Interdisciplinary Contributions to Archaeology

Sarunas Milisauskas
Editor

European Prehistory

A Survey

2nd Edition

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To Vita

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Buffalo, New York Sarunas Milisauskas

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Chapter 1
Introduction

Sarunas Milisauskas

The purpose of this book is four-fold: to introduce English-speaking students and scholars to some of the outstanding archaeological research that has been done in Europe in recent years; to integrate this research into an anthropological and historical frame of reference; to address episodes of culture change, such as the transition to farming, the origins of complex societies, and urbanism; to provide an overview of European prehistory from the earliest appearance of humans to the rise of the Roman empire.

In 1978, Academic Press published my *European Prehistory* which, typically for that period, emphasized cultural evolution, culture process, technology, environment, and economy. In my 2002 revision, *European Prehistory: A Survey*, I invited contributions from specialists in the Paleolithic and Mesolithic (Michael Jochim), the later Neolithic (Janusz Kruk), the Bronze Age (Anthony Harding), and the Iron Age (Peter Wells). This latest revised version attempts to incorporate the results of archaeological research since 2000. Like its predecessor, this edition is structured around selected general topics, such as technology, trade, settlement, warfare, and ritual.

Approximately 20,000 archaeologists are currently conducting research in Europe, producing a large volume of research material and publications each year. Although all contribute to our knowledge of European prehistory, it is only feasible to include a small percentage in this survey. Most archaeologists operate within a limited scholarly sphere; thus, for example, a publication on the Linear Pottery culture will refer to work by Eszter Bánffy, Marjorie de Grooth, Detlef Gronenborn, Christian Jeunesse, Nándor Kalicz, Anna Kulczycka-Leciejewiczowa, Eva Lenneis, Jens Lüning, P.J.R. Modderman, Ivan Pavlů, Juraj Pavúk, Alasdair Whittle, and other distinguished scholars. An ideal survey of this culture would include hundreds of archaeologists in its bibliography. Even in the case of a single prominent site like Stonehenge, every year sees new research published (Atkinson 1979, Cunliffe and Renfrew 1997, Bender 1998, Chippindale 1994, Worthington 2004, Darvill 2006, Parker Pearson et al. 2007). As Timothy Darvill (2006:56) has observed, it would be impossible to cite all relevant scholars as "The sheer volume of material is now so great that more than a lifetime would be needed to read and digest it all." Contributors to this survey have made their own choices about the ideas, sites, and personalities to be included. I regret that not every deserving archaeologist can be included. However, I have tried to include as many scholars as possible from "minority countries" as they were defined by Neustupný (1997–1998). The European archaeological community is very diverse and it is important that we hear the voices of archaeologists of many nationalities.

Many more British and American archaeologists are contributing to the study of European prehistory than was the case two generations ago, making the discipline much richer, especially in method

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and theory (Milisauskas et al. 2010). At the same time, "tourist archaeology" has developed, consisting of only a brief visit to a site or region by an archaeologist, resulting in a publication with breathless interpretations. The popularity of the English language in science, business, and entertainment in Europe is also reflected in archaeology. Numerous publications such as *Archaeologia Polona* and *Archaeologia Baltica* are published in English, and many journals, like *European Journal of Archaeology* and *Estonian Journal of Archaeology,* publish articles in three or four major languages. Others, like *Archaeologia Lituana* are more traditional in selecting articles for publication in English, French, German, Lithuanian, and Russian.

The archaeology of continental Europe is still not well known to most English-speakers. Much of the literature is scattered in numerous non-English publications, many of which reach only a few North American libraries. Since archaeological specialization is more advanced in Europe than in many other parts of the world, it is difficult for the newcomer to ascertain what is significant and to keep up with advances in the discipline. Large-scale efforts to integrate this archaeological mosaic for English-speakers have been ongoing for 100 years or more, but, over the past generation the database has expanded rapidly, and the questions archaeologists ask and the interpretations they offer have multiplied even faster. Therefore, the authors feel that an up-to-date treatment is needed.

