccessioning such items. During this decade, groups received remains from, for example, the Tasmanian Museum and Art Gallery and the Queen Victoria Museum in 1984, from the National Museum of Australia in 1986, from the University of Queensland in 1988, and from the Museum of Victoria in 1989. Nearly all of these returns had only been achieved after lengthy campaigning by relevant Aboriginal groups and had met significant opposition from the scientific and museum community. However, by the late 1980s, most Australian museums had adopted policies which responded positively to Aboriginal requests for the return of the remains of named or known individuals, those who had died post-contact, those whose line of descent to a modern community could be demonstrated, or those which had been obtained in "unethical" circumstances (Fforde 2004: 112). By the end of the 1990s, these categories were no longer viable, and with the successful campaign for the return of fossil remains excavated at Kow Swamp in 1991 and the unconditional return of the ancient cremated remains of "Mungo Woman" to the people of the Willandra Lakes region in 1992, broader policies encompassing all human remains regardless of age, provenance, or circumstances of acquisition became the norm.

Museums Australia is the national organization for museums in this country, and its document *Continuous Culture, Ongoing Responsibilities: Principles and Guidelines for Australian Museums Working with Aboriginal and Torres Strait Islander Cultural Heritage* (2005) well articulates the new approach to Indigenous collections. And while Australia has no legislation regarding the return of human remains to compare with that of the *Native American Graves and Repatriation Act* (1990) in the USA, through State legislation and museum policy (both individual and via representative bodies), it is now the case that Aboriginal and Torres Strait Islander people may successfully claim the human remains of their ancestors housed in Australian museums and collecting institutions.

Significant Cultural Material

In the repatriation context in Australia, significant cultural material is generally considered to be those items classified as secret/sacred objects, a large number of which were acquired by museums and private collectors. As defined by Museums Australia (2005: 19), "Secret/sacred materials are items of special religious and spiritual significance to Aboriginal and Torres Strait Islander peoples. They have an associated tradition of restricted access and have never been accessible to all members of a community. Such items are usually associated with men's and women's private ceremonies which are not open to outsiders or to certain people within their society of origin." Cultural context is important in the definition of objects as secret/sacred and their degree of restriction; thus Museums Australia recognizes and acknowledges that it is "the

community of origin who ascribe the special status of cultural material and knowledge" (2005: 19).

Responding to Aboriginal concerns, in the early 1970s, some Australian museums began to remove secret/sacred objects from display and to place them in storage areas inaccessible to the public. This decade also witnessed the first return of such items to keeping places established in some remote communities. The South Australian Museum (SAM) in Adelaide, which had acquired significant numbers of secret/sacred objects particularly from Central Australia, played a prominent early role in developing dialogue with communities about the future of these items in its collections. When reflecting on this history, the Senior Curator and Director later noted, "Since their removal from the public gaze, sacred objects have become a difficult issue for museum curators. If such objects cannot be displayed, then it was clear that as objects of research and publication they were not an easy category with which to deal" (Clarke & Anderson 1997: 172). Indeed, removal from display and placement in museum storage did little, if anything, to increase the chances of access to these objects by their traditional owners or even to increase the chances of their knowing what was held in collections.

Serious discussions at the SAM were prompted in the early 1980s by a fortuitous visit from a group of senior Aboriginal men who were in Adelaide to try to stop the sale of secret/sacred objects collected by Professor T.G.H. Strehlow which were then in private hands (Clarke & Anderson 1997: 173). They were shocked to discover large collections at the SAM of which they had no prior knowledge, and the Museum in response undertook to "get its house in order" (Clarke & Anderson 1997: 173). Increasing realization of the extent of museum holdings then led to requests being sent to all museums in Australia requesting the return of secret/sacred objects. From the mid-1980s onwards, the SAM conducted extensive consultation with senior Aboriginal custodians in Central Australia to discuss the future of the secret/sacred objects in its collections, which resulted in the return of some objects and the decision by many communities to leave some or all of their objects in the museum for safekeeping, as well as visits by appropriate community members to the museum's newly built restricted access store.

In the same decade, other museums across Australia began to research their collections of secret/sacred objects and to open dialogue with traditional custodians about their future. While the SAM Board would only consider the return of secret/sacred objects, and particularly those which were still required for ceremonial function, other museums broadened their definition of what type of object was considered "returnable." Other avenues were also pursued, including the long-term loan of secular objects, commonly to community-led cultural centers. Repatriation policies such as those followed by the SAM, combined with the prevalence in collections of secret/sacred objects originating from remote areas, meant that unlike human remains, the return of secret/sacred objects has generally been more geographically confined to Central and Northern Australia.

Research undertaken by museums, Aboriginal groups, and their representatives to locate restricted material in institutional and private collections increased the amount of information available. The work of Museums Australia and its precursor, the Australian Council of Museums, to develop ethical guidelines for the management (including return) of significant cultural material demonstrates the change in the museum profession that has occurred in response to long-running Aboriginal concerns and campaigns. Thus, *Continuing Cultures, Ongoing Responsibilities: Principles and Guidelines for Australian Museums Working with Aboriginal and Torres Strait Islander Cultural Heritage* adopted by Museums Australia in 2005 clearly sets out instructions for the acquisition, return/repatriation, custodianship and access, and display of secret/sacred material, which at all times recognizes the high significance of these items and the right of appropriate Aboriginal and Torres Strait Islander people in source communities to determine their future and management.

Key Issues and Future Directions

In the case of both human remains and secret/sacred objects, it is common for these items to have been separated from any associated provenance information (if this existed). This factor, combined with their frequent placement, a consequent (often unorganized), in storage, and loss of institutional memory, has meant that considerable research is often required to determine as far as possible how and where they were acquired. This type of information is crucial for repatriation, not only to identify the appropriate source community with whom to consult but also because communities do not wish to receive objects or the deceased who are not from their traditional country. The question of what to do with unprovenanced human remains and secret/sacred objects is a significant issue.

Some communities have established keeping places to hold secret/sacred objects – whether returned to them from museums or placed there by their custodians as other locations have become unsafe or inappropriate. As noted by Wallace and Akerman (2008), where and how best to store secret/sacred objects raises a number of questions for communities which require a variety of different solutions. A range of different types of keeping places have been established since the 1960s, and communities face practical and financial challenges in maintaining structures against often harsh climatic conditions, and sometimes vandalism and theft. Human remains are rarely planned to be held permanently in keeping places, although this may occur for a period prior to re-interment.

Funding has been a significant issue in the return of Indigenous cultural property in Australia, which can often be a lengthy and costly process for both museums and communities. Funded by Commonwealth, State, and Territory governments, the *Return of Cultural Property* (RCP) program (1993–1997) followed by the *Return of Indigenous Cultural Property* (RICP) program (1999–present) has provided funds to both museums and communities towards four specific objectives: "identify the origins of all ancestral remains and secret/sacred objects held in the museums where possible; notify all communities who have ancestral remains and secret/sacred objects held in the museums; appropriately store ancestral remains and secret/sacred objects held in the museums at the request of the relevant community; arrange for repatriation where and when it is requested" (Truscott 2006: 2). The National Principles developed by the RICP program strongly align with those of Museums Australia (2005). Nonetheless, the substantial and long-term costs for community organizations, which are associated, for example, with employment of repatriation officers, information management, community consultation, museum visits, acquiring and maintaining keeping places, and conducting funerals, are considerable and remain perhaps the most significant practical issue for communities in the repatriation process. The sheer scale of the number of human remains and secret/sacred objects acquired by collectors in Australia and overseas in the nineteenth and early twentieth centuries means that this issue will be faced by Aboriginal and Torres Strait Islander communities for many years to come.

Cross-References

- ▶ Australia: Repatriation Acts
- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Human Remains in Museums
- ▶ Indigenous Peoples, Working with and for
- ▶ Kennewick Man Case: Scientific Studies and Legal Issues
- ▶ Repatriation Acts: The Politics of Repatriation in North America
- ▶ Repatriation and Race in Indigenous Archaeology
- ▶ Repatriation of Cultural Property in the United States: A Case Study in NAGPRA (USA)
- ▶ Tamaki Makau-Rau Accord on the Display of Human Remains and Sacred Objects (2005)
- ▶ Vermillion Accord on Human Remains (1989) (Indigenous Archaeology)
- ▶ Vermillion Accord on Human Remains (1989) (Legislation)

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Australia: Maritime Archaeology

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Introduction

Indigenous sites underwater, historic shipwrecks, abandoned vessels, survivor camps, jetties, and aircraft underwater, together with the archaeological evidence associated with maritime industries such as whaling or shipbuilding, comprise the maritime archaeological heritage of Australia and its surrounding waters (Gibbs 2006; Nutley 2006). Indigenous people have been present in Australia for at least 50,000 years, and they arrived by voyaging in some form of watercraft making them among the earliest "maritime" people that we know of. While it is considered unlikely that we will ever find physical or archaeological evidence of early Indigenous watercraft, interesting experimental maritime archaeology can still be attempted. Furthermore, as a result of rising sea levels since the Last Glacial Maximum (LGM), some of the earliest terrestrial archaeological sites associated with Australia's Indigenous peoples have been inundated and now lie beneath the sea (Nutley 2006: 84-88). As a result part of the maritime archaeological record in Australian waters potentially goes back at least 50,000 years.

We know that the Dutch, both deliberately and accidentally, came into contact with Australia after 1600 CE. Soon afterwards Dutch, British, and other vessels began to be wrecked around Australia with the first, that we know of, being the English East India Company ship *Trial* lost in 1622 (Green 1977). Over the next 400 years, thousands of vessels were lost in the waters around Australia, and since the early 1970s, maritime archaeologists have conducted a number of significant excavations of historic shipwrecks in Australia (Nash 2006: 55-68). In addition, while there has been a focus in Australian maritime archaeology on "historic shipwrecks," there has also been important research on abandoned vessels, jetties, aircraft underwater, and other kinds of maritime archaeological sites (Gibbs 2006; Nutley 2006).

Definition

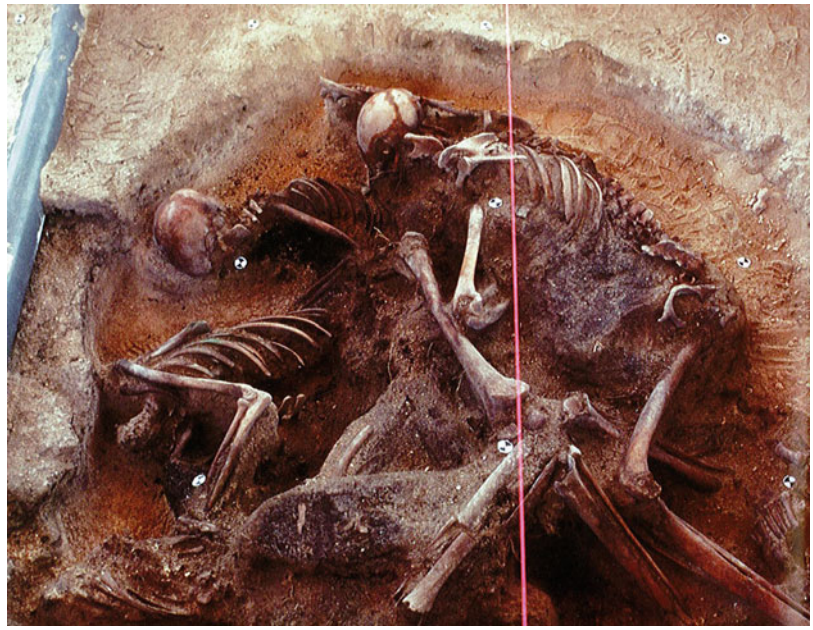
Maritime archaeology in Australia has included the archaeological investigation of the remains of ships (shipwrecks), boats (boat finds), other watercraft or vessels, and aircraft underwater as well as cultural material that was accidentally dropped, lost overboard, or deliberately deposited into the water body. Maritime archaeological evidence can include the remains of structures that were originally built wholly or partly underwater (such as fish traps, bridges, piers, jetties, and wharves). In addition archaeology may examine the remains of human activity that originally took place on dry or marshy land that have subsequently been inundated (or submerged), either by rising water levels or by marine (or fluvial) erosion. Maritime archaeology is a subdiscipline of archaeology associated with the sea, seafaring, and human interactions with the sea. Maritime archaeology can also include sites and artifacts that are not underwater but that are related to maritime activities such as lighthouses, harbor constructions, or shore-based maritime industries such as shipbuilding, whaling, or sealing.

Historical Background

It was the finding of two seventeenth-century Dutch East India Company (VOC) ships during the early 1960s (*Batavia* lost in 1629 and *Vergulde Draeck* sunk in 1656) that first prompted the Western Australian Government to enact legislation designed to protect shipwrecks through the *Museum Act Amendment Act* of 1964 (Jeffery 2006: 124). While this provided a legislative basis for the protection of historic shipwrecks, such as the VOC shipwrecks, there were still no trained, experienced, or qualified maritime archaeologists working in Australia in the late 1960s. This changed in 1971 when the Western Australian Museum employed Jeremy Green who had worked on shipwrecks in the UK with Colin Martin and in the Mediterranean with people like George F. Bass and Michael Katsev (McCarthy 2006: 2). Green brought others to Western Australia from overseas including Myra Stanbury and Patrick Baker who would go on to become long-serving staff members of the Maritime Archaeology Department. Also in the 1970s, other key staff including Graeme Henderson and Michael McCarthy joined the Department, and at the same time, the Materials Conservation Department was gearing up to conserve the artifacts generated by large-scale underwater archaeological excavations.

Starting in the 1970s, the WA Museum conducted a number of terrestrial and underwater excavations of VOC shipwrecks such as *Batavia* (1629), *Vergulde Draeck* (1656), and *Zeewijk* (1727) as part of what was known as the Dutch Shipwrecks Program (Green 1989). Excavations of later period sites like the ex-slaver *James Matthews* (1841), the merchant vessel *Eglinton* (1852), and SS *Xantho* were conducted under the Colonial Shipwrecks Program (McCarthy 2000; Stanbury 2003; Henderson 2009). The excavated assemblages are held by the Maritime Archaeology Department and some material is now on display in the Western Australian Maritime Museum Shipwreck Galleries in Fremantle (Hosty 2006: 155-57; Fig. 1).

In 1976 the Australian Federal Government (the Commonwealth of Australia) enacted



Australia: Maritime Archaeology, Fig. 1 Excavation of a mass grave from *Batavia* shipwreck on Beacon Island (Western Australian Museum)

the *Historic Shipwrecks Act* (*HSA*) 1976 which fundamentally changed the basis for legislative protection and management of historic shipwrecks in Australia. By 1988 all states and territories had enacted state legislation for the protection of historic shipwrecks and/or requested that the Federal government apply the *HSA* to waters off their coastlines. As a result of amendments to the legislation in the early 1990s, the *Historic Shipwrecks Act* 1976 now provides legislative protection to all shipwrecks (but not other kinds of underwater cultural heritage such as aircraft) which sank more than 75 years ago (a rolling date) and that are located in the territorial seas, contiguous zone, and Exclusive Economic Zone (EEZ) from the High Water Mark out to 200 nautical miles offshore (Jeffery 2006: 123-36).

Key Issues

Education is identified as the first key issue as maritime archaeology is a multifaceted discipline that requires both theoretical learning and practical skills training. Fortunately Australia has been one of the few countries in the world that has a long and sustained tradition over more than 30 years of running tertiary education courses in maritime archaeology. The need for tertiary level teaching in maritime archaeology in Australia was first acknowledged in the mid-1970s when the Western Australian Museum canvassed several options for university teaching in maritime archaeology including a 3-year Bachelor's degree course and a Graduate Diploma. In 1980, a 12-month Graduate Diploma in Maritime Archaeology (GDMA) was introduced by the WA Institute of Technology (later renamed Curtin University) and was taught in association with the Department of Maritime Archaeology at the WA Maritime Museum. The GDMA was offered on five occasions between 1980 and 1995 (in 1980/81, 1981/82, 1986, 1990, & 1995/96). At different times since 1990, universities in Western Australia (Curtin University and the University of Western Australia), Queensland (James Cook University), and South Australia (Flinders University) have all offered undergraduate and/or postgraduate courses as well as research higher degree (Ph.D.) supervision (Staniforth 2009). Currently Flinders University has the largest and

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Fig. 2 Flinders University Intensive Program in Underwater Cultural Heritage, 2009 (Maritime Archaeology Program, Flinders University)

most active teaching and research programs at an Australian university (Fig. 2).

The second key issue revolves around the activities of the Australasian (formerly Australian) Institute for Maritime Archaeology (AIMA) and volunteer involvement in Australian maritime archaeology. One of the great strengths of Australian maritime archaeology over the years has been the activities of AIMA, which was formed in Adelaide in 1981. Membership of AIMA includes not only trained, professional maritime archaeologists (which would be a very small and exclusive club indeed) but many other interested people including volunteers. One important contribution made by AIMA has been the regular publication of *The Bulletin of the Australian Institute for Maritime Archaeology* initially twice a year but in recent years only once a year as well as a quarterly newsletter that is available on the AIMA website. Another has been the regular annual conferences that have been run by AIMA for nearly 30 years, usually in September which not only bring together most Australian maritime archaeologists and underwater cultural heritage managers each year to talk about their work, exchange ideas, and hold various meetings but have also provided the opportunity for many others to come to Australia from all over the world. For a decade now the annual AIMA conference has usually been held jointly with the annual conference of one or more of the other related organizations in Australia (and New Zealand) including the Australasian Society for Historical Archaeology (ASHA), the Australian Association for Maritime History (AAMH), and the Australian Archaeological Association (AAA). In the late 1990s AIMA purchased a license to run the internationally recognized Nautical Archaeology Society (NAS) training program, which was then tailored to suit the Australian situation as the AIMA/NAS training program which has proved of enormous benefit by providing a flow of new membership, fulfilling important public education and awareness needs, as well as being used by universities for training students. AIMA also provides a national umbrella body for the avocational (amateur) organizations that exist in some, but not all, Australian states including the Maritime Archaeology Association of Western Australia (MAAWA), the Society for Underwater Historical Research (SUHR), and the Maritime Archaeology Association of Victoria (MAAV).

Research is the final key issue but has always had a relatively strong track record in Australian maritime archaeology, which has contributed to the development of the methods used in maritime archaeology worldwide (Green 1990) as well as to our understandings of specific aspects of shipbuilding and large-scale historical processes

Australia: Maritime Archaeology, Fig. 3 View from seaward with dive boat and surf breaking over *Sirius* wreck site (Western Australian Museum)

including colonialism, consumerism, and capitalism (Staniforth 2003). This chapter will examine three case studies of historic shipwreck excavations of vessels that date from the last decade of the eighteenth century: HMS *Sirius*, HMS *Pandora*, and *Sydney Cove* in order to consider some of the key issues in maritime archaeology in Australia that have arisen over the last three decades.

HMS Sirius (1790)

HMS *Sirius* was the flagship, and largest, Royal Navy vessel to accompany the First Fleet to Australia in 1788. In 1790 under the command of Captain John Hunter, and together with HMS *Supply*, the vessel made a voyage to Norfolk Island to transport convicts and Royal Marines to that island in order to establish a colony there. For HMS *Sirius*, the voyage ended in disaster on 13 March 1790 when the ship was driven backwards onto the reef near the new settlement of Kingston (Nash 2006: 56-58; Stanbury 2007: 25-26). The wreck of HMS *Sirius* was a highly significant event in Australian history generally and specifically in the history of Norfolk Island. The connections to the events of the First Fleet and British convict settlement of Australia make the site of great significance to Australians.

Three seasons of fieldwork were conducted in 1985, 1987, and 1988, with funding from the Australian Bicentennial Authority (ABA), sponsorship from private companies, and support from a number of museums and government agencies. These archaeological expeditions were led by maritime archaeologist Graeme Henderson from the WA Museum and included a team of about 12 experienced professional maritime archaeologists and avocational volunteers (Henderson & Stanbury 1988, Stanbury 2007). A fourth expedition funded by the Australian Federal Government's Historic Shipwrecks Program took place in 2002 (Fig. 3).

The site is located in very shallow water of two to three meters depth that is regularly subjected to very heavy wave action. Experience gained on shallow water "surf-zone" sites in Western Australia, such as *Batavia*, had demonstrated that valuable information could still be obtained from such sites. The survey and recording work was carried out using SCUBA equipment and conducted from an inflatable dive boat anchored on the seaward side of the surf zone. Apart from a substantial ballast pile consisting of cast-iron ballast pigs (or ingots) known as "kentledge," most of the artifacts were located in gullies and holes in the limestone reef flat. The four

expeditions, and a program of artifact conservation and cataloguing carried out over the last 20 years and largely funded with grants from the Federal Government's Historic Shipwrecks Program, have provided accurate survey data as well as raising and conserving hundreds of small artifacts. The archaeological assemblage contained a wide variety of material from a copper coin to large anchors, but most consists of material primarily associated with the structure of the ship, its fastenings and fittings, and a smaller amount of equipment and personal belongings relating to the crew and passengers.

A number of specialist reports have been written and articles published in respected international journals such as the *International Journal of Nautical Archaeology* (IJNA) as well as a popular paperback book called *Sirius – Past and Present* (Henderson & Stanbury 1988; Stanbury 2007). Artifacts from *Sirius* are now on display both in the lower floor of the Norfolk Island Museum (Pier Store) on Norfolk Island and some loan material has been on display at the Australian National Maritime Museum (ANMM) in Sydney. In addition some material from HMS *Sirius* was incorporated into a major exhibition that toured Australia during 1988 and 1989 titled *Shipwreck – Discoveries from our Earliest Shipwrecks 1622–1797*. (Hosty 2006: 160-61).

HMS Pandora (1791)

As a consequence of the famous and well-documented mutiny on HMS *Bounty* on 26 April 1789, the Royal Navy dispatched the 24-gun frigate HMS *Pandora* under the command of Captain Edward Edwards to the South Pacific in 1790. After capturing some of the mutineers, HMS *Pandora* ran onto a reef-top during the night of 29 August 1791 and the next day sank into deeper water (Gesner 1991, 2007; Nash 2006: 58-62).

In November 1977 the site of HMS *Pandora* was relocated by two rival groups of divers with the assistance of an airborne magnetometer carried aboard an RAAF (Royal Australian Air Force) maritime reconnaissance aircraft. The wreck was reported to the Australian Federal Government and initially inspected in April 1979 by a team led by maritime archaeologist Graeme Henderson, and including Patrick Baker, from the WA Museum. The site is in an extremely remote location, some 50 nautical miles offshore, which would normally fall outside the claimed offshore jurisdiction of many countries, certainly during the 1970s. Nevertheless, Australia had recently passed the *Historic Shipwrecks Act* 1976 which claimed a 200 nautical mile jurisdiction and so HMS *Pandora* was declared as a historic shipwreck in November 1979. The Queensland Museum was made responsible for managing historic shipwrecks in Queensland including HMS *Pandora* and in 1981 the Museum appointed Ron Coleman as curator of maritime archaeology. Also in 1981 HMS *Pandora* was given protected zone status that requires a permit to enter a zone extending for a radius of 500 m from the wreck. The site is still a protected zone, which probably makes it one of the longest periods (now 27 years) of direct, and effective, government control over access to a historic shipwreck anywhere in the world.

Between 1983 and 1989 the Queensland Museum undertook several expeditions to survey and partially excavate the site. Initial funding came from the Australian Federal Government, and with support from maritime archaeologists in a variety of interstate organizations, as well as volunteers, some test excavations were completed and a permanent grid structure was established on site. It was found that a substantial section of the ship's lower timbers had survived on the starboard side including relatively intact areas of the lower hull as well as the collapsed remains of upper works and cabins with their contents (Gesner 1991, 2007).

The remains of HMS *Pandora* lie in approximately 30–34 m of water which, together with the remote location more than 600 km from the nearest major port (Cairns), makes any archaeological investigation both person-intensive and expensive. By about 1990 the problems of the short dive times allowable with SCUBA diving and having to hire "live-aboard" vessels for large teams had led to the conclusion that without large-scale funding, the excavations should

Australia: Maritime Archaeology, Fig. 4 Diver next to one of *Pandora*'s main anchors (Western Australian Museum)

probably cease. Expeditions in 1993 and 1995 concentrated on sediment and core sampling with only limited excavation but, importantly in light of subsequent developments, trialled the use of Surface-Supplied Breathing Apparatus (SSBA) that increased dive times and improved communications (Gesner 2007; Fig. 4).

The situation changed in the mid-1990s when the Queensland state government offered the Queensland Museum $1,000,000 for the project, subject to matching funds being raised from the private sector. The nonprofit *Pandora* Foundation was established in Townsville in 1996 and raised a further $2,500,000 from local businesses and donations, which placed the *Pandora* project back on track to continue excavations. The Queensland government subsequently also announced that it would provide more than $17,500,000 for a major museum development (the Museum of Tropical Queensland) in Townsville which would house and exhibit the *Pandora* material in one of the new museum's major galleries (Hosty 2006: 158).

A series of five expeditions between 1995 and 1999 raised several thousand artifacts including ship's equipment, human skeletal remains, crew items, and "collected" artifacts from the Pacific islands (Gesner 2000, 2007). Over the years a number of research reports, catalogues, and commentaries based on the material culture assemblages from HMS *Pandora* have been completed (Gesner 1991, 2007). The "collected" artifacts or "artificial curiosities" are of considerable interest for what they tell us about the cultural interactions between the "West" and the "Other." British exploration vessels and their crews would collect the material culture of the Indigenous inhabitants of Australasia and the Pacific. The collected artifacts from HMS *Pandora* are of particular importance as they represent collecting by all social strata among the *Pandora* officers and crew, rather than just the "official" or elite collections that made their way into collections of the British Museum, Museum of Natural History, and the like. After the 1999 expedition the project focussed on the opening of the new Museum of Tropical Queensland in April 2000 and, despite plans to continue excavation work, no further expeditions have taken place to date (Nash 2006: 62). There is considerable maritime archaeological potential remaining on the HMS *Pandora* site, particularly in the bow area, which has not been excavated to date. In addition, the existing archaeological assemblages provide excellent comparative collections for other investigations of late eighteenth-century Royal Navy vessels in other parts of the world.

Sydney Cove (1797)

Sydney Cove was wrecked on 9 February 1797 during a voyage from Calcutta in India to the

newly established, penal colony at Port Jackson (Sydney). The merchant vessel had been consigned by Campbell and Clark, a small trading enterprise involved in trading European, Indian, and Chinese goods, primarily around the coasts of the Indian subcontinent, and for whom trading to Australia would be a new venture (Staniforth 2003: 65-99; Nash 2009). It was carrying a speculative, mixed cargo including bags of rice, sugar, tobacco, salted meats, tar, vinegar, soap, candles, leatherware, Indian textiles, livestock, Chinese porcelain, as well as 7,000 gal (31,500 l) of rum (Nash 2009: 32-53).

The site of *Sydney Cove* was relocated by sports divers in January 1977 in only 4–6 m of water, approximately 400 m off Preservation Island in Bass Strait. Despite the recent enactment of the Commonwealth *Historic Shipwrecks Act* (1976), the Tasmanian government proclaimed the underwater site itself, and the associated land sites where a part of the salvaged cargo had been stored and the survivors' camp was located, as a Historic Site on 29 March 1977 under the Tasmanian *National Parks and Wildlife Act* 1970. Survey work and test excavations were undertaken in the late 1970s and further work was carried out in the 1980s to install permanent survey controls around the wreckage. Some artifacts including the partially intact rudder and two cannon were raised during this early work (Nash 2009: 94-99).

An extensive program of archaeological excavation on the underwater site was carried out between 1991 and 1994 under the direction of Mike Nash of the Tasmanian Parks and Wildlife Service, with funding from the Federal Government Historic Shipwrecks Program and conservation assistance from the Queen Victoria Museum in Launceston. Support also came in the form of personnel and equipment from federal and interstate government agencies backed up by numerous volunteers. Diving operations were conducted using surface-supplied air from an 11-m charter vessel *Strait Lady* and SCUBA tanks were only used for some photographic and video recording. A total of 216 m^2 of the site was excavated using water dredges and underwater recording was carried out with a rigid grid frame system. Among the artifact assemblages were more than 200 kg of mostly broken polychrome overglaze and blue underglaze Chinese Export Porcelain, which was commonly imported into the Australian colonies before 1830 which, in addition to its functional utility, tells us about some of the meanings attached to ceramics in the early colony (Staniforth & Nash 1998; Staniforth 2003: 86-99). The excavation also revealed interesting features about the construction of *Sydney Cove* such as the use of traditional Indian methods of protecting the hull including the use of waterproof resins and a thin layer of sacrificial planking, over which the latest imported technology of copper sheathing, over a backing of woollen felt, was laid. The final expedition in March 1994 recovered the entire site using more than 500 polypropylene sandbags, and periodic monitoring has demonstrated this to be a cheap but effective means of stabilizing the site after excavation (Nash 2009: 111, 131-4; Fig. 5).

To commemorate the bicentenary of the loss of *Sydney Cove*, an exhibition was developed which opened at the Queen Victoria Museum in Launceston in February 1997. This exhibition travelled around Australia for 2 years funded by the Federal Government's *Visions* exhibition touring program before returning to Launceston where the archaeological assemblage is now held. In 2002 and 2004 two further terrestrial expeditions were conducted to locate and excavate part of the survivor camp, which included at least one dwelling, at the south end of Preservation Island (Nash 2009: 190-209).

International Perspectives

Australian maritime archaeology is widely respected internationally and Australian maritime archaeologists often individually, but sometimes with institutional support and backing, have taken leading roles in a variety of regional Asia-Pacific and international activities. For more than three decades, Jeremy Green of the WA Maritime Museum, for example, has taken a leading role in research and teaching maritime archaeology in Thailand, China, and Sri Lanka

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Fig. 5 Divers recording an excavated section of *Sydney Cove's* hull (Parks and Wildlife Service, Tasmania)

through programs like SPAFA as well as conducting research on Dutch East India Company (VOC) ships in Malaysia and Asian-built vessels throughout the Asia-Pacific region. Furthermore, AIMA, and individual maritime archaeologists such as Jeremy Green, support for maritime archaeology projects and programs in the Asia-Pacific region has been an important contribution to the development of the subdiscipline in the region.

Graeme Henderson, also from Western Australia, was the first head of ICUCH – International Committee on the Underwater Cultural Heritage – and he took a leading role in the drafting of both the ICOMOS Charter on the Protection of Underwater Cultural Heritage 1996 and the UNESCO Convention on the Protection of the Underwater Cultural Heritage 2001. David Nutley has been the Secretary and is now Vice-President of ICUCH and Mark Staniforth is currently a member of ICUCH. Staniforth also served for two terms on the ACUA – Advisory Council on Underwater Archaeology (2000–2008) including 3 years as deputy Chair (2001–2003) and 3 years as Chair (2004–2007) as well as 3 years on the board of the Society for Historical Archaeology (SHA) in his capacity as ACUA Chair. Wendy Van Duivenvoorde currently serves on the ACUA Board.

Future Directions

Clearly one part of the future directions for maritime archaeology in Australia lies with the tertiary education system, which has expanded in recent years partly as a result of the establishment of the Maritime Archaeology Program (MAP) at Flinders University (Staniforth 2009). Flinders University is currently the only university in Australia to develop and sustainably undertake a fully integrated program of teaching in maritime archaeology from undergraduate to research higher degree level in the form of the Maritime Archaeology Program in the Department of Archaeology. In addition to the ongoing teaching of maritime archaeology at Flinders University, it is considered likely that other Australian universities are likely to take up the teaching of maritime and underwater archaeology at various levels during the next decade. Collaborative research projects involving universities can also be expected to undergo expansion with some signs that this is starting to happen with the Australian Historic Shipwreck Protection Project (AHSPP) receiving a large ARC Linkage grant in 2011 as well as the appointment of the first postdoctoral fellow in maritime archaeology in Australia (Jun Kimura) at Murdoch University in 2012.

Australian maritime archaeology has a long history of "holistic" approaches to the integration of related underwater and terrestrial archaeological sites going back to the 1970s *Zeewijk* excavations, but recent decades have also seen the broadening of maritime archaeology activity to include the study of Indigenous sites underwater, abandoned vessels, jetties, aircraft underwater, survivor camps, and shipyards (Gibbs 2006; Nutley 2006). This kind of holistic approach is another likely future direction for Australian maritime archaeology and, together with the (eventual) ratification of the UNESCO *Convention for the Protection of the Underwater Cultural Heritage* (2001) by the Australian government, is likely to provide the basis for increased activity in these areas of maritime archaeology.

On the other hand state and Federal Government funding cuts, the lack of updated legislation and the loss of positions within government heritage agencies and museums have been ongoing problems for more than a decade (Staniforth 2000) and show signs of continuing well into the future. Unfortunately the comment made in 2000 that "the legislation is seriously dated and in need of a complete rewrite" remains as true today as it was more than a decade ago (Staniforth 2000: 91). The same paper also suggested that "not-for-profit" and community-based organizations provided opportunities for the expansion of activity in maritime archaeology (Staniforth 2000: 91-2). While the opportunities in the "not-for-profit" sector have seen limited progress over the last decade, there remains one area where future expansion is still possible.

Cross-References

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- ▶ Australia's Archaeological Heritage
- ▶ Convention on the Protection of the Underwater Cultural Heritage (2001)
- ▶ Green, Jeremy N.
- ▶ International Council on Monuments and Sites (ICOMOS) (Ethics)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
- ▶ Modern Vessel Archaeology (Iron and Steel Wrecks)
- ▶ Pacific Ocean: Maritime Archaeology
- ▶ Ship Archaeology
- ▶ Shipyard Archaeology
- ▶ Society for Historical Archaeology (SHA) (Historical Archaeology)
- ▶ Southern Ocean and Antarctic Maritime Archaeology
- ▶ Underwater Archaeology

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Australia: Repatriation Acts

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Introduction

There are estimated to be thousands of Indigenous Australian human remains in the collections of Australian and international institutions and, in addition, hundreds of thousands of culturally meaningful artifacts (see Fforde 2004; Cubillo 2010). As such, repatriation is a significant issue in Australia for Indigenous communities and also for archaeologists and those working in museums and cultural heritage. Repatriation is also significant as part of a wider assertion of the rights of Indigenous Australians to control their own cultural material, archaeological sites, sacred landscapes, and heritage. Thus, the collections of Indigenous human remains and sacred objects on a deeper level both represent and continue the colonial process. Watson (2003) noted the importance of acts of repatriation when combined with an understanding of other legacies of British colonization, such as the entrenched social and economic disadvantages still suffered by Indigenous people, and how and why these remains have come to be in such collections. In recent years a philosophy of repatriation has been established in Australia and principles have been endorsed by federal, state, and territory ministers and governments, as well as museums. There is no overarching legislation equivalent to the NAGPRA in the United States, but since 2000, individual acts of repatriation have been undertaken as a matter of policy by successive federal governments. In practice this is done through the administration of the Indigenous Repatriation Unit, which negotiates with both overseas and domestic institutions, but efforts to put forward claims are primarily driven by Indigenous communities. The code of ethics of the

Australian Archaeological Association (AAA), one of the largest archaeological organizations in Australia, requires that members acknowledge the importance to Indigenous peoples of ancestral remains, objects, and sites.

Definition

In Australia, repatriation has been referred to as the "repatriation debate" and the "reburial issue" (Fforde 2004; Wilson 2006). It concerns the return of human remains, grave goods, sacred objects, or objects of cultural significance to the individuals, groups, or nations that represent the original owners. Reburial refers more specifically to the reinterment of human remains that were archaeologically excavated. Repatriation is part of a general reassertion of Indigenous control over cultural heritage and of human rights. Following Wilson (2006), repatriation can be defined as more than the return of "something" or "someone" and extends to include the return of authority, power, and control to Indigenous peoples. It thus allows for any important object to be returned and which signifies an important shift in power relations.

Historical Background

Museums in the eighteenth and nineteenth centuries were an expression of the western conviction in concepts of progress, classification, and empire. They displayed the trophies and curiosities of colonial expansion – the specimens, artifacts and human remains, and classification that contributed to the study of race. Theoretical platforms such as monogenism, polygenism, phrenology, eugenics, and social Darwinism reduced Indigenous people to museum curiosities and likened them to fossils for comparative anatomical analysis. When Australia was colonized by the British in 1788, Indigenous peoples collided with perceptions built on such racial theories. Consequently, Indigenous Australian human remains were procured to expand the discourse on Caucasian superiority. From colonization to the 1950s, Indigenous remains were removed, without permission, from burial grounds, hospitals, and morgues, and sent, sold, or traded to museums, universities, and private collections in Australia and overseas (see Fforde 2004). Remains are known to be held in more than 180 museums and in 26 countries (Simpson 2001: 239). A multitude of false premises were put forward about the nature and origins of Indigenous Australians, with one of the most prevalent and pervasive representing them as degenerate, or "primitive," as lowest on the hierarchy of human civilization (Turner Strong 1986; McGregor 1997). A discourse of extinction emerged from the 1860s of a "dying race" and ultimately led to a culture of protectionism and the enactment of legislation such as the *Half Caste Act of 1885* (Victoria) that forced the removal of mixed race children from their parents. The forced removals of Indigenous children occurred across Australia and are now known as the "stolen generations." As argued by Watson (2003: 38–9), "by reducing Aboriginal people to wretched and doomed creatures, science wiped the European slate clean of culpability for genocide, and justified invasion."

From the mid-1960s, Indigenous organizations such as the Tasmanian Aboriginal Centre (TAC) and the Foundation for Aboriginal and Islander Research Action (FAIRA) began campaigning for the return of their "Old People" and cultural property from institutions in Australia and overseas. In 1976, the Tasmanian Museum and Art Gallery was the first museum in Australia to repatriate Aboriginal remains to community. It was also at this time that there was increased interest in Australian archaeologists studying their own continent and undertaken at Australian sites. Excavations of skeletal remains such as at Kow Swamp and Lake Mungo changed the discourse of Australian archaeology and reassessed the age and nature of colonization of the continent. This work provided evidence of the antiquity of

Indigenous occupation, and the nature and timing of the colonization of Australia, as well as the origins of Indigenous Australians, are still principal research areas.