Throughout this book, various Paleolithic, Mesolithic, Neolithic, Bronze Age, and Iron Age cultures and developments will be described, analyzed, interpreted, and discussed. Some archaeologists believe that the classic Three-Age system for European prehistory should be replaced by subdivisions more sensitive to social and symbolic realities. Darvill (1987), for example, divides British prehistory into six periods: hunter-gatherers, early agriculturalists, the first chiefdoms, agrarian societies, tribes and chiefdoms, and political societies. But this scheme just reworks the old Three-Age system: hunter-gatherer societies refer simply to the Paleolithic and Mesolithic, early agriculturalists to the Early and Middle Neolithic, and so forth. We use a modified traditional division of European prehistory, since this is familiar to most archaeologists. For example, Early Neolithic society implies domesticated animals and plants and permanent settlements. We need to communicate our information and the traditional system, with all its faults, still transmits the best images of various periods. We recommend Rowley-Conwy's (2007) *From Genesis to Prehistory* for readers interested in the development and wholesale adoption of the Three-Age system.

Developments such as the appearance of agriculture or bronze technology did not occur at the same time in Europe; they vary chronologically over the continent. The beginning of the Bronze Age is dated around 3,300 BC in Greece and only around 2,300 BC in central Europe. A general chronological sequence of the major periods in European prehistory is shown in Figs. 1.1 and 1.2.

When archaeologists talk about "cultures," they usually mean excavated collections of stone, ceramic, bone, metal, and other artifacts and sometimes patterns of graves, structures, etc. (Childe 1952:25, Behrens 1993:5–8). The relationship between such manifestations and real human communities, populations, ethnic groups and societies, what ethnologists would call culture, is, to say the