In 1984 the *Aboriginal and Torres Strait Islander Heritage Protection Act* (APA) was adopted. The *APA* (*1984*) was successful in establishing dialogues between museums and Indigenous communities on the repatriation process. However, in the same year the Australian Archaeological Association (AAA) gave only conditional support to the return of human remains to Indigenous communities and to what it saw as the *destruction* of remains, (such as those discovered at Kow Swamp and at Lake Mungo), arguing that this constituted a loss of artifacts which could impact the understanding of human cultural development or biological evolution (Meehan 1984). John Mulvaney, a leading Australian archaeologist, was cynical about the fate of human remains being wholly decided by the appropriate Indigenous community, publicly stating that these remains hold "potential clues to many issues common to all races" and that study is "significant for Aboriginal self-knowledge of their origins and cultural development." (Mulvaney 1989, 1991). Repatriation in the 1980s can thus be characterized as a debate between "science" and Indigenous "politics" (later, after requests and lobbying by communities, the Kow Swamp remains were significantly repatriated in 1990, followed in 1992 by those from Lake Mungo).

The Australian government began funding the repatriation of Indigenous Australian remains from overseas in the 1990s. This funding was first provided through the Aboriginal and Torres Strait Islander Commission (ATSIC), followed by a succession of other federal government departments. As distinct from the USA, Australia has no federal repatriation legislation, only policy. The broad responsibilities for identifying and protecting Indigenous heritage including archaeological sites lie with Australia's state and territory governments. State legislation and how it is interpreted and enforced differs. In some states, such legislation is little more than tokenistic. Indigenous heritage can be protected to varying degrees and developers can apply for a permit or certificate to allow them to proceed with activities that might affect Indigenous heritage. Watson (2003) noted that under Australian common law, there is no provision for ownership of human remains. However, institutions in Australian (and primarily in the United Kingdom) have not relinquished collections of human remains but have worked around this by classifying them as objects. The only Commonwealth Act that may support a repatriation claim is the aforementioned *APA* (*1984*). It is also unlikely that Indigenous people could claim the right to human remains under Native Title legislation, as it is confined to rights and interests in lands and waters. Watson (2003: 40) observed that Native Title rights might exist over burial grounds and in appropriate cases may be available to restrain excavations, but this has not been tested to date.

In 1998 the Australian Cultural Ministers Council endorsed a strategic plan to return human remains and secret sacred objects held in the eight major Australian museums back to their communities of origin. The resulting Return of Indigenous Cultural Property Program (RICP) was administered by the then Federal Department of Environment, Water, Heritage and the Arts (DEWHA). In 2009, the Australian government formally announced support for the Declaration on the Rights of Indigenous Peoples; of relevance is Article 12 which states that:

"Indigenous peoples have the right to the repatriation of their human remains." In August 2011 the government consolidated the international and domestic repatriation programs into one program, the Indigenous Repatriation Program, to seek the unconditional return of Indigenous ancestral remains from overseas institutions and the return of secret sacred objects from Australian major museums to their communities of origin. Australian legal recognition has effectively adhered to its obligations under the *UN Declaration* and which, in a sense, allows it to be more progressive and adapted and implemented more rapidly. For example, the federal policy states that study on Indigenous human remains must be undertaken with consultation and with the informed consent of traditional owners or their

identified representatives and that invasive physical research, such as the sampling of teeth, should not be undertaken.

In terms of Australian museums, repatriation is managed by eight collecting institutions: the Australian Museum, the Museum and Art Gallery of the Northern Territory, Museum Victoria, the National Museum of Australia, the Queensland Museum, the South Australian Museum, the Tasmanian Museum and Art Gallery, and the Western Australian Museum. The "Previous Possessions, New Obligations" policy (PPNO) was instigated in 1993 by Museums Australia. The PPNO was important in that it attempted to build relationships with Indigenous communities by way of Indigenous employment, by gaining their input into policy formulation and by increasing their representation on museum boards. Assistance is still provided where necessary by the National Museum of Australia and/or the relevant major state or territory museums to the federal Indigenous Repatriation Program, including research to establish the provenance of ancestral remains and the identification of overseas collections of ancestral remains and the holding of remains in temporary "keeping places."

There have been over 1,000 repatriations to communities in Australia since 2000. Notable among these are the 2003 return of the remains of over 300 ancestors of the Ngarrindjeri nation from the University of Edinburgh in collaboration with the National Museum of Australia Repatriation Unit and, in the following year, another 74 from Museum Victoria under the RICP, as well as the Oxford Museum. In 2011 the Natural History Museum in London returned 138 ancestral remains to the Torres Strait Islands in the largest single return to Australia to date. Also in 2011, an important precedent was set with the Smithsonian Institution's National Museum of Natural History's first international repatriation when it returned ancestors to the community of Gunbalanya in West Arnhem Land. This is also an example of positive collaboration – here between the community and archaeologist Sally May. In this situation, it was May's research for her dissertation and subsequent publication (May 2010) that acted as the catalyst for the repatriation process.

Key Issues, Current Debates, and Future Directions

Following the ratification of The Vermillion Accord in 1989 by the World Archaeological Congress (WAC), the Australian Archaeological Association (AAA) identified a need for a code of ethics endorsing Indigenous control of their cultural heritage. The code of ethics was adopted in 1992 and amended in 2004; it makes clear that the primacy of ownership, curation, and protection of skeletal remains must ultimately reside with Indigenous Australians. It must be noted that the majority of Australian archaeologists do work with Indigenous cultural heritage and some do carry out research on skeletal remains. This, however, must be undertaken in collaborative arrangements with the permission of traditional owners and by way of negotiation. As pointed out by Smith and Burke (2003), it is difficult to measure the impact of codes of ethics of the AAA and of the Australian Association of Consulting Archaeologists Incorporated (AACAI) in terms of implementation and behavior, apart from any explicit violations of the code. However, it can be said that the vast majority of Australian archaeologists accept, support, and expect a level of Indigenous control and approval if working on Indigenous sites (see Smith & Burke 2007). This is a distinguishing aspect of Australian archaeology.

Undoubtedly, some Australian archaeologists believe that Indigenous remains are of greater value to science than to descendant communities, particularly those working with collections of human remains in museums. This position may be more difficult to defend without strong evidence of ongoing, relevant, and ethical research outcomes (such as publications). Archaeologists do not stand alone from the moral compass of the broader community; there is a need to demonstrate responsiveness to the needs and aspirations of both Indigenous and non-Indigenous communities. Working ethically also requires a consideration of changing social attitudes (such as the reconciliation movement in Australia) and of whether it is acceptable to treat the human remains of Indigenous and non-Indigenous people differently.

Simpson has argued "if museums are to demonstrate they have shaken off the colonial mantle they must address fully the issue of repatriation. To have a blanket 'no returns' policy reflects a failure to recognise or acknowledge the relevance of the concepts of spiritual ownership, cultural patrimony and the cultural importance of certain objects to cultures that did not die out in the nineteenth century, as was expected." (Simpson 2001: 246). Of course, all Indigenous cultures survive and continue today, and the repatriation process allows a handing back of some degree power and control. Positive outcomes can arise from the repatriation process and have demonstrably enabled archaeologists and museums to grow and maintain relevance, not only with Indigenous peoples but also with the broader Australian community. The point must also be made that not all Indigenous communities are antiscience nor necessarily work in opposition to non-Indigenous archaeologists (see Atalay 2008). Through the repatriation process, it may be possible to foster a greater sense of collaboration, dialogue, and capacity to gain a deeper understanding of cultural material and alternate world views.

To progress the debate, it is imperative that potential cultural material, in addition to human remains and grave goods (often termed secular objects), be repatriated. Museums frequently display these objects, such as boomerangs, spears, shields, and clap sticks, to present a story on traditional life. These have not been included in repatriations to date, primarily as collecting institutions do not categorize them as holding the same cultural significance as human remains and known secret sacred material. This is a failure to recognize that such objects, obtained mostly without permission, may also be of significance to Indigenous peoples or that some Indigenous peoples have a spiritual connection to their cultural property regardless of its nature or age. It also fails to recognize that those outside the relevant community may not possess a complete understanding of the role and knowledge of certain artifacts nor the right to be privy to this information which should be based on social position, age, and gender.

An acute aspect of the repatriation debate in Australia concerns the support provided once human remains are returned to a community. Though Indigenous communities are in no way responsible for the removal of their ancestors and cultural material, they are required to carry the burden of the repatriation process. This involves enormous responsibility in terms of time, finances, and cultural resources, as well as an emotional burden, particularly for elders (see Wilson 2006). There is the responsibility that remains are returned in a dignified and culturally appropriate manner, with resources and land for reburial. The April 2010 Discussion Paper on the review of the International Repatriation Program by the Federal International Repatriation Advisory Committee identified a lack of appropriate land as a major problem for a number of communities, particularly if there must be a large number of reburials. This entails negotiating with federal, state/territory, local governments, and private landowners and finding relevant and appropriate sites that now, for example, are housing estates. Further to this there are also issues surrounding access and site protection. Current federal funding does not have the provisions for keeping places (either their establishment, or maintenance, or for holding remains where the specific cultural group is not able to be identified), for the purchase of land, or ongoing site management and protection. The issue of compensation has also been touched on by Hemming and Wilson (2010) and would assist with such issues. However, the issue of Native Title compensation has generated division in Australia. This raises complexities around who is entitled to compensation and on what basis, what might constitute just terms for that compensation, and who is to pay. In reality this may risk further isolating some institutions (particularly outside Australia) who are already resistant to the repatriation process.

Archaeologists have played a role in the disempowerment of Indigenous Australian communities through the appropriation and dispersal of their cultural material. Yet archaeologists do have the potential to be positive agents of change in partnership with Indigenous communities by way of acts of repatriation such as that that has

occurred in Gunbalanya. Through collaboration, rigorous archaeological research can be undertaken that also has real impact, now.

Cross-References

- ▶ Australia, New Zealand, and Papua New Guinea: Museums
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Repatriation and Race in Indigenous Archaeology

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Australia's Archaeological Heritage

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Introduction

Archaeology in Australia covers a time from around 60,000 years ago to the present day. Many of Australia's World Heritage properties consist of large protected area landscapes, and archaeological sites from all historic and prehistoric periods are likely to be contained within them. However, for the most part, the archaeological values within these landscapes have played a minor role in the presentation of the country's suite of World Heritage Areas. Exceptions to this are the Willandra, Kakadu, and Tasmanian Wilderness WHAs, which are mixed natural and cultural sites where archaeological evidence was fundamental to establishing Outstanding Universal Value (OUV). Archaeological excavation programs have also contributed to our understanding of many of the individual sites in the Australian Convict Sites WHA.

For many years following the advent of radiometric dating techniques, the quest to find the oldest site and have the final word on the first human settlement of the continent dominated archaeological debate in Australia. This quest led to many important discoveries but also

limited the range of archaeological inquiry. While there is still great interest in Pleistocene sites, the post-processual movement has provided a sense of legitimacy to a range of different inquiries. New dating techniques measuring modern carbon and optically stimulated luminescence (OSL) have coincided with a rise in archaeological interest in the recent past.

The practice of so-called historical archaeology began as a way of exploring settler history. Problematically, it developed as a strand that was seen to be non-Indigenous and often involved practitioners that had no undergraduate training in Indigenous archaeology, anthropology, or history. However, a strong emergence of interest in the contact period in the 1990s led to a spate of projects that focussed on the Aboriginal settler contact and post-contact relationships.

Historical Background

Australia became a signatory to the World Heritage Convention on August 22, 1974, and has since served four terms on the World Heritage Committee. In the 38 years since becoming a signatory, 19 Australian sites have been inscribed on the World Heritage List. Of these only three sites, the Australian Convict Sites, the Royal Exhibition Building in Melbourne, and the Sydney Opera House, have been listed for cultural values alone, and four others are mixed natural and cultural sites: Kakadu, Uluru-Kata Tjuta, Tasmanian Wilderness, and Willandra Lakes (see Table 1). To some extent, this range of sites can be understood in the context of the nation's changing understanding of "Australian" identity, advances in archaeology, and the emergence of cultural heritage as an important interdisciplinary field which has been pioneered by archaeologists.

Archaeology was not seriously practiced as a discipline until 1929 with the first systematic excavation at Devon Downs Rockshelter on the lower Murray River (see Mulvaney & Kaminga 1999). The growth of archaeology in Australia reflected a growing interest in the origin of Australia's Indigenous peoples, led largely by the South Australian Museum where Norman B. Tindale worked and the Australian Museum where F. D. McCarthy was the curator. It was not until the 1960s that archaeological positions were established at Australian universities and filled by qualified personnel. A growing interest in archaeology in the 1960s and 1970s led to discoveries that radically changed both our academic knowledge and the public's perception of Aboriginal society and its antiquity.

The discovery of Aboriginal occupation sites dating to the Pleistocene altered the perception of Aboriginal people and their culture, laying to rest the idea that the continent had only recently been settled. In the Pleistocene, sea levels were much lower and the landmass now called Australia was part of a larger area scientists refer to as Sahul. Many of the earliest sites in Australia are presumed to be now submerged below current sea levels. The antiquity and geographic distribution of Pleistocene sites in Australia are important in demonstrating how humans occupied most of the continent in the Pleistocene despite climatic extremes.

While archaeological practice in Australia has been critiqued by its Indigenous people as a fundamentally colonial exercise, by demonstrating and empirically proving the antiquity of Aboriginal occupation of Australia archaeology has also undoubtedly contributed to major political shifts in the recognition of Aboriginal rights. Archaeological discoveries dramatically revised the dates for Aboriginal colonization of the continent and provided the ammunition for Aboriginal people to engage with land managers and environmentalists, pointing out that in the millennia of Aboriginal occupation, they had shaped Australia's so-called "natural" landscapes.

Key Issues/Current Debates

Pleistocene Sites and World Heritage

Australia's earliest WH sites focussed on the country's Pleistocene archaeological heritage, reflecting the impact of these discoveries.

Australia's Archaeological Heritage, Table 1 Table of Australian World Heritage Sites inscribed for cultural value (Criteria numbers have been converted to the current numbering convention)

Number	Site name	Inscription date	Cultural Criteria	Natural Criteria	Archaeology period	Archaeology	Area Originally listed	Currently listed (ha)	Notes
185	Willandra Lakes	1981	iii	Viii	Pleistocene (indigenous)	Crucial to both natural and cultural OUV	Difficult to ascertain easily as not specified in the nomination dossier. Dossier says the Willandra lakes Region=6000 km2 (600,000 ha)	240,000	Area reduced (19Comm Decision 1995)
147	Kakadu National Park	1981	I,v	Vii, ix, x	Pleistocene to current day (indigenous)	Archaeology important but Rock Art the most central to the cultural OUV	6,144 km2 (614,400 ha)	1,979,766	Extension 1987, 1992
447	Uluru-Kata-Tjuta	1987 inscribed for natural values. 1994 re-inscription (as cultural landscape)	V, vi	Vii, viii	Primarily Holocene	Evidence for criterion 5	132,566 ha	132,566	Again humans and environment-intensification at 5,000BP and increase in ritual intensity.
181	Tasmanian Wilderness	1983, extension plus cultural listing in 1989 (cultural)	I ii, iv, vi	Vii, viii, ix, x	Pleistocene	Yes	769,355 ha	1,407,513	+ a buffer zone of 3,747 ha
1306	Australian Convict sites	2010	Iv, vi	No	Colonial 1788–1877	Supplementary although key source of information in some of the sites	1502.51 ha	1502.51	+3883.42 buffer
166	Sydney Opera House	2007	i	No	20th Century	No	5.8 ha	5.8	+buffer 438
1131	Royal Exhibition Building & Carlton Gardens	2004	ii	No	19th Century	No	26 ha	26	+buffer 55

Australia's Archaeological Heritage, Fig. 1 Willandra Lakes World Heritage Area (Copyright Mark Mohell & DSEWPaC, used with permission)

Willandra Lakes WHA is a semiarid landscape of dried lake beds located in far southwestern New South Wales (Fig. 1). It was inscribed on the World Heritage List in 1981 for outstanding cultural and natural universal values under criteria iii and viii. Here more than any other WHA in Australia the archaeological and geomorphological evidence played a crucial role in establishing the Outstanding Universal Value of the area (see Fig. 2).

The most well-known archaeological site in Australia is the Lake Mungo Lunette in the Willandra Lakes WHA. A hearth radiocarbon dated to 31,000 years BP is underlain by another half meter of cultural deposit, suggesting that the basal date for the cultural deposit is in fact much older about 40,000 years BP; some speculate even earlier at 60,000 years ago. Mungo provides early evidence of human ritual and all it implies about the complexity of the society and cosmological beliefs of the people who left these traces. This evidence includes a 26,000-year-old burial, which is the world oldest known cremation, and a 30,000-year-old ochre burial.

In addition to addressing the timing of colonization, this WHA illustrates one of the enduring themes of archaeological research in Australia – that of human relationships with the environment through time. Other evidence from archaeological sites within the WHA includes the remains of giant marsupials and seed-grinding stones from 18,000 years BP. Recently, the area has revealed poignant evidence of Australia's earliest inhabitants in the form of footprints of ancient family groups preserved in clay.

The Tasmanian Wilderness WHA was inscribed on the World Heritage List in 1982 for its natural values and extended in 1989 for both its outstanding natural and cultural universal values. It is listed under seven of the ten criteria (criteria iii, iv, vi, vii, viii, ix, x) and is one of the largest conservation reserves in Australia. Climatic changes in the ancient past influenced landscape development. Rising sea levels formed

As a cultural property the region is of outstanding universal value because:

- the remains of Homo sapiens sapiens in the Lake Mungo lunette establish that modern man had dispersed as far as southeastern Australia before 30,000 years ago
- complex ritual and symbolic systems are indicated by the 30,000 years old ochred burial and by the 26,000 year old crematic (the oldest cremation site in the world)
- these skeletal remains provide amongst the earliest evidence of Homo sapiens sapiens anywhere in the world and establish the great antiquity of Australian Aborigines
- some of the world's earliest substantial evidence for the exploitation of freshwater resources occurs here in quantity
- the evidence enables a reconstruction of the economic life of Homo sapiens sapiens, showing a remarkable adaptation to local resources and the interaction between culture and the changing natural environment
- grindstones to produce flour from wild grass seeds were used here in the late Pleistocene, at much the same time as their use in the Middle East.
- pigments were transported to these lakeshores before 32,000 BP
- the typology of early Australian stone tools was defined as a result of research in this region

An aesthetic sense, ritual, and concern for deceased kin are surely the hallmarks of mankind. The Willandra discoveries have established the great antiquity and richness of Aboriginal culture and have caused a significant reassessment of Aboriginal prehistory and its place in the history of modern man. The discoveries have linked the origins of modern society in the Old World with one across Wallace's Line in Australia.

Australia's Archaeological Heritage, Fig. 2 Extract from the nomination dossier – Willandra Lakes WHA

Bass Strait and the Australian mainland became inaccessible; the resulting isolation experienced by Tasmanian Aboriginal people and the cultural effects of this isolation captured the interest of archaeologists.

Kutikina Cave is one of about 40 Pleistocene sites so far discovered in the Tasmanian Wilderness WHA. However, at the time of the original nomination in 1982, there had been no systematic survey for Aboriginal sites, and Kutikina (Fraser Cave) in the Lower Franklin River was the only specific site mentioned in the nomination dossier. It was described as:

> one of the six archaeologically richest limestone caves sites in the western Pacific. A radiocarbon date from the base of part of the cave deposit indicates human occupation in the area about 21,000 years ago....further research is

> proposed. . .It may be claimed already that an antiquity of 21,000 years establishes southern Tasmania as the most southerly known penetration of the earth's land surface during ice age times' (Nomination Dossier 1982: 13).

These sites are of great significance and their discovery contributed greatly to the campaign to protect the area from logging and from proposed dam construction. However, the original justification for listing on cultural values was only four paragraphs, while the natural values justification was nine pages long, which provides some indication of how the archaeology, although significant, was something of an afterthought in the assessment process. By the time the 1989 extensions were proposed, about 37 Pleistocene archaeological sites were known. The justification for inscription under criteria ii, v, and vi is more clearly articulated on the basis of its information about past Aboriginal settlement.

Rock Art and World Heritage in Australia

"Rock art is the most widespread cultural manifestation of humankind. . . it is a manifestation of human conceptual thought and of the beliefs that are at the heart of traditional societies" (ICOMOS 2010: 1). Aboriginal paintings, drawings, and engravings occur in many parts of Australia. There has been a wealth of research into subjects as diverse as the contemporary meaning to Australia's Indigenous people, what the depictions reveal about environmental change and extinct species, and development of techniques for dating and recording the art itself. Significant rock art sites occur in many of the country's protected area reserves outside of current WHAs. Some highly significant sites such as those in the Burrup Peninsula, Western Australia, and in Laura in North Queensland are still at risk from development pressures. Rock art sites also exist in WHAs listed for their natural criteria alone such as the Blue Mountains WHA. However, the only WHA to date where rock art has directly contributed to the case for establishment of the OUV of the landscape is Kakadu National Park.

Kakadu National Park was inscribed on the World Heritage List in three stages over 11 years, commencing in 1981 for both outstanding cultural and natural universal values. It was listed under criteria i, vi, vii, ix, and x. The site description notes that:

> This unique archaeological and ethnological reserve has been inhabited continuously for more than 40,000 years. The cave paintings, rock carvings and archaeological sites record the skills and way of life of the region's inhabitants, from the hunter-gatherers of prehistoric times to the Aboriginal people still living there. It is a unique example of a complex of ecosystems, including tidal flats, floodplains, lowlands and plateaux, and provides a habitat for a wide range of rare or endemic plant and animal species (see http://whc.unesco.org/en/list/147).

Kakadu is a landscape of dramatic vistas, renowned for its beautiful freshwater wetlands and rock art sites. The paintings cover a long chronological span, the oldest date back nearly 20,000 years and the most recent are from contemporary times. Prior to its inscription, there had been a long push to ensure that this area was conserved and protected from mining, and in fact the gazettal of a national park over part of this area arose from recommendations made in the Ranger Uranium Inquiry. While the presence of Indigenous inhabitants was noted in the original nomination dossier, the emphasis was on the archaeological evidence of the Indigenous past, rather than the contemporary Aboriginal community. It was not until the third extension nominated in 1992 (Australian Government 1992: 87-88) that the focus of the nomination dossier changed to more comprehensively incorporate the living traditions of the Traditional Owners and cultural continuity:

> The cave paintings, rock carvings and archaeological sites present a record of the skills and lifeways of the region's inhabitants, from the hunters and gatherers of prehistoric times to the Aboriginal people still living there (Australian Government 1992).

This was an important shift in thinking about heritage and not just in Australia. It was around this time in 1992 that the World Heritage Committee convened a meeting of specialists to redraft the Operational Guidelines to include the concept of associative cultural landscapes more

explicitly in a way that allowed for the recognition of Indigenous cultural values.

While it is the Aboriginal rock art that was the key evidence to support the inscription of this cultural property on the World Heritage List in 1981, there are also a number of Pleistocene archaeological sites in the WHA. The original nomination dossier provides a glimpse of the contemporary debates about the dates and process of Indigenous colonization of the continent (White 1971; Jones 1973). At the time of the nomination, the emerging results from Lake Mungo were challenging some of the assumptions derived from the archaeological work in the Kakadu area in the late 1960s (e.g., White 1967).

Cultural Landscape, World Heritage, and Archaeology in Australia

The changes to the Operational Guidelines adopted in 1992 defined three categories of cultural landscapes including (1) a landscape designed and created intentionally by man, (2) an organically evolved landscape, and (3) an associative cultural landscape.

Australia has actively engaged with the development of cultural landscape concepts within the Convention and quickly moved to renominate Uluru-Kata Tjuta following the successful nomination by New Zealand of Tongariro – the first cultural landscape to be listed. Uluru-Kata Tjuta WHA remains the only cultural landscape listed in Australia. This reserve is in the arid inland and comprises extensive sand plains, dunes, and alluvial desert, dominated by the Uluru monolith and Kata Tjuta. The focus of the park has always been on the monolith Uluru (formerly known as Ayers Rock) which has drawn curious tourists since the 1940s. This interest, while a catalyst, for conservation from tourists gave rise to the long-term struggle of Anangu to retain their traditional way of life and control of their spiritual sites (Layton 1986). This WHA was first inscribed in 1987 for its natural values and it was not until 1994 that it was reinscribed for its cultural values under categories v and vi. The ICOMOS evaluation (p. 100) notes:

> To write that the landscape is *associated with* the narratives, songs, and art of the *tjukurpa*, while accurate from a western perspective, does not do full justice to Anangu ontology and is a poor translation of Anangu concepts. For the Anangu this landscape is the product of heroic ancestors' actions and can be read as a text specifying the relationship between the land and its indigenous inhabitants laid down by the *tjukurpa*. The very rock of Uluru and Kata Tjuta is proof of the heroes' actions and being [criterion vi].

Archaeological evidence of Aboriginal adaptation and change includes the introduction of new tool types and the creation of new forms of rock art as well as changes to camping patterns and social organization over the past 5,000 years. However, the recommendation of ICOMOS (1994) supporting the re-inscription illustrates that though this evidence may have been useful to authenticate the time depth and adaptive nature of Anangu society, it is their relationship and interaction with their landscape and the way it embodies their spiritual beliefs that is the core of the Outstanding Universal Value.

The Archaeology of the Recent Past and World Heritage in Australia

The Australian Convict Sites WHA (Fig. 3) is one of the nation's most recent additions to the WH List. It comprises 11 properties spread across Tasmania, Norfolk Island, NSW, and Western Australia. It was inscribed in 2010 under criteria iv and vi. It incorporates Australia's first ever WH site in private ownership. Each of these places include substantial archaeological values and several, e.g., the Female Factory, Port Arthur, the Hyde Park Barracks, and Parramatta Park, have had extensive archaeological programs associated with them; however, there is little overt acknowledgment of the archaeological values of these places in the nomination dossier.

In the case of the remaining cultural sites, i.e., the Royal Exhibition Building and Carlton Gardens in Melbourne (inscribed 2004) and the Sydney Opera House (inscribed 2007), a consideration of archaeological evidence played no role in their nomination. Interestingly, the Draft Conservation Plan for the Royal Exhibition Building included with the nomination

Australia's Archaeological Heritage, Fig. 3 Student volunteers excavate the site of convict sawpits and tan pits at Port Arthur Historic Site, part of the Australian Convict Sites WHA (Image courtesy of Port Arthur Historic Site Management Authority)

dossier did not address the issue of any associated archaeological deposits and how they would be managed. This reflects a problem with architecturally focussed heritage planning, in that it does not always include multidisciplinary input from archaeologists.

As we have seen, Australia's first cultural nominations can be understood in a national context of the dramatic discoveries of Australia's Indigenous Pleistocene past in the late 1960s and 1970s. Aboriginal activism was re-energized through the scientific discoveries of the antiquity of Aboriginal settlement, the heated environmental battles over the so-called wilderness, and large-scale development proposed in "natural" areas (e.g., Ranger Uranium Mine Inquiry, the proposed Jabiluka mine near Kakadu, and the Tasmanian hydroelectric scheme dam proposal) in the 1970s and 1980s, and the expansion of Australia's protected area reserves. Since that time, government resourcing for the assessment of new areas has dwindled, as too has resourcing for the heritage sector generally.

Heritage bodies have repeatedly lobbied the Australian government to populate its Tentative List through strategic and thematic studies to no avail. There are substantial community-driven campaigns not yet supported by government advocating consideration of a number of cultural properties including the Goldfields, Canberra, Adelaide Park Lands, Cornish mining sites Budj Bim, and the rock art of the Dampier Archipelago. Currently, the assessment of Cape York Peninsula provides opportunities for Indigenous landowners in the region to contribute to any future nomination and develop new models for cultural landscapes shaped by continuing traditions. Ongoing concern over the issues such as costs of managing World Heritage Sites, the globalization of "culture" through international processes such as the World Heritage Convention, the commercialization of significant cultural places through the conflation of world heritage as tourism, and the rights and interests of local communities is debated as hotly within Australia as elsewhere. There are conflicting political positions adopted within Australian society on the impacts of World Heritage listing on Indigenous rights which continue to hamper the development of new models driven by Indigenous Traditional Owners.

Archaeological research is nationally underresourced compared with other areas of research. While a number of persistent archaeologists continue to carry out field research, the main forms of archaeology now practiced in Australia are consulting and salvage archaeology which are not likely to give rise to dramatic archaeological evidence, and if they do, it is often too late to save it.

International Perspectives

The human species did not evolve on the Australian continent but arrived here somehow

from elsewhere. Evidence to date suggests that these first colonists were modern humans (*Homo sapien sapiens*). Just how, when, and why they arrived is still under debate. International discoveries, such as *Homo floresiensis* in 2003 not far away on the Indonesian island of Flores (Morwood et al. 2004) and a geochronologically dated site in Malaysia at 1.8 million years ago (Majid 2003), are still being made that may potentially change theories about colonization of the region. Such discoveries in turn spark new research questions for Australian archaeologists and may have implications for future transnational serial nominations.

More broadly, the relationship between humans and their environment and responses to environmental change are enduring themes in archaeological research in Australia. The specter of Global Climate Change that now confronts the world has re-energized this area of study with many researchers looking to the consequences of past change and human responses.

Australia's contribution to the articulation of the cultural landscape concept along with the listing of Uluru-Kata Tjuta WHA as a cultural landscape so quickly after the 1994 changes to the Operational Guidelines is significant within the history of the convention (Rossler 2006), and Australian archaeologists remain active in developing new approaches and methodologies relating to the identification of cultural landscapes and in particular articulating the links between tangible and intangible heritage.

Future Directions

The future for World Heritage in Australia is unclear, along with the role that archaeology might play in any future nomination. There have been repeated calls for a serial rock art nomination incorporating the most significant art sites across the nation. The oldest dated rock art site in Australia (>24,600 years BP) is found in the Laura region of Cape York Peninsula (Cole & Watchman 2005), renowned for its distinctive rock art style which is a major tourist attraction in the region. Unfortunately, management of this area is under-resourced and the Traditional Owners struggle to manage tourism impacts on these sites. Investment in management of these sites has been at best sporadic.

Cape York Peninsula is currently being considered as a cultural landscape created and maintained through the continuing association of the Indigenous Traditional Owners. Similarly, there are Indigenous community calls to renominate the Gondwana Rainforests WHA as cultural landscape. There continues to be an opportunity to develop new models and methodologies to assess, describe, and manage associative cultural landscapes.

It is unlikely that there will be standalone nominations relating to Australia's recent past. In many cases, comparative analysis will show that many such sites are similar to those of other colonial nations. This does not diminish the importance of such sites to the Australian people. They can be effectively protected through local, state, and national mechanisms in most cases. However, it is possible that transnational serial nominations of some of these places would be successful (assuming a future government commitment to support them). One example is the proposal for a transnational nomination of the Cornish mining sites.

The Torres Straits is a region that is not represented in Australia's suite of WH places, and Torres Strait Islander cultural heritage is underrepresented on relevant national and state heritage registers. This is a vibrant cultural landscape which was and continues to be a cultural nexus between Melanesian Papua New Guinea (PNG) and mainland Australia and has deep historic connections through their shared Sahul prehistory.

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Cross-References

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▶ Burra Charter: The Australia ICOMOS Charter for Places of Cultural Significance (1999)

- ▶ Chile's World Archaeological Heritage and Its Management
- ▶ China: Cultural Heritage Preservation and World Heritage
- ▶ Global Archaeology
- ▶ Heritage and Archaeology
- ▶ International Committee on Archaeological Heritage Management (ICAHM) (Cultural Heritage Management)
- ▶ International Council on Monuments and Sites (ICOMOS): Scientific Committees and Relationship to UNESCO
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- ▶ Local Populations and Global Heritage

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Australian Archaeological Association Inc. (AAA)

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Basic Information

Formally established in 1972, the Australian Archaeological Association Inc. (AAA) has grown to become the largest archaeological organization in Australia (http://www.australianarchaeology.com/). Aimed at encompassing all subfields within the discipline, including Indigenous archaeology, historical and industrial archaeology, ethnoarchaeology, and maritime archaeology, the association now represents a diverse membership of professionals from the private, government, tertiary, and museum sectors, students, and others with an interest in archaeology. The association's membership encompasses archaeologists and cultural heritage practitioners (including many Indigenous archaeologists and cultural heritage practitioners) from across Australia and the world and as of 2012 comprises approximately 1,000 people.

The AAA holds a conference each year, this being the major national annual meeting of archaeologists, attracting delegates from across Australia and internationally. This conference is hosted by a different institution each year in varying locations across the country to encourage attendance from a broad-cross section of the archaeological community. *Australian Archaeology*, a refereed journal published twice a year since 1974, is the

official publication of AAA. In line with the aims of the association, this journal accepts original articles in all fields of archaeology and other subjects relevant to archaeological research and practice in Australia and nearby areas. This includes subject matter covering research and cultural heritage management focused on prehistoric, historic, and contemporary periods.

Through the annual conference, publication of the journal, and the use of various social media platforms, the aims of AAA are to promote the advancement of archaeology, to provide an organization or forum for the discussion and dissemination of archaeological information and ideas, to publicize the need for the study and conservation of archaeological sites and collections, and to increase public awareness of the aims of archaeology in Australia.

Major Impact

Since its inception, AAA has lobbied the Australian federal and state governments, and private industry on behalf of its members, and has prepared submissions on a range of archaeological and cultural heritage-related issues. These include heritage legislation reform, research funding, and best practice in consulting archaeology (several instances in collaboration with the Australian Association of Consulting Archaeologists Inc. and the Australasian Society for Historical Archaeology).

The AAA actively promotes and supports Indigenous and student engagement with archaeology through the annual conference (often via the provision of funding support for attendance and participation) and promotes the importance of Australia's archaeological heritage as a major sponsor of annual National Archaeology Week events run across the country every year in May. Additionally, the AAA supports and promotes teaching and learning in archaeology across schools and higher education through the Australian National Committee for Archaeology Teaching and Learning (ANCATL).

The association's flagship journal, *Australian Archaeology*, is internationally recognized as a high-quality peer-reviewed forum for the publication of archaeological research from across Australasia. The journal is indexed in the Arts and Humanities Citation Index of the Web of Knowledge, SCOPUS, Australian Public Affairs Information Service (APAIS), and Anthropological Literature and Anthropological Index Online and has been ranked as a tier A journal by the European Reference Index for the Humanities and French Agence d'Evaluation de la Recherche et de l'Enseignement Supérieur.

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- Australasian Institute for Maritime Archaeology Inc. (AIMA)
- Australasian Society for Historical Archaeology (ASHA)

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Australian Archaeology: Pioneers and Traditions

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Introduction

Australia's first archaeological observations were made by early explorers and colonists or noted by observers primarily working in other disciplines (Smith & Burke 2007: 1). The first excavation in Australia was undertaken by the governors of the Colony of New South Wales with a focus on human burials (Horton 1991: 3-5), while the first to employ the method of stratigraphic analysis were anthropologists Herbert Hale and Norman Tindale, who undertook archaeological

excavations at Devon Downs in 1929 (Hale & Tindale 1930).

Formal archaeological work in Australia began in the 1950s when John Mulvaney returned from courses at Cambridge University and introduced archaeological study into the Australian curriculum (Mulvaney 2011). Mulvaney began work on a number of archaeological excavations around Australia and instructed and mentored a number of students who would become leaders in the field, including Isabel McBryde, Jim Allen, and Ian Glover.

In the 1970s, a series of political circumstances spurred by a confluence between the Aboriginal land rights movement and public environmental concerns led to the creation of state heritage legislation, After this, the amount of archaeological work conducted in Australia dramatically increased, both with development of heritage surveys required by legislation and in academic circles, with several universities opening archaeology departments.

While Australia's first department of archaeology had been instituted at the University of Sydney in 1948, the focus was not specific to Australian archaeology. Later, archaeologists with an Australian focus arrived at the university, with Vincent Megaw and Richard Wright arriving in 1961 and Rhys Jones in 1963. John Mulvaney was appointed to the History Department University of Melbourne in 1953, later moving to ANU. Isabel McBryde took up the first titled position in Prehistory and Ancient History at the University of New England, Armidale, in 1960, while Jack Golson was appointed to the Anthropology Department at Australian National University in 1961, which was then just moving into the field of archaeology.

Key Issues

Since this time, Australia has grown a thriving discipline covering a range of research topics. The nature and timing of human settlement in the continent has been a long standing topic of interest in Australian archaeology, with the first estimate being made in 1884 by Reverend Peter MacPherson, who postulated an age of 400 years BP for human arrival on the basis of his excavations in Victoria (Horton 1991: 34-43). This date was quickly superseded with the commonly accepted date of human arrival in Australia now being an estimated 50,000 years BP (see Hiscock 2008: 1). The archaeology of the periods of European contact and industrialization has developed into a major field.

The first Australian book dedicated to an overview of archaeological field methods was written in 1983 by Graham Connah (see Connah 1983), which was followed by a more detailed treatment of field methods and related topics by Heather Burke and Claire Smith (see Burke & Smith 2004). The method of ethnographic analogy has often been employed in Australian archaeology and in many cases has served to inform our interpretation of the past (Hiscock 2008: 268-85).

One of Australia's strengths in archaeology has been its analysis of sociopolitical issues, particularly the reflexive analysis of its relationship as a discipline with Aboriginal people (see Burke et al. 1994). This has evolved from simple consultation in the early days to numerous community-based research projects, informed, and sometimes initiated by Indigenous people (Greer et al. 2002). This has begun to transform archaeology in Australia from a field that studied the history of indigenous people to one that cannot only learn more about the past but also benefit contemporary peoples. Employment in cultural heritage management increased dramatically in the early twenty-first century, in response to the legislative requirements of a mining boom in Australia. In 2012, there were over 1,000 members of the Australian Archaeological Association.

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Australian Association of Consulting Archaeologists Inc. (AACAI)

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Basic Information

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The Australian Association of Consulting Archaeologists Inc. (AACAI) was established in the 1970s as an organization for professionals working in all fields of contract and public archaeology. AACAI aims to uphold and promote the discipline of archaeology and to advance the welfare of members. AACAI has a Constitution, a Code of Ethics, and a Consulting with Aboriginal Communities Policy Document. It is affiliated with the Australian Archaeological Association Inc and is a Foundation Member of the Council for the Humanities, Arts and Social Sciences.

Major Impact

The Australian Association of Consulting Archaeologists Inc. is a national organization with local chapters in Queensland, New South Wales, Victoria, South Australia, and Western Australia. The National Executive Committee (NEC) deals with national issues, including membership applications, AACAI policy, and general administration, while State Chapters deal with local matters. AACAI may also provide technical and professional advice, and dispute resolution. It runs an occasional Professional Development Workshop Series. It also publishes a newsletter, a recommended minimum fee scale, and is preparing an Australian Archaeology Consultancy Monograph Series.

The National Executive Committee of AACAI oversees issues of wide-ranging importance for consultants, clients, and the community. The Membership and Publications Committees answer to the NEC. State Chapters of AACAI deal with specific issues relating to practice in different parts of Australia with different jurisdictions and heritage organizational structures. The Chapters hold specialist workshops, seminar series, and act as the first contact point for consultants. Workshops are organized on specialized topics that assist in the professional development of consultants and which help to inform them on issues that affect their work, such as changes to legislation. Recent workshops include the analysis and management of spatial data (GIS applications) and the implications of the GST on business practice and accountability.

AACAI produces a newsletter, which keeps the members and subscribers up to date with a cross section of archaeological issues in Australia and overseas. Each Newsletter includes updates on workshops and lectures of interest to consultants.

AACAI's Register of Consultants lists all Members. For Full Members, the Register lists contact details, academic qualifications, general fields of work (as ratified by the Membership

Committee), special fields of expertise, specialist studies, and consulting experience. The Register provides summary contact details, expertise, and availability of Associate Members and lists all Affiliate Members. The AACAI website lists all financial Full Members' details as well as all policy documents. AACAI can serve to lobby collectively on issues deemed to be of interest to its professional membership, such as amendments to heritage legislation. It has formal ties with other archaeological organizations, including the Australian Archaeological Association.

Cross-References

- ▶ Australian Archaeological Association Inc. (AAA)
- ▶ Ethics in Archaeology
- ▶ Heritage and Archaeology

Further Reading

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Australian Deserts: Extreme Environments in Archaeology

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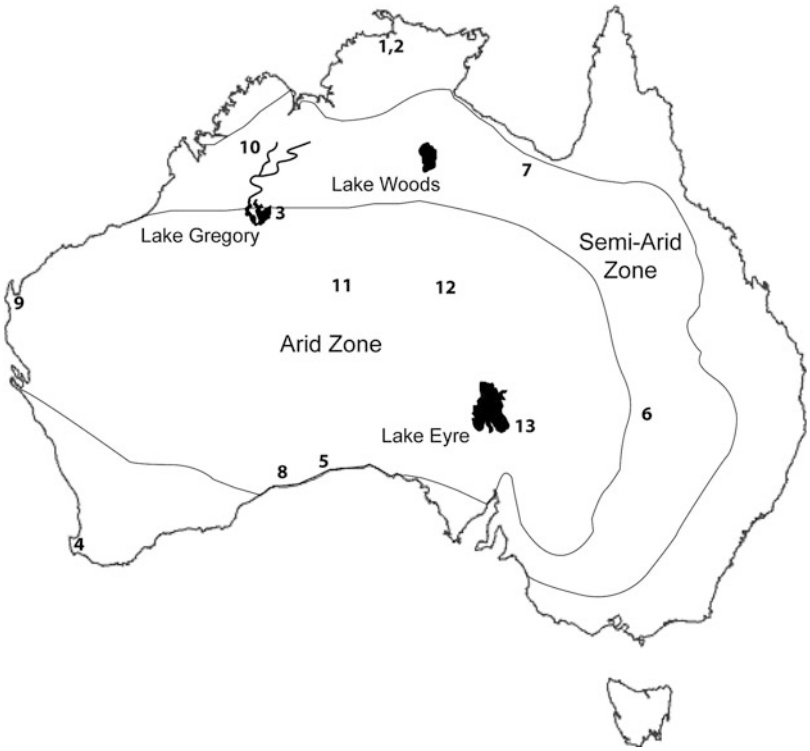
State of Knowledge and Current Debates

Introduction

The first Australians passed through biogeographic filters of the increasingly depauperate islands of Wallacea to enter the most arid continent ever occupied by preindustrial era humans. But were Australia's deserts marginal, extreme, and risky environments for these hyper-adaptive modern humans? We must recall that they were part of a "fast track" southern diaspora of modern humans from Africa to Australia who had already shown extraordinarily adaptive abilities. Given that the Last Glacial Maximum expanded Australia's deserts even further and made for some truly extreme environments, what does archaeology tell us of how Ice Age Australians dealt with the most common environments in Sahul? By the time Europeans arrived in Australia, the deserts were more densely packed with people than ever before, a process that had escalated in the late Holocene to create the renowned desert societies known to ethnographers. Even then, these were some of the lowest density populations ever observed (in some instances one person per 100–200 km^2) (Hiscock 2008). Australian deserts, and desert peoples, have now moved close to the center of Australian society for the first time, providing a vital pump for art and ideas from the desert outward. Here we review Australia's deserts from an archaeological perspective.

Modern humans left Africa between approximately 70,000 years ago (cal BP (years before 1950) is used here to denote calendar years; years BP and BP are used to denote radiocarbon years; ka is used to denote thousands of years ago and generally relates to OSL ages. The Pleistocene period extends from 2 million to c. 10, 000 years ago, and then the Holocene epoch begins) and reached Sahul at the eastern end of this diaspora before 50,000 years ago (Smith 2013). This was an impressive accomplishment, since it entailed crossing through Wallacea, which encompasses the islands of the Lesser Sundas including Flores and Timor, and would have required a series of substantial water crossings out of sight of land (Fig. 1). With the exception of Flores, the archaeological evidence left by the early colonists is indisputably the product of modern human behavior (Balme et al. 2009).

Currently the oldest sites are found in Arnhem Land in the north of the continent. These sites are



Australian Deserts: Extreme Environments in Archaeology, Fig. 1 Map of archaeological sites discussed in text: (1) Malakunanja rockshelter, (2) Nauwalabila rockshelter, (3) Parnkupirti, (4) Devil's Lair rockshelter, (5) Allen's Cave, (6) Cuddie Springs, (7) GRE 8 rockshelter, (8) Madura Cave, (9) Mandu Mandu rockshelter, (10) Riwi rockshelter, (11) Puritjarra rockshelter, (12) Arltunga, and (13) Killalpaninna mission

not far from the coast today but would have been a significant distance inland at the time of first occupation. Dates of between 65,000 and 50,000 BP have been obtained for sediments in association with the lowest stone artifacts recovered at rockshelter sites Malakunanja and Nauwalabila 1 based on the optically stimulated luminescence (OSL) method (Fig. 1). Sites in the inland arid zone such as at Lake Gregory (*Parnkupirti*) have been dated to between 50,000 and 45,000 (Veth et al. 2009). Using the radiocarbon technique that dates charcoal and other organic remains, dates in the order of 50,000–45,000 cal BP have been obtained for sites in both northern and southern Australia (Balme et al. 2009). A spectacular limestone cave in the extreme southwest of Western Australia, Devil's Lair, currently has the oldest radiocarbon date for occupation approximately 48,000 BP (Turney et al. 2001) – to get here would have required passing by, or through, the arid regions of the northwestern reaches of the continent. Thus, while once thought to have been barriers to human occupation until the Holocene, with many analogues to the Great Basin of the USA, desert sites from Australia in the order of 40,000 BP predating glacial aridity are now well established (Hiscock & Wallis 2005; Smith 2013).

Australian deserts are not uniform, and the impact of environmental transformations over time was variable. The deserts exist across a massive belt of semiarid and arid Australia. In the east arid, regions around Lake Eyre contrasted with the large occasionally active river systems such as Cooper Creek. While people such as *Diyari* benefited from rivers, others were suited to more extreme deserts, such as Wangkangurru dwelling in the dune fields of the Simpson Desert. Moving westward, Central Australia is broken by sets of ranges occupied by *Arrandic* speakers, which had long provided a highly elevated refuge at the continent's heart. Further west, the massive Western Desert combines several separate deserts, both sandy and gravel in form. For humans in these

environments, such as *Martu* and *Pintupi* peoples, life in the sand-dune country required the use of ephemeral waters and more reliable water in rock holes found in small ranges like the Cleland Hills. Reaching the Western Australian coast, the Pilbara is a vast set of ranges extending from the Western Desert to the arid Indian Ocean coast, now clearly never abandoned at any stage in Australia's past. In the south, the Nullarbor Plain also borders an ocean, the Southern Ocean, abutted by a vast flat, often un-vegetated plain, with little surface water.

The Climate of the Arid Zone

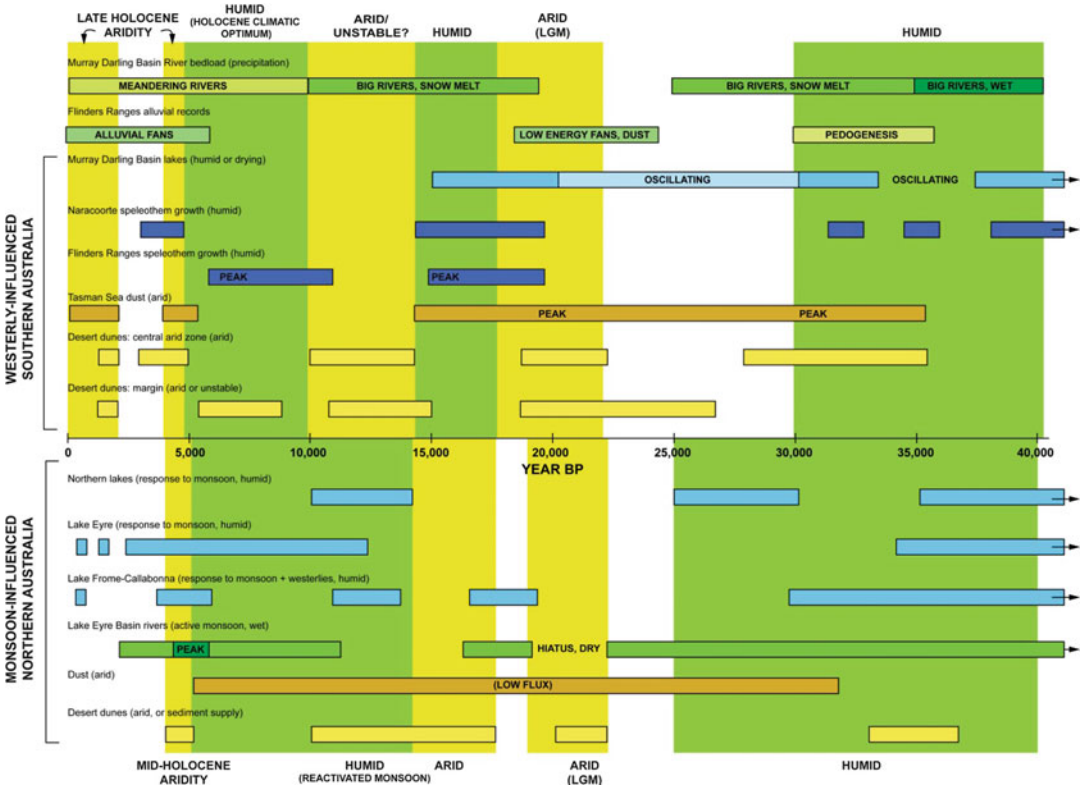
The climatic history of Australia's desert provides a critical frame through which to understand human uses of the arid regions which have witnessed some of the most dynamic human-landscape transformations anywhere (Veth 2005).

The climate of arid Australia is characterized by several drivers, notably the northern summer monsoons, cyclones, and pseudo-monsoons in the north and winter westerlies and frontal systems in the south (Sturman & Tapper 1996). The major river systems that bring rain from the monsoon belt into the arid interior and fill water bodies such as Lake Gregory, Lake Woods, Lake Eyre, and Lake Frome also play a significant role in the availability of water and thereby accessibility of the desert (Williams et al. 2010). Changes in the strength and location of these systems, therefore, have large influence over the effective precipitation in the arid interior and indirectly affect other hunter-gatherer requirements, including food resources, vegetation, fire regimes, and water availability.

At the time of human arrival, the arid zone was cool but humid, with several of the large lakes (including Lake Frome, Lake Gregory, and Lake Eyre) containing water from intensified summer monsoons and/or an equatorward displacement of the winter westerlies (Fitzsimmons et al. 2012). These conditions, which would have allowed the exploration of much of the arid interior, persisted until the onset of the Last Glacial Maximum (LGM) beginning at ~30,000 years BP and peaking at ~23,000–18,000 years BP.

The LGM in Australia was a period of significant cooling and increased aridity (Fig. 2) and saw a decline in annual temperatures by as much as 10 °C compared with present day; glaciation of uplands in the Snowy Mountains and Tasmania; reduction in rainfall by 60 % or more, especially in the interior through the weakening of the summer monsoons and poleward displacement of winter westerlies; changes in vegetation structure to generally more steppe-like and grassland-dominated environments; lower lake levels; increasing dune activity and dust transport; and an expansion of the arid zone into semiarid and mesic environments (Williams et al. 2009; Petherick et al. 2011; Fitzsimmons et al. 2012). Sea levels were also at their lowest through this period, at ~120 m below modern day levels, and led to increased continentality across the interior. In the arid zone, only the Murray-Darling Basin system showed evidence of continuing resources, being fed by water from the ice fields covering the Snowy Mountains during this period. Fluvial activity at the headwaters of the Cooper River and high lake levels at Lake Lewis, however, suggest episodic wet events occurred within, or on the margins of, the arid zone throughout the LGM.

Following the LGM, the Terminal Pleistocene/Holocene transition saw rapid environmental change. Increasing temperatures initially outpaced precipitation and, at least for prehistoric people, probably led to some of the driest conditions in the last 50,000 years (Markgraf et al. 1992). Sea levels rose rapidly and by 12,000 years BP had reached present-day levels, inundating the continental shelf and likely displacing significant populations in the (now) Timor and Arafura Seas. Lake Carpentaria would similarly be inundated by ~8,000 years BP. Recent studies show this period to be one of increasing complexity, with the southern parts of the continent having a brief humid phase between ~17,000–15,000 years BP before increasing aridity at ~14,000–10,000 years BP, while in the north the lapsed monsoon saw dry conditions until after 14,000 years BP after which it got progressively wetter (Fitzsimmons et al. 2012). In the center of Australia, the Todd River reveals



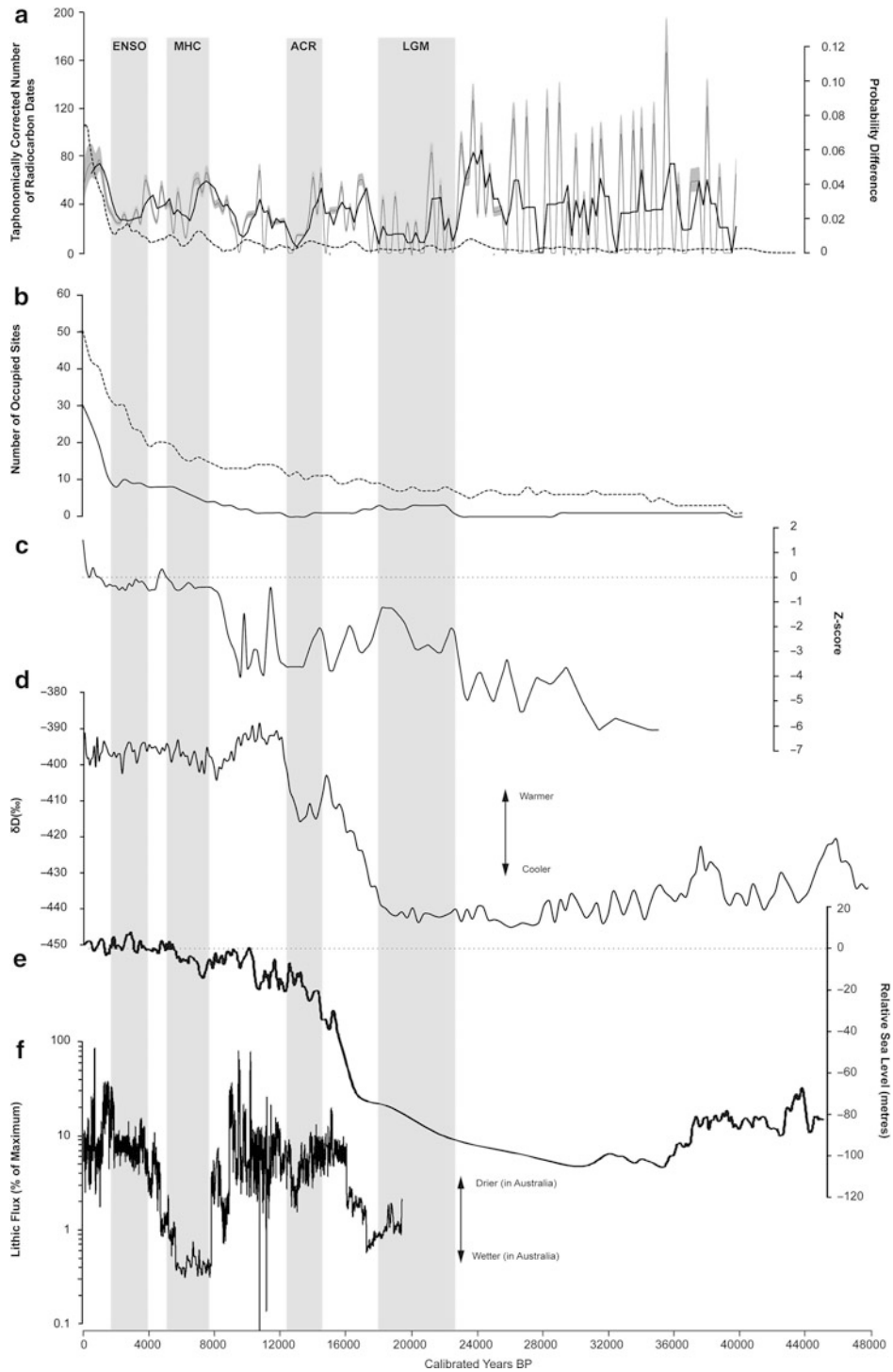
Australian Deserts: Extreme Environments in Archaeology, Fig. 2 A summary of paleoclimatic proxies from northern and southern Australia (Fitzsimmons et al. 2012)

evidence of paleo-floods initiating from 14,000 years BP and continuing into the early Holocene (Smith & Ross 2008).

In the early Holocene, ameliorating climate would have allowed far greater access into the arid interior. An area that had generally been fairly inhospitable to long-term occupation now had increasing resources due to an intensification of the monsoon system brought about by the inundation of the Sahul Shelf (Smith 2013). Rainfall from the increased monsoons fed the major rivers systems running into the center of the continent, and Lake Eyre, Lake Frome, and Lake Gregory were, again, all full (Smith et al. 2008).

From approximately 5,000 years BP, the current El Niño-Southern Oscillation (ENSO) cycle was initiated (Shulmeister 1999). Beginning as a period of increased effective precipitation and enhancement of the monsoons across Australia, the climate quickly turned to prolonged drying and increased variability. Intensification of ENSO would have caused the movement of the Intertropical Convergence Zone northward, increased the anticyclonic conditions overlying the region, and thereby reduced the likelihood of monsoon or rain-laden low-pressure systems into the Australian interior. Between ~3,700 and 2,000 BP, this intensification of ENSO caused significantly drier conditions in Australia and increasing climatic variability in the arid interior. A number of different datasets all demonstrate that ENSO, and specifically El Niño events, was consistently stronger and more frequent during this period. However, while the overall effect of ENSO was to reduce rainfall in this period, increasing variability would have seen significant rainfall in the interior occasionally.

The intensification of El Niño events continued and may have increased until approximately



Australian Deserts: Extreme Environments in Archaeology, Fig. 3 A graph showing proxies for population and/or human activity compared with paleoclimatic records. (**a**) Summed probability distribution (*dashed*) of radiocarbon dates from archaeological sites in the arid zone. Taphonomic correction of the radiocarbon data is also presented (*dark gray line* provides the corrected values with associated 95 % confidence

1,500 years BP. Several Australian paleoclimatic datasets suggest amelioration from 2,000 to 1,700 years BP or later. Consequently, the climate of the last 2,000 years was considerably more stable than the mid-Holocene, although there were the well-known climate shifts of the wetter Medieval Climatic Anomaly at 1,200–800 years BP and the cooler Little Ice Age at 600–200 years BP (Williams et al. 2010).

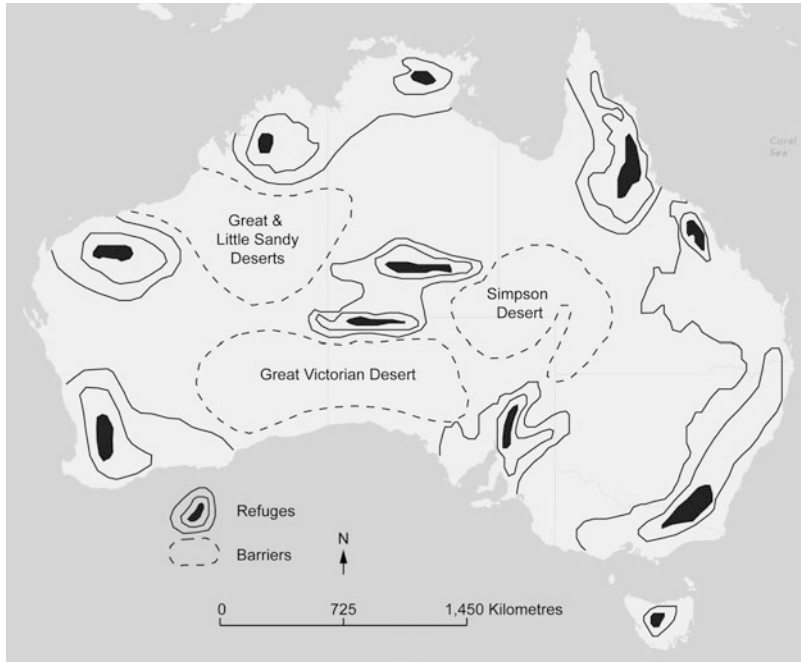
Regional Trends: Time-Series Analysis

Recent approaches in the use of time-series analysis provide a good opportunity to explore the first-order response of prehistoric people to the climatic changes outlined above. Techniques to explore regional response fall into three main categories: (1) the use of summed probability approaches – involving the compilation of radiocarbon data from archaeological sites as an indicator for population size and/or mobility (Fig. 3a); (2) the interpretation and compilation of individual site records to give an inference of peak occupation periods (Fig. 3b); and (3) artifact z-scores, a standardization approach taken from recent paleo-fire studies that allows integration of a wide range of spatial and temporal records into one regional curve (Fig. 3c) (Williams 2012).

As Fig. 3 demonstrates, occupation of the arid zone began soon after colonization. There are now eight sites that would have been located within the expanded arid core of Australia before and during the Last Glacial Maximum. The oldest is *Parnkupirti*, located on a tributary of the once mega-lake of Lake Gregory in the southeastern Kimberley dated from 50 to 45 ka. Lake Gregory itself would have once been a very large freshwater lake fed by the Kimberley ranges to the north and containing shellfish, fish, water fowl, and myriad of fauna such as emu and macropods. Other sites in the Kimberly are dated to 45 ka, while at the western edge of the Central Australian ranges, Puritjarra rockshelter shows evidence for occupation between 40 and 35 ka BP. On the Nullarbor Plain to the south, Allen's Cave has an OSL date of 40 ka, while the earliest occupations at Lake Mungo to the east are estimated by OSL to lie in the range of 50–46 ka. To the northeast, Cuddie Springs dates to 38,500 years ago, while a shelter near Lawn Hill in Queensland (GRE 8) has a radiocarbon determination of 41,500 cal BP (Hiscock 2008; Smith 2013).

Following colonization, human activity and/or prehistoric populations grew slowly until the LGM, when several of the indices show a decline in data. This corresponds with well-documented abandonment of large tracts of the arid interior, population decline, and the falling back of surviving populations into refugia, including the Pilbara, Central Australian ranges, and Murray-Darling Basin (Veth 1989, 2005) (Fig. 4). (It should be noted that the z-score results here are heavily influenced by the Puritjarra rockshelter record, which formed a refugia during this event, and explain the increase in artifact discard during this time.) After a brief recovery, a similar decline in activity is evident during the ACR. Not previously considered in archaeological literature, the ACR probably saw a similar human response as the LGM. With the exception of the LGM

Australian Deserts: Extreme Environments in Archaeology, Fig. 3 (continued) intervals (*pale gray shading*); *black line* presents a 3-point (equivalent to 750-year) moving average. No smoothing or zero trimming was attempted); (**b**) using data from 58 archaeological sites in the arid zone, a graph showing number of occupied archaeological sites by 500-year time intervals (*dashed lined* shows number of sites; *solid line* shows periods of increased artifact discard or other archaeological indices), (**c**) mean z-scores of artifact discard rates (effectively a regional signal) of nine Central Australian rockshelters: Wanmarra, Wanga East (WO4), Ilarari 17, Rrewurlpmurlpme Kweke, Intirekwerle, Urre, Kweyunpe 6, Therreyererte, and Puritjarra. (**d**) EPICA Dome C ice core deuterium/hydrogen ratios – a proxy for temperature, (**e**) sea-level change from sediments in the Red Sea, (**f**) a record of El Niño-Southern Oscillation from an ocean core, SO147-106KL, off the coast of Peru – a proxy for rainfall. Climatic periods are shown, including the Last Glacial Maximum (*LGM*), Antarctic Cold Reversal (*ACR*), mid-Holocene climatic optimum (*MHC*), and intensification of El Niño-Southern Oscillation (*ENSO*). See Williams (2012) for further information and methods presented in this figure



Australian Deserts: Extreme Environments in Archaeology, Fig. 4 Conceptual map of barriers (sand sheets), refuges (uplands), and corridors (interstitial lowlands) used by Aboriginal people during climate perturbations from earliest pluvial phase, expansion of the arid interior during the Last Glacial Maximum, and then subsequent amelioration and climatic fluctuations of the Holocene. Developed by Veth (1989) as a heuristic model to provide a framework for understanding some of the dynamism in the timing, settlement, and mobility of desert societies, this has been supported in large by 25 years of desert studies (cf. Hiscock 2008). The new cryptic refuge model of Smith (2013) sees smaller satellite refugia outside of the major uplands – as deduced from studies of faunal biogeography – especially for persistence of populations during the LGM

and ACR, the data suggests that the Terminal Pleistocene was generally a period of decline or period abandonment in the arid interior.

After the ACR and in tandem with ameliorating climate, significant increases in populations/human activity can be observed in the Terminal Pleistocene/early Holocene between ~12,000 and 8,000 years BP (Smith 2013). A significant increase in both radiocarbon data and artifact rates can be observed during this period, and several sites were occupied for the first time (e.g., Puntutjarpa rockshelter in the Musgrave Ranges, Norina Cave and Madura Cave on the Nullarbor Plain, and Marillana A rockshelter in the Pilbara uplands) or contain evidence of intensified occupation (e.g. Allen's Cave on the Nullarbor Plain and Puritjarra rockshelter in the Cleland Hills).

The initiation of ENSO during the late Holocene led to a series of changes in the configuration of Aboriginal populations, between ~4,000 and 2,000 years BP, including responses inferred as regional abandonment and population decline. During this period, the use of hafting technology, the appearance/proliferation of microlithic tools (e.g., tula adzes and backed blades), and the standardization of stone tools, intensifying long-distance trade and ritual networks, all occur for the first time (Smith 2013).

After 2,000 years BP, hunter-gatherer populations may have increased exponentially, a fact identified by several authors but yet to be adequately explained (Smith & Ross 2008). Importantly, this increase is still prominent in the taphonomically corrected data, indicating it is not an artifact of site loss through time (Williams 2012). This period also saw a series of new adaptive responses to climatic variability, including

marked increase in use of marginal and outlying sites, the extended use of existing sites, increased territoriality expressed through greater differentiation of rock art, and more intensive use of lower calorific food resources, such as *Acacia* and grass seed processing. Recent work has shown this period to be increasing complex with human responses to events such as the Medieval Climatic Anomaly (Williams et al. 2010).

Human Response to Extreme Environments

Conditions were generally more favorable when groups entered Sahul c. 50,000 years ago, meaning that people were not entering the daunting and ostensibly "dangerous" landscapes lamented by early European explorers – although this can be in part explained by European lack of familiarity with these environments. These favorable conditions then became more diverse and in many cases challenging by 30,000 BP. This has been labeled the "desert transformation model." In this scenario, groups first adapted to more benign climates and then made changes in their settlement behavior, technology, economy, dietary suites, and material culture to accommodate significant changes in the landscape.

Environmental reconstructions suggest that while conditions would have been colder than today, other factors may have promoted early movement inland. Hiscock and Wallis (2005) make the case that:

> In many regions it is likely that up until 45,000 years ago – and perhaps to 30,000 years ago in some locations – the availability of fresh surface water would have been at least as good, if not better, than during the Holocene. . .The greater relative availability and predictability of resources. . .would have facilitated exploration and exploitation of these unique interior landscapes.

These recent environmental reconstructions, coupled with the patterning of radiocarbon dates and economic evidence from numerous archaeological sites, support a very early movement of people into well-watered inland regions, and here we would argue the "extreme" deserts of Australia.

Groups not only occupied radically different environments in a relatively short period of time; they also began to develop signature regional traits. Interestingly many of these are sources from the then expanded arid zone of Australia. These are inferred from differences in tool production, long-distance exchange networks (witnessed in movement of ochre specimens), complex funerary practices (such as at Lake Mungo at the Willandra Lakes), and very different group-identifying behaviors that have been interpreted from different art styles thought to date to the Pleistocene period (such as the engraved Archaic Faces found from the Pilbara and then in a vast swathe across the western, central, and arid lands on the eastern border).

Lumps of faceted ochre, grindstones on which ochre has been ground, and slabs smeared with ochrous pigment date back to c. 42,000 years ago, from sites in the southwest Kimberley and from a burial site in Lake Mungo, from excavations in Arnhem Land, and from excavations dated to >32,000 BP from Central Australia (Hiscock 2008). It is assumed that ochres were used in the earliest pigment art and that it was likely part of the repertoire of Indigenous Australians (Veth et al. 2011).

Shell beads were important signals of modern behavior in Africa and the Levantine. Representing items of personal adornment and identity, they have now been recovered from Australasia as well. The two key sites of Mandu Mandu Creek rockshelter and Riwi lie on the edge of the deserts of northwest Australia and have yielded "strands" of 22 cone shells older than 32,000 BP and 10 tusk shells dated to approximately 30,000 BP, respectively (Balme & Morse 2006). Such regionally distinct personal wear is seen to have helped in mediating interactions within and between groups.

Long-distance exchange can be inferred from artifacts that lie well outside their supply zone and can be sourced accurately. The oldest comes from a burial site in the Willandra Lakes, more than 40,000 years old, where the closest source for ochre is the Barrier Range some 250 km distant. Ochre as old as 32,000 BP was transported 125 km to the Central Australian site of Puritjarra, while ochres from Mandu Mandu Creek rockshelter in northwestern Australia were transported over 300 km as early as 25,000 BP. Pearl, baler, and tusk shell were moved up to 500 km from as early as 30,000 BP.

During the period of intensified aridity in the Last Glacial Maximum, the ways that humans used the arid zones have been debated. Most agree that certain regions such as inland ranges acted as potential refuges, with other less watered environments being abandoned. This thesis is presented in Peter Veth's (1989) *Islands in the Interior*, where people retreated to ranges in the Pilbara, Flinders, Kimberly, and Central Australia, with the remainder of the arid regions being used in more sustained ways in post-LGM climatic regimes. The main dune fields representing some of the more extreme and challenging environments were thought to remain largely unoccupied prior to 5,000 years BP, although some use of sandhill country occurred during the Pleistocene (Smith 1993). The significance of refugia is clear, particularly in the Pleistocene. In building on Veth's paradigm, Smith has recently proposed a model for "cryptic refugia" borrowing from biological studies that suggest that some areas outside of uplands acted as refugia for scattered populations of various species and that a similar model for scattered human groups may be appropriate. If so, populations would need to survive in smaller numbers spread over a former range, relying on pockets of microhabitats (Smith 2013).

European Contact

Following rare, accidental, and deliberate coastal landfalls in the seventeenth and eighteenth centuries, the arrival of European colonists in Australia in the late eighteenth century heralded a dramatic change from a continent of Indigenous hunter-foraging societies with deep-time attachments to local environments (as they were at the time of contact) to a settler nation wherein migrants vastly outnumbered Indigenous peoples. In terms of world history, Australia is colonized "late," with various colonies (mainly penal in nature) around Australia only after 1788 CE.

Unsurprisingly, Australia's massive interior desert regions remained outside the colonization "frontier" until the mid-nineteenth century. Explorers entered (but did not necessarily survive) the arid lands and encountered the peoples already resident there, although many only saw signs of occupation as they passed by camps and sites. Knowledge was a critical barrier to exploration. Some explorers such as Eyre traveled with Aboriginals, while others such as Canning at times forced Aboriginal people to blaze trails. By the 1860s, explorers had provided knowledge essential for the establishment of isolated outposts strung across Australia's central deserts. These in turn allowed trans-global communication in the form of the Overland Telegraph connecting southeastern Australian colonies to Darwin, then by submarine cable to Singapore and the British Imperial realms. Another very different communication occurred in and around the telegraph repeater stations for each was established in the traditional country of desert communities – this settings provided the location for significant "early historical" observations about Australian Aboriginal society best reflected in the ethnographic observations of Baldwin Spencer and F. J. Gillen. These and other later observations form the foundation from which ethnographic knowledge of desert societies is constructed (see Keen 2003 for further discussion).

From this time onward, Australia's deserts become the setting for increasingly diverse encounters between Indigenous Australians and outsiders (mainly British, but including other ethnicities to create diverse desert societies located well beyond the colonial "frontier"). Nineteenth- and twentieth-century explorations were fuelled by the desire to access land for stock and suitable droving routes (the Canning Stock Route, e.g., cuts across the Western Desert), imaginary interior water sources (the various permutations of "inland seas"), mineral prospectors (such as the announcement by Harold Lassiter in the 1920s of a centralian goldfield), scientific knowledge, and a place beyond the gaze of colonial authority. Exploration led to the establishment of stock-droving routes that crossed the deserts, linked by water and infrastructure, and to various mineral industries, such as Arltunga in the White Range – Central Australia's first official town following gold discovery in 1887 (Holmes 1989).

The early historical period of Australia's desert, from a European perspective, occurred almost

a century after British colonization/invasion. We expect environmental and demographic changes resulting from introduced species to have moved well in advance of colonists (and thus European historical observers). When Europeans arrived, there were few large native fauna and European-introduced species – particularly camels, horses, cows, sheep, goats, dogs, cats, rabbits, and foxes – that had changed the Australian environment dramatically after 1788, resulting in the decline and extinction of many endemic mammalian fauna (Rolls 1984). The ancient Australian soils had never been exposed to hooves, and these animals created havoc (and still continue to) around natural water resources. New plants crowded out native grasses and other plants, at a time when any forms of Indigenous land management – such as the use of fire – were in a state of flux. Few pastoralists looked kindly on the use of fire, seeing it as a threat to stock and the newly installed pastoral infrastructure.

Equally diseases need to be understood – what effect did they have in the early period? Did desert populations plummet, as has been argued by some? The archaeological record is rarely sensitive enough to rigorously measure fluctuations in population in these critical years, given that it is largely a surface record (Campbell 2002). Certainly, the maintenance of long-distance trade networks as observed in Central Australia, for ochre, *pituri* (native tobacco), grindstones, and ceremonies, suggests some robustness in these desert societies following the disruptive arrival of colonists.

We need to distinguish within the various arid and semiarid environments across the continent whether they were colonized by Europeans and other non-Indigenous peoples or not. Many regions were suitable for sheep and cattle pastoralism – other massive desert regions were simply unviable. A gradient of arability emerged from the margins of semiarid regions where stock could be raised, through to those that could not – a situation exacerbated by environmental degradation and fine climatic variation in the more "extreme" or marginal arid environments.

Another significant element of historical period deserts was the introduction of camels and handlers from various origins in West and South Asia – although widely termed "Afghan" or "Ghan" – a name commemorated in the Alice Springs to Darwin transcontinental railway (Stevens 1989). Little archaeology has yet been done of their camps, places of worship, and work. Equally the arrival of missionaries is a significant archaeological topic, only addressed at a handful of sites such as the Killalpaninna Lutheran Mission on the Birdsville Track (Birmingham & Wilson 2010).

The largest corpus of post-contact archaeological work has been carried out on pastoral sites, some simply interested in pastoralism and others interested in pastoral settings as part of a broader regional process of culture contact. In Lake Eyre, for instance, the archaeological record reveals that Aboriginal people continued to live in and around their estates on vast sheep stations – providing labor, knowledge, and economic security through their seasonal availability. However, only some remained "inside" the pastoral domains, and others remained "outside" as "wild strangers" – at least in the perception of Europeans. Conversely in the northern realms, the demands for work married better with seasonal work demands, with the wet season being a time for the fulfillment of cultural responsibilities (Paterson 2008).

For many today the cultural heritage of deserts reflects pastoralism, remote communities, or survival – or not. Bean (1910) reflected: "There, around Lake Eyre, and over some part of Central Australia you may see them today – deserted homesteads standing out from the desert with the marks of old settlement around them. That is what sheep mean to Australia." The other record of heritage often overlooked is an Indigenous record, which too has historical components.

To summarize, the archaeological study of post-contact deserts can be divided into (1) rural and regional heritage studies interested in buildings, mine, and infrastructure (Gill & Paterson 2007); (2) culture contact between Aboriginal people and various outsiders (Veth et al. 2008), particularly pastoralists; (3) Indigenous responses to historical contingencies, as reflected in subsistence, settlement, depictive traditions

(especially rock art) (Taçon et al. 2012), and colonial/government authority and labor demands (Paterson 2008); and (4) "longue duree" approaches that articulate historical events into longer time scales, such as Smith's study of the Cleland Hills (Smith 2005).

In extraordinary events of global relevance, played out locally on patches in the Western Deserts, as late as the 1960s, Aboriginal people who had never seen white people "came out" of the desert and "came into contact" with white Australians for the first time. These events represented the last extreme environments of earth to come into the fold of the wider global community.

Cross-References

- ▶ Australian Deserts: Extreme Environments in Archaeology
- ▶ Australian Paleoart
- ▶ Complex Hunter-Gatherers
- ▶ Evolutionary Anthropology: Issues, News, and Reviews
- ▶ First Australians: Origins
- ▶ Indigenous Archaeologies: Australian Perspective

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Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology

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Introduction and Definition

The statutory authority of the Australian Commonwealth (federal) government known as the "Australian Institute of Aboriginal Studies" from 1964 to 1989 and "The Australian Institute of Aboriginal and Torres Strait Islander Studies" (1989 to present) has as its primary function support of research into Indigenous Australia (Anon. 1964, 1989). Archaeology was a central focus of the Institute from its inception. The 1961 "Conference on Aboriginal Studies" held under the auspices of the Social Science Research Council that led to the founding of the Institute heard presentations by representatives of each of the disciplines comprising the then fields of Australian Aboriginal Studies: anthropology, human biology, linguistics, prehistory and material culture, and strong arguments for a national research center (Stanner & Sheils 1963; Mulvaney 1963: 33-51; Horton 1986: 83). The Institute's first two principals (chief executive officers), Fred McCarthy (Fig. 1) and Peter Ucko (Figs. 2 and 3), were archaeologists, and chairs of the Institute's Council were involved in prehistoric archaeology Professor Neil W.G. Macintosh (1906–1977), Professor of Anatomy at the University of Sydney and a foundation member of AIAS, between 1966 and 1974; and Professor D. John Mulvaney AO CMG (1925–), known as the "father of Australian archaeology," during the years 1982 and 1984 (Figs. 4 and 5). Most of the first generation of Australian academic archaeologists was involved with the Institute in at least its first decade, guiding not only its activities but also the development in Australia of the discipline itself.