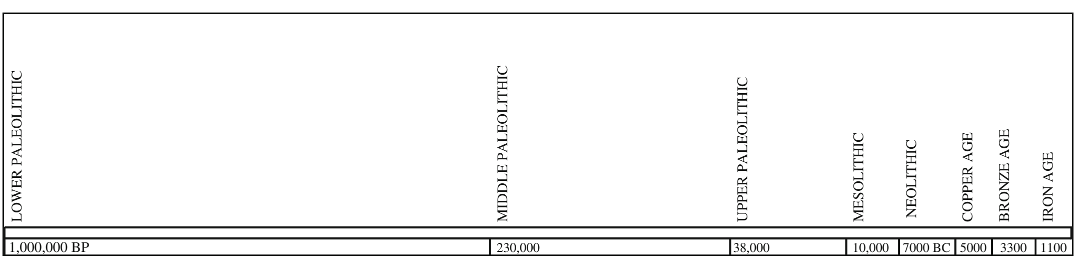

Fig. 1.1 General chronology of European prehistory

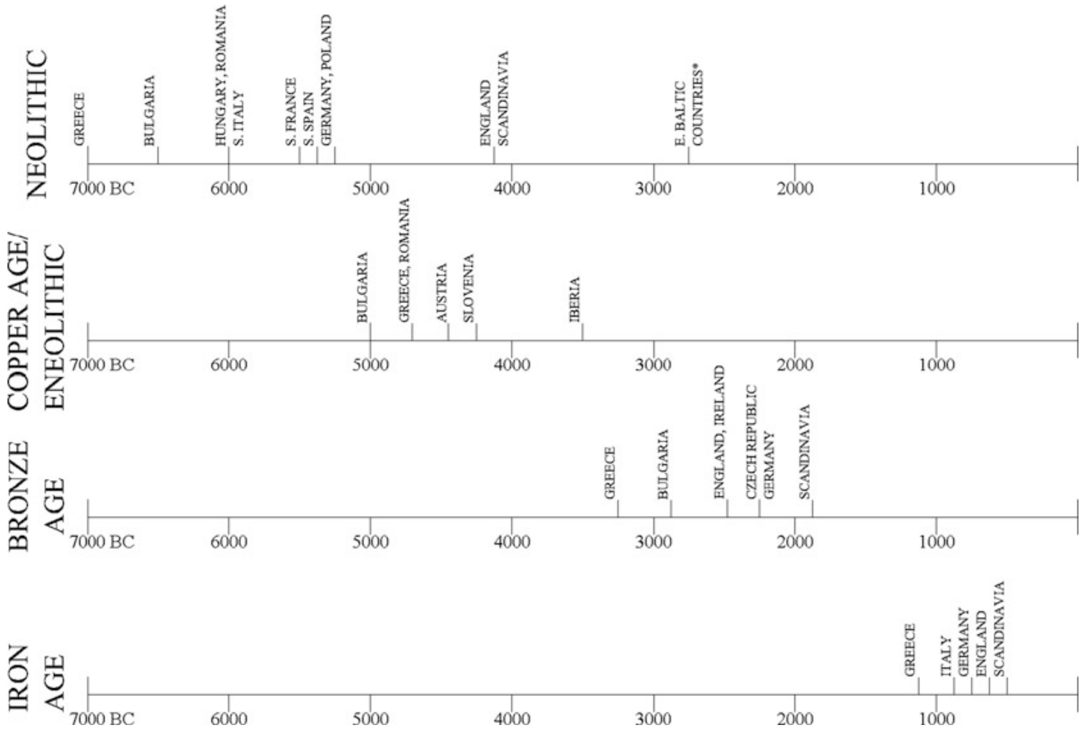

Fig. 1.2 A general chronology of the Neolithic, Copper Age, Bronze Age, and Iron Age

least, problematic. Strictly speaking archaeologists should not use the term at all; however, they do by the convention of the discipline.

Our rich inheritance of European archaeology goes back to the early nineteenth century, but the number of archaeologists, projects, and publications has increased greatly during the last three decades. When writing on a continental level we are bound to make broad generalizations that mask the geographic and chronological diversity of the past. Just like today, there were different cultures and societies within Europe in the past, varying in beliefs, social systems, rituals, languages, and ethnic groups.

Our explanations and interpretations of European prehistory are changing; many new approaches have appeared since the 1970s. There is much more emphasis on symbolism, values, beliefs, and ideology. Sometimes this leads to an idealized version of the past; prehistoric societies are portrayed without greed, warfare, personal, or gender exploitation. We are all entitled to our utopias, but we are not entitled to pass them off as descriptions of prehistory. As C. Renfrew (1994:154) has stated, "that so far as possible politics should be kept out of archaeology, and that objectivity, while perhaps an unattainable goal, is nonetheless a worthy one." Unfortunately, "European archaeology of the 20th century has in various ways been connected with current ideologies and entangled with current events and politics" (Lech 1999:20). With the rise of cognitive, feminist, agency, Darwinian, phenomenological, and other recent perspectives in archaeology, topics that were somewhat dormant in Anglo-American archaeology have again become of major interest. Thirty-five years ago, I would not have predicted that in the 2000s, there would be a lively debate about the origins of the Indo-European homeland (Anthony 1995, 2007, Zvelebil 1995, Mallory 1997, Mallory and Adams 2006, Häusler 1998, Renfrew et al. 2000), the meaning of Neolithic figurines (Gimbutas 1991, Bánffy 1990–1991, Gimbutas 1991, Biehl 1996, 2007, Tringham and Conkey 1998, Bailey 2005, Hansen

2007), the megalithic phenomenon (Bakker 1992, Bradley 1993, Burl 1993, Briard 1995, Casal 1996, Soulier 1998, Guilaine 1998, Beinhauer et al. 1999, Darvill 2006, Libera and Tunia 2006), or the Celts (Megaw and Megaw 1999, Kuckenburg 2004, Collis 2008). Also recent developments in archaeogenetics are making us reevaluate some of our assumptions about the past. The amount of archaeogenetics literature increased enormously over the last decade. It is unfortunate that there is a Kossinna's Syndrome (Smolla 1980, Veit 2000) in some countries: archaeologists are afraid to deal with prehistoric linguistic and ethnic problems. Just because these topics were misused in the past for political or nationalist agendas, we should not avoid them. We have thousands of interesting questions about the past, but frequently we do not have answers to them.