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 1 Dr. Frederick D. McCarthy (1905–1997), first principal (second from L) with Professor D. John Mulvaney AO CMG, Professor W.E.H. Stanner CMG (1905–1981), one of the founders of the Institute, and Dr. Norman Tindale AO (1900–1993), at The Australian National University, Canberra, May 1980, on the occasion of granting honorary doctorates to McCarthy and Tindale (Photograph courtesy of D.J. Mulvaney)

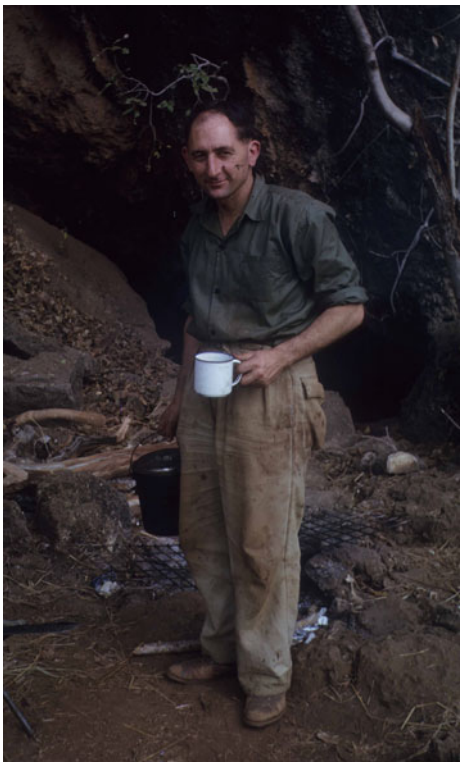
Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 2 Dr. Peter J. Ucko (1938–2007), second principal, contemplating an archaeological manifestation/Aboriginal cultural heritage place near Gove, on a visit to the Northern Territory in 1976 (Photograph courtesy of D.J. Mulvaney)

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 3 Professor Peter Ucko at University College London signing copies of his festschrift 7 January 2006, a day of seminars and celebration of him, his work, and his collegiality ("Peter's Day") (Photograph: Lydia Maher, courtesy of Jane Hubert)

Historical Background

Australian Archaeology Before the Institute

In his address to the 1961 conference, John Mulvaney (1963: 34, 44–5) reviewed the state of Australian archaeology, speaking of the



Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 4 Professor D. John Mulvaney AO CMG (1925–), Chair of Institute Council, at Kintore, Northern Territory, 1963 (Photograph courtesy of D.J. Mulvaney)

necessity for "typological exactitude," obtaining "more than one age estimation from each site," and of the difficulty of covering the costs of field research. On the same occasion, McCarthy (1963: 53-5) recorded what he saw as the "urgent needs" of Australian archaeology and spoke of the "neglect" of the discipline: there were no university courses in archaeology, no support for research from funding bodies, and neither a specialist journal nor a professional association to organize regular meetings. There were extremely limited employment opportunities; the few persons active were based in museums. Opportunities for publication were similarly limited; while there had been short articles on archaeology in Australian anthropological journals and in museum proceedings, Mulvaney's (1961) major review of Australian prehistory had been published in Britain. The only opportunity for disciplinary meetings was at congresses of the Australia and New Zealand Association for the Advancement of Science. There was no legislation in most jurisdictions to protect archaeological sites or to control field research. Australian archaeology was neither professional nor self-sufficient.

The Institute Established: 1961–1964

In December 1961, an Interim Council was appointed to make recommendations toward "the permanent establishment of a national research organisation" (Stanner & Shiels 1963: xiv). In 1964, following the passage of the *Australian Institute of Aboriginal Studies Act* confirming a 22-member Council and a foundation membership of 100, the first principal was appointed. McCarthy (1905–1997) was ethnologist and curator at the Australian Museum in Sydney; while his scholarly pursuits were broad, archaeology and cultural materials studies were central to his interests. He was one of the few archaeologists active in Australia in the previous three decades, known for his systematic excavations of rockshelters in the Sydney area (Attenbrow & Khan 1994), and for a book on stone tools, for many years the main scholarly work on Australian lithic assemblages (McCarthy 1967/1976). McCarthy, with the assistance of staff initially comprising a secretary, technical officers, and a librarian, commenced building the Institute and establishing its role vis-a-vis other institutions concerned with Australian Aboriginal studies.

Key Issues/Current Debates

Institute Research Grants

The Institute's Interim Council was empowered to provide grants for research, and some of the first went to support archaeological endeavors. The initiative was welcomed; Megaw (1963: 298), acknowledging a fundamental change, noted that "... from the point of view of archaeology in Australia the momentous decision is that of the principle of Government sponsorship for research

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Fig. 5 John Mulvaney with (L) Dr. Rhys Jones (1941–2001) and Don Ranson at Kutikina Cave, Tasmania, in 1983. John was involved in the successful national heritage listing of the site. Rhys was an early grantee, long-term Member of the Institute and served on its Prehistory Advisory Committee as member and chair for many years as a sometime member of the Institute Council (Photograph courtesy of D.J. Mulvaney)

Australian Institute of Aboriginal and Torres Strait Islander Studies (AIATSIS): Its Role in Australian Archaeology, Table 1 Institute grants for archaeology from 1961 to 1970

Topic	Excavation	Survey and excavation	Survey	Ethnoarchaeology	Radiocarbon age determination	Other project types
Number	13	7	5	3	31 (201 analyses)	6

projects …". Listing of successful grants in the Institute *Newsletter* effectively publicized the grants process and encouraged further applications at a time when new researchers were being trained in universities.

Twelve of the 63 initial grants in 11 disciplinary categories went to archaeology. By 1968, when McCarthy (*Newsletter* 2(3): 34-6, 38-41) reported assistance for archaeological research, that support was being manifested across the continent, and it was probable that most of the research in Australian prehistoric archaeology was being funded by the Institute and involved not only Australian-based researchers but also archaeologists from Great Britain and the United States. Toward the end of his term as principal, McCarthy (*Newsletter* 3 (1): 1-101), summarizing research support during the Institute's first decade, showed that archaeology represented more than one fifth of the total grants for all disciplines and the range of research covered (Table 1).

Major projects supported included excavations at Mount Cameron West, Kow Swamp, and Koonalda Cave; there were also 21 projects to record and research rock art. Funds were provided for films on stone tool manufacture and the Kow Swamp excavations. In the 1970s, with the development of various university departments and State agencies, while archaeology became less dependent upon the Institute, AIAS was still a major source of funding for archaeological research. Toward the end of the next decade, the deputy principal was able to report that a similar proportion of grants had been allocated to archaeology and related fields as had been the case in the 1960s (*Newsletter* n.s.13: 6-21).

Throughout the 1990s, Institute annual reports record that archaeology and related disciplines were substantial recipients of research grant

funding. Fifty years after its establishment, despite many changes of emphasis, about one quarter of the Institute's support for external projects in the 2011 grant round was applied to archaeological projects. When the Institute's Grants Program was suspended indefinitely in 2011, the Australian Archaeological Association protested on behalf of its membership.

Support for Publication

An early initiative of the Institute was to provide for the publication of the results of research and related activities. Aside from publishing short archaeological reports in its *Newsletter*, the Institute provided substantial financial contributions toward publication of articles, monographs, books, and technical manuals. The first scholarly article in the *Newsletter* was by archaeologists Megaw and Glover (*Newsletter* 2(3): 4-15); it was accompanied by another on comparison of skeletal materials and a first listing of radiocarbon age determinations. The second principalship, that of Peter Ucko (1938–2007) who took up his appointment in 1972 from a lectureship in archaeology at University College London where he had been responsible for influential books on European rock art, domestication, and urbanism, coincided with the term of a reforming Australian government, an extension of the Institute's role and fundamental changes in its governance and emphases. In January 1974, Ucko initiated a new series of the *Newsletter*, which subsequently carried an increasing proportion of reports and scholarly articles. The Institute's journal, *Australian Aboriginal Studies*, which replaced the *Newsletter*, was started in 1983 and continues today, albeit in a reduced format less suitable for presentation of archaeological material.

In the 1960s, the institute made contributions to the cost of publication of papers in the existing Australian anthropological journals and various museum series. Publication subsidies were provided also for books, including covering the cost of illustrations for a new edition of McCarthy's *Australian Aboriginal Stone Implements* (1976) and assisting with the publication of McBryde's (1974) New England survey (*Newsletter* 3(1): 38-9). By 1970, however, the Institute had its own publication section responsible for the production of books and audiotapes, as well as the *Newsletter* and annual reports. Various publication series were initiated including manuals and monographs on archaeology and "material culture." The first was the radiocarbon dating manual prepared by Henry Polach and Jack Golson, *Collection of Specimens for Radiocarbon Dating and Interpretation of Results* (1966).

This was followed, over the next decade, by *A Guide to Field Methods and Laboratory Techniques* (Mulvaney 1968); *Aboriginal Antiquities in Australia: Their Nature and Preservation* (edited by McCarthy, Isabel McBryde and Mulvaney 1970); *The Preservation of Australia's Aboriginal Heritage: Report of National Seminar on Aboriginal Antiquities in Australia, May 1972* (edited by Edwards 1975); *Stone Tools as Cultural Markers: Change, Evolution, and Complexity* (edited by Richard Wright 1977); and *Form in Indigenous Art: Schematisation in the Art of Aboriginal Australia and Prehistoric Europe* (edited by Ucko 1977). These works were central to the development of the discipline. From the 1980s, the emphasis of Institute publication changed, notable archaeological exceptions being *A Record in Stone: The Study of Australia's Flaked Stone Artefacts* (Holdaway & Stern 2004) and *The Social Archaeology of Australian Indigenous Societies* (edited by Bruno David, Bryce Barker and Ian J. McNiven 2006).

Support for Positions in Archaeology and Related Disciplines

A major contribution to the discipline was the Institute's funding of positions within museums, universities, and the research program of the Institute itself. In an early example, the Institute sought to provide greater access to radiocarbon analysis and to strengthen the provision of new radiocarbon facilities by paying the salary of an analyst at The Australian National University (ANU). A total of seven professional positions were funded in the 1960s, along with research assistants (eight), technical assistants (two), and State-based research officers (*Newsletter* 3(1): 36-7).

This initiative continued during Ucko's principalship, when the Institute funded the establishment of university chairs of archaeology and "material culture," as well as providing for lectureships, usually on the basis of an agreement that the university would continue funding the position at the end of the period of assistance.

In the mid-1970s, Ucko obtained a significant expansion of Federal government funding; he established several research positions based at the Institute. There were to be five research consultants (five-year appointments) and 14 (three-year) research fellowships. Two of the former and two of the latter research positions were in archaeology or related disciplines (*Newsletter* 3: 4-5). An important addition was the appointment in 1974 of a paleoecologist, David Horton, who worked with archaeologists on faunal assemblages (*AIAS Annual Report* 1975 to 1976).

A significant proportion of the Institute's research funding has supported postgraduate positions. Two of the postdoctoral fellows in archaeology in the 1980s, John Beaton and Colin Pardoe, were based at the Institute; the former adapted the extensive kitchen facilities of the old hostel that housed the Institute to his archaeological laboratory.

Support for Conferences and Specialist Meetings

The 1961 conference provided valuable reviews at that time of the various disciplines of "Aboriginal Studies" (Stanner & Sheils 1963; Horton 1986). It set a useful precedent, encouraging discussions of a wide range of research concerns, and it was followed by other national subject-focused meetings, encouraged and sponsored by the Institute's Council. Institute-supported meetings and conferences were important not only for establishing a collective sense of the discipline of archaeology but also for widening appreciation and agreement on particular matters and sometimes prompting action outside the Institute. In 1963, a "Conference on Nomenclature of Implements and Cultures" was held at the Australian Museum in Sydney (McCarthy 1965). Mulvaney (1986a) wrote that it was the first specialist meeting in Australia of the discipline, Megaw (1963) reported favorably to a wider readership, a subcommittee was established so that the problems raised about typology could be pursued further (*Newsletter* 3(1): 38), and the discussions contributed to the new edition of McCarthy's (1967) manual on the subject, which, decades later, Holdaway and Stern (2004: xiv) could describe as still the ". . .classic typology of Australian stone tools."

Issues of significance to particular disciplines were discussed by members at subsequent biennial General Meetings. In 1964, McCarthy (*Newsletter* 2(1): 3) outlined to the Prehistory Panel his program for encouraging archaeological research toward Australia-wide studies of surface campsites to allow the study of stone tool types in a broader context. At the 1966 General Meeting, discrete disciplinary conferences covered covered human biology, and prehistory and "material culture"; the latter Panel, convened by Mulvaney, explored the need to standardize methods and procedures for recording sites (*Newsletter* 2(4): 49); Mulvaney subsequently edited *Australian Archaeology: A Guide to Field Techniques* (1968; revised 1972; third edition by Connah in 1983).

In 1968, archaeologists combined with ethnographers for a four-day conference on "Monuments and Antiquities: Their Control and Preservation" convened by McCarthy, Robert Edwards, and Mulvaney. McCarthy (1970) described its goal as to place pressure on State and Territory jurisdictions to introduce legislation to protect "Aboriginal antiquities" and to provide for their conservation; the conference proceedings were available several months later (published 1970). At the 1972 General Meeting, a "National Seminar on Aboriginal Antiquities" was convened by Edwards (published 1975) and another by Alan Thorne on "The Settlement of Aboriginal Australia" (*Newsletter* 3(5): 24-5).

The major conference held in conjunction with the 1974 General Meeting was notable for its broad scope, the participation of distinguished international scholars, and some controversy over lack of involvement of Indigenous Australians. The prehistory symposium, "Stone Tools as

Cultural Markers: Change, Evolution and Complexity" was published in Canberra and internationally (edited by Wright 1977), as was the symposium on "Form in Indigenous Art" (edited by Ucko 1977). In February 1975, the Institute organized a meeting to discuss computerization of records of collections of Aboriginal artifacts held in State and Territory collections. This was followed by another to discuss problems associated with the export of Aboriginal artifacts; it recommended several actions to control the trade, and the Material Culture Advisory Committee recommended that the Institute help Australian museums purchase objects of national significance that had been refused an export permit (*Newsletter* 5: 15-6). Other biennial conferences followed – the archaeology focus in 1976 was on "Aboriginal artifacts" – but none were on a similar scale and with a comparable commitment to publication of the presentations and resulting discussions as for the 1974 conference.

Seminars have been another important opportunity for Institute researchers and grantees to present the results of their researches. Regular seminars were started by Ucko soon after he became principal, involving, particularly, Institute-funded grantees who were visiting the Institute, and there were several presentations in the initial series of seminars by archaeological researchers.

Currently, the Institute coordinates two semesters of seminars that occasionally include presentations on archaeology and related topics. Specialist meetings were an integral part of the 1970s Sites of Significance Program, and the Rock Art Protection Program supported conference attendance, especially by Indigenous participants.

Some 32 years after McCarthy's 1963 "Conference on Nomenclature. . .," another meeting, a workshop organized by the Institute and La Trobe University staff members, was held at the Australian Museum (February 1995) with the intention of reviewing McCarthy's typology; a new and comprehensive work on "Australia's Flaked Stone Artefacts" resulted (edited by Holdaway & Stern 2004). Over the last decade, however, specialist meetings have been few and usually held in association with the Institute's major conferences.

The Influence of Institute Committees

In the early 1960s, the Institute used panels of experts for advice on, particularly, the allocation of grant funds; these committees set high standards in the allocation of grants and also guided the development and direction of each of the disciplines. On taking up his appointment as principal in 1972, Ucko developed this concept, enhancing the roles of the disciplinary advisory committees that had previously conducted their business by correspondence. Committee members now meet in Canberra twice each year, not only to advise the Council on grant applications, fellowships, and related matters but also to debate the direction of the development of each discipline and, where necessary, to commission urgent research. Ucko (*Newsletter* 1: 5) emphasized that the task of committees was to formulate research priorities. In 1973, there were 14 committees with up to 12 members each (*Newsletter* 1: 1-4,7). Of relevance here are the Prehistory, and Material culture, Advisory Committees, and the "Committee on Sites of Significance," established under the chairmanship of the deputy principal to oversee the activities of the National Site Recording Program. A few years later, all Institue committees had an additional member in the person of an Indigenous Australian who was working in or who had a particular interest in the relevant field of study. Institute research staff served as "executive officers" for each committee.

The value of the activities of these committees in developing the direction and practice of archaeology in Australia cannot be overemphasized; over the years that the committees were in operation, many senior practitioners were involved in the discussions and deliberations, and the Institute committees were seminal in the development and professionalization of archaeology in Australia. Much earlier, McCarthy had written how the involvement of the principal and members of the Council in making decisions about the allocation of grants gave the Institute a strong role in deciding

archaeological research priorities and enhancing professionalism in various disciplines; he claimed (1965: 307) that the Institute was "... not only a source of funds for research, but a co-coordinating and advisory body, building up slowly a corpus of information available nowhere else." This process was enhanced by the committee system and may be seen as a major contribution to archaeology and other disciplines of "Aboriginal Studies."

A period of "financial austerity" curtailed the activities of the Institute's committees in the early 1980s (*Newsletter* 17: 4-6), and in 1989, following the passing of the Institute's new Act, most were terminated. A "Research Advisory Committee" including eight elected disciplinary representatives deliberated on grants applications. Some of the wider functions of the Institute's Sites of Significance Committee – which had advised on the allocation of grants under external funding (below) – was superseded by annual meetings of a "National Aboriginal Sites Authorities Committee" hosted in turn by the various State and Territory heritage agencies, involving professional, technical, and Indigenous staff.

Sites of Significance and Rock Art Protection: Externally Funded Programs

The Institute has, on two occasions of significance to Australian archaeology, accepted major external funding to conduct and promote research programs.

Early in his term in office, McCarthy had established a "Catalogue of Aboriginal Relics" to deal with the volume of records being provided by researchers, culled from the literature, and from the voluminous correspondence that he maintained with amateur fieldworkers; copies of the cards were sent to museums and provided the basis of some State site record systems; there was a concern for standardization of terms and recording procedure (*Newsletter* 2(2): 20; 3(5): 26-7). Following the meeting on the need for archaeological legislation at the Institute's 1968 conference, and another on "A National Register of Aboriginal Sites" in 1972, a committee had made recommendations to the Commonwealth government concerning a scheme "to protect and salvage prehistoric monuments and antiquities in Australia." In 1973 – in a period of rapid resource development – funds were provided by the Commonwealth to the Institute for the implementation of a National Site Recording Program (*Newsletter* 3(6): 13): the Institute "... has been vested with responsibility of all sites of either traditional or historic importance to the aboriginal people"; a committee, chaired by the deputy principal, was established with representatives of State and Territory authorities, "one fully initiated Aboriginal man," and others. (In Australia, where responsibility for land tenure rests with the States and Territories, such sensitivities could be mediated by such inclusive membership, but it is not clear how one Indigenous Australian could speak for the many and no doubt various Indigenous interests).

The committee was to meet at least twice each year; it was to formulate a coordinated program and allocate funds to record sites, and a National Register of Sites was to be maintained (*Newsletter* 3(6): 14). Two years later, 22 positions in the various jurisdictions had been filled (*Newsletter* n.s. 3: 11); there were regular meetings of site recorders to discuss processes and other matters of professional interest, a major example being the 1979 site recorders meeting at Kioloa that "...provided an opportunity for site recorders and others, but Aborigines in particular, to meet people currently engaged in research into Australian prehistory" (Dix 1980: 8). There was much to be done, and the expectation that all places of significant heritage value could be recorded was unrealistic.

The Institute continued to provide funding for site recording for several years. By the early 1980s, all Australian States and Territories had archaeological legislation in place and had established their own programs to record and protect Indigenous heritage places with professionally qualified personnel and programs to train and employ Indigenous site recorders. The Sites of Significance Program provided further opportunities for employment of archaeologically trained fieldworkers and thus the development of the field of public or consulting

archaeology in Australia, an area in which a substantial proportion of graduates find work. The Australian Association of Consulting Archaeologists, a professional body established in 1979, has 50 full members and more associates and affiliates.

The national Rock Art Protection Program (RAPP) was established at the request of the then Minister for Aboriginal Affairs to provide for the protection of Indigenous Australian rock art. The RAPP was funded by the Commonwealth government for 12 years from 1986, after which time the Institute continued to provide for a similar range of projects for the next decade. The scope of the RAPP ranged from the physical preservation and management of endangered sites, including those threatened by natural elements and by interference from humans and animals, to the support of new research and applied projects including the development of new dating techniques. As with the Sites of Significance Program, it required the cooperation of State and Territory authorities and that of Indigenous knowledge-holders and custodians of the cultural places involved. It has been argued that the program made a significant contribution to the development of systematic studies of Australian rock and influenced research and practice in these fields elsewhere in the world (Ward 2011).

Indigenous Australian Influences on the Institute and on Australian Archaeology

No Indigenous Australians were present at the 1961 conference; there were, however, many present who had worked in depth with Indigenous communities and would have had their interests in mind (*Newsletter* 1(1): 9-10). In the first decade of the Institute's research activities, there are many instances of the involvement of Aboriginal persons, mainly in association with various grantees, for instance, in bringing traditional knowledge-holders to the Institute to work with researchers. The difficulty that some archaeologists had experienced in obtaining access to sites to conduct their fieldwork was the subject of an Institute meeting in 1971 (Mulvaney 1986b: 105). After the attention brought by the "Eaglehawk and Crow Letter" (signed by Widders and another five activists) on the rationale for the 1974 Biennial Conference and the orientation of the Institute's research program in general, the process of change within the Institute was hastened; along with the opportunities to serve Indigenous interests presented by the *Aboriginal Land Rights (Northern Territory) Act of 1976*, it has been seen as marking "... more or less the start of negotiated anthropology within Australia" (Peterson 1990: 17 fn).

Organizationally, Ucko and the Council encouraged a positive program of "Aboriginalisation" (Ucko 1983; Moser 1995). Indigenous knowledge-holders and community leaders became Members, and, from 1975, an Aboriginal Advisory Committee provided a firmer Aboriginal voice on other committees and in the activities of the Institute in general (*Newsletter* 3: 6). From 1976 a "social issues adviser" participated in the discussions of each advisory committee, so that Indigenous interests could be considered in the various research programs (*Newsletter* 7: 10-1). More Indigenous staff were employed at the Institute, and Indigenous Australians were offered training in research (*Newsletter* 5: 7, 10: 28-9); Indigenous-requested research and training projects were emphasized alongside lists of grants awarded (e.g., *Newsletter* 7: 25). These initiatives were confirmed by a resolution at the 1976 biennial meeting (Newsletter 7: 7). In 1981, outside the Sites of Significance Program, there were ten Indigenous trainees based at the Institute (*Newsletter* 15: 8).

The arrangements for Indigenous participation on the Council and its advisory committees were described as "... the most significant development of all in the 1970s" (*Newsletter* 15: 8). The new direction was formalized by the Institute's revised governing statute (Anon. 1989); this provided for an Aboriginal-controlled Council with a minority elected component and a disciplinary-based Research Advisory Committee – it was a structure that may been seen as a culmination of the undertakings begun in 1974 toward collaborative governance and research endeavor.

In 1976, there was initiated a category of Aboriginal-requested grants, particularly for the

mapping of sites of significance. Concurrently, the Institute continued to provide support through the grants process for the training of Indigenous fieldworkers in site survey and management, despites significant cuts to its budget (*Newsletter* 5: 1-4, 12-3). The new Prehistory Committee decided that its scope should include the ecological studies of living Aboriginal groups (*Newsletter* 1: 7); it reiterated its interest in the investigation of ecological relationships of contemporary Indigenous communities as well as with other archaeological research foci; it discussed ways in which Indigenous Australians might be supported to gain formal qualifications in archaeology (*Newsletter* 11: 11).

Also in the late 1970s, the Sites of Significance Program broadened its scope from archaeological and historic places to include ethnographic places and areas of significance to Indigenous communities – a reflection of the increasing participation in the program of Indigenous fieldworkers. Ucko (*Newsletter* 1: 13) wrote that the program not only reinforced the involvement of the Institute in field research but also that it provided employment opportunities for Indigenous researchers. This had been accomplished through the provision of funds to State and Territory authorities for Indigenous training programs. The site recorders' meetings had a strong Indigenous involvement.

The archaeology and sites programs, in particular, participated in major changes in direction and emphasis of the Institute's research. When the initial conference and the leadership of Interim Council, then that of McCarthy and his executive and committees, firmly located archaeology within "Aboriginal Studies" it also forged relationships between archaeologists and Indigenous Australians that either had not existed or were at best tentative. These were developed during Ucko's tenure, in conferences, specialist meetings, and in the regular meetings of the disciplinary committees and workshops that they organized. For the year that he left the Institute, Ucko (*Newsletter* 11: 6) emphasized the significant changes in the degree of Indigenous participation in the functions of the Institute.

In the research grants process, applicants were required to demonstrate not only appropriate Indigenous participation but also, through an evaluation by the Research Ethics Committee, appropriate dealing with Indigenous community interests, including cultural and intellectual property rights, and defining procedures for the communication of research results to the communities involved. Jointly initiated applications for projects, those combining Indigenous agendas with technical expertise, tended to have greater chance of success in what had become a highly competitive grants program.

All of this resulted in a growing appreciation both of the depth of Indigenous culture and its legitimacy, on the one hand, and, on the other, of the professional and technical heritage of the discipline and its potential to serve Indigenous aspirations (e.g. McBryde 1985). Archaeologists had to consider Indigenous interpretations of sites and their roles in a wider cultural landscape; concurrently, archaeological results – particularly dating that emphasized the longevity of Indigenous occupation of the continent – quickly became incorporated into Indigenous discourses. As Australian archaeology developed academically and professionally, and beyond the direct involvement with the Institute, it was able to move more readily to an appreciation of broader societal and ethical responsibilities. Places were made for Indigenous students in archaeology; several ANU graduates, for example, work or have worked as consultant archaeologists or in museum research. Not only has research regularly and systematically involved consideration of Indigenous interest and participation but spaces have been made for research initiated and conducted by Indigenous scholars (e.g., Johnston 2009). This process of legitimating and privileging Indigenous voices in archaeology may be seen to have begun in the 1970s at meetings in Canberra.

Future Directions

The Institute was established more than 50 years ago by academics and politicians concerned that much knowledge of the Indigenous cultures

of Australia was being lost. Archaeology, one of the founding disciplines, was described as a neglected area of study. Through various avenues, including Institute sponsorship of meetings and conferences, support for specialist committees, for research grants, and for lectureships and chairs, support for publication of research monographs, by encouraging the development of legislation to protect Indigenous cultural heritage places, and insisting on the collaboration with Indigenous communities, the Institute became closely involved in the development and professionalization of archaeology in Australia.

By the turn of the millennium, the role of the Institute in the development of prehistoric archaeology in Australia was muted. The discipline had become a popular university teaching subject with associated research strengths and with its own specialist journals, and with access to various sources of funding; it had its own national association organizing conferences and specialist meetings, encouraging the participation of students in fieldwork and conference activities, and lobbying governments. It constituted a professional discipline with its own institutional base, one largely independent of the Institute. As well, the focus of the Institute itself had changed. It was widely accepted that the traditional disciplines, such as social anthropology, linguistics, and prehistory, were not necessarily the main sources of knowledge about Indigenous Australian cultures. During his principalship, supported both by the new involvement of Indigenous interests and the acceptance of the research community, Ucko saw the direction of the Institute had fundamentally changed from one of recording knowledge about a past culture to exploring aspects of contemporary peoples. The Institute's governance formally recognized Indigenous interests as did its research agenda; there was a strong emphasis upon collaborative research. Although its grant program continued to be accessed by younger archaeologists, archaeological research was no longer central to the Institute's research and other activities. Archaeology, however, would not have become an independent discipline in the way that it did without the early and continued support of the Institute.

The future is less clear; the continuing reorientation of the Institute's research interests has taken it far from its foundation disciplines including archaeology. The ideal expressed by previous administrations of having staff expertise to maintain a purview of research across the range of Australian Indigenous Studies largely has been forgotten. In parts of the southeast, some community members have revived an understanding of their cultural heritages by drawing upon archaeological research results, but it may well be another generation before there are enough Indigenous Australians who value such research for their own ends for archaeology again to be a central focus of the Institute.

Cross-References

- ▶ Australia's Archaeological Heritage
- ▶ Australian Rock Art
- ▶ Conservation and Management of Archaeological Sites
- ▶ Ethnoarchaeology: Building Frames of Reference for Research
- ▶ Heritage and Public Policy
- ▶ Indigenous Archaeologies: Australian Perspective
- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Kow Swamp
- ▶ McCarthy, Frederick D.
- ▶ Rock Art Sites: Management and Conservation
- ▶ Ucko, Peter (Indigenous Archaeology)

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Australian Paleoart

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Introduction

Australia, almost the size of Europe but with a population only a third of that of France or Britain, boasts not only the greatest concentration of rock art in the world but also the highest number of rock art researchers relative to population size. The perhaps most interesting aspect of Australian rock art research is that the country's rock art scholars are significantly less inclined to attempt interpretation of rock art than those of any other world region. Bearing in mind that Australia is universally agreed to have the strongest ethnographic evidence for the original meanings of rock art (Fig. 1), this presents a paradox.

It is the awareness of the uncertainties of etic interpretations that has prompted Australian researchers to opt for scientific investigation in lieu of the creation of a modern mythology about rock art and its meanings. They have therefore been particularly active in such fields as physical rock art analysis, age estimation, survey work, preservation techniques, and methods of site management, while interpretation is largely limited to what has been obtained by ethnographic means.

Definition and Historical Background

Paleoart comprises rock art and portable art-like material of preliterate societies. Rock art is basically divided into petroglyphs (made by a *reductive* process, such as pounding, hammering, pecking, engraving, scratching, or finger marking of soft cave deposits) and pictograms (made by an *additive* process, such as painting, drawing, stenciling, or application of beeswax). In contrast to the prehistoric mobiliary art of other continents, that of Australia is limited to just a few types and these remain largely undated.

Similarities between the earliest types of rock art in Australia and southern Asia have suggested that the first colonizers, Middle Paleolithic seafarers from Indonesian islands, brought with them a tradition of creating rock art when they arrived, possibly in the order of 60,000 years ago.

Australian Paleoart, Fig. 1 Traditional Custodian at Wandjina site he is responsible for, in the Kimberley, NW Australia

A significant part of the surviving Australian rock art, estimated to be in the order of 10 % of the total corpus, is thought to be of the Pleistocene. Such age appears to be mostly confined to petroglyphs, as is the case in most parts of the world. Although the presence of Pleistocene rock art has been suggested since the early twentieth century, such antiquity has only been demonstrated since the 1980s. It applies to much of the cave petroglyphs in the southern coastal region and to particularly erosion-resistant rock facies of open-air sites in various parts of the continent.

Australian paleoart has been studied in one way or another since the early nineteenth century, but until the 1980s, its scientific contemplation was sporadic and intermittent. The establishment of the Australian Rock Art Research Association in 1983 led to a significant intensification of research and publishing efforts, and the first world congress in the field, held in Darwin in 1988, prompted the establishment of the International Federation of Rock Art Organizations.

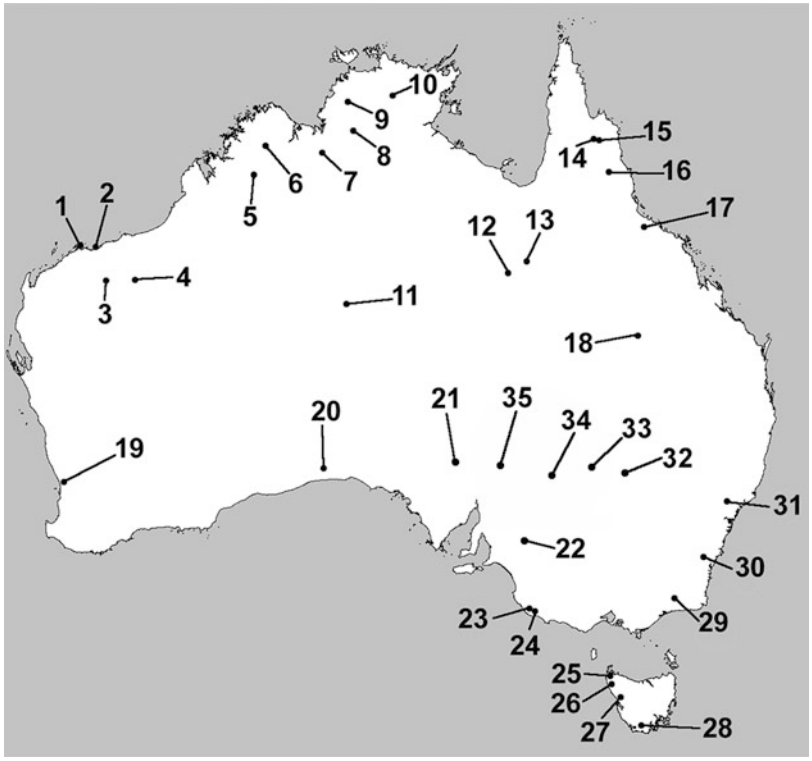
Australian Rock Art

With such a large national corpus of rock art, the creation of inventories is a long-term process involving many individuals and research teams. Because the greatest concentrations of rock art tend to be in the north of the country, this is where much of the survey work has been focused (Fig. 2). The major concentrations are the petroglyphs of the Pilbara, the paintings of the Kimberley and Arnhem Land, and the mixed corpora of the Victoria River region and the far north of Queensland (Cape York Peninsula). Noteworthy is also the stencil art centered on the Carnarvon Ranges in Queensland and concentrations in central Australia and eastern South Australia (Flood 1997).

While the sites in the north have attracted the greater interest, comprehensive inventories have been attempted in some southern regions, such as Gariwerd (Grampians mountains) in Victoria, the Olary and Flinders Ranges region of South Australia, in western and coastal New South Wales, and a small selection of petroglyph sites in Tasmania (Sims 1977). It is impossible at this stage to provide reliable quantitative estimates of Australian rock art, and in view of the size of the national recording task, this will remain so for many more years. However, in assembling the best estimates from leading specialists working in the main regions, one would expect that there should be between 100,000 and 200,000 rock art sites in Australia. The largest of them comprise several tens of thousands of motifs, but as a very rough estimate of average numbers, a figure in the order of perhaps 500 motifs per site seems reasonable. Hence, the total number of rock art images is certainly in the tens of millions, roughly half of which are petroglyphs. Pleistocene rock art comprises mostly petroglyphs and consists exclusively of nonfigurative motifs. For the past 100 years, there have been sporadic claims that extinct Pleistocene species or their tracks have been depicted in Australian rock art, but none of these are scientifically credible.

A number of taxonomies endeavoring to identify stylistic traditions have been proposed, but unless they were very narrowly based, spatially or temporally, they tend to be contradicted by evidence in too many cases. Therefore, no accepted continent-wide stylistic sequence is available, and most traditions, genres, or styles tend to be too heterogeneous for simplistic categorization. Nevertheless, several genres are widely recognized as valid traditions, especially the Wandjina and Gwion Gwion (formerly "Bradshaw"; Fig. 3) painting styles in the Kimberley region, the Woodstock anthropomorphs of the Pilbara, the x-ray paintings of Arnhem Land (Chaloupka 1993) (Fig. 4), the Quinkan figures of Cape York Peninsula (Fig. 5), the stencil traditions of central Queensland, the widely distributed track and circle petroglyphs of the arid zones, and the early petroglyphs and finger flutings of the limestone caves (Fig. 6). Each of these broadly identified genres features a variety of motifs co-occurring with the characteristic leitmotifs, some of which are thought to be chronologically diagnostic.

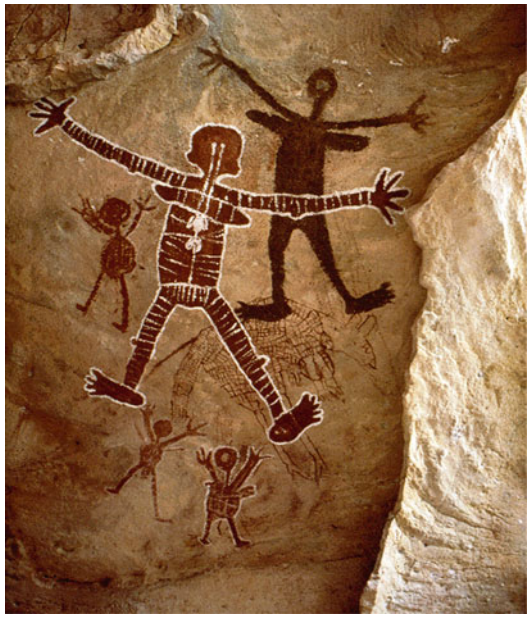
Currently the occurrence of authentic cave art has been confirmed in 49 Australian limestone caves, distributed over four regions across the southernmost parts of the mainland and in Tasmania (Bednarik 1990). Most Australian cave art



Australian Paleoart, Fig. 2 Some important rock art sites and site complexes in Australia: *1* – Murujuga/Dampier, *2* – Depuch Island, *3* – Pilbara, *4* – Spear Hill-Abydos complex, *5* – Tangalma/Carpenters Gap Shelter, *6* – Kimberley complex, *7* – Jinmium, *8* – Ingaladdi, *9* – Laurie Creek, *10* – Kakadu complex, *11* – Puritjarra and Wanga East, *12* – Carbine Creek, *13* – Saxby Waterhole, *14* – Sandy Creek Shelter, *15* – Early Man Shelter, *16* – Walkunder Arch Cave, *17* – Turtle Rock, *18* – Ken's Cave, *19* – Orchestra Shell Cave, *20* – Koonalda Cave, *21* – Pimba, *22* – Devon Downs, *23* – Karlie-ngoinpool, Karake, Prung-kart, Malangine, and Koongine Caves, *24* – Paroong and Yaranda Caves, *25* – Preminghana, *26* – Sundown Point, *27* – Trial Harbour, *28* – Judds Cavern, *29* – New Guinea 2, Cave, *30* – Gnatalia Creek and Waterfall Cave, *31* – Mt. Yengo Rockshelter, *32* – Cobar, *33* – Mutawinji, Sturts Meadows, *34* – Olary-Yunta site complexes, *35* – Flinders Ranges sites

Australian Paleoart, Fig. 3 Gwion Gwion art (inappropriately called "Bradshaw figures"), Kimberley

Australian Paleoart, Fig. 4 Arnhem Land rock art at Nourlangie, painted in 1964



Australian Paleoart, Fig. 5 Quinkan rock art, Laura, Cape York Peninsula

consists of petroglyphs and a significant portion of it is of the Pleistocene, although several genres or styles have been recognized. Six of the Australian caves containing rock art have also yielded evidence of underground chert mining, most of which also seems to date from the Pleistocene.

Analytical Studies

Scientific analytical work began in Australia with the introduction of direct dating and nanostratigraphy during the 1970s (see Ward & Tuniz 2000 for review). The tradition of rock art dating developed by Australian researchers since then has been instrumental in developing scientific research globally. Nearly all analytical rock art dating methods currently in use were initially developed or introduced in Australia: carbon nuclide and uranium series analysis of carbonates, radiocarbon analysis of oxalates and inclusions in accretive mineral crusts, carbon isotope dating of organic materials in paint residues, luminescence analysis of sand grains in wasp nests, microerosion and other weathering indices analyses of petroglyphs, colorimetric analysis of pictograms and patinae, and carbon dating of beeswax figures. Methods introduced elsewhere, such as the determination of cation ratios in rock varnishes or of cosmogenic radiation products, had to be subsequently rejected as

Australian Paleoart, Fig. 6 Karake-style petroglyphs on the ceiling of Malangine Cave, Mt. Gambier, which have been minimum dated through uranium-thorium analysis of a concealing reprecipitated calcite skin (speleothem) deposited 28,000 ± 2,000 years BP

unsuitable. Nanostratigraphy, first introduced in the 1970s (Bednarik 1979), has during the 1990s been developed into a stunningly sophisticated technique (Watchman 2000). In one case, ten radiocarbon dates spanning 26,000 years were obtained from a sequence of mineral layers only 2.11 mm thick. This kind of work has been made possible by the introduction of innovative techniques such as focused laser extraction of carbon-bearing substances (Watchman 1993), replacing manual excavation of microscopic stratigraphies.

Analytical work with rock art is not limited to dating attempts, however. For instance, Cole and Watchman (1992) have examined paint residues to locate evidence of binder substances as well as incidental inclusions, such as brush fibers, vegetable remains, pollen, and airborne matter, all of which can provide useful information about the circumstances of the painting event. Other applications of analytical methods developed in Australia include investigations of paint recipes (e.g., Clarke & North 1991; Ridges et al. 2000), "internal analysis" of engravings in deep limestone caves, the differentiation between natural and human rock markings (Bednarik 1994), and the study of petroglyph technology (Bednarik 1998), which includes the analysis of the tools that were used in creating petroglyphs.

The Ethnography of Australian Rock Art

Ethnographic studies of rock art have been conducted by many scholars, providing the world's most comprehensive record of this dimension (Layton 1992). The key message from Australian rock art studies is that unless one is a participant in the culture in question, one has no scientific access to what the rock art means or depicts. Much of rock art "research" outside of Australia comprises such practices and Australian ethnographic rock art research has shown that it has to be rejected. This is the result of observations of the production and use of rock art having been made throughout the twentieth century in some parts of the country and the continuation of the importance of this cultural element within an existing, functioning society. Such research has always shown that the valid interpretations of rock art are vastly more complex than an outside observer would be able to deduce: interpretations concocted by uninitiated outsiders are almost universally false (Macintosh 1977). We know from various contemporary traditional peoples that their perception of the world can differ significantly from that of, for example, modern Europeans, so it would be hasty to assume that people of the distant past perceived the world as any modern group does. Hence it is to be expected that the

intricate iconographic meanings of paleoart are not effectively accessible to us.

It is precisely *because* of Australia's superb access to Indigenous ontologies and cosmologies that the continent's rock art researchers have learned to exercise restraint in the invention of interpretative mythologies. Elsewhere in the world the researchers of entirely alien cultures have simply assumed what motifs depict, by projecting their own iconographic perception and contemporary beliefs and mores onto the mute and usually undated rock art. The most important message from Australia is therefore that it is inappropriate to call the simplistic application of alien belief systems to an iconography "research"; it is simply autosuggestion.

Moreover, collaboration between Australian researchers and traditional custodians of rock art sites has shown that other Aboriginal perspectives of rock art can also differ significantly from those of researchers. Archaeology, in particular, has effectively disempowered Aborigines and denied them their identity (Piotrowski & Ross 2011: 38), essentially by posing as the state's interpreter of their past and the gatekeeper of their cultural heritage.

Management and Protection

Australian rock art preservation and site management practices owe much to the efforts of a small number of researchers who have been instrumental in establishing an Australian tradition of site care (Rosenfeld 1985). The underlying strategy is that by selecting well-known and easily accessible sites for public viewing, attention is drawn to these localities, while the locations of others can and do remain confidential. Vast numbers of sites are on privately owned land, and as many landowners are quite conservation minded, this offers considerable protection, particularly in remote regions. Sites selected for public visitation are usually intensively developed, often with marked access paths, raised walkways and viewing platforms, "psychological barriers" as well as physical barriers of various types, interpretation material, and visitor books. Vandalism by visitors of Australian sites has decreased sharply over recent decades as a result of subtle public education measures (Gale & Jacobs 1986), especially through the mass media. Active conservation measures include graffiti removal, stabilization of deteriorating rock, the installation of artificial drip lines and other changes to hydrology, modification of microclimate, removal of fire hazards, dust suppression, and installation of protective barriers.

Public attitude is itself an important safeguard in rock art protection: it can be more effective than laws, fences, or signs. The change in the public perception of rock art, from one of almost complete indifference and ignorance just a few decades ago to a largely positive attitude, coincides with the establishment and progress of the Australian Rock Art Research Association. AURA has since the mid-1980s successfully lobbied the media and public agencies to promote site protection. Not only have these changes had profound effects on the prospects of Australian rock art to survive, they have had equally significant effects on the public's perception of Aboriginality as such, that is, of the value and relevance of traditional Australian culture.

This shows how far-reaching the results of campaigns to raise the cultural status of rock art can be in some circumstances. In the Australian experience, the public funds made available to conservation programs are in fact quite modest, compared to, for example, those expanded in France. This seems to indicate that the actual level of funding is not necessarily the decisive factor in the success of protection measures for rock art. The most important factor is that such endeavors need to be supported by an altruistic, nongovernmental body such as a scholarly society. State bureaucracies and the mass media can both be usefully enlisted in such efforts, but the impetus must come from dedicated and genuinely motivated individuals with a long-term commitment. Indeed, Australian protective legislation for rock art and other Indigenous heritage resources is both inadequate and can be easily circumvented with the help of compliant archaeological consultants.

This is best illustrated with the most comprehensive Australian campaign to preserve a body of rock art, the campaign to save the one million or so

Australian Paleoart, Fig. 7 This flame tower of a natural gas processing plant emits 14,000 t of nitrogen oxide per year, which forms nitric acid in the atmosphere. Note the petroglyph panel on the *left*, 400 m from the plant

petroglyphs of the Dampier Archipelago, northwestern Australia. They have long been under threat of destruction, both physical and by acidic emissions (Fig. 7), and by 2001 a significant portion of the corpus had been destroyed. The international campaign to save the Dampier rock art has diverted dozens of billions of dollars of industrial development from the threatened sites and secured their listing for National Heritage protection. The International Federation of Rock Art Organizations accomplished this with public support but against sustained opposition from the responsible state agencies, the corporations destroying rock art, and the consulting archaeologists.

Portable Paleoart

In contrast to Australia's rich endowment of rock art, the portable component of the continent's paleoart is surprisingly light. It comprises essentially two forms: cylcons and tjuringa. The first of these, cylindrical-conical objects usually made of sandstone, slate, basalt, or limestone, occur in parts of Queensland and New South Wales. They range in length from 15 cm to over 1 m and in the order of half of them bear some engraved marks. Their purpose is not securely established but among the hypotheses suggested that of a phallic significance is perhaps the most likely.

Although the ethnographic tjuringa (also churinga, atywerrenge, tywerrenge, etc.) are generally made of wood, in the past they were also fashioned from schist or sandstone. Such stone objects were decorated much in the manner of the wooden versions, and they are highly sacred. Access to them is restricted to initiated men, and therefore few researchers who have studied them have published about them. Stone tjuringa are thought to have been made by the Dreamtime ancestors themselves, whereas wooden ones are surrogate replicas of them. It is incorrectly assumed that stone tjuringa, and the complex rituals they engendered, were limited to the Arrernte tribe of central Australia.

A series of Pleistocene limestone plaques found in two caves (Devils Lair and Koonalda Cave) have been described as engraved but in all cases were demonstrated to bear only taphonomic markings. Other materials, such as woodcarvings or paintings, have not survived from early periods and are not considered here.

Current Debates

There have been many proposals over the past 100 years that zoomorphs or animal tracks in

Australian rock art are attributable to extinct Pleistocene fauna. Perhaps they were subconsciously inspired by the cave art of southwestern Europe. However, with the exception of the numerous probable depictions of thylacines, both in the form of petroglyphs and paintings, none of these claims have much credibility. The thylacine or Tasmanian wolf only became extinct on the mainland during the late Holocene and in Tasmania in the 1930s. All other animals supposedly represented in Australian rock art are thought to have expired several tens of thousands of years ago. Most of these proposals refer to poorly protected paintings on rapidly eroding sandstone that should not be expected to be more than a very few millennia old. Moreover, the only justification of these claims is that the supposedly diagnostic features of the images suggest the extinct fauna, even though no zoomorphs in Australian rock art are naturalistic, in the sense of resembling textbook images of the species in question. The proponents of these "interpretations" effectively claim that they somehow know which aspects are diagnostic and which are not. For instance, in a recent example, a goose-like image was interpreted as a depiction of Genyornis on the basis of its head shape, and yet only squashed specimens of the species' skull have been recovered. The image was found well outside the known geographical distribution of the species, it had been subjected to rainwater damage, and Genyornis is thought to have died out well over 40,000 years ago. All other claims of this nature are similarly flawed, and there is currently no figurative rock art known in Australia that can be safely attributed to the Pleistocene.

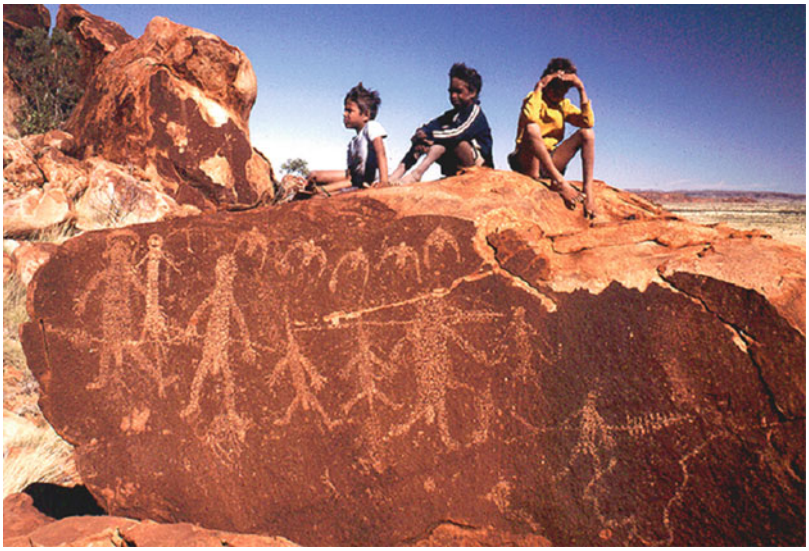
Another issue currently debated in Australia is the relationship of archaeological consultants with their often very powerful corporate clients, particularly when it concerns rock art. The two parties in this debate are people who believe that it is the role of the consultants to facilitate the needs of resource companies at all costs, and those who feel that consultants should be impartial but facilitate the preservation of the cultural heritage resources they investigate. This debate is not endemic to Australia; it can be found in various forms in many countries, but in Australia it tends to be interpreted as a contest of national economic interest or greater good of the nation versus Indigenous heritage, instead of being seen as a confrontation between economic and cultural values. This is because Australia has yet to attain the maturity of a nation that regards its entire cultural heritage as the patrimony of *all* of its inhabitants. In other words, vestiges of cultural apartheid have yet to be overcome in Australia.

International Perspectives

Australian rock art is of interest from an international perspective for several reasons. The amount of sound ethnographic knowledge about its meaning, purpose, production, and cultural roles is significantly greater than anywhere else (Fig. 8). Indeed, in most world regions, there is no such information at all available, and particularly in the endeavors of explaining European paleoart, Australian ethnography has long been recruited for positing bridging analogies. This is ironic because it is precisely the reluctance of Australian rock art scientists to interpret rock art, based on their recognition that etic interpretation is futile in the absence of emic understanding, which distinguishes Australian researchers most from those of the rest of the world.

Another reason to be of special interest is the sheer size of the Australian corpus of rock art, which is to some extent attributable to excellent preservation conditions in a predominantly semi-arid environment. Also, Australia has not experienced any significant iconoclasm, which has had much effect in many parts of the world, and much of this rock art is in exceedingly remote parts of the country. The efforts of recent decades to preserve and manage this rock art have contributed as well, and these have also attracted international attention. These practices have been widely replicated in other continents.

Finally, the quality of rock art research being conducted in Australia or by Australian scholars abroad has established scientific standards in recent decades that have international



Australian Paleoart, Fig. 8 Petroglyphs at the Spear Hill Complex, eastern Pilbara, with young Aboriginal initiates

recognition. In recent years, Australian rock art scientists have undertaken work in literally dozens of countries and in all continents. The discipline's preeminent journal, international conference, and organizational structure are all based in this country, and Australian rock art scientists are frequently consulted internationally.

Future Directions

Protection and management issues encountered with Australian rock art have shown the need to expand the inventory of this vast resource and to attempt creating a comprehensive national register of it. Development projects of various types, especially in the mining and energy industries, are expanding relentlessly into the most remote parts of the country. The safety of the majority of sites, relatively secure until fairly recently, is being increasingly compromised because legislative protection either is inadequate or is being circumvented by exploiting flawed legislation. The most effective remedy to this is to win broad public support for the preservation of Indigenous cultural heritage. This strategy has already been shown to be the most expedient, and it needs to be developed further. In particular, a deliberate effort is required to change the widely held public perception that Aboriginal rock art is the cultural inheritance *only* of the Indigenes. In this sense the rock art can play a significant role in national reconciliation and in facilitating the development of an inclusive attitude to national heritage.

The establishment of a national inventory of rock art is not only required for the purpose of protection and cultural heritage management; it is also of significance to its scientific study. Despite the great efforts that have been made in this direction, the size of the task will involve many more years of recording work. Considering that rock art is being degraded not only though human intervention but also through natural deterioration, this is a task of some urgency and should have precedence over other archaeological work. Future directions therefore demand that greater efforts be focused on endangered rock art, and this would initially involve a change of emphasis in university teaching priorities. This development has already become evident with the recent establishment of facilities at three Australian universities to specialize in rock art studies.

Cross-References

▶ Dampier Archipelago Petroglyphs
▶ Gwion Gwion

▶ Indigenous Archaeologies: Australian Perspective
▶ Kakadu National Park: Rock Art
▶ Rock Art, Forms of

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Australian Rock Art

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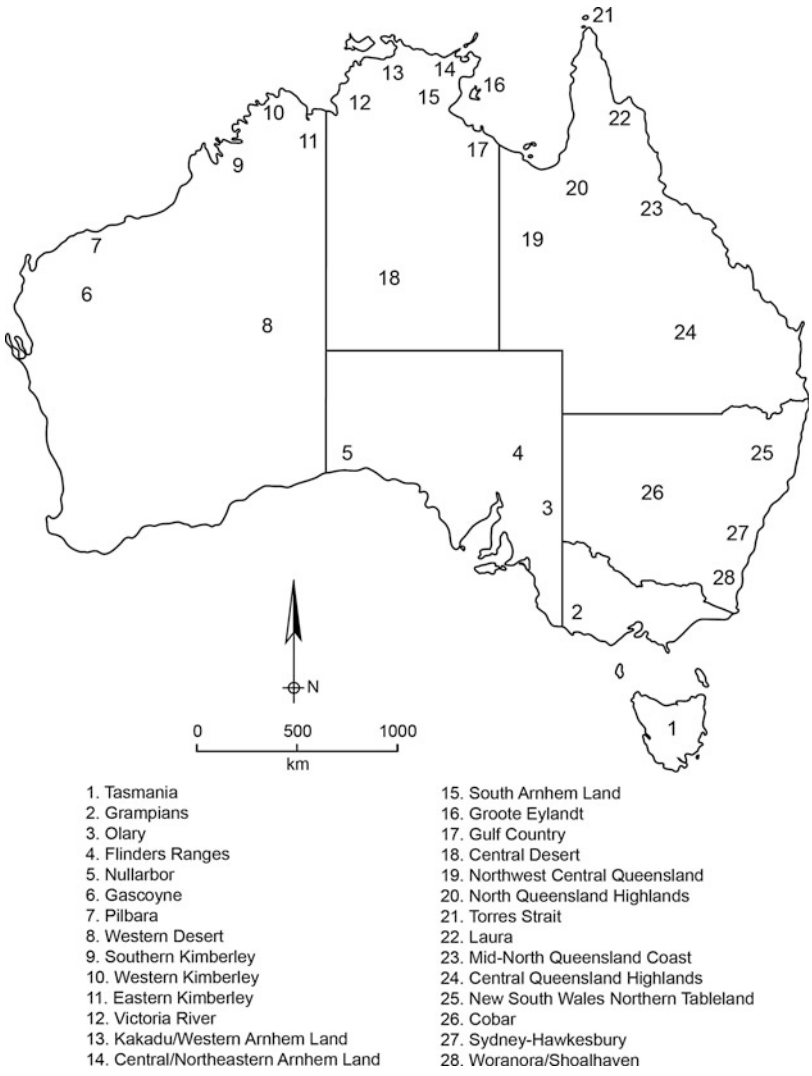
Introduction and Definition

The earliest evidence of human occupation on the Australian continent is a piece of faceted red ochre dated to 50–60 ka, recovered from an excavation at Malakunanja II, in the Arnhem Land Region of the tropical north (Fig. 1). While not conclusive evidence for the production of rock art, this and other similar finds indicate that Australia's earliest inhabitants were at the very least processing pigment. Hampered by difficulties in dating rock art assemblages and the limited potential for the preservation of rock art of such great antiquity, identification of the earliest rock art remains a challenging goal for Australian researchers.

Australia is the world's smallest and driest, permanently inhabited continent with an area of about 7.6 million square kilometers. The geographic location of the continent and its size mean that it encompasses a wide range of climate zones. The climate along the southeastern margins of the mainland and island Tasmania is classified as temperate. In the north, tropical climates are marked by hot summers and heavy monsoonal rains, while the climate of the vast



Australian Rock Art, Fig. 1 Australian rock art provinces (Modified from Layton 1992)

interior covering almost two thirds of the continent is arid or semiarid and is characterized by low and unpredictable rainfall. Rock art is found in all climatic zones from the highest snow-covered mountain ranges in the southeast to the vast sand-ridge deserts of the center and the rugged and remote gorges and coastal islands of the north and northwest (Fig. 1).

In northern, central, and western regions of Australia, rock art remains an integral part of Aboriginal culture and belief systems. Although varying in form and detail across the country, the concept of "the Dreaming" is a universally held philosophy that spells out the relationship between Ancestral Beings who created the land, Aboriginal people, and nature (Berndt & Berndt 1988). Aspects of the Dreaming are manifested in rock art throughout Australia, and the origin of many paintings and engravings is attributed to the creation period or Dreamtime. While new assemblages are rarely created today, remarking or other practices that involve traditional maintenance of the potency of rock art sites continue where sites are accessible to communities, now often located in distant towns. In other regions where European colonization has resulted in dislocation of people from traditional lands, specific knowledge of the meaning and function of rock

art assemblages has been lost, although the significance of the rock art remains integral to today's custodians.

The richness of Aboriginal life and the variability of cultural practices across the country have been captured in numerous ethnographic records collected in the nineteenth and early twentieth centuries by researchers such as R. H. Mathews, B. Spencer and F. Gillen, W. Roth, H. Basedow, J. R. B. Love, D. S. Davidson, A. P. Elkin, and T. G. H. Strehlow and more recently by C. and R. Berndt, C. Mountford and R.A. Gould, N. Munn, H. Morphy, R. Layton, I. Crawford, and V. Blundell. The complexity of rock art as a symbolic system, alongside the multivalent meanings attributed to single motifs recorded in these ethnographies, has warned rock art researchers of the futility of relying on literal interpretations of individual motifs alone, a point made strongly by academics, John Clegg (1991) and Iain Davidson (1997). Similarly, the use of simple ethnographic analogy to explain the content or composition of assemblages across regions is acknowledged as problematic. In addition, running contrary to earlier cultural evolutionary ideas that saw Aboriginal people living a substantially unchanged life over thousands of years, the archaeological record attests to the dynamic nature of Aboriginal society especially through the Holocene. To a large degree, these factors have directed Australian rock art research away from speculative interpretation of the meaning of motifs towards research questions that seek to develop an understanding of the role that rock art played in social organization, economies, and ideologies through time.

There are more than 100,000 recorded rock art sites in Australia with many more being added to databases held by universities and state government agencies each year. Rock art is typically found in rockshelters, along cliff lines, on open rock platforms, in gorges, or on angular boulders forming low hills rather than in deep caves. In arid regions where water is scarce, rock art sites are associated with water supplies however meagre. Most techniques including petroglyphs (produced by pecking, abrading, incising, or pounding) and pigment art (pictographs: incorporating painting, stencilling, printing, and drawing) are found in all major art provinces in varying proportions. Motifs created with beeswax pellets have a limited distribution in the north. Studies show that geological substrates alone do not govern the selection of technique used to create rock art assemblages but rather choice of technique can be attributed to regional, temporal conventions. For example, engravings have been produced on the relatively soft Hermannsburg sandstones of Central Australia but are also found on the extremely hard and dense gabbros and granophyres of the Pilbara in the west. Extensive panels of engraved art produced on open rock surfaces dominate the assemblage recorded throughout the central and southern arid zones, while in the northern regions of Cape York, Arnhem Land, Victoria River District, and the Kimberley, rock art painted on shelter walls is most common. On friable white sandstone in the Central Queensland Highlands, stencilling is the most commonly documented technique, whereas on the Woronora Plateau south of Sydney, drawings predominate on similarly light-colored sandstones. In most art provinces, a variety of techniques occur together although specific techniques may dominate during different time periods: the Sydney region stands out as one where two different art media were practiced contemporaneously (McDonald 2008). At the Kuyunba rock art complex in Central Australia, more recent assemblages of drawing, printing, pounding, abrading, and scratching have been recorded in addition to production methods used to create earlier assemblages, i.e., engraving, painting, and stencilling.

Space precludes a comprehensive overview and detailed descriptions of the rock art from each style province and the changes that took place through time. Very briefly, the rock art of the Central Desert region is dominated by engraved assemblages with a limited graphic vocabulary dominated by circle variants, animal tracks especially bird and kangaroo tracks, lines, arcs, mazes, dots, and pits (Fig. 2). Believed to have its origin in the Pleistocene, the same suite of motifs continued to be produced in the more recent painted assemblage and is retained today

Australian Rock Art, Fig. 2 Typical Central Australian engravings (Photo by June Ross)

Australian Rock Art, Fig. 3 Macropod engraving from the Dampier Archipelago (Photo by Ken Mulvaney)

in Western Desert acrylic paintings produced for a national and international art market. In contrast, engraved rock art from the Western Desert and Pilbara regions, some of which is also thought to be of great antiquity, is dominated by depictions of animals especially kangaroos (Fig. 3), birds, and marine species such as fish, turtle, and anthropomorphic figures. Most striking are a series of intaglio faces now labelled archaic faces that are found throughout arid regions across the continent (McDonald 2005).

The rock art of Arnhem Land and the Kimberley regions is dominated by painted assemblages with marked stylistic changes through time. Across both regions, pecked cupules, grass prints, large naturalistic figures, and hand stencils were replaced by elegant, monochrome anthropomorphic figures decorated with an array of tassels, aprons, headdresses, and other accoutrements: known as dynamic figures in Arnhem Land and Gwion figures across the Kimberley where they appear in a highly decorated form (Fig. 4).

Australian Rock Art, Fig. 4 Gwion figures, Kimberley (Photo by June Ross)

Assemblages in both regions also have accurate depictions of animals from their respective regions. Differences between the arts of the two regions become marked in the more recent art assemblages. In Arnhem Land, polychrome X-ray figures display not only the profile of the animal or anthropomorphic figure but also the internal organs and/or skeleton. Over the last 3,000 years in the Kimberley, large spirit figures called Wanjinas were painted on rockshelter walls. Wanjinas are known by individual names and stories of their exploits in the Dreamtime continue to be passed on to younger generations. Often many meters long, these are painted in red, black, and sometimes yellow on a prepared white background and feature two large black eyes, a halo-type headdress, but no mouth.

Historical Background

Prior to the 1970s, Australian rock art studies generally involved description and quantification of assemblages. This resulted in detailed documentation of sites such as those recorded by Fred McCarthy on Groote Eylandt, Dupuch Island, Port Hedland, and the Cobar Pediplain; Ian Crawford in the Kimberley; Robert Edwards in the Olary and Central Desert regions; and B. S. Wright in the Pilbara. Based on these early descriptions, several researchers (D.S. Davidson, F. McCarthy, C. P. Mountford) proposed pan-Australian rock art sequences constructed around motif classification and geographic distribution. However, it was the evolutionary stylistic sequence proposed by Lesley Maynard (1979) – and her archaeological approach to art assemblages – that influenced much of the later thinking related to regional styles and stylistic distribution.

The 1970s saw a dramatic increase in Australian rock art studies driven by the arrival of a number of overseas researchers with international reputations (e.g., Peter Ucko, Andrée Rosenfeld, and Patricia Vinnicombe). For the first time, Australian universities offered specialist units in rock art studies within archaeology degrees at ANU (Andrée Rosenfeld and Howard Morphy) and Sydney University (John Clegg) and later at UNE (Mike Morwood and Iain Davidson). This stimulated a proliferation of regional studies in the following decades, for example, Bruno David in the North Queensland Highlands and with Josephine Flood in the Victoria River District; Paul Taçon and Darrell Lewis in Arnhem Land; Andrée Rosenfeld in Central Australia and Cape York where Mike Morwood and Noelene Cole also worked; Pat Vinnicombe in the Sydney Basin, Kimberley, and Pilbara; Michel Lorblanchet at Skew Valley; Claire Smith in Jawoyn country in southern Arnhem Land; Iain Davidson and June Ross in northwest central Queensland; and Jo McDonald and John Clegg in both the Sydney Basin and western New South Wales. More recent regional studies have been undertaken by Ken Mulvaney in the Dampier Archipelago, ben Gunn and June Ross in the Central Desert; Jo McDonald and Peter Veth in the Dampier Archipelago and Western and Great Sandy Deserts; Paul Taçon in the Wollemi and Kakadu National Park; Sally May,

Chris Chippindale, Bruno David, Bryce Barker, Daryl Wesley, and ben Gunn in Arnhem Land; Liam Brady and Bruno David in the Torres Strait; Julie Dibden and Jillian Huntley in the Woronora Plateau; Al Paterson in the Pilbara; and Mike Morwood and June Ross in the Kimberley.

Running parallel to these studies, important groundwork was laid by dedicated individual researchers such as Percy Trezise in Cape York, Eric Brandl and George Chaloupka (1993) in Arnhem Land, and Grahame Walsh and David Welch in the Kimberley. Relative stylistic chronologies in each of these regions are underpinned by the extensive fieldwork, careful documentation, and analysis of rock art over many decades by these committed enthusiasts.

The dynamics of the 1980s can be attributed to two significant influences. First, the archaeological milieu in which rock art was taught encouraged students to think of rock art as an archaeological dataset to be studied by formal methods. From this time, most major rock art projects were undertaken as part of collaborative research projects involving excavation as well as disciplines such as paleofaunal and paleobotanical studies, which provided social and environmental contexts against which to set an understanding of art assemblages. Datasets were routinely analyzed using statistical analyses including cluster analysis and principal component analysis.

However, by far the most influential changes to the way rock art was perceived resulted from the introduction of new international theoretic approaches that complemented archaeological methods being fostered in Australia. Interest shifted from the concept of art as an object in its own right to a focus on rock art created by the intentional actions of humans in the past. The particular way of producing the art, the "style" was viewed as a means of communication. As Martin Wobst argued, art assemblages can encode a range of social, economic, and ritual information. Conceived in this way, the form and structure of assemblages could thus be seen to express group interaction or differentiation, social boundaries or social organization.

This notion was extended by Clive Gamble, based on ethnographic information from Australia's deserts. He saw a corresponding relationship between the form of art assemblages, the type of social networks people utilized in the past, and availability of resources. Areas with poor resources would have homogeneous art assemblages over vast areas indicating open social networks, while conversely, resource-rich areas would have heterogeneous art styles, each distinctly different from its neighbors, corresponding with closed social networks and territoriality. Open social networks are seen as a means to allow flexibility and mobility in areas subject to unpredictable climates. The theory of information exchange has been widely adopted as an explanatory tool for diachronic changes in the content and composition of rock art assemblages found across the Australian continent. For example, Mike Morwood identified tightening of social networks and a corresponding change in the composition of the rock art assemblages across the Central Queensland Highlands around 3,000 years ago (2002).

The theory that Polly Weissner popularized, "identification via comparison," where each individual or group understands their place in the world by comparing aspects of their material culture with others has been similarly influential in Australia. In the case of rock art, people could choose to produce art that was stylistically similar to others to cement their group status, or conversely, they could choose to differentiate themselves by producing singular art assemblages. Using rock art or material culture in this way, people in the past could mediate their interactions with others. As Australian Aborigines were hunter-gatherers, regularly moving across the landscape, rock art provided an ideal tool to flag identity and mediate predictable interaction in their absence. Ross et al. (2008) have argued that the production of distinctive anthropomorphic figures within a bounded area in northwest central Queensland provided a mechanism that bonded local inhabitants while at the same time flagging to outsiders coming into the area to trade that they needed to mediate their behavior in some way (Fig. 5).

Ceremonial gatherings involving large aggregations of people from distant locations

Australian Rock Art, Fig. 5 Anthropomorphic motif, Northwest Central Queensland (Photo by June Ross)

are well documented in Australian ethnographies. Meg Conkey identified the structure of graphic elements on bone artifacts, which she contended enabled her to trace the history of aggregation at sites in Northern Spain. Identification of similar structural criteria, particularly richness and diversity in the rock art assemblage at sites within the Australian arid zone, has provided a means to distinguish aggregation sites in the absence of ethnographic evidence. Jo McDonald and Peter Veth (2012) attributed the stylistic diversity in rock art assemblages in the Western Desert to the aggregation of people from different groups across the region. Brett Galt-Smith tested the identification of aggregation sites based on Conkey's criteria against assemblages from sites known to have been the focus of large ceremonial gatherings during the late nineteenth century in Central Australia. He found that Conkey's criteria were useful markers of large aggregation but were less successful in identifying more localized aggregations.

There has been resistance in Australia to one international interpretive framework. Shamanism and the associated altered states of consciousness espoused by David Lewis-Williams as an explanation for the production and form of rock art assemblages in South Africa, Europe, and other parts of the world have not been widely adopted by researchers in Australia, largely because there is no ethnographic evidence for shamanism within Australia. Although ethnographies recount some instances where altered states of consciousness might have been achieved – when performers accompanied ceremonial activities with long periods of rhythmic beating using clapsticks or when young men endured periods of fasting during initiation – none records any association between these activities and the production or content of rock art.

The establishment of an Australian rock art organization and the passing of heritage and environmental legislation have also contributed to the direction and growth of rock art studies in Australia. In 1984, the Australian Rock Art Association (AURA) was launched by Robert Bednarik. Conferences organized under the auspices of AURA have drawn international researchers to Australia, and the publication of its biannual journal provides a forum for dissemination and discussion of the results of both national and international rock art studies.

Political change and the promotion of ethical considerations and recognition of Indigenous ownership and intellectual property have also influenced the path of rock art studies in Australia. Today, most rock art projects are run in collaboration with Aboriginal or Torres Strait Islander owners who now participate in research as active partners with their own agendas and priorities. Many work as rangers managing rock art or other cultural heritage sites on their country, while others have developed tourist programs aimed at educating visitors about the Indigenous significance of sites.

Key Issues and Current Debates

Reliable chronometric dating of assemblages remains central to the research efforts in

Australian rock art. The longevity of rock art production across the continent is signalled not only by the extreme weathering of some engraved assemblages but also by the marked stylistic changes identified in many regional rock art provinces as well as the presence of ochre crayons in excavated sediments dating back from the recent past to the time when the original occupants arrived on the continent. Despite concentrated efforts, attempts to date rock art have met with limited success.

David et al. (2013) have reviewed the evidence for establishing the age of ancient pictographs in Australia and note that few proposed dates involve direct and reliable dating of identifiable rock art motifs. Rather, early dated examples include pigments only seen in cross section sandwiched between gypsum-oxalate crusts, the problem being that the very mineral skins that provide a substance to date also obscure the art. The use of radiocarbon dating on other organic materials as a means to date pictographs has met with mixed results. It has been used to successfully date wax motifs, the earliest of these from a turtle motif in Arnhem Land and dated to around 4,500 BP. Samples from a single charcoal drawing located in the Sydney Basin provided two vastly different ages, a problem likely to have resulted from substrate contamination. The radiocarbon dating of charcoal ash adhered to the bottom of a stone slab painted with a partial black motif provides the oldest date (28,000 BP) for Australian rock art although the motif is unclear. More contentious has been the minimum date of approximately 17,500 BP proposed for a Northern Kimberley Gwion figure and hand stencil obtained by Bert Roberts from an overlying mud wasp nest using optically stimulated luminescence. Criticism has been directed towards the technique, but most disquiet results from concerns about the relationship of the section of the nest being dated to the underlying figures (Aubert 2012). Additional concerns were raised when dating of oxalate skins by Alan Watchman indicated a mid-Holocene date for the same stylistic period.

Continued improvements in the preparation and extraction processes for radiocarbon sampling such as plasma oxidation and accelerator mass spectrometry have been used to date charcoal drawings and organics within pigment. Results have provided a range of dates for late Holocene assemblages in the Western Desert, Arnhem Land, and the Kimberley enabling researchers to build temporal frameworks for the dynamic changes that occurred in the last few thousand years. Uranium series, a dating technique used successfully by Maxime Aubert in China and East Timor, is now being trialled in the Kimberley at locations where art is beneath a covering of precipitated flowstone. Even with ongoing improvements to dating techniques, Rosenfeld and Smith (1997) argue for the continued importance of developing a fine-grained understanding of relative stylistic sequences to complement and inform dating projects. Chippindale and Taçon (1998) provide a comprehensive summary of methods that can be adopted to develop such sequences in Australia.

Researchers seeking to date engravings in the past had to rely on recovering examples from stratified deposits. Andrée Rosenfeld dated deposits associated with engravings excavated from the Early Man Shelter in Cape York to about 14,000 BP. Today, dating techniques focus on establishing ages for mineral coatings covering engravings such as silica skins, calcium oxalate crusts, rock varnish, and localized calcium carbonate deposits, thus providing a minimum date for the underlying art. After a promising start, cation-ratio dating of rock varnish has proved unreliable, and likewise, the dating of carbonate deposits has met with little success. Outcomes from Alan Watchman's radiocarbon dating of oxalate crusts have provided more convincing results. Crusts overlying pecked cupules in the East Kimberley provided age estimates up to 5,840 years old, while the dating of crusts overlying similar suites of rock art at two different sites in Central Australia returned to mid-Holocene dates (Smith et al. 2009). The latter example provided a means of validating Watchman's results. The rock art had been engraved on slabs of roof-fall lying on shelter deposits. Radiocarbon dates were obtained from

deposits immediately under the slabs of roof-fall providing a maximum age for the engravings thus bracketing the age of the art between maximum and minimum ages obtained using two different techniques.

Dating studies are now being augmented by analyses of the chemical and mineral composition of pigments and ochres to provide information on the composition of paints and the origin of pigments. Further, a detailed understanding of the composition of pigments provides data that can inform management decisions relating to conservation of art for future generations. The chemical fingerprint of paint samples can be established in the field in situ using portable X-ray fluorescence without damage to the art although Jillian Huntley's research flags some limitations to this technique (Huntley 2012). Alternatively, samples are removed and then processed and analyzed under laboratory conditions.

Interest in gestural marks or associated rock art traditions has continued to grow in Australia as the role and significance of these marks become more apparent. The process of interacting with rock surface continues to retain its significance for traditional owners in some regions although rubbing with a hand frequently replaces earlier practices. While assemblages of pecked cupules and abraded grooves have been regularly recorded in the past, few have been quantified or subjected to rigorous analysis. The recording of abraded areas, battered and flaked edges and random pecking on, or associated with art panels has largely been neglected. Studies on flaked edges at rock art sites in the Northern Kimberley are currently underway in an effort to establish if this practice had a ritual or economic function.

A range of other key issues are currently under debate. Speculations dating to the late nineteenth century that extinct megafauna or their tracks had been depicted in Australian rock art have been revived, although these assertions are not universally accepted. Over recent years, claims have been made for a range of painted motifs judged to be iconic depictions of *Genyornis, Zaglossus, Palorchestes*, *Diprotodon* and *Thylacoleo*, taxa deemed to have become extinct on the Australian continent around 40,000 years ago. Identifications rely either on the likeness of the motifs to hypothetical reconstructions of extinct fauna or on the comparative size of the depictions considered to be larger than any related taxa present today. Further, the presence of depictions of megafauna has been used by some researchers as a temporal proxy to extend their chronological framework and underpin relative sequences.

Bruno David (2002) has argued that both Aborigines and other Australians see the Dreaming as atemporal. Yet when he examined the archaeological manifestations of the Dreaming as we know it from ethnographic times, he concluded that the evidence from multiple sites across Australia reveals a dynamic and emergent culture rather than an unchanging one or even one of great antiquity. This has implications for the understanding of the decline or cessation of earlier art styles and the rise of distinctive regional rock art assemblages that appeared during the late Holocene.

By the time of European contact, Australia was a continent of Aboriginal nations, each with its own language, ceremonial practices, and rock art style. Earlier more homogeneous rock art styles produced over vast areas were replaced with differing regional styles. Identification of the forces responsible for driving changes in rock art assemblages has been the focus of rock art studies in many regions, with available datasets or theoretical perspectives influencing conclusions. In the late 1960s, researchers hypothesized that the demise of the production of elegant monochrome Gwion figures (formerly known as Bradshaw figures) and the later emergence of polychrome Wanjina-style figures over the past few thousand years resulted from the diffusion of ideas from a new wave of immigrants from Southeast Asia. In Arnhem Land, researchers identified dramatic changes in the topography of the region resulting from fluctuating sea levels and an increase in population density supported by resources from the rich alluvial plains that formed (Taçon 1989). Estuarine species depicted in earlier rock art such as mullet and saltwater crocodiles were replaced by

paintings of freshwater species such as magpie geese and water lilies. In Central Australia, the change from a relatively homogeneous engraved assemblage to dramatic site-specific motifs produced during the last 1500 years was attributed to changes in social organization necessitated by pressures from increased population resulting from the onset of more productive but unpredictable climates.

Contact rock art is now regarded as an important Indigenous archive. Clarke and Frederick (2006) demonstrate in their detailed study of recent rock art on Groote Eylandt that analysis of the content and form of the motifs as well as the social, geographic, and historical contexts of contact rock art can be used to examine the complexity of relationships, meanings, representations, and exchanges that resulted from cross-cultural interaction between Aboriginal people and newcomers. This view is supported by the findings of Paul Taçon and Sally May (Arnhem Land), June Ross and Ursula Frederick (Central Australia), Alastair Paterson (Pilbara), Jo McDonald (Sydney Basin), Noelene Cole (Cape York), and Liam Brady (Torres Strait) in their analyses of contact rock art. The history of contact and cross-cultural exchange varied across regions between rural, town, and mining settlements, but analysis of contact rock art assemblages demonstrates that Aboriginal people should more accurately be viewed as keen observers and active participants in past cross-cultural exchange rather than simply as passive victims.

While the threat to rock art assemblages posed by the mining boom of the last decade has led to an increased awareness of conservation and management issues associated with the preservation of sites, direct government financial support for specific rock art management programs and heritage agencies has been reduced. However, the proportion of government funds channelled through the Australian Research Council has seen a far greater proportion of available grant money being awarded to archaeological projects with strong rock art components. In threatened areas, rock art recording and management strategies are generally completed as consultancies commissioned by resource companies or as negotiated offset arrangements where resource companies fund research to better understand the resource generally.

There is a marked trend today, for rock art to be included as a major component in large regional archaeological projects in Australia. Neither is it unusual for projects to incorporate multiple proxies from varied scientific disciplines in order to formulate the clearest picture of the past. The range of disciplines associated with projects such as *Lifeways of the First Australians* in the Southern Kimberley, *Change and Continuity* in the Northwest Kimberley, the *Canning Stock Route: Rock Art and Jukurrpa Project* in the Western Desert, or *Connecting Country: The Jawoyn Homeland Project* in Southern Arnhem Land is more diverse than ever before. Rock art researchers now work side by side with geomorphologists; geochronologists; physical geographers; anthropologists; historians; geologists; palynologists; ecologists; faunal, botanical, ochre, and shell experts; GIS specialists; photographers with specialist technical skills; and filmmakers, each providing ever more specialized knowledge.

Future Directions

In the past decade, three university rock art centers have been established: the Australian National University's Rock Art Research Centre in Canberra founded under the guidance of Howard Morphy, Griffith University's Place, Evolution and Rock Art Heritage Unit led by Director Paul Taçon and situated on the Queensland Gold Coast, and the University of Western Australia's Perth Centre for Rock Art Research + Management with Jo McDonald as Director. Initiatives instigated by these fledgling bodies include raising the awareness of heritage and rock art management issues amongst government agencies and the general population, facilitating and broadening the scope and relevance of rock art research, funding of visiting international scholars, organizing professional workshops,

providing worldwide access to remote rock art sites via internet forums such as Google, and dramatically increasing the number of students studying rock art at tertiary level across Australia. The amount of industry and institutional funds committed to these centers attests to the significance of role that rock art is seen to play in Australians' past, present, and future.

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- ▶ Archaeology of Art: Theoretical Frameworks
- ▶ Chaloupka, George
- ▶ Clegg, John K.
- ▶ Dampier Archipelago Petroglyphs
- ▶ Dating Methods (Absolute and Relative) in Archaeology of Art
- ▶ Kakadu National Park: Rock Art
- ▶ Morwood, Michael
- ▶ Rosenfeld, Andrée
- ▶ Wobst, H. Martin

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Australopithecines

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Introduction

The term "Australopithecines" derives from the subfamily name Australopithecinae that was first used by W.K. Gregory and M. Hellman (1938). It differentiated the ape-men *Australopithecus* and *Paranthropus* from the subfamily homininae or humans that included the genera *Homo* and *Pithecanthropus* and which is abbreviated to "hominines."

Australopithecines are known from Plio-Pleistocene sites in South and East Africa and in Chad. Claims for their presence at sites outside of Africa have not been confirmed. Australopithecines have over the years been variously referred to as ape-men, man-apes, near-men, or Dartians after Raymond Dart who named *Australopithecus* in 1925. These names reflect the characteristics of the Australopithecines as being manlike primates with apelike features.

Key Issues/Current Debates/Future Directions/Examples

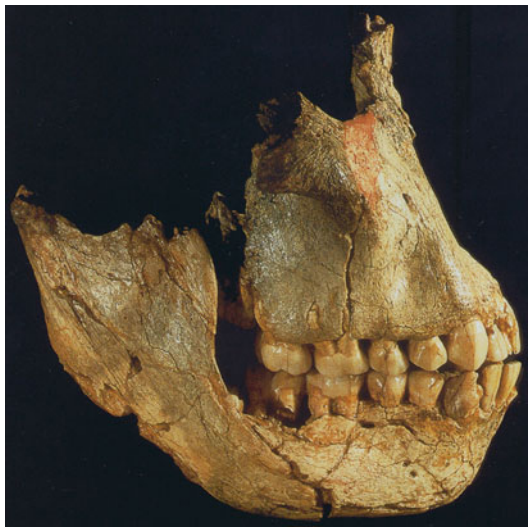
The first known Australopithecine was blasted out of a limestone tufa cliff at Buxton Limeworks near Taung, South Africa, in 1924.

Australopithecines, Fig. 1 The Taung child

A natural endocranial cast and a block of calcified matrix displaying sections of cranium and mandible were, with other fossils, saved by miner M. de Bruyn and taken to the mine manager's office. Later, they were sent by geologist R. B. Young to Professor Raymond Dart who had asked Young to look out for monkey fossils. Dart found that the natural brain cast fit into some exposed bone in the matrix block. After he had cleaned away the hard matrix, he realized that he had the face and brain cast of a primate that he considered an ape on the way to becoming man. It was the skull of a child of about 4 years and Dart noted that the molar teeth, though large, were humanlike, that the deciduous canine was much smaller than that of an ape, and that the position of the foramen magnum indicated that it would have walked upright. The brain size was however apelike, and other ape features were the projecting muzzle, flat nose, and facial premaxillary suture (Fig. 1).

Dart (1925) named the fossil *Australopithecus africanus* or Southern ape of Africa. Many of his colleagues were skeptical of his claims that it was a human ancestor but the Scots doctor and paleontologist Robert Broom supported Dart's interpretation and determined to prove it with an adult skull. This he did in 1936 when he recovered a crushed adult cranium with good brain cast that had been blasted out

during limestone quarrying at the Sterkfontein Caves, South Africa. Broom at first named it *Australopithecus transvaalensis* but after discovery of a child mandibular symphysis 2 years later, he created a new genus *Plesianthropus* for the Sterkfontein fossils (Broom & Schepers 1946). Broom, later aided by his young zoologist assistant John Robinson, recovered many Australopithecine fossils (Fig. 2) from the Sterkfontein Caves including, in 1947, part of a skeleton with a pelvis that proved conclusively that they walked upright (Broom et al. 1950).



Australopithecines, Fig. 2 Lower face of Sts 52, a male *Australopithecus africanus*

From 1966 onward, Phillip Tobias and Alun Hughes and later Ron Clarke conducted systematic excavations at the caves and added considerably to the inventory of fossils. Most publications in recent years have considered there to be only one species, *Australopithecus africanus*, in South Africa but R. J. Clarke (2013) has demonstrated that many of the fossils belong to a second larger-toothed, bulbous-cusped, flat-faced species now well represented by a virtually complete skeleton (StW 573, Fig. 3) that he and his assistants Stephen Motsumi and Nkwane Molefe discovered in a lower deposit within the caves (Clarke 1998). Clarke found this second species to be the same as some Australopithecine fossils that Dart's team of the Kitching brothers and Alun Hughes had found at the Makapansgat Limeworks Cave beginning in 1947. Dart (1948) named this species *Australopithecus prometheus* (Fig. 4). These date to around three million years ago and are contemporary with *Australopithecus africanus* at both Makapansgat and Sterkfontein. At this latter site, they are also found in a deposit (member 4 of the Sterkfontein formation) dating to between 2.1 and 2.5 Ma. Males and females of each species can be determined. For example, within *Australopithecus*

Australopithecines, Fig. 3 StW 573 skull of *Australopithecus prometheus*

Australopithecines, Fig. 4 MLD 2, mandible of *Australopithecus prometheus*

Australopithecines, Fig. 5 StW 252 cranium of *Australopithecus prometheus*

africanus, StW 53 is a male and Sts 5 is a female. Within *Australopithecus prometheus*, StW 252 (Fig. 5) is a male and Sts 71 is a female (Clarke 2013). A third South African species has been named *Australopithecus sediba* by L. Berger et al. (2010) on two partial skeletons discovered by his team at Malapa in a 1.9 million-year-old deposit.

Australopithecines, Fig. 6 Laetoli Hominid 4, the type mandible of *Australopithecus afarensis*

The first discovery in East Africa of what eventually proved to be an early species of *Australopithecine* occurred in 1939 when L. Kohl-Larsen found a maxillary fragment at Garusi (now Laetoli) near Olduvai, Tanzania. The deposits in which it was found are now known to date to about 3.6 Ma. Survey work done by Mary Leakey and her team in the 1970s (Leakey et al. 1976) uncovered many more such fossils, including a mandible (Laetoli hominid 4, Fig. 6) which became the type specimen of a new species *Australopithecus afarensis* (Johanson et al. 1978). They grouped the Laetoli *Australopithecus* with similar fossils they had discovered at Hadar in the Afar region of Ethiopia. These fossils included the partial skeleton, known as Lucy, and they possessed features, in particular the lower third premolar, which are more apelike than those of the South African *Australopithecus*. Some other very significant fossils of this species are the reconstructed male skull AL 444–2 (Kimbel et al. 2004), an infant skeleton with a skull (Alemseged et al. 2006), and the trail of Laetoli footprints.

This trail (Fig. 7), representing two individuals side by side, was discovered by Paul Abell in 1978. He noticed what appeared to be a humanlike heel impression in an outcrop of volcanic tuff. Subsequent excavation revealed a 41-m-long trail made by one large and one

Australopithecines, Fig. 7 Laetoli footprints of *Australopithecus afarensis*

small individual. Although the footprints are those of a bipedal walker, they demonstrate some apelike features, including a slightly divergent big toe and a medial expansion of the abductor muscle of the big toe. Such features are consistent with the foot anatomy of the StW 573 skeleton from Sterkfontein. That fossil also has a slightly divergent and mobile big toe that would have been useful for tree climbing.

A canine tooth found at Laetoli in 1935 was so large that Louis Leakey thought it was a monkey. It was only in 1981, with the hindsight of many similar discoveries of large canines, that Tim White recognized this canine in the British Museum as that of an *Australopithecus afarensis* discovered 1 year before Broom's first adult *Australopithecus* from Sterkfontein. An anterior portion of mandible from Chad dating to 3.5 Ma has similarities to *Australopithecus afarensis*, but was named as a new species, *Australopithecus bahrelghazali*, by Brunet (1996).

Jaws of an even earlier and more primitive species of *Australopithecus*, dating to 4.2 Ma ago, were discovered by Meave Leakey's team at Kanapoi in Kenya and named *Australopithecus anamensis* (Leakey et al. 1995). This followed the recovery from that area of a hominid distal humerus by Bryan Patterson's Harvard expedition in 1965. Two years later, Patterson's team recovered part of a hominid right mandibular ramus with a heavily worn first molar at the site of Lothagam near the shore of Lake Turkana, Kenya. This fossil site, rich in Miocene fauna, had been found by Larry Robbins, a University of California, Berkeley, student, and it is possible that the hominid mandible is a representative of *Australopithecus anamensis*.

Another *Australopithecus* species dating to 2.5 Ma ago was recovered from Bouri, Middle Awash, Ethiopia, and named as *Australopithecus garhi* by Asfaw et al. (1999). A partial cranium has very large cheek teeth, combined with a large, prognathic anterior dentition.

From much younger deposits in Olduvai Gorge, Tanzania, and from East Lake Turkana, there are some hominid fossils that have generally been accepted as representing *Homo habilis*, but which have close resemblances, including small brain size, to the South African *Australopithecus africanus*. These fossils dating to under 2 Ma are OH 24, OH 62, OH 13, and KNM ER 1813. They occur in the same areas and same age deposits as much larger brained fossils of *Homo habilis*. Thus, they seem to represent late surviving *Australopithecus africanus* or a closely related form.

Although the earliest stone tools date back to at least 2.6 Ma ago, none has ever been found with the earliest Australopithecines and at later sites, it seems more probable that early *Homo* was responsible for the tools. In the 1950s, Raymond Dart published many articles, as well as a book, claiming that *Australopithecus* had a bone tool culture that he named Osteodontokeratic. Subsequent investigations have shown that there is no justification for such claims and that the accumulations of damaged skulls and broken bones were the natural result of carnivore predation, porcupine collecting, and rock fall and pressure within the cave deposits.

Another form of Australopithecine in addition to *Australopithecus* is the flat-faced, large-toothed ape-man called *Paranthropus*. This was first discovered by a schoolboy, Gert Terblanche, at Kromdraai, near Sterkfontein, South Africa, in 1938 and named *Paranthropus robustus* by Robert Broom. Details on this form of ape-man are given under the entry *Paranthropus* in this encyclopedia.

The several species of Australopithecine are represented over a large part of Africa and although there have in the past been suggestions that isolated teeth and jaw fragments from China and Java are Australopithecine, there has been no indisputable support for this. It seems probable that the fossils in question are those of *Homo habilis* that had spread from Africa to Asia.

Palaeoenvironmental information suggests that many of the Australopithecines were associated with woodland or tropical forest close to lakes and rivers. Their diet, as suggested by their dentition, varied from omnivorous to more vegetarian for *Paranthropus*. All Australopithecines were bipedal with humanlike hand proportions, humanlike (but large) cheek teeth, and small brain size ranging from about 430 ccs in some *Australopithecus* to 530 ccs in some *Paranthropus*.

These apelike brain sizes, and many other apelike features in the skull and skeleton, coupled with the humanlike bipedality, hands, and teeth, mark them as transitional between Miocene ape and Pleistocene human. There is, however, no clarity on which, if any, of the several known Australopithecine species was ancestral to *Homo*, which was a contemporary of both *Paranthropus* and late forms of *Australopithecus*, e.g., at Olduvai Gorge Bed I.

Cross-References

- ▶ Dart, Raymond Arthur
- ▶ *Homo habilis*
- ▶ Leakey Family
- ▶ Olduvai Gorge Archaeological Site
- ▶ *Paranthropus*
- ▶ Tobias, Phillip V.

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Authentication and Conservation in Archaeological Science

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Introduction

Authenticity is one of the most influential factors for determining the course of action of heritage in need of conservation. Determining exactly what constitutes a site or objects' authentic state can be problematic and challenging because there is not one history rather a series of histories and stakeholders to consider. Authenticity in conservation is guided by the ethics behind how a place or object should be perceived and protected.

Since the late seventeenth to early nineteenth century, when archaeology as a science developed in the "age of enlightenment," authenticity has referred to the material condition of something original and unique. For this period of Western cultural history, authenticity denoted a relation to genuine identity. The physicality (tangibility) of archaeology and the concept of successive strata served primarily (process) for dating and proof of authenticity. Archaeological objects unearthed within specific layers became recovered symbols of that historical occupancy. Collectors were known to refer to archaeological objects as ranging from genuine antiquities to imitations of high artistic merit and forgeries of little value. Conservation treatments sought to retrieve the past through restoration or to bring an artifact back to an original condition. The degree of discernable restoration treatment could move an artifact up or down within this authenticity scale based on visual determinations and skill of the observer.

In the second half of the twentieth century, new technologies enabled tests (laboratory results) for determining authenticity through provenance and dating to accompany the previous role of strata or archaeological typology (documentation). Technical studies replaced the role of assessing aged decay and patina for assigning authenticity. Within Western conservation by the end of the twentieth century, interventions to "improve" were considered inauthentic.

Today, at its simplest, authenticity refers to the presence of original material. But authenticity is much more. A practical approach for assessing physical authenticity in conservation treatments may include four authenticities: materials, workmanship, design, and setting. Jokilehto (1993: 59-75) elaborates that treatment must maintain authenticity by maximizing retention of historical material and ensuring harmony with original design and workmanship and not allowing new additions to dominate over the original fabric but respecting the archaeological potential.

If authenticity is the ability to convey significance, then in archaeology, it is also context dependent because sites and their objects can have different meanings at different times, in different places and to different people. Lowenthal (1999) clarifies that this should include origin and evolution and the recognition of multiple histories and stakeholders.

In addition, social value authenticity helps to clarify aspects of (value) spirituality or possibly sentimentality. Economic authenticity helps to clarify sustainability and development (tourism, trade, insurance, or market value).

Beyond these refinements, one sometimes hears reference to *an aura of authenticity* about

a place or object. However, there are many examples that illustrate that rather than being an attribute, both aura and authenticity can be created. This conundrum is what makes the discussion of authenticity and conservation an interesting challenge for all concerned with the preservation and protection of sites, monuments, and objects of cultural heritage.

Definition

Cultural sites and objects are particularly vulnerable to deterioration due to their past utilitarian roles, post-excavation lack of maintenance, and continuous exposure to agents of decay. Unfortunately, warning signs that conservation is needed become visible after deterioration has already taken place. Some of the resulting terms of condition that reflect a loss of accuracy include:

- Dilapidation or structural deterioration: a state of disrepair or nonfunction by misuse, neglect, or abandonment often resulting in loss of validity
- Dismemberment or fragmentation: a state of being divided, cut, torn, broken into parts, and resulting in loss of integrity
- Disfigurement or surface insecurity: a state of instability or vandalism, potentially resulting in loss of legitimacy
- Recreation or use of replacement parts: nonoriginal components added to augment the structure using nonindigenous technologies and materials, potentially leading to loss of accuracy
- Disenfranchisement: heritage that is deprived of the traditions of community use and loss of accuracy or relevance

In practice, authenticity has a significant effect on our choices of conservation interventions (Jerome 2008: 4). Unfortunately, the word conservation has slightly different meanings for professionals working in the environment of built immovable heritage (sites, monuments, and structures) and professionals working with moveable object collections (in museums). More conventional uses of the terms related to conservation are included in Table 1.

The comparison of basic definitions of conservation, preservation, and restoration for immovable and movable heritage shows that the fields are not in sync. For heritage professionals dealing with sites and buildings, conservation is the umbrella term for the overall goal of the profession, while object conservators use the term preservation for this purpose. It is useful to note that in the United States, conservation does not typically apply to buildings, but to other cultural objects. Preservation for buildings and sites refers to the steps taken to achieve overall conservation, while objects conservators refer to the conservation methods needed to achieve overall preservation of artifacts, hence in the USA the difference in titles: preservationists (sites and buildings) and conservators (objects).

Though the working definitions for conservation and preservation differ between the fields, both definitions fall under the relatively new term heritage science which involves managing change and risk and maximizing social, cultural, and economic benefit not just today but in such a way that we can pass on to future generations that which we have inherited. Scientists carrying out heritage science research range across a number of physical and natural science disciplines and their applications, including archaeological science, building science, engineering and technology, computer science, conservation, environmental science, physics, chemistry, biology, engineering, and environment (House of Lords 2006: 2.21 and 3.17). Olsen (2001: 213) warns that at times heritage scientists assume that knowledge is open and available to all, but in reality it is the powerful nations that are the subjects of knowledge and the rest of the world is rendered as object.

Historical Background

"Each generation views authenticity in a new guise, reflecting its new needs for truth, new standards of evidence, and new faiths in the uses of heritage" (Lowenthal 1999). A coherent philosophy for conservation began to emerge in the last quarter of the nineteenth century. At this

Authentication and Conservation in Archaeological Science, Table 1 Terminology

Immovable (Sites and built environment)	Moveable (Objects)
Conservation: all efforts designed **to understand** cultural heritage (monuments, groups of buildings, and sites of cultural value); know its history and meaning; and ensure its material safeguard and, as required, its presentation, restoration, and enhancement (World Heritage Convention. Article I)	*Conservation:* all **measures and actions** aimed at safeguarding tangible cultural heritage while ensuring its accessibility to present and future generations. Conservation embraces preventive conservation, remedial conservation, and restoration. All measures and actions should respect the significance and the physical properties of the cultural heritage item (International Committee on Museums-Conservation Committee)
Preservation: methods of maintaining the historical integrity of a building with limited alterations or additions; methods of stabilizing and preventing further decay (National Trust for Historic Preservation). This term is considered more specific than conservation	*Preservation:* the **protection** of cultural property through activities that minimize chemical and physical deterioration and damage and that prevent loss of informational content (American Institute for Conservation). This term is considered to be broader than conservation
Restoration: methods used in rebuilding buildings and structures with **historically accurate materials** to achieve historical authenticity in keeping with a particular time period or event. There is a focus on maintenance of intact historic features, replacement of lost features, and removal of inappropriate features (US Secretary of the Interior's Standards for the Treatment of Historic Properties, 1995)	*Restoration:* all actions directly applied to a single and stable item aimed at facilitating its appreciation, understanding, and use. These actions are only carried out when the item has lost part of its significance or function through past alteration or deterioration. They are based on respect for the original material. Most often such actions modify the appearance of the item. Examples of this restoration are retouching a painting, reassembling a broken sculpture, reshaping a basket, filling losses on a glass vessel (International Committee on Museums-Conservation Committee). In the United States, it refers more specifically to the treatment procedures intended to return cultural objects to a known or assumed state, often through the **addition of non-original material** (American Institute for Conservation)
Reconstruction: is the process of depicting, by means of **new construction**, the form, features, and detailing of a non-surviving site, landscape, building, structure, or object for the purpose of replicating its appearance at a specific period of time and in its historic location (US Secretary of the Interior's Standards for the Treatment of Historic Properties)	*Reconstruction:* is less commonly used with objects but may refer to an aspect of the conservation or restoration process where new materials are used to create a replacement part of the structure (i.e., a missing chair leg) or if collapsed parts are reassembled
Rehabilitation: actions that emphasize the **retention and repair** of historic materials on deteriorated property with a focus on those materials, features, finishes, spaces, and spatial relationships that, together, give a property its historic character (US Secretary of the Interior's Standards for the Treatment of Historic Properties)	Term not commonly used
Anastylosis: reconstruction or reassembly of collapsed or fallen parts into their original place and when necessary, incorporating new materials (World Heritage Sites)	Term not commonly used

time, manuals for the conservation of ancient buildings were developed, and authenticity was identified as a concern. By the 1920s, Marshall (1923: 10) wrote: "Although there are many ancient buildings whose state of disrepair suggests at first sight a renewal, it should never be forgotten that their *historical value is gone when their authenticity is destroyed*, and that our first duty is not to renew them but to preserve them."

Philosophies, treaties, various heritage charters, and conventions were organized and laid the foundation for the advancement of doctrine,

practice, and dialogue in conservation. Lowenthal (1999) summarizes that the focus has moved from possession of authenticity to an "authenticity of materials and form, of structure and process, and of aim and intent, moving from exclusive concerns with buildings and artifacts to broader considerations of landscape and nature, folklife and folklore, ideas and beliefs."

Highlights from some of the important international gatherings that have defined conservation for archaeological sites and monuments are outlined below.

The Athens Charter for Restoration of Historic Monuments, organized by the International Museums Office in 1931, established basic principles for an international code of practice for conservation. It recognized a common responsibility to safeguard monuments for future generations as our duty to hand them on in the full richness of their authenticity. Reference is made that "the work of consolidation [use of modern materials such as reinforced concrete] should whenever possible be concealed in order that the aspect and character of the restored monument may be preserved" (Article 4) and that "the architects and curators of monuments should collaborate with specialists in the physical, chemical, and natural sciences with a view to determining the methods to be adopted in specific cases" (Article 5.1).

The Venice Charter for the conservation and restoration of monuments and sites, organized by the International Congress of Architects and Technicians of Historic Monuments in 1964, established that "it is our duty to hand them [ancient monuments] on in the full richness of their authenticity" (Preamble) and that "ruins must be maintained and measures necessary for the permanent conservation and protection of architectural features and objects discovered must be taken" (Article 15). This Charter also identified conservation judgments as necessarily relative and contextual as opposed to a belief in international absolutes.

The guidelines developed in Venice in the 1960s became problematic when authenticity in heritage went beyond the stone remains of past structures and had to consider rebuilding techniques that would preserve the traditional techniques and forms of living cultures or those created from more ephemeral (i.e., organic) materials.

The Burra Charter was first adopted in 1979 and has been revised several times. In 1999, it became known as Burra: The Australia ICOMOS Charter for Places of Cultural Significance. It established that "places of cultural significance must be conserved for present and future generations" (Preamble). "Cultural significance means aesthetic, historic, scientific, social or spiritual value for past, present or future generations. Cultural significance is embodied in the place itself, its fabric, setting, use, associations, meanings, records, related places and related objects. Places may have a range of values for different individuals or groups" (Article 1).

The Nara Document on Authenticity, organized by the World Heritage Committee in 1994, opened the world to discussions involving the essential role of understanding of authenticity during the scientific study of cultural heritage. It expanded the range of values for authenticity to accommodate the mainstream Japanese conservation practices of dismantling, repair, and reassembly. The broader framework for authenticity analysis developed at Nara inspired regional meetings that were held in Africa, Europe, the Americas, Australia, and China. The Nara Document establishes that "the conservation of authenticity contributes essentially to the clarification and illumination of the collective memory of humanity" (Article 4) and "judgments of values and authenticity must be considered and judged within the cultural contexts to which they belong" (Article 11).

The Declaration of San Antonio, organized by ICOMOS in 1996, suggested expanding proofs of authenticity to include reflection of true value, integrity, context, identity, use, and function. It states that "the authenticity of our cultural resources lies in the identification, evaluation, and interpretation of their true values as perceived by our ancestors in the past and by ourselves now as an evolving and diverse community" (that coexist but often assign different values to them) (Article 1) and "when an

archaeological site is no longer used by the descendants of [its] builders, the material evidence of the site provides the most direct link to the past which makes it possible for the present inhabitants to perceive and interpret the sites meaning and value" (Article 5).

The Zimbabwe Meeting Recommendations in 1999 state: "In the context of the World Heritage Convention, the notions of authenticity and integrity cannot be expressed in isolation. . .. The meaning of the heritage is usually a combination of values created by people. These values include norms and belief systems, as well as material and technological aspects. In most instances culture and nature are inseparable." Basically, it suggests that language, indigenous knowledge, skills, and technology should participate and be documented in preservation and management of heritage. Munjeri has clarified that "in traditional African societies, it [authenticity] is not based on the cult of physical objects 'the tangible' and certainly not on condition and aesthetic values. . .. The solution lies in recognizing that indigenous communities are at heart, 'ecosystem people' integrally linked to the ecosystem they inhabit. They are part of the integrity equation" (Munjeri 2001: 18-9). This truly complicates the equation by expanding the boundaries of authenticity into the slippery slopes of landscape and identity.

The World Heritage Operational Guidelines (2005, Article 81) provides insight into authenticity and includes a list of information resources: form and design, materials and substance, use and function, traditions and techniques, location and setting, spirit and feelings, and other internal and external factors such as management systems, language, and other forms of intangible heritage. It addresses the reconstruction of archaeological remains or historic buildings or districts as acceptable only on the basis of complete and detailed documentation and recognizes the role to some extent on conjecture (Article 24).

The conservation of objects is a smaller aspect of archaeology than buildings, sites, and monuments, and there are no doctrines, charters, and declarations to illustrate historical perspective. By the end of the nineteenth century, there was an increasing recognition of the importance of preservation for antiquities and a justification for the creation of conservation handbooks. Most provide explanation for deterioration and treatment processes, and the use of before and after photographic documentation is identified in some. By the mid-twentieth century, handbooks for collectors, archaeologists, and museum curators were developed because appreciation and study mandated that objects be cleaned, restored, and repaired. By the last quarter of the twentieth century, an intensification of laboratory training was recommended for the conservation of objects.

The conservation of moveable historic and artistic objects is guided by various codes of ethics developed by professional conservators in numerous countries. These codes are statements of values, standards, and aims that guide the conservator through a complex range of issues. Beginning in the mid-twentieth century, professional organizations for the conservation of historic and artistic works were formed to break with the tradition of the craftsman-restorer. The codes provided generalized and idealized standards of behavior for the new professionals of the later twentieth century who owe their professional training to formal graduate studies devoted specifically to the field of conservation.

Most codes of ethics continue to focus on physical or tangible cultural heritage. For example, the American Institute for Conservation code requires that "statements about age, origin, or authenticity should be based on the physical evidence derived from an object, rather than on opinions, and should include an explanation that scientific data alone cannot provide definite attributions."

Conservators are governed by a respect for the integrity of the object or its unmarred, unimpaired, or uncorrupted condition. Some codes specifically clarify that integrity may include physical, historic, and aesthetic integrity, while others have added a reference to conceptual integrity. The American Institute for Conservation's code calls for "an informed respect for cultural property, its unique character and significance, and the people or person who created it."

An important aspect of the Canadian Association of Conservation code is an emphasis placed on "full documentation without fraudulent intent. . .the presence and extent of any restoration or reconstruction must be detectable, though they need not be conspicuous." The historian Cesare Brandi is often credited with introducing modern principles for the conservation of art that led to a rejection of imitative restoration and heightened respect for the traces of time and concepts of authenticity in 1963. This concept respects the original and present contexts in the reintegration while making the intervention discernable at close range.

In addition to the unwritten "six foot, six inch" rule, meaning a restoration should be discernable at six inches but not at six feet, there is the principle of reversibility that has been a long-standing focus of the conservation codes of ethics. It refers to the capacity of a treatment to be undone or reversed, at a later date, without resulting in damage or change to the object. This is inclusive of any materials such as adhesives or restorations that may be added. Despite numerous commonalities in theoretical approach and practice, the needs of different materials have led many specialist conservators to develop different attitudes and approaches to treatment. Conservators of moveable objects tend to specialize by divisions based on material composition (ceramics, wood, glass, metal, painting, paper, and stone). Other times, the specialties represent types of objects (paintings, books, textiles, sculpture, architecture), or they may refer to the academic discipline that objects broadly belong (archaeological, ethnographic, decorative arts, historical, fine arts) or to a type of material function (furniture, costume, and musical instruments).

At the end of the twentieth century, contexts of value began to influence the conservation of moveable objects. Important examples of change include (1) the concept of a single standard toward conservation treatment (the highest and most exacting standard of treatment for each work) was determined to be impractical, (2) the role of cultural sensitivity that allows acknowledgment of indigenous feelings and the connectedness of different values and priorities toward conservation became significant, and (3) a caution about the removal of dirt and residues because analysis may identify past uses, signature a provenance, or provide a date or place of origin.

Also, it is important to point out where discussions of authenticity do not appear. For instance, it is not mentioned in the 1990 Federal Regulation 36 CFR 79: Curation of Federally Owned and Administered Archaeological Collections, which was promulgated to provide minimum standards for the long-term management and care of archaeological collections, including associated records and reports. Notably, the regulations consider actions that need to be taken for both new and existing collections. Likewise, the Salzburg Declaration of 2009 on the Conservation and Preservation of Cultural Heritage established a new collaborative platform to more effectively preserve the world's cultural heritage, but it does not specifically discuss authenticity. Perhaps the assumption that modifying an object should be done for the sake of authenticity is problematic because all conditions are equally authentic (Muñoz-Viñas 2005: 91-113).

Key Issues/Current Debates

Conservation, as the overall goal for heritage science, has evolved from how to conserve to why conserve to for whom we should conserve. Archaeological sites, monuments, and objects may hold values that conflict with one another. Authenticity is critical to consider in conservation, but it is relative, and as a term it has different meanings in different contexts.

Conservation has focused on the material qualities of archaeological remains to meet the test of authenticity and to implement treatments that arrest and stabilize the process of decay. What was seen as objective criteria, relating to design, material, and workmanship, was used to establish the authentic character for treatment. This works well when cultural heritage monuments and objects belong to

a society that has ceased to exist, because faithfulness to original objects, materials, contexts, and aims become a shared common denominator (Lowenthal 1999).

Considering authenticity to be a condition in relation to context means that the revealing of relevant values is also a basis for treatment. But basing authenticity on judgments of intangible value is subjective. Also, values are subject to cultural and educational processes that may change over time. Attempts to conserve cultural contexts and aims over time become more relative and subject to interpretation and negotiation, especially when multiple stakeholders are involved.

Thus, two of the important issues that have emerged regarding authenticity and conservation involve (1) concerns that over-restoration or reconstruction of the tangible original should not destroy value and integrity as in the Venice Charter and (2) concerns that link to intangible cultural values of heritage, that have been maintained over time, should be a primary consideration for meaning and validity as in the Nara Document.

Conservation can claim to provide authenticity through analysis and technical study, but it can also inadvertently remove material authenticity by cleaning away critical evidence. In fact, scientific analysis in the course of conservation is better at producing evidence than it is at proving authenticity. Examples include dating techniques applied to a composition material or elemental analysis of materials known for being indicative of a particular group (based on a body of reference material) or that the wear patterns on an object surface are human made. Continuous developments in science and changes in conservation treatments can complicate investigations into authenticity for ancient sites, monuments, or finds. For instance, Myrberg (2004) summarizes the role of authenticity in ancient monument preservation and provides a problematic example involving a labyrinth on the Swedish archipelago. He asks: "What is a true monument of the past? Many monuments have been reused over the centuries, rebuilt, added to or copied – processes that continue into the present. . . should their use or even their construction in the present be considered less meaningful than their use or construction in, say, the eighteenth century or the Neolithic?"

An authentic value of inspiration may also be important to conservation particularly when it is linked to artistic, historic values. Brajer (2009) illustrates a confusing history of many re-restorations for wall paintings in a Danish church beginning in the nineteenth century due, in part, to the use of medieval techniques and materials and innovative tricks to achieve the appearance of original wear and tear. The resulting condition was a hotchpotch of overlapping repairs, reconstructions, and overpaintings, presenting a picture of repeated disintegration and partial recreation. A growing consciousness regarding the meaning behind the previous restoration efforts helped the conservators establish a link between value (the source of meaning) in treated objects and the authenticity manifested in them (integrity of meaning).

As conservators learn to look beyond the context of original materials to cultural dialogues and engagements or dialectics, they are better able to deal with interpretative issues that involve complex arrays of contexts, sets of data, or multiple stakeholders. Conflicts such as treatments that conserve the research interests of archaeology with tourism or public values can be negotiated. For example, when the Lucy hominid remains were selected for a traveling exhibition, research scientists were concerned about object safety and their loss of research access. Despite the fact that public visitors to the National Museum of Ethiopia had for years been inspired by a display of a cast, that they thought was original, organizers for the traveling exhibit were convinced that only the real Lucy fossil would be adequate to generate tourism dollars. Conservation compromises allowed the Lucy remains to travel safely, to be handled only by her keeper, to be available to both researchers and museum visitors, and to bring home financial reward.

International Perspectives

International perspectives on authenticity and conservation focus a great deal on notions of tangible and intangible aspects, global and local expertise, and universal and particular principles. The founding of the International Council of Monuments and Sites (ICOMOS) in 1965 by UNESCO initiated a global network of professionals devoted to heritage conservation. The World Heritage Convention of 1972 pledged to safeguard heritage resources deemed to be of *universal* value to all of humanity. Various philosophies, treaties, heritage charters, and conventions have laid the foundation for conservation practice and dialogue. "Imbalances between [in] different regions and types of heritage have led to different approaches to conservation, fueling tensions and undermining exchanges of ideas and experiences" (Luxen 2004). Today, the relevance of these documents, which have moral rather than legal authority, is sometimes contested, but they serve to remind and challenge us.

Throughout the world, heritage conservation with value based on original fabric is very different from heritage with living or great spiritual value. Dialogue between professionals from different cultures around the world continues to improve the understanding and practice of conservation. Various international meetings in Africa have identified the importance of culture and nature, while in the Far East, the importance of traditional crafts skills as cultural heritage conservation has been acknowledged with the concept of "living cultural treasure." In the Americas, a common indigenous concept of authenticity suggests that "any object or structure reproduced, replicated, repaired, stabilized or restored by descendants of the original craft persons or members of the same ethnic party loses no integrity" (Ladd 1999: 22). In other words, "A structure can be authentic if it closely resembles an ancient structure in form and design or if its spirit and feeling is that of an ancient building" (Holtorf & Schadla-Hall 1999: 235).

Conservators working with archaeological objects in museum collections often find decisions regarding appropriate conservation treatment to be difficult. If values can be aesthetic, historic, scientific, social, or spiritual and may reflect past, present, or future generations, then objects of similar type including ancient originals, historic or honest copies, recent replicas, forgeries, or deceptive replicas created with some original parts married from different objects may all be authentic. Examination and analysis can detect materials of construction; methods of technological construction; natural corrosion, residue, salt, or other accretion products versus chemical finishing, false patina, or modern adhesive and paint products; and typical wear marks versus machine tool marks. Based on conservation studies, objects may retain a value but have their authenticity, and cultural significance reassigned. Just as a fragmentary object condition may be an argument for authenticity, replicas can be born out of demand for continuing tradition (sometimes referred to as heritage craft), a lack of the original, or the need to fulfill market demand. Restoration techniques that include repainting may come to represent an important history for a piece.

Conservation is still challenged in how to include and evaluate the role of authenticity in treatment decision making, how to reconcile the difference between scientific conservation and the revival of heritage craft, and how to minimize the conservation of spectacular monuments and objects at the expense of less spectacular ones. Several authors (Layton et al. 2001; Muñoz-Viñas 2005; Stanley-Price & King 2009) have offered thoughtful discussion on these subjects. Justifications for reconstruction (returning a place to a known earlier state by the introduction of new material into the fabric) would rarely meet the requirements of the Charters that they are based on but can and do satisfy a variety of stakeholders nonetheless.

Future Directions

Local knowledge and public participation have become recognized components in site preservation efforts. Avrami (2009) explains that social theorists offered their application to planning,

which resulted in "broader participation of stakeholders, challenged top-down expert-driven models, and helped to transform planning into a more social and contextually-responsive endeavor."

The stewardship of sites and monuments is very tied to subjective relationships between people and places. The repainting treatment project of the Kamehameha statue in Hawaii is an example of how a conservation project could be directed with community-centered goals. The first goal included standard conservation procedures, except they were based on the community's decision about whether to paint or gild the statue and how to train local community members to effectively maintain the sculpture into the future. The second goal was to establish a link to future regional development with traditional arts, heritage preservation, and community identity. The use of participatory conservation offers a model for bringing this knowledge into play (making) the conservation process a vehicle for public engagement and as a tool for critical discourse about how conservation represents the past (Wharton 2002). Measures of monitoring treatment relevance, improving management frameworks, and humanizing documentation may also benefit from the inclusion of various stakeholders.

Finally, repatriation rights for sites and objects for indigenous groups are but one example of how decisions of conservation can vary for different people at different times. A critical aspect of the repatriation process in the United States is the role of consultations in determining control, treatment, and disposition of human remains and sacred objects and is outlined in 43 CFR 10.5, 10.8 (a), and 10.9 (b). The repatriation process can be subjective and political, and it can actually be an appropriate reverse of conservation when objects and human remains excavated from a burial are reinterred together or when sacred objects are left to naturally deteriorate as intended.

Sullivan (1998: 8) aptly identifies two important issues that are relevant for all future discussions: "(1) that over-restoration or reconstructions not destroy the value for which the site is listed as a World Heritage Site and (2) that the idea of authenticity is indissolubly linked to cultural value and only has meaning and validity in this context. Thus an appropriate treatment to conserve authenticity will vary depending on the primary cultural values of the place."

Authenticity in conservation has come to require a sense of respect for the place, the indigenous people, and the local history and implies a means of linking to the future as part of a flow of time. Stressing an understanding of knowledge rather than collecting, testing, and presenting facts is important for the integrative stewardship of sites or the preventive conservation and management of collections. National symbolism, continuing function or reuse, education and research, tourism promotion, and site preservation are all linked to sustainability of cultural heritage. Debate over how best to conserve material culture will continue. Some will argue for minimal intervention, while others will argue for extensive restoration and active use of cultural heritage. The recognition of cultural relativism and contested meanings embedded in material objects has formally entered conservation literature (Odegaard 1995; Clavir 2002).

Significant Charters and Declarations for Conservation

Athens Charter for Restoration of Historic Monuments, 1931. http://www.icomos.org/docs/athens_charter.html

Venice Charter for the Conservation and Restoration of Monuments and Sites, 1964. http://www.international.icomos.org/charters/venice_e.htm

36CFR60.4 US National Park Service Regulations for National Register of Historic Places (National Historic Preservation Act of 1966) last revised 2010. http://www.nps.gov/nr/publications/bulletins/nrb38/nrb%2038%20page%204.htm

Burra Charter; the Australia ICOMOS Charter of Places of Cultural Significance, 1979. http://www.icomos.org/burra_charter.html

Nara Document on Authenticity, 1994. http://www.international.icomos.org/naradoc_eng.htm

The Declaration of San Antonio, 1996. http://www.icomos.org/docs/san_antonio.html

The Zimbabwe Meeting Recommendations, 1999. http://www.africa2009.net/common/reports/r-zimb00.pdf

World Heritage Operational Guidelines, 2005. http://whc.unesco.org/archive/opguide05-en.pdf

Salzburg Declaration on the Conservation and Preservation of Cultural Heritage, 2009. http://www.imls.gov/pdf/SalzburgDeclaration%20.pdf

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Authenticity in Archaeological Conservation and Preservation

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Authenticity and Pastness in Cultural Heritage Management

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Brief Definition of the Topic

Seemingly cultural heritage in modern Western societies can successfully evoke the past because it encompasses authentic remains from the past. The discernible basis of authenticity and thus cultural heritage rests in this context largely on an immanent, usually material substance and its inherent qualities. On closer inspection, however,

the significance of cultural heritage is not dependent on the immanent authenticity and age of its objects. Authenticity turns out to be variable, negotiable, and relative to a specific social and cultural context; it is in the eye of the beholder. For something to evoke the past, for example, in popular culture, it does not have to be of great age and can in fact be rather new. Yet materiality often remains crucially important – not insofar as it embodies an inherent quality but insofar as it affects the beholder. This insight affects heritage management in a profound way.

Instead of focusing on age, we ought to focus on the quality of being of the past, as it is this quality that actually matters about age. A useful term denoting that quality of being of the past is pastness (Holtorf 2010, 2013). Pastness is the result of a particular perception or experience, and thus not immanent in any material object. Although pastness may result from a credible determination of the age of a given item of heritage, it may also derive from other perceptions or experiences linked to the item's materiality or context. For example, a ruin may possess pastness because its walls are in an obvious state of decay, irrespective of when it was built. Similarly, an object on display in a glass case may be considered of the past because a label or guide is saying so. If we want to understand and manage cultural heritage with regard to the important role it fulfills in contemporary society, including popular culture, we thus need to investigate under which conditions human beings experience "pastness" in relation to a given object and precisely what that means. In this way, studying pastness extends the scope of both cultural heritage studies and heritage management considerably.

In a second step, it turns out that for an object to evoke the past it does not even have to possess pastness and may thus lack the quality of being of the past. Arguably, cultural heritage is best defined not as being made up of survivals from the past or simulated replacements that in certain circumstances can fool audiences about their actual age, but as the accumulated body of everything that reminds contemporary society of the past. Both definitions overlap but they are not identical. Even historically themed hotel/casinos in Las Vegas like the Luxor or Caesars Palace remind us of an ancient past – far earlier than the twentieth century when they were built and quite obviously without surviving from that time. A similar emphasis on remembrance has been brought to bear on heritage by the French intellectual Pierre Nora. His highly influential book series presenting "Les lieux de mémoire" (1984–92) explored all those realms of memory in France "where memory crystallizes and secretes itself" (Nora 1989: 7). These include not only historic sites but also memorials, commemorative rituals, and imaginary representations of the past in popular culture, all of which evoke the past (rightly or wrongly but that is not the point). All of Nora's realms of memory evoke the past in the present, just like an ancient monument that has survived until our day.

Cultural heritage in modern societies thus consists of those elements of our life-worlds, including popular culture, that either possess the quality of being of the past (pastness) or that remind us of the past in some other way. Heritage management ought to deal with all those elements and address, among other issues, how the quality of pastness and the power of remembrance relate to tangible and intangible remains of the past.

Cross-References

- ▶ Age Estimation
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Cultural Heritage and the Public
- ▶ Cultural Heritage Management and Images of the Past
- ▶ Experiencing Cultural Heritage
- ▶ Heritage: Public Perceptions

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Authenticity and the Manufacture of Heritage

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Introduction

The desire for authenticity pervades all facets of modern life. Authenticity, accordingly, constitutes an important site on which tradition and modernity have been debated and reformulated. The recovery of tradition – the cataloguing of the past through material, social, and cultural forms – has allowed narratives of modernity as a future-oriented enterprise imaginable. As illuminated in writings on the interlocking pair of tradition and modernity (e.g., Mitchell 1991; Wright 1991), tradition came into being only when it was imagined as a defining complement of modernity not only temporally – with tradition linked to the past and modernity with the future – but also spatially through the built environment (see Roy 2004).

If authenticity is an important discursive site of tradition and modernity, the built environment serves as an actual terrain on which the recovery of tradition, on one hand, and the elaboration of modernity, on the other, have been displayed. Nowhere is the recovery of tradition more apparent than in defining the meaning of heritage. Like tradition, heritage implies continuity not only with the past, but a past determined to be historically suitable. Yet as Eric Hobsbawm and Terence Ranger (1983: 1) have stressed, "traditions" that "appear or claim to be old are often quite recent in origin and sometimes invented" as is captured in their concept, "invented traditions." The notion of invented traditions suggests that the distinction between tradition and modernity is itself constructed and that authenticity as a proxy for originality or as a marker of differentiation must be questioned.

Extending the concept of invented traditions to the built environment, this entry examines how heritage sites that may appear authentic are oftentimes manufactured in the service of the tourism economy. Specifically, it looks at how heritage itself has become a commodity that is valued through circuits of travel and consumption. Tradition and heritage, recovered and restored as well as invented and manufactured, have been central to the making of the nation-state and in constructing nostalgia-based notions of identity. From an economic standpoint, heritage sites have become invaluable sources for communities, cities, and nations through which to cultivate symbolic capital and accumulate profits. As heritage sites become increasingly commodified and commercialized under late capitalism, the authenticity of heritage has become a taken-for-granted concept whose meanings are assumed but not specified.

The built environment, or "space" broadly conceived, has been identified as part of the web of social experience crucial to forging cultural consciousness (Harvey 1990). When viewed at the intersection of tradition and built form, the built environment has been understood as a "system of settings" or a "cultural landscape" (Rapoport 1989). These conceptualizations highlight the built environment's crucial role as a mediator of values, symbols, power relations, and culture. Rooted in the interdisciplinary perspectives of architectural history and urban studies, this entry focuses on the meaning of authenticity and the manufacturing of heritage evident in the proliferation of place-making practices and the revalidation of locality as it relates to two shifts. The first shift is economic with tourism, a central vehicle for the acquisition of culture and the experience of authenticity. Tourism generates economic and symbolic

values for localities vying for positions in a global order of places. Capitalism, with its infinite ability to commodify everything, has engendered new regimes of production and consumption where commodities are no longer manufactured goods but cultural landscapes, among them heritage environments. The second shift is discursive. Tourism both advances and depends on the trope of authenticity. As evidenced in former colonial cities that are refashioned for global tourism, for example, the marketing of such sites draws upon and extends older myths on the authenticity of "the Orient" or "Africa." The production of these landscapes, cultural commodities under contemporary capitalism, has transformed space and history and made them spectacular. Heritage, by extension, can be understood as a spectacle on display where the phantasmagoria of authenticity is also the source of its profitability (AlSayyad 2001).

Definition and Historical Background

Genealogies of a Concept

Built environments unite capitalism and culture as exemplified in landscapes that are packaged for consumption in the global economy of tourism. In such regimes of tourism, heritage is manufactured for consumption. Manufactured heritage has become a new norm in tourism development with entire built environments constructed to cater to and order difference. Paradoxically, the advance of mass tourism has led to the dismantling of actually existing traditional places and historic sites. Because the built environment is both spatial and visual, the trope of authenticity has been central to a system of classification and representation of place in these cultural landscapes. Authenticity conditions knowledge of a place and underwrites the values that are brought to bear upon this knowledge. That heritage is manufactured to suggest that heritage, culture, and tradition are part of the modes of production not of the industrial economy, but of the cultural economy. Rather than goods that are produced to be consumed, heritage along with the signs and representations of culture is manufactured for consumption. Heritage as a commodity aligns with its root definition as property that is owned.

The purpose of this evaluation of the manufacture of heritage is not to expose an assumed artificiality or constructedness of heritage per se. Rather, the proliferation of manufactured heritage necessitates a look at how heritage is fashioned. Part of this fashioning is the language of authenticity, whether for its symbolic power or in the ways authenticity as an idea imparts value to the traveling experience. Etymologically, authenticity is from the Greek word *authentikos* or genuine. It denotes a state of being in accordance with fact or reality, truth in substance, or in origins and authorship. In social life, however, authenticity functions as a keyword. According to Raymond Williams (1976), keywords used to describe social life are active forces in shaping it. By underscoring the performative, as opposed to the representational, dimension of language, Williams shows how keywords are sites through which social experience is mediated and defined. Earlier, Theodor Adorno (2003 [1964]) cautioned against the allure of semantic games that compromise the task of critical thought. The "fact that the words of the jargon sound as if they said something higher than what they mean. . .the terms of the jargon of authenticity are. . .words that are sacred without sacred content" (Adorno 2003 [1964]: 6). Directed at existentialist philosophers who relied on authenticity as a key trope to critique society's values, Adorno stressed the ideology of language in what he called the "jargon of authenticity." For Adorno, jargon was like an "aura." Following Walter Benjamin, an aura refers to a "strange weave of space and time: the unique appearance or semblance of distance, no matter how close it may be" (Benjamin 2005 [1931]: 518) and provides a means to understand the possibilities of authenticity yielded by new cultural forms.

In the study of the built environment, authenticity is both performative in the sense elaborated by Williams and ideological in the way stressed by Adorno. As a keyword, authenticity has held a dialectical hold over the field of heritage studies in its ability to shape the discourse as well as

name one of its key premises. As a jargon, authenticity is used extensively in heritage debates though with limited analytical utility. Authenticity is often treated as a state of being or as a fundamental characteristic inhered in the built environment. Authenticity ascribes value to heritage or those buildings, landscapes, and monuments historically validated and contextually valued through their transmission across generations. Conversely, built heritage is assumed to be authentic as a space that instantiates history or heritage that displays the past from the position of the present. Indeed, authenticity occupies a paradoxical position in that odd coupling, "authentic heritage." The yoking of these two terms – authenticity and heritage – renders "authentic" an empty signifier or exposes its redundancy specifically when the term "heritage" is unpacked.

Heritage, which derives from the Old French meaning to inherit, denotes property that is valued and transmitted across generations. This ascription of value is crucial. Heritage, whether in the form of objects, traditions, or material culture, acquires its value from a history established through documentary evidence as well as through a set of authorized narratives. For travelers, the authenticity of tourism imparts "distinction" in the sense outlined by Pierre Bourdieu (1984) to those who "consume" heritage sites, exotic locales, and faraway destinations. Bourdieu's focus on the political dimension of consumption suggests that tourism is one of many strategies used by social groups to maintain and reproduce class power and privilege.

The "interpretative turn" (Rabinow & Sullivan 1987 [1979]) in the social sciences was an epistemological as well as methodological shift away from positive science to a hermeneutic approach in the analysis of human practices, discursive strategies, and systems of knowledge. Decades later in 2003, a similar turn took place when UNESCO (the United Nations Educational, Scientific and Cultural Organization) set out to include "intangible heritage" in its definition of cultural heritage. UNESCO has long ignored the political dimension of culture appealing to culture's universality. In expanding the meaning of heritage, the UN agency expanded its original mandate as a steward of culture. Following its reclassification, intangible heritage – those immaterial practices such as oral traditions and performing arts – were deemed to have equal claim to heritage status as much as tangible heritage or buildings, monuments, and objects that have long served as the core of heritage.

The distinction between intangible and tangible heritage relies in part on the trope of authenticity as well as the difference of materiality. But what is equally at play in this expanding category of heritage is the nexus of power and knowledge – experts in planning, preservation, and architecture as well as in history and anthropology who are able recover places, norms, and customs and categorize them. Such categorization suggests that authenticity is not an essence or a thing, but rather contextually driven if not malleable. Places and objects are not inherently authentic. Rather, heritage and authenticity are interpretative categories with certain icons of visibility – the monument or the landscape – that are part of multiple systems of significance, practice, and meaning.

Before going into greater discussion of the manufacture of heritage, it is important to situate the emergence of heritage as part of an emergent cultural consciousness. This desire for knowledge and culture was institutionalized through specific mediums that are central to heritage preservation today – mediums based on specific formalized apparatuses of intelligibility. Among these institutions of intelligibility, codified through colonialism, have been the museum and the world exhibition. These two institutions reflect a nexus of power and knowledge over place that in turn legitimated the colonial enterprise. The museum was part of the classificatory system of the colonial state that functioned as a "pictorial census" (Anderson 1991 [1983]) or a means of governing through categories of identity that allowed for culture to be fixed to a delimited locale or territory. The world exhibition was another institution through which culture – through its visibility – was given object status. These apparatuses continue to be relevant today.

Key Issues

From Colonialism to Global Capitalism

As outlined in AlSayyad (2001), heritage can be contextualized within three historical moments. The first corresponds to late colonialism during which interest in indigenous heritage became initially catalogued and classified. The second period followed decolonization in the period of postcolonial nationalism during which newly emerging nation-states used heritage and authenticity as markers, paradoxically enough, to assert a modern identity. The last is this era of twenty-first century global capitalism where heritage production has become a new frontier of accumulation, placemaking, and positioning. The periodization below serves to illuminate relevant debates rather than indicate strict historical brackets. In what follows, this entry examines the intersection of authenticity and heritage through the lens of the built environment. The manufacture of heritage can be considered the aesthetic organization of space-history under the demands of modernity. All heritage is manufactured in the way that all traditions are invented. Heritage must also be seen as the articulation and management of difference and as a preoccupation with defining a position and place in a globalizing world. The concern here is with the ways in which historical knowledge is not only mediated through something called heritage but how it is mediated through space, that is, in built form. This requires a move away from a normative reading of heritage as a set of truths and essences but rather as socially constructions and systems of representation that make claims to truth, to identity, and to history.

Authenticity as Recovery: The Colonial Ordering of the World

Modernity has been a central platform of engagement with the meanings, discourses, and representations of heritage and tradition. In his treatise on experiences of modernity, Marshall Berman (1988 [1982]) juxtaposes the inauthentic modernity of St. Petersburg, what he calls the "modernism of underdevelopment" with the authentic modernity of Paris associated with progress, reason, and the future. While modernities of the global South have been riddled with questions surrounding the authenticity of the copy or modernity as mimicry, traditions are assumed to be locatable in and native to the Third World. Authenticity and tradition have been treated as stable and positive configurations, associated with the weight of the past deemed to contrast to the dynamism and change of modernity. Yet as noted below, heritage and tradition were representations of culture and power that were erected into reality.

The first systematically visual display of heritage emerged through the world exhibition and the museum. Museums and exhibitions became the staging grounds on which colonial heritage could be rationalized and represented for the consumption of metropolitan viewers. In the colonial order of things, tradition and modernity could be mapped according to the separation of the world between the West and the non-West or in more recent parlance between the global north and global south. Authenticity was reconstituted under colonial rule as the grounds from which to recover tradition and heritage. Thus, tradition was located in non-Western societies and modernity in the West. However, the colonies were also important sites to experiment with modernity and to work through what would become policies of public health, education, sanitation, and urban planning. The colonial encounter was thus crucial in sustaining if not consolidating structural dualisms that have framed much of Western social thought – modernity versus tradition, use-value versus exchange value, and core versus periphery. The museum along with the exhibition transformed objects into historical evidence and valorized landscapes as heritage. The colonial imagination, through such instruments as the exhibition and the museum, was made into reality as colonial administrators and scholars categorized heritage environments and displayed them for public consumption.

Scholars of postcolonial theory and cultural studies have pointed to the multiple temporalities and reconstructions of history associated with the emergence of colonial nostalgia as a cultural phenomenon, nostalgia that positions the past as

critique of present or as a cultural practice connected to revisionist history and politics. Edward Said (1978) has identified this process as the "citationary structure" of Orientalism where the repetition and the circulation of the same notions become sedimented and legitimized as assertions of authenticity and truth.

An example of authenticity as recovery can be found in the Cairo Street or Rue de Caire that was built as part of the Paris Exposition of 1889. As detailed by Zeynep Çelik (1992), Cairo Street was willingly financed and authored by Delort de Gleon, a wealthy Frenchmen who had lived in Egypt for a quarter of a century. His concern for authenticity was so deep that he imported dirt and donkeys directly from Egypt as well as actually existing historic structures including a Quranic school and a water fountain that were disassembled, shipped to Paris, and finally installed at the exposition site. Gleon argued that the Rue de Caire was in fact more authentic than the streets of Cairo based on the reasoning that it was impossible to find an untouched, and thus authentic, street in Cairo.

Authenticity and Postcolonial Nationalism

Benedict Anderson (1991 [1983]) argues that nationalism was made possible and new communities imaginable through the interplay between technology and the relations of capitalist production. In order for a nation to be modern, it had to produce a past. Time, made continuous and linear, became central to the construction of an appropriate history and identity that would be coextensive with territory of the imagined community of the nation. Chronological time, measured by the clock and calendar, coupled with the technologies of capitalism made it possible to represent the nation. Such forms of representation – whether print commodities like the newspaper – made new communities imaginable.

Landscapes were brought into the horizons of intelligibility and knowledge through other forms of representation as well, among them the map and the census, allowing the contours of any community (including the nation) knowable and visible. As writings by Hobsbawm and Ranger (1983), Anderson (1991 [1983]), and Shils (1981) have illuminated, establishing continuity with the past has been essential to the process of making a particular assemblage of people, practices, and histories into a coherent body. In a similar vein, to produce continuity with a past – that is, to produce a history – also entailed the production of place. Together these systems of representation have come together to produce the heritage of place, that is, through practices that establish social cohesion or symbolize belonging for real and artificial communities.

Nation-states, newly formed with the end of decolonization, were active in making national identities that would be projected on an international stage. Following World War II, postcolonial nations engaged in cultivating national identity in the architecture of capitol buildings (Vale 1992). Vernacular architecture has also provided another stage to cultivate national identity. Returning to Egypt, the work of the architect Hassan Fathy provides a case of heritage that was manufactured at the behest of the government. Fathy continues to be a key interlocutor of Egyptian national identity and one of its most well-cited authors of heritage. What is now deemed authentic vernacular architecture, based on traditional mud construction and the housing layouts of medieval Cairo, was indeed Fathy's interpretation and construction of those forms. In the 1940s, the Egyptian Department of Antiquities commissioned Fathy to build a model village for the inhabitants of the village of Gurna located on the west bank of the river Nile near the necropolis of Luxor. The model village of New Gurna would be a relocation site for these inhabitants. Though the village remained unfinished and the project abandoned by Fathy, New Gurna became internationally admired for its usage of local materials and Fathy for his appropriation of forms. His work continues to help define national heritage and postcolonial authenticity. In a recent twist, UNESCO set out to "safeguard" New Gurna beginning in 2011 through the restoration and preservation of the village further cementing the authenticity of what was a manufactured heritage.

Authenticity in an Era of Global Capitalism

In the realm of architecture and urban design, the critique of high modernism coupled with the reconfiguration of capitalism and society together has renewed debates on heritage and authenticity. Heterogeneity, difference, and distance have become the hallmarks of a cultural industry that must deal with the time-space compression of global capitalism. What began as an interrogation of culture in the 1980s and 1990s in the social sciences and humanities has lent to an emphasis on the politics of difference, a turn that has entailed a rejection of totalizing and abstract narratives in favor of the contingent and variable identities and spaces. Coupled with this epistemic shift has been a recalibrated role of culture in the political economy – what David Harvey (1990) has referred to as culture in the embrace of capitalism – evident in tailored projects in architecture, heritage, and urban design. If the built environment constitutes one dimension of the complex of experience crucial to forging new cultural sensitivities, the expanding importance of heritage sites as regimes of accumulation and difference making can be seen as its dialectical twin.

In looking at the question of mediation of authenticity through space, AlSayyad (2001) has noted increasing demand for built environments that promise unique cultural experiences. A countervailing weight to the intensifying flows of the global has been the revalidation of place and local difference. The manufacture of heritage supports the Marxist view on the infinite capacity of capitalism to commodify everything. Among these commodities are cultural landscapes. Amidst the fragmentation generated by flexible accumulation and the condition of postmodernity, the identities of built environments have become new frontiers of cultivation and manipulation.

Following AlSayyad (2001), practices of manufacturing can be categorized as such: an emphasis on iconography where iconography becomes culture, the memorialization of history established through visuality, and an emphasis on the profitability rather than facticity of history. Tourism exposes the paradoxes of authenticity as an ideal and as a pursuit. On one hand, tourism is predicated on the desire for an authentic experience, to see life as it is really lived. Yet tourism, as part of the visual economy of consumption, has also been associated with the superficiality of engagement with the figure of the tourist content with inauthentic experiences. What is taken to be authentic may in fact be a performance of authenticity or indigeneity, with culture and place circumscribed, rationalized, ordered, and exploited. Representations of place – peoples, geographies, culture, and nature – are central elements to a visual economy that links the political economy of capitalism to the aestheticization of space and the appropriation of culture and history.

The city of Las Vegas represents the most explicit site of manufactured heritage where any pretense of authenticity or reality is dispensed with altogether. Here the sophisticated themed casino complexes proffer "authentic fakery" (AlSayyad 2001). Vegas boasts a fake Sphinx and miniature Pyramid at Luxor, the self-contained Venice canals, and a scaled down Arc de Triomphe and Eiffel Tower based on the mimicry of authentic places. The Brooklyn Bridge runs parallel to the Strip, and the Statue of Liberty sits on the corner of Las Vegas Boulevard and Tropicana Avenue. The 20-acre New York-New York Hotel and Casino aims to evoke the glamor of New York without the city's grit or density. As "spectacle" organizes both economy and society in the US general and Vegas in particular, Vegas has been able to capitalize on its ability to adapt to the demands and needs, particularly of the middle class. Specific to Vegas is its characteristic malleability, its ability to brand itself anew, pointing to the absence of a fixed identity for the city. It is a place where "nothing is real" which is understood as its selling point that has ensured its viability throughout its history.

Future Directions

The authentic fakery of Las Vegas is best understood in relation to the "fake authenticity"

(AlSayyad 2001) of Santa Fe, New Mexico. Santa Fe's pueblo adobe forms, though rooted in the history of the area, are in fact constructions of cement and wood disguised as adobe. The unity of appearance of Santa Fe afforded by the Santa Fe style of architecture became codified through a series of urban planning efforts in the early twentieth century. And, what is now known as the "Santa Fe style" was defined by the Museum of New Mexico in the 1910s. The city is, according to Wilson (1997: 4), "an unusually successful illusion of authenticity." The fabrication of its identity and the manufacture of Santa Fe's heritage were designed to revive the cal economy through tourism.

The power of the manufacture of heritage is beautifully captured by Andreas Huyssen:

> One of modernity's permanent laments concerns the loss of a better past, the memory of living in a securely circumscribed place, with a sense of stable boundaries and a place-bound culture with its regular flow of time and a core of permanent relations. Perhaps such days have always been a dream rather than a reality, a phantasmagoria of loss generated by modernity itself rather than its prehistory. But the dream does have staying power (2000: 34).

Authenticity continues to be a resilient trope through which locality and identity are cultivated. As the preceding discussion has shown, what determines authenticity is the frame of reference. Disneyland, that quintessentially American landscape is a case in point. Disneyland's Main Street evokes the nostalgia for small town America. The street's design was inspired by two towns in particular, Marceline, Missouri, and Fort Collins, Colorado. Marceline was Walt Disney's boyhood home and Fort Collins the birthplace of Disneyland's first director, Harper Goff. Facing economic decline in the late 1990s, Marceline sought to further cement its fate to Disneyland and transform itself into its official hometown. In a move that shows the circular movement of authenticity, the town renamed its Kansas Avenue to "Main Street USA" after the gateway to Disneyland Park. Many of the architectural flourishes of Disney's Main Street come directly from Fort Collins. Disneyland's City Hall is a replica of the courthouse in Fort Collins, drawn at three-quarters scale. As Fort Collins grows and attempts to preserve its heritage, it also has resorted to a process that some have called Disneyfication (Iovine 1998). Here lies the greatest dilemma for authenticity. The authentic object has to rely on its own replica to maintain its survival rendering the authentic and the replica a reciprocal couplet in a never-ending dynamic.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity in Archaeological Conservation and Preservation
- ▶ Cultural Heritage and the Public

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Authenticity in Archaeological Conservation and Preservation

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Introduction

The Pioneers

"Authentic" is defined in the *Merriam-Webster Dictionary* as "*a*: worthy of acceptance or belief as conforming to or based on fact, *b*: conforming to an original so as to reproduce essential features, and *c*: made or done the same way as an original." This adjective derives from the ancient Greek *authentēs*, meaning "perpetrator or master." The entry for "authenticity" in the *Shorter Oxford Dictionary* (2nd edition, 1936) defines it as "the quality of being authentic," dating from as early as 1657, with four examples of specific applications: (1) as being authoritative or duly authorized, (2) as being true in substance (1762), (3) as being genuine (1760), and (4) as being real, actual (1851).

Concern for authenticity, however defined, in the approach to the restoration and conservation of historic buildings and monuments did not begin to manifest itself fully until the nineteenth century. However, the role of the painter Raphael (Raffaele Santi) in the early sixteenth century played a significant role in the conservation of the earliest surviving monuments of Rome. It was, however, the work of such pioneers as Karl Friedrich Schinkel (1781–1841) and Eugène Emmanuel Viollet-de-Duc (1814–1879) that created an awareness of the need for a systematic approach toward the restoration and conservation of ancient and historic buildings.

The early twentieth century saw the development of a more analytical approach toward the conservation and restoration of the historic heritage. Two names stand out in this theoretical field, those of the Austrian Alois Riegl (1857–1905) and the Italian Cesare Brandi (1906–1988). Following a detailed analysis of the requirements of a state monuments service, Riegl published *Der modern Denkmalcultus, sein Wesen, seine Entstehung* (The modern cult of monuments: its character and its origin) in 1903. In this he identified two main groups of values:

Memorial values (age value, historical value, and intended memorial value)

Present-day values (use value, art value, newness value, and relative art value)

This penetrating classification retains its fundamental validity up to the present day.

Brandi's work dovetails in with that of Riegl, whose classification he expanded slightly into the aesthetic and the historical. He set out three essential elements in any interventions relating to the conservation and restoration element of heritage preservation:

Any reintegration should be easily recognizable at close hand, but at the same time it should not adversely impact the unity that is being restored.

The role of material that directly results in the images is irreplaceable in so far as it forms the aspect and not the structure.

Any restoration should be made in such a way that it will not be an obstacle to subsequent future interventions – indeed, these should be facilitated.

Key Issues/Current Debates/Future Directions/Examples

The Venice Charter

Brandi's holistic approach to conservation and restoration has not always been accepted uncritically, but by and large it still constitutes the contemporary approach to the subject. He did not make use of the term "authenticity" in any of his many publications, but it is implicit in everything he wrote. The first significant use of the word seems to have been in the 1964 International Rescue Convention, produced by the Second International Congress of Architects and Specialists of Historic Buildings and best known as the Venice Charter (to commemorate the historic city in which the conference took place).

The Charter is a remarkable document, providing as it does a detailed ethical and practical framework for the conservation and restoration of the built heritage. It is interesting that the word "authenticity" occurs only once in the Charter: its preamble states that "The common responsibility to safeguard [*historic monuments*] for future generations is recognized. It is our duty to hand them on in the full richness of their authenticity." Article 9 contains the single use of the adjective "authentic": the object of restoration is defined as "to preserve and reveal the aesthetic and historic value of the monument and is based on respect for original material and authentic documents." The fact that there is no definition or explanation of this term, however, suggests that the concept was in general use by the 1960s.

The 1964 Venice conference had been convened at the prompting of UNESCO, which was moving toward the drafting of a convention on the protection of the world cultural and natural heritage. It also resulted in the creation in the following year of the International Council on Monuments and Sites (ICOMOS) with the express responsibility of applying the conservation philosophy and recommendations of the Venice Charter. With the signing of the UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (better known as the World Heritage Convention) in 1972, ICOMOS was designated an advisory body to the UNESCO World Heritage Committee, responsible for the cultural heritage.

Authenticity and the World Heritage Convention

The practical implementation of the Convention is set out in the *Operational Guidelines for the Implementation of the World Heritage Convention*, which has been subjected to considerable modification and emendation since its first edition in 1977. That text requires that properties inscribed on the World Heritage List should "meet the test of authenticity in design, materials, workmanship, and setting." It goes on to specify that "authenticity does not limit considerations to original form and function, but includes all subsequent modifications and additions, which in themselves possess artistic or historical values." The attributes deemed to be appropriate in evaluating authenticity underwent minor changes over the following years: in 1980, for example, this included the statement that "the [World Heritage] Committee stressed that reconstruction is only acceptable if it is carried out on the basis of complete and detailed documentation on the original and to no extent on conjecture." With the recognition by the Committee in 1992 of cultural landscapes as constituting a distinct category of cultural heritage, evaluation of their distinctive character and components was added to the existing four qualities.

The current (2011) text of the *Operational Guidelines* is more detailed and more comprehensive, as the following excerpts show:

> Depending on the type of cultural heritage, and its cultural context, properties may be understood to meet the conditions of authenticity if their cultural values are credibly expressed through a variety of attributes including form and design, materials and substance, use and function, traditions, techniques, and management systems, location and setting, language and other forms of intangible heritage, spirit and feeling, and other internal and external factors.
>
> Attributes such as spirit and feeling do not lend themselves easily to practical applications of the conditions of authenticity, but nevertheless are important indicators of character and sense of

place, for example, in communities maintaining tradition and cultural continuity.

In relation to authenticity, the reconstruction of archaeological remains or historic buildings or districts is justifiable only in exceptional circumstances. Reconstruction is acceptable only on the basis of complete and detailed documentation and to no extent on conjecture.

This amplification of the concept of authenticity in the World Heritage context (and thereby in the understanding of the international cultural heritage community) is due primarily to a series of debates and discussions that resulted indirectly from the ratification of the Convention in 1992 by the Government of Japan. Japanese heritage experts and government officials had been aware for some time of the prevalent view outside Asia that the approach to conservation, and more particularly reconstruction, in some non-European cultures was radically different to that elsewhere, notably in Europe and North America. This perception was seen as posing a fundamental problem in the nomination and inscription of many important Asian heritage monuments.

The Nara Document

The World Heritage Committee at its 16th Meeting in Santa Fe (USA) in December 1992 identified an urgent need for a critical evaluation of "the criteria governing . . . authenticity and integrity" and called upon ICOMOS to organize a meeting of experts to that end. A 3-day Preparatory Workshop was held in Bergen (Norway) on 31 January to 2 February 1994, funded by the Norwegian and Canadian Governments. On the recommendation of ICOMOS, the Japanese Government agreed to fund a major international conference on authenticity, which took place in Nara in 1–6 November 1994.

The Nara Conference brought together 45 leading experts in the field of preservation of cultural heritage: they represented international organizations and 26 countries from round the world. Following a number of statements from representatives of international bodies, the Chairman of the conference called upon delegates in turn to define their understanding of the meaning of authenticity and its application by their organizations or countries. This revealed a startling variability between regions and latter-day cultures, which demonstrated the truth of a statement by one distinguished expert: "Authenticity is in practice never absolute, always relative" (David Lowenthal in Larsen 1995). It also underlined the need for a more specific definition of what constitute the fundamental principles of authenticity based upon the international perceptions that emerged during three days of papers and intensive discussions. The result of this timely and revealing meeting was the Nara Document on Authenticity, which has become the touchstone for assessing authenticity.

The main points of the Document may be summarized as follows:

Cultural heritage diversity exists in time and space, and demands respect for other cultures and their belief systems. Where cultural values appear to be in conflict, respect for cultural diversity demands acknowledgment of the legitimacy of the cultural values of all parties.

Conservation of all cultural heritages is rooted in the values attributed to it, understanding of which depends, in part, on the degree to which information sources about these values may be understood as credible or truthful.

Knowledge and understanding of these sources of information, in relation to original and subsequent characteristics of the cultural heritage and their meaning, is a requisite basis for assessing all aspects of authenticity.

Authenticity is thus the essential qualifying factor concerning values, understanding of which plays a fundamental role in all scientific studies of the cultural heritage, in conservation and restoration planning, as well as within the inscription procedures used for the World Heritage Convention and other cultural heritage inventories.

All judgements about values attributed to cultural properties as well as the credibility of related information sources may differ from culture to culture, and even within the same culture. It is thus not possible to base judgements of values and authenticity within fixed criteria. On the contrary, the respect due to all cultures requires that heritage properties must be considered and judged within the cultural contexts to which they belong.

Therefore, it is of the highest importance and urgency that, within each culture, recognition be accorded to the specific nature of its heritage values and the credibility and truthfulness of related information sources.

Depending on the nature of the heritage, its cultural context, and its evolution through time,

authenticity judgements may be linked to the worth of a great variety of information sources. Aspects of the sources may include form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling, along with other internal and external factors. The use of these sources permits elaboration of the specific artistic, historic, social, and scientific dimensions of the cultural heritage being examined.

The ICOMOS Ename Charter for the Presentation of Cultural Heritage

The Charter for the Interpretation and Presentation of Cultural Heritage Sites (known across the world as the Ename Charter) was approved by ICOMOS at its 16th General Assembly in Québec (Canada) in 2008. This charter deals with an aspect of authenticity that is not covered elsewhere. Its stated objective is to establish seven cardinal principles upon which interpretation and presentation, in whatever form or medium is deemed appropriate in specific circumstances, should be based. Principle 4 is directly relevant to this survey:

Preservation of Authenticity The interpretation and presentation of cultural heritage sites must respect the basic tenets of authenticity in the spirit of the Nara Document (1994).

4.1 Authenticity is a concern relevant to human communities as well as material remains. The design of a heritage interpretation programme should respect the traditional social functions of the site and the cultural practices and dignity of local residents and associated communities.

4.2 Interpretation and presentation should contribute to the conservation of the authenticity of a cultural heritage site by communicating its significance without adversely impacting its cultural values or irreversibly altering its fabric.

4.3 All visible interpretive infrastructure (such as kiosks, walking paths, and information panels), when deemed appropriate and necessary must be sensitive to the character, setting and the cultural and natural significance of the site, while remaining easily identifiable.

4.4 On-site concerts, dramatic performances, and other interpretive activities — when deemed appropriate and sensitive to the character of the site — must be carefully planned to minimise disturbance to the local residents and to the physical surroundings of the site.

It remains to be seen to what extent this admirable charter will influence the interpretation and presentation of the cultural heritage in the years to come.

The Riga Charter

The Riga Charter on Authenticity and Historical Reconstruction in Relationship to Cultural Heritage, known as the Riga Charter, is an international statement of the scope, objectives, and participants in cultural heritage projects. The charter was adopted at Riga (Latvia) on 23 and 24 October 2000 at the Regional Conference on Authenticity and Historical Reconstruction in Relationship to Cultural Heritage, initiated by ICCROM.

It focuses on reconstruction and supplies additional comments on the existing provisions in this field of the Venice Charter and other doctrinal texts including the Nara Document. These as well as the UNESCO World Heritage Convention establish a presumption against reconstruction of the cultural heritage, except in circumstances where reconstruction is necessary for the survival of the property, where a property is incomplete through damage or alteration, where it reconfirms the cultural significance of a property, or in response to loss through disasters, whether of natural or human origin. Reconstruction must, however, be carried out without conjecture or compromising existing in situ remains and must be legible, reversible, and the minimum necessary for conservation and presentation. It takes note of the fact that issues of reconstruction and authenticity have become of particular concern, particularly in countries that have recently regained their independence.

The Charter contains the following definition of authenticity (Article 4):

Authenticity is a measure of the degree to which the attributes of cultural heritage (including form and design, materials and substance, use and function, traditions and techniques, location and setting, and spirit and feeling, and other factors) credibly and accurately bear witness to their significance, believe that replication of cultural heritage is in general a misrepresentation of evidence of the past, and that each architectural work should reflect the time of its own creation, in the belief that sympathetic new buildings can maintain the environmental context, but that *in exceptional circumstances*, reconstruction of cultural heritage, lost through disaster, whether of natural or human

origin, may be acceptable, *when* the monument concerned has outstanding artistic, symbolic or environmental (whether urban or rural) significance for regional history and cultures; provided that appropriate survey and historical documentation is available (including iconographic, archival or material evidence); the reconstruction does not falsify the overall urban or landscape context; and existing significant historic fabric will not be damaged; and providing always that the need for reconstruction has been established through full and open consultations among national and local authorities and the community concerned.

Authenticity and Archaeological Sites and Monuments

Most debate about authenticity has tended in the past to concentrate on historic buildings. On the whole ancient structures and archaeological sites have been given considerably less attention by heritage conservators and managers. As a result there are some archaeological monuments on the World Heritage List where reconstruction has gone well beyond the strict application of the concept of *anastylosis*, and the level now considered to be "acceptable only on the basis of complete and detailed documentation and to no extent on conjecture." The creation of structures on major archaeological sites for the form of which there is little, if any, justification either in the remains themselves or in the available contemporary literature is to be found most frequently associated with so-called theme parks or similar enterprises. The number of these is happily declining, but archaeologists and heritage organizations must constantly watch out, since this can be a profitable business in the wrong hands.

In this context, ICOMOS is to be commended for its initiative in approving the Ename Charter, which, it is to be hoped, will be widely approved and adopted by the heritage community.

Cross-References

- ► Authenticity and Pastness in Cultural Heritage Management
- ► Charter for the Protection and Management of the Archaeological Heritage (1990)

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Authenticity in Archaeological Writing and Representation

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Introduction

Calling fictional writing "authentic" immediately raises both eyebrows and hackles among linguists, authors, and scientists, along with any person with a passing knowledge of elementary school curricula. The etymologist might protest by citing the origins of the term "fiction," tracing the word to the Old French ficcion, meaning "something invented," and beyond that to the Latin fictio, meaning "a fashioning or feigning." These lingering meanings of pretense, construction, and invention contrast strongly with the

concept of authenticity – that which is genuine, real, or original. Novelists might raise a similar objection, stressing the degree of imagination and creativity required to conceive a work of fiction – while the most loudly voiced and popular confusion would likely find its grounding in the vernacular understanding that fiction is by definition "made up." How, then, can it be considered "authentic?"

Definition

There is an apparent problem in these various disjointed reactions to precisely why authenticity and fictionality are opposed to one another; the arguments are founded on impossibly disparate definitions of what fiction is. To commit wholly to the morphological path would imply, in fact, that all writing is fictive, since any piece of writing is the clearly constructed work of its author (Clifford & Marcus 1986: 9; Lamarque 1990: 137). However, once "fiction" can be used to label all writing, it is thus rendered a meaningless category. Still, bounding the term by using it only to describe work that is entirely "make-believe" threatens to implicitly challenge the practical applicability and value of literature as a medium for teaching and interpreting the external world (Lamarque 1990: 137). It is essential to disentangle a commitment to reality from the definition of fiction, instead viewing it as discrete from nonfiction based on the existence of three integral characteristics: first, the possibility of creating a narrative voice that diverges from the author's real perspective (Lamarque 1990: 148; Joyce 2002: 12). The role of the narrative voice as the creator of an overarching, emplotted framework exemplifies the imaginative effort required to construct narrative in a way that resonates with ideas of fiction as an artistically creative endeavor. Second, fiction implies an invitation to thematic interpretation and to a critical examination of the conditions impacting the construction of a narrative (Deetz 1988: 16; Lamarque 1990: 148; Pluciennik 1999: 656). Finally, fiction entails an engagement with readers that transcends direct and straightforward communication, relying additionally on evoking emotive and visceral reactions (White 1987: 180; Lamarque 1990: 148). With this definition of fiction in mind – one rooted directly in discussions of archaeological epistemology – it becomes apparent that fiction is a particularly "authentic" approach to writing archaeology with regard to how uniquely well suited it is for rendering the interpretive endeavor of archaeology transparent and understandable to diverse audiences.

Key Issues/Current Debates/Future Directions/Examples

The idea that anyone studying the material past naturally crafts narratives to comprehend the historical world is a longstanding argument in the philosophy of social science (White 1987; Hodder 2003). Hayden White (1987: 60), for example, views narrative not only as "the mode of discourse in which a successful understanding of matters historical is represented," but also as "the way in which a historical interpretation is achieved." This concept of the role of fictive writing – not only as a product but furthermore as a hermeneutic process – has been applied and explored explicitly by archaeologists such as Ian Hodder (1999; 2003), Rosemary Joyce (2002), and Janet Spector (1993).

Both Spector (1993) and Joyce (2002) have examined the integrality of informal in-trenched imaginings – those moments in the field when excavators excitedly extrapolate upon each other's speculations of the events, people, and processes that could have created the archaeological record. Janet Spector's What This Awl Means (1993) is primarily noted for its sections of hypothesized biography detailing the experiences of Mazaokiyewin, an imaginary nineteenth-century Dakota girl. Yet Spector's work is also remarkable for the way she explains the circumstances surrounding the creation of these fictional narrative sections – namely, the casual conversations had in the field between excavation crew members crafting vivid stories to explain their findings. Dialogue, after all, is crucial for the

production of knowledge in all science but especially in archaeology, given the field's inherent dependence on teamwork and communality (White 1987; Landau 1991; Hodder 1999; Leonard 2001). It is through contesting each other's assertions and locating convergences in analyses that the interpretative archaeological product is forged.

Yet archaeologists face an especially daunting challenge in attempting to identify resonances across analyses given the variety of vocabularies employed by archaeologists working in different temporal and regional contexts, as well as the divergent research questions they have in mind. The overwhelming array of languages and methodologies subsumed within archaeology creates archaeological records so diverse in their format and intended function that cross-contextual comparison can appear nearly impossible (Landau 1991; Tringham 1991; Hodder 1999; Joyce 2002). Ignoring this dilemma implies an unjustifiable assumption that authors are using evidence and terminology in universal and objective ways. Instead, examining how archaeological authors utilize characters and archetypal plot devices in their writing can offer a more appropriate method of working with the products of archaeological hermeneutics – and a more authentic one as well, since reading archaeological analysis as fictions sheds the problematic pretenses of positivism (Landau 1991).

Archaeological fictional narrative therefore enables an authentic experience for the audiences of these narratives and grants an opportunity for generating further conclusions founded on transcendent and recognizable literary hermeneutics, avoiding much of the crisis created by mismatched typologies and terminologies professing to be universally and scientifically applicable. The fictive act of writing a plot is also characterized by a great potential for authenticity, allowing as it does for alternative ways of discussing the diverse lines of evidence involved in archaeological hermeneutics. Fieldwork, for example, involves many various activities, which co-occur, coalesce, and impact each other in a multiplicity of ways (Hodder 1999; Joyce 2002; Hodder 2003). An archaeologist-author finds that the temporalities and purposes of these activities need to be viewed and explained in different ways for specific reasons; the flexibility and fullness possible with a creative, fictional narrative enables the simultaneous pursuit of many of these purposes within a single text (Clifford & Marcus 1986).

Fictional narrative additionally allows discussion of the first-person experience which is contradictorily both crucial to and remarkably absent from the majority of archaeological literature. The authority engendered by the atmosphere of the authentic which first-person creative narrative produces has been discussed extensively with regard to ethnography, most notably by James Clifford (Clifford & Marcus 1986). By comparison, archaeological reporting tends to draw its authority from a distanced, scientific voice which feigns inarguable accuracy – rather than the convincing, vivid, fictive voice telling the story of having been at an excavation and having seen the transformation of the site. Fictional narrative allows for communication of the full body of evidence that motivates an archaeologist's decision-making and hermeneutic procedures. Writing archaeological fiction is therefore epistemologically authentic, relying as does archaeology itself on a wide range of internal, emotional, and sensory experience.

Furthermore, presenting archaeological analysis through any medium involves a necessary blurring between evidence and conclusions, since what authors choose to leave out, what they choose to include, and how they choose to address the information therein are all choices shaped by the arguments furthered later in the text (Hodder 1999). In fact, it is clear that analysis and data collection proceed simultaneously and continuously from the identification of a site to publication (Spector 1993; Hodder 1999, 2003; Joyce 2002). Archaeological methodology, data, and interpretation are intertwined, and it is possible for archaeological writing to more closely approximate the complicated chronology of this process, by taking advantage of fiction and narrative's manipulable timelines. *What This Awl Means* (1993) offers an example of this, when

Spector leads her reader through her interpretive approach, discussing how her analysis and findings informed each other as her research progressed. She lays bare the succession of problems she considered over the course of the project. The result is that her presentation of the data and her understanding of it appear together. The context provided by the larger fiction, in this publication and others like it, eliminates the possibility that evidence may be presented and described – deceptively – as if it is scientific data impartially written without regard to the later analysis in which they are implicated.

Archaeological writing which implies that archaeological conclusions rest on inarguable, natural, and scientific authority is an untenable situation when one considers that the appeal of archaeology (or any research in general) to both scholarly and public audiences resides primarily in understanding more than well-supported factoids but, more importantly, the journey by which the researchers involved have come to their current interpretations (Holtorf 2007). The unavoidable storymaking that occurs as archaeologists attempt to make sense of their findings can then be made useful when archaeologist authors choose to write fictional narrative. They are thereby able to invoke a multitude of perspectives and lines of evidence, both of which are integral characteristics of generating archaeological understandings of the past. Moreover, the fictive effort of vividly relating one's firsthand experience conducting fieldwork frees archaeological writing from deriving its authority solely from the neutrality of science, additionally invoking the authority of the ethnographer's perspective, as well as the genuine, broader sensory matrix in which archaeology is conducted. The liberated sense of time and space available to an author creating an emplotted narrative also allows the archaeologist to more closely approximate the authentic temporality impacting his or her hermeneutic endeavor – which has the ability to produce a clearer and even more persuasive text. This means that fictional narrative not only offers benefits entirely pragmatic in the way of staging a convincing argument but also that it offers an avenue to more effectively accessing the authenticity of archaeological interpretation and epistemology in the published products of these endeavors.

Cross-References

- ▶ Authenticity and Pastness in Cultural Heritage Management
- ▶ Authenticity and the Manufacture of Heritage
- ▶ Authority and Legitimacy in Political and Social Archaeology
- ▶ Narrative and Storytelling for Archaeological Education

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Authority and Legitimacy in Political and Social Archaeology

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Introduction and Definition

Authority is, according to the dictionary included in Mac computers: "the power or right to give orders, make decisions, and enforce obedience." It is also "the power to influence others, esp. because of one's commanding manner or one's recognized knowledge about something," as well as "the confidence resulting from personal expertise." There is yet another meaning of this word: "a person with extensive specialized knowledge about a subject; an expert."

Whereas somebody is legitimate when he or she is "conforming to the law and to rules," archaeology is legitimate when it operates according to the legal system that regulates social life in a State and when it follows the rules it defines, as a discipline, for the practice of the profession. Despite the differences between these concepts, it is evident that they are closely related: archaeology's authority emanates from, among others, its own legitimacy. However, there are other, more important and more ancient sources for its authority.

Key Issues/Current Debates/Future Directions/Examples

Archaeology has the authority to talk about humankind's past through the study of the material culture of societies of yesteryear. It is the voice of the experts (those mentioned by the dictionary) on that matter, and in order to be able to be considered one, the individual needs to have obtained a formal education (with degree and all) in a University. As a discipline, then, it seeks to produce knowledge founded upon rules and protocols that underlay its academic practices, and in order to learn to do that well, it is necessary to get a formal education. In Randall McGuire's opinion, archaeology is above all a craft, which means that its practitioners need to acquire not only the aforementioned knowledge imparted by institutions of higher education, but also a series of motor skills that allow them to actually put that knowledge into practice (McGuire 2008: 85).

This situation of privilege is in manifest conflict with the worldview and opinions of other social groups, especially in those countries where different ethnic populations co-exist. This scenario becomes really tense when archaeologists show little interest or respect for the opinions offered by indigenous groups. As a matter of fact, archaeologists have total control over their investigations and they can unilaterally pick and design their research agendas – which in general benefit the scholar's career and very rarely favor indigenous demands or needs. This, according to Jeffrey C. Bendremer and Elaine L. Thomas, can be described as a colonial situation (Bendremer & Thomas 2008: 60). Whether this is an appropriate classification or not for postcolonial societies, the truth is that this kind of situation comes from a power differential similar to the one described by Edward Said in his study about Orientalism: it is an asymmetric

distribution of power that makes it possible for a group to elaborate a dominant and authoritative discourse about another group, and not the other way around (Said 1978).

Although it can be argued (successfully, I suspect) that, in the framework of postcolonial societies formerly dominated by colonial powers, it is not quite right to qualify the situations of oppression as colonial or colonialist; it is true, though, that in the past they were so. That is, the present-day situations of oppression are the product or the consequence of colonial legacies: the legacies left by the different colonial situations of the past, and also the epistemological frameworks from which scientific authority emanates developed, as Walter Mignolo has convincingly demonstrated in *The Darker Side of the Renaissance*, in an era that is normally characterized as early modernity or the Renaissance, but which we forget is also a colonial one (Mignolo 1995). According to this author, the traits of Modernity that are usually celebrated (scientific progress, emancipatory drive, and a long etcetera), are just the reverse (the dark side) of the colonial endeavors that took place during the first stage of European expansion. It is probably not an exaggeration nor an imprecision to suggest that the authority archaeology enjoys in the present has its origin in the prestige that surrounded science and knowledge production in the societies that emerged from the European expansion of the sixteenth century. The societies that together are known as the West are the dominant ones, as is well known, in the realm of knowledge production – the protocols, rules, and practices that characterize modern science originated and developed in them. This is a group of societies that expanded throughout the whole planet, carrying with them not only the seeds of capitalism but also a worldview based on a scientific and philosophical approach that finds its foundation in Cartesian assumptions about subject and object, mind and res extensa, and other equally foundational dichotomies (Londoño 2010: 382). From that matrix emerges not only the paradigm of modern science, in general, but also the archaeological paradigm known as New Archaeology or processual archaeology, in particular. As is well known, this new way of doing archaeology presented itself as truly scientific. Therefore, its myth of origin, according to Gavin Lucas, was to imagine itself as a conscious and scientific practice (Lucas 1995: 37). Some of archaeology's prestige and authority stems from its claim about having objectivity, universality, and exteriority as its foundation (Gnecco 2006: 82). This is why one of the most important sources of authority for the discipline is, as mentioned above, Western education and its institutions (Gnecco & Ayala 2010: 32). And it is so, among other reasons, because scientific discourse was very useful for the administration and control of populations in the periphery (Funari 2006: 74).

The authority of the discipline comes, also, from its role in the task of building national narratives, both in the countries that endeavored the colonial enterprise and in those that emerged after being colonies of the former. According to Ian Hodder, the "scientific" archaeology (my quotation marks) that develops in the nineteenth century was made possible thanks to the State's interest in finding ways to control historical heritage (Hodder 1999: 170). In the same vein, Wilhelm Londoño avers that archaeology was (and is) a very useful dispositif that confirmed the success of the modern project; that is to say, it confirmed the dissolution of indigenous peoples' communal ties and the discontinuity between the indigenous peoples of the present and their precontact ancestors (Londoño 2010: 392). This kind of statement proffered by the discipline explains why it played such a fundamental role in the dispossession of indigenous lands: because archaeology declared them dead or vanished, it made it possible for those lands to be left at the disposal of the State and private interests (Haber 2010: 56).

In the countries of what today comprise central capitalism, such as the United States and those of Europe, archaeology is strongly related to a social class, in spite of the claims about being an objective science that characterize the discipline's spokespersons since the advent of the New Archaeology. As a matter of fact, the birth of the modern Nation-State is specifically tied to a social class,

the bourgeoisie, that needed the help of archaeology and other disciplines to both legitimate that experiment in State organization and to rewrite the past of human occupations of the territory (Trigger 1989). It should be also pointed out that, as McGuire suggests, in the countries where settler colonialism developed, archaeology has become a neo-colonial endeavor, because it has dedicated itself to write the history of the ancestors of present-day indigenous peoples by the descendants of the settlers (McGuire 2008: 77–78), while in more recent times it has become a strong ally of the segment of society known as the middle class in both Europe and the United States (McGuire 2008: 88) – and it can be argued that this has happened in other parts of the world as well.

From the 1980s, however, archaeology has had to face a series of challenges undertaken by individuals coming from social groups that do not feel represented by the rules, epistemological assumptions, protocols, practices, and the knowledge produced by the discipline. The bourgeois, Europeanized, and masculine nature of archaeological practice could not continue to pretend to be an objective view of humankind's material past. Its practices, which were dedicated, from its beginnings as a discipline, to favor the interests of the dominant segments of society, began to be rejected from several fronts. Those criticisms were grouped in an umbrella concept known as postprocessualism, which as a multi-headed Hydra attacked, from different angles, the fundamental tenets of processual archaeology. Among the different, new ways of doing archaeology, one, indigenous archaeology, deserves special mention. It is a practice that proposes to take into account the interests, desires, and opinions of indigenous societies of the present.

It is probably in this new way of understanding and doing archaeology that the most effective and long-lasting attack on both the discipline's claim to authority as a group (as McGuire correctly points out, the structure of the profession follows the guild model), and the legitimacy of its aspiration to be the only authorized agent to study and make sense of the past, can be found. As a matter of fact, one of the things indigenous peoples demand from the discipline is to stop having the monopoly of decision-making throughout the archaeological process. In this type of situation, the conflicts are played out and negotiated in different fields of action, and the arguments used by the parties involved cover a wide range that goes from the cultural to the political (and the economic). Yet, without a doubt, the most important, the most decisive sphere were the conflict is discussed, is the legal system. This is why it can be argued that the approval of a series of laws throughout the world, from the 1990s on, about repatriation and restitution of human remains and associated materials (of which the one known as NAGPRA, approved in 1990 in the United States, is paradigmatic), has had unique repercussions in the way in which the discipline is imagined and practiced, because it forces archaeologists to communicate, consult, and collaborate with indigenous living peoples.

As Joe Watkins has rightly pointed out, it is a pity that archaeologists had not themselves promoted this kind of democratic practice before the law forced them to do it, because it precluded the possibility that consultation and collaboration with indigenous subjects could be the product of a conscious ethical decision on their part (Watkins 2000: xii). The fact is that thanks to this kind of legislation, archaeologists are not (in several countries), today, the only legitimate actors for the task of interpreting the past – that is, they are not the only agents that can decide on matters related to indigenous pasts. Nowadays, indigenous groups have the opportunity to be part of those processes of decision-making, which relativizes and undermines archaeologists' previously exclusive authority.

These indigenous struggles for obtaining the chance to be part of the interpretation, preservation, and study of their own past, are attempts at restituting some equilibrium in the face of the above mentioned differential of power that Sonya Atalay calls power imbalance, that kept indigenous peoples outside the processes that led to decisions regarding their own cultural heritage (Atalay 2011: 48). According to this author, those struggles against the existent

power imbalance may end up benefitting other oppressed communities at a global scale (Atalay 2011: 48). The efforts made in that direction have taken diverse forms, one of which is the development of archaeological programs by some indigenous communities (for example, the Navajo, discussed in Watkins 2000: 93-103) who endeavor to study their own past without the help or intrusion of intermediaries. This is not the most common case, because the number of indigenous groups that do not have an archaeology program is much higher than the one of those who have one. More frequent is the case of individuals belonging to indigenous communities who decide to dedicate themselves to the profession in order to change it from within, so to speak (see a rather complete panorama of this growing group of people in the book edited by Nicholas). Last but not least, a modality that becomes more common with time: programs of collaborative archaeology in which individuals of different ethnic backgrounds undertake archaeological investigations in which indigenous values that were absent in mainstream practices are now present. The presence and importance of said values depend, in good part, on two undertakings: consultation and collaboration among different groups.

Some authors, like Nina Versaggi, opine that the kind of consultation required by the law, which is a one-time thing or an event, is not enough to reestablish some equilibrium in the distribution of power among the actors. On the contrary, in her view, consultation must be both continuous and meaningful; it must be a process instead of an event (Versaggi 2006: 30). For other authors, consultation, although a vital element in the whole process, is not enough because only collaboration leads to "praxis" – that is, to a series of conscious actions that intend to change the world (McGuire 2008: 8). For another author, Cara Lee Blume, the collaboration process differs from consultation in that the former means "to work together" (Blume 2006: 210). And according to the same author, the only way collaboration can happen is through the participation of indigenous communities in all the stages of the research process, which implies, for archaeologists, to share power, so that indigenous participants can be part of the instances when decisions are made (Blume 2006: 198). In this way, the new scenario contributes to fight the power imbalance that Atalay talks about and the power differential, if your prefer Said's parlance.

In sum, for at least a couple of decades, archaeologists' authority as the only legitimate agents for the interpretation of the past of the diverse communities that inhabited the planet, has been systematically questioned.

Although this is a situation that puts them in a less privileged position than in the past, it is arguably an opportunity to produce a better science, and a less biased, more democratic knowledge. This is why special attention should be paid to what Cristóbal Gnecco proposes as possible ways in which archaeology could recover some legitimacy in these times when the discipline is undergoing a certain degree of decolonization: to help in the processes of recovery of the local traditions and histories that it contributed to silence and erase in the (sometimes much too recent) past; to become public; to question its long association with the national narratives; and to abandon the academic ghetto to embrace and reach, at last, a wider variety of social sectors than it used to (Gnecco 2008: 30-1). What can be done, then, is to use the expert knowledges that have traditionally been at the service of the exclusion and subalternization of the West's others, to favor the causes and projects defended and undertaken by the latter (Verdesio 2005: 142). This is in tune with what Funari says about the World Archaeological Congress (WAC): its objective is to promote an archaeology that seeks to liberate, instead of to exploit, the world (Funari 2006: 74).

Cross-References

- ▶ Indigenous Knowledge and Traditional Knowledge
- ▶ Professionalization: Archaeology as an "Expert" Knowledge

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Avocational Archaeology

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Introduction and Definition

Finding a suitable term to describe people who do archaeology without being paid a salary, who do it mostly as a leisure pursuit, is not easy. Many terms have acquired emotional baggage through misuse over the years or have inadequate definition to be accurately used. Avocational is often used as the opposite of professional but is a term seldom used in the UK. We usually talk about the voluntary sector and of volunteers, although this can apply more widely to work placement students as well as people doing archaeology outside the professional sector. An older term is amateur archaeologists, although this has been used as a dismissive term by professionals as though being amateur were somehow less worthy or of lesser standard. It is often seen therefore as a politically incorrect term, the use of which involves an attitude of condemnation towards nonprofessional and therefore slipshod standards. The proper use of the word amateur simply means working for pleasure rather than financial gain. It is therefore entirely appropriate to use as a way

of describing people who do archaeology without being paid a salary. Avocational is also a term that begs questions about assumptions and definitions. I will use all three terms interchangeably since the use of one term alone will become tedious through sheer repetition and some variation is needed for stylistic aesthetics.

Avocational archaeologists are people with a passion for the past as experienced through archaeology but have not chosen to follow a professional career in the subject. They are volunteers in their archaeology. Moreover, they are not content to watch archaeology from the sidelines. They are not mere spectators. People who watch archaeology programs on television are not avocational archaeologists. Nor are people who visit heritage sites or stand behind barriers watching excavations in progress. Nor are people who attend lectures in archaeology. Avocational archaeologists are those who practice archaeology in whatever form during their spare time without personal income or profit.

One question immediately springs to mind as to how comparable these volunteer archaeologists are to professionals in their level of skills and contribution to the study and protection of the past. The role of education is to make sure that volunteers work to the same level as professionals and put into practice the appropriate disciplinary standards.

Where volunteers work within the context of professional organizations, perhaps on work placements as students or as volunteers carrying out agreed special tasks, then they will be trained and fully incorporated into professional levels of practice by their host organization. Where they work on their own as individuals or as part of local groups and societies, the issue of training and education becomes more important.

Historical Background

Archaeology began as an amateur pursuit. In the United Kingdom, most of the early archaeologists of the seventeenth, eighteenth, and nineteenth centuries were volunteers. Some of the great names in the history of archaeology had no employment as an archaeologist. Sir John Evans (1823–1908) was a paper manufacturer, while Sir John Lubbock, Lord Avebury (1834–1913), was a banker. It was in the nineteenth century from the 1840s to the 1870s that most of the county archaeological societies were created. The members of these societies were mostly middle-class professionals with the income and time to devote to archaeological study, such as doctors, clergymen, and lawyers. They carried out archaeological fieldwork and published the results of excavations and surveys. Some early volunteer archaeologists were active over long careers. John Mortimer, a corn merchant, excavated more than 300 barrows in Yorkshire from 1863 to 1900 to what was a very high standard for the nineteenth century.

Newer, more local archaeological societies were founded throughout the twentieth century, especially from the 1950s to the 1980s. The social makeup of their members was wider than in the nineteenth century but was still mostly educated middle class. However, the context of their activities was changing. The 1970s saw a great expansion in professional archaeology, in both universities and field units. The profession grew from around 200 people in 1960 to around 4,500 in 2000 and around 6,500 in 2010. With greater domination by professional archaeologists, the discipline began to systematize its practices and develop an idea of appropriate professional standards. A set of National Occupational Standards was drawn up by the then Institute of Field Archaeologists (founded in 1982 and now the Institute for Archaeologists) in 2002. Nevertheless, the professional sector is small in numbers compared with the amateur sector. A report by the Council for British Archaeology identified more than 200,000 people belonging to local voluntary societies and groups with an active interest in the historic environment (Thomas 2010).

The way that archaeology developed in the United Kingdom as an amateur discipline has meant that there is no legal sanction against anyone carrying out archaeological work, including excavation. There is no system of licensing of practicing archaeologists within England,

Scotland, or Wales (although there is in Northern Ireland). Avocational archaeologists can therefore carry out archaeological investigations. The UK also has a vibrant metal-detecting sector who can also legally detect for finds and may be considered by some as part of the avocational sector (although views among archaeologists on this inclusion of detectorists as part of "the family" are sharply divided).

The avocational sector of archaeology has a long tradition of fieldwork and publication and can research parts of archaeology the modern professional sector seldom has time or resources for. Amateur archaeologists are not limited to working in opportunities provided by the planning system, and are especially strong in being able to carry out research in rural areas, and have often pioneered new areas of research, such as the archaeology of industry, transport, or twentieth-century defenses.

Key Issues

Given that avocational archaeologists in Britain carry out fieldwork, one of the key issues is how to maintain adequate standards in archaeological fieldwork. Some archaeologists may have an instinctive distrust of amateurs. They are "not one of us" and have not been through the same education and training. However, many amateur archaeologists have been active in the field for decades and have levels of experience rarely matched in the professional sector. Some will also have university archaeology degrees, having not chosen to pursue a career in a poorly paid profession and found more lucrative jobs instead while keeping their interest alive as a leisure time pursuit.

What the voluntary sector needs is training in knowledge of archaeological artifacts and sites, the acquisition of methodological or technical archaeological skills. In part this can come from the previous generation of volunteers within their local societies. However, the main source of knowledge and skills has traditionally been university teaching through part-time courses aimed at the general public. The terms used to cover these courses have changed over the years from extramural provision to continuing education to lifelong learning. Whatever the term used, they involve university staff, postgraduates, or highly qualified professionals delivering evening and weekend courses through lectures and seminars and summer field schools based around excavation or field survey. Some of these field schools were long-term research projects such as that at Wharram Percy run by Maurice Beresford from 1950 to 1990 and the Shapwick project run by Professor Mick Aston from 1989 to 1999. One advantage of such courses was that the adult students could be taught by postgraduates at the cutting edge of academic research, and the postgraduates gained early experience at teaching which would be useful for an academic career.

Gradually, funding for these kinds of university courses came under increasing pressure. While some universities still manage to run a program of archaeology lifelong learning courses, many no longer do so. The pressures on these courses stem from an instrumentalist vision of education held by government which demands that in return for state funding, higher education must deliver tangible benefits for society. Such benefits are usually seen as financial and economic. Do courses help people find work? Do courses benefit the local or national economy? Archaeology belonged firmly within a tradition of liberal adult education: education as worthwhile for its own sake as humanizing the individual. It was clearly out of step with instrumentalist views about education. Government funding for adult education became diverted towards vocational training courses, and archaeology found itself left out in the cold. Only where there is strong managerial support for traditional education have liberal adult education courses survived, and such courses are expected to be as self-funding as possible.

Participation in such courses by mainstream academic staff and postgraduates was also under pressure due to the relentless drive for research excellence as almost the only measure of academic worth and funding in higher education. Excellence in teaching has long played second fiddle to research, and courses no longer compete

on the academic CV at the same level as the peer-reviewed research paper in a prestigious journal. Now that the UK government has accepted that a measure of universities' impact outside academia on wider society should be a measure to take into account for receipt of funding, it may be that attitudes will change.

Since 1994, there has been funding for community-led heritage projects through the Heritage Lottery Fund, augmented by a separate Local Heritage Initiative funding from 2000 to 2006. As a result, there has been a renewed expansion of local heritage groups, many of which engage in archaeology. The funding has supported not only existing groups but also the founding of new ones, often on an intensely local geographical base. This has meant an increasing demand for education and training in archaeology. In order to meet this demand, the profession has begun to employ people with the necessary skills in community outreach. In many cases, these new posts have been project funded, only rarely treated as part of the core function of the organization. What these community archaeologists can do is both train local people in archaeological skills and arrange access to professional equipment and specialist help. The old model of university-based support for amateur archaeology is being augmented, and in many areas replaced, by a partnership between professional archaeological organizations and local amateur societies.

International Perspectives

Great Britain (that is the United Kingdom less Northern Ireland) is somewhat out of step with the rest of Europe. Most other European countries operate a system of licensing, where only licensed (in practice only professional) archaeologists can carry out or supervise archaeological excavation. This is not the case in Great Britain. The continental position has been given prominence in the European Convention on the protection of the archaeological heritage (revised) as passed by the Council for Europe at Valletta in 1992 (known simply as the Valletta Convention), in which Article 3 (ii) states that each signatory will undertake:

> To ensure that excavations and other potentially destructive techniques are carried out only by qualified, specially authorised persons.

The signing of the convention by the UK government caused considerable alarm in sectors of British amateur archaeology. In practice, the interpretation of the convention is left to individual states, and the responsible bodies in the UK have no intention of enforcing a system of licensing or in restricting voluntary sector archaeology. Systems of protection through the scheduling of important sites, the role of archaeologists within the planning system, and the usually good relationships between local societies and professional organizations, along with the long record of high-quality fieldwork by many societies, are deemed enough to ensure that the archaeological resource is protected from inexperienced destruction.

Future Directions

Avocational archaeology in the United Kingdom seems to be in a secure position. Provision of education and training for amateur archaeologists is recognized as needed within the profession. Future trends in that provision may be towards a more systematized and nationally recognized framework instead of the varied and local responses currently in place.

Moves by the Institute for Archaeologists towards gaining the status of a chartered body, and therefore towards improving the status of archaeologists as chartered professionals in the same way as being doctors or engineers, could be seen as potentially closing off the discipline into chartered and unchartered sectors. It is important therefore that the IfA has within it a voluntary and community archaeology special interest group and that the IfA continues to be open to membership from both professional and amateur archaeologists. The IfA's annual conference is a major meeting point for the discipline where training in archaeology can occur. Importantly, the IfA also oversees the vocational Qualification in Archaeological Practice, based on the National Occupational

Standards. This is an important avenue of training and education for the voluntary sector. Some have already taken advantage of this, although the costs of taking the qualification may be a deterrent for others. The qualification is based on best practice in archaeology, defined by the Institute for Archaeologists through their standards and guidance. The Council for British Archaeology, funded by English Heritage, has been leading a project, the Introduction to Standards and Guidance in Archaeological Practice (ISGAP), to translate these into a form that is more user friendly and suitable for the voluntary sector across the whole United Kingdom. The introduction highlights best practice for voluntary groups and outlines standard procedures for carrying out archaeological research and investigation. The project's documents have recently been made available at http//:www.isgap.org.uk.

The Council for British Archaeology has been successful in attracting sponsorship to organize funded placements for community outreach officers to help train a new generation of archaeologists with the skills needed for supporting the voluntary sector. There are also a few postgraduate courses in archaeology in public engagement in archaeology helping to provide a future generation of professional archaeologists who are enthusiastic about supporting the voluntary sector.

While many people would not think of metal detectorists as avocational archaeologists, there is no doubt that they are part of the community of interest in the remains of the past and can be seen as part of the wider family that has archaeologists at its center. They produce data which adds to our archaeological knowledge. The Portable Antiquities Scheme in England and Wales does much to educate and train detectorists through its network of Community Liaison Officers. Detectorists also commonly enroll on traditional lifelong learning courses to increase their own knowledge of archaeology.

The future for avocational archaeology in Britain seems secure, so long as the funding is in place to make sure that amateur archaeologists of all kinds have access to the support they need for knowledge and skills from the professional sector. Archaeology in Great Britain is a partnership between professionals and amateurs, in which both are stronger that they would be alone.

Case Studies

The biennial British Archaeological Awards recognize excellence in various aspects of archaeology. One of the awards is the Pitt-Rivers Award for the best project by volunteers. There were two joint winners in 2012: the Norfolk Historic Buildings Group and the Washingborough Archaeology Group.

The Norfolk Historic Buildings Group produced a report on buildings within the village of Buckenham. They had a 5-year plan to survey the buildings, and as some of the members had previous experience of building recording, they were able to train the others on the necessary techniques. Heritage Lottery Funding allowed them to get dendrochronology dates for some of the houses and to publish their results. They produced the largest collection of vernacular houses to have been dated by dendrochronology in the county of Norfolk.

The Washingborough Archaeology Group was a founder member in 2001 of the Witham Valley Archaeological Research Committee. The group concentrated on intensive field walking and auger surveying under the rapidly eroding peat soils of the valley. This identified many archaeological sites and provided an accurate topographical map of the valley. The work was funded by other organizations which also provided surveying equipment in return for access to the results of their work. Specialist reports were produced by the group with some professional support.

The prestigious special award of the Graham Webster Laurels went to the Upper Nene Archaeological Society which has been excavating at Piddington Roman Villa for 27 years. Along the way, they have trained their own members and encouraged them to become specialists in various archaeological disciplines. The society raised their own funds to buy a redundant chapel and turn it into to a modern museum with

a viewing area and rooms where students and local school children are given training.

The British Archaeological Awards also have another category, the IfA Award, for the best professional or professional/voluntary archaeological project that demonstrates a commitment to professional standards and ethics in archaeology. In 2012, this went to the Whiteleaf Hill Local Nature Reserve Project. This was a project initiated by community representatives with the help of Buckinghamshire County Council and Oxford Archaeology. The local community excavated, conserved, and interpreted the remains on Whiteleaf Hill for future generations. The sites included a Neolithic barrow, a Bronze Age dyke and two supposed round barrows, First World War practice trenches, sunken trackways, and ancient and modern woodland. The project involved an emphasis on research and conservation but also integration of the historic and natural environment and an education program for local schools, all under strong community leadership.

A separate award, the Marsh Award for Community Archaeology, was held in 2011. The winner of this award was the Dartmoor Cairn Survey and Repair Project that started in 2005. This recognized the work of the Dartmoor Preservation Association (DPA) Conservation Team, Dartmoor National Park Authority (DNPA), and English Heritage in providing opportunities for volunteers to become involved in a professionally led project. Cairns that marked Bronze Age burials or territories were slowly being altered by people adding or removing stones. The project created opportunities for different groups such as scouts and other youth groups, businesses seeking team-building projects, and students requiring work experience to get involved. The quality of the work done was exceptionally high and depended on the close working partnership between the volunteers and the organizations involved.

Summary

Avocational archaeology, also described as voluntary or amateur archaeology, is a thriving part of the discipline in the Great Britain. Avocational archaeologists work without being paid and receive no personal financial benefit for their work. It has a long history of research and publication and continues to contribute to our understanding of the archaeological remains of all periods from prehistory to the modern world. Many amateur archaeologists have a great deal of field experience and high levels of archaeological skills. A key part of the voluntary sector's success lies in the education and training that amateurs receive from professional archaeologists based in universities, archaeological agencies, and field units. This support has traditionally been through university continuing education courses, although less so than previously due to changes in government funding. More recently, support is becoming more widely available through the new field of community archaeology where professional archaeologists support local societies and groups directly in the field. Much amateur activity is supported by funding from the Heritage Lottery Fund, which helps local groups buy in the professional expertise they may need for specialist tasks and helps with costs of publication of their findings. The profession is beginning to realize that the study of the past is too big a task for a small number of financially hard-pressed professionals. Together, professional and avocational archaeologists make a formidable research team.

Cross-References

- ▶ Archaeological Licenses
- ▶ Communicating Archaeology: Education, Ethics, and Community Outreach in North America
- ▶ Community Archaeology
- ▶ Community Engagement in Archaeology
- ▶ Community Partnerships in Safeguarding World Cultural Heritage
- ▶ Cultural Heritage Outreach

- ▶ Local Communities and Archaeology: A Caribbean Perspective
- ▶ Professionalization: Archaeology as an "Expert" Knowledge
- ▶ Public Education and Archaeology: Disciplining Through Education
- ▶ Public Involvement in the Preservation and Conservation of Archaeology
- ▶ Stakeholders and Community Participation
- ▶ Volunteers in Archaeology

References

THOMAS, S. 2010. *Community archaeology in the UK: recent findings*. York: Council for British Archaeology.