Numerous theoretical approaches aim at explaining and interpreting the archaeological record, thus there are different versions of the past, some more credible than others. Since the 1970s the pendulum has swung from grand unifying theories to more particularistic studies. We advocate neither a naive empiricism nor an extreme relativism. Moreland (1997:180) notes that archaeological "evidence must be situated within a theoretical framework which allows the humanity of the past to shine through and which does not smother that past with a reified present." At present some archaeologists view prehistory as a form of literature or storytelling, leading them to write narratives (Tringham 1991). Actually, archaeologists' stories are no more unreasonable than anybody else's, but fiction, by definition, needs no justification by archaeological data. For many archaeologists trained in the continental tradition, or in the United States and UK before 1970, archaeology is an empirical discipline. Narrative constructions have to be supported by archaeological data. The Early Neolithic Europeans may indeed have worshipped a goddess; however, this must be demonstrated with some kind of evidence. As my colleague Peter Reid (pers. comm., University of Windsor, Canada) observes, if archaeology were a kind of literature, then V. Gordon Childe's (1953) oasis theory for the origins of agriculture would stand to Lewis Binford's (1968) post-Pleistocene adaptations scenario, for example, as Shakespeare's *Antony and Cleopatra* stands to Shaw's *Caesar and Cleopatra*; that is, as two non-comparable narratives, contingent upon the two unique culture-historical situations in which Childe and Binford were located. While neither Binford nor Childe would characterize their work this way, some current archaeologists may find this acceptable. These plays, of course are not worthless because they do not present an accurate analysis of ancient history. It is just that, for most of us, they are not history or archaeology. As Sherratt (1997:ix) observes, "To deal only with what survives is to espouse a naive positivism, but to leave evidence in favour of pure imagination is to go into free fall. The alternative to both is to develop a sensitivity to time and an awareness of anachronism, and to realize how different things were at successive stages in the past." The Upper Paleolithic, Mesolithic, or Neolithic periods were more than simply passages of time; beliefs, values, ideologies, and other aspects of culture separate us from them and they did not remain constant through time. Being an Upper Paleolithic "European" was not the same as being "European" in the Neolithic. To explain these periods in terms of the same recurring models is problematic (Shanks and Tilley 1987).

Because of the limited and fragmentary nature of archaeological data that are scattered over an enormous area, there is plenty of space for exotic interpretations, personal utopias, Never-Never lands, and the misuse of archaeology for personal, ideological, and nationalist agendas. Minoan matriarchies as well as extreme nationalist utopias can all comfortably be imagined within European prehistory. There is a patriotic approach by some archaeologists in Europe to the study of the past. For example, a dedication of a book on an Early Neolithic site of Bicske-Galagonyás in Hungary reflects national pride (Makkay et al. 1996). This book is dedicated to "the glorious memory of Árpad who, with his people eleven centuries ago, founded the State of the Holy Crown of Hungary." As long as this preoccupation with the past, especially the mythical past, does not go to political extremes, such as defining modern state boundaries on the distribution of Neolithic pots, no harm is done.

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Chapter 2
Historical Observations on European Archaeology

Sarunas Milisauskas

In the second half of the nineteenth century, prehistoric archaeology came into existence in Europe (Daniel 1964:9). Since then numerous excavations have been conducted, thousands of publications covering various topics have been published, and new theories and methods have been applied to archaeological research. From a small number of pioneering scholars the profession has grown to include the thousands of men and women who are responsible for the present standing of archaeology in Europe. Unfortunately histories of archaeology do not treat all archaeologists equally. Each archaeologist writing the history of the field chooses his/her examples of events and personalities, so a totally unbiased perspective does not exist. Most archaeologists would agree that Marija Gimbutas (1921–1994) was a famous archaeologist (Milisauskas 2000); however, in Trigger's (1989), *A History of Archaeological Thought*, she was not included. A list of archaeologists associated with greatness may be quite different in England from one in Russia.

It is not surprising that British archaeologists dominate histories written by Anglo-American scholars such as Glyn Daniel (1950, 1975) and Brian Fagan (2003). Even in Tim Murray's (1999) *Encyclopedia of Archaeology: The Great Archaeologists*, out of 58 archaeologists, 21 (36.2%) are English and 14 (24.1%) American. Only three Germans, Gustaf Kossinna (1858–1931), Heinrich Schliemann (1822–1990), and Johann Winckelmann (1717–1768), are included. The three volumes of *Encyclopedia of Archaeology: History and Discovery* by Tim Murray (2001) have short summaries about many archaeologists and the history of archaeology of most countries of this world. For the European archaeologists, the Czech archaeologist's Jan Filip (1966, 1969) publication, the *Enzyklopädisches Handbuch zur Ur- und Frühgeschichte Europas*, contains a treasury of information about archaeologists and sites. It is not my intention to deemphasize the contributions of the British archaeologists that were made to the growth of archaeology in Europe. However, for a variety of reasons we frequently forget to acknowledge the outstanding archaeologists of other nationalities.

Our profession memorializes scholars like Henri Breuil (1877–1961), V. Gordon Childe (1892–1957), Oscar Montelius (1843–1921), and Grahame Clark (1907–1995) whose fame rests on the pan-European achievements such as Clark's (1952) *Prehistoric Europe: The Economic Basis*, translated into several languages. It should be pointed out that the number of pan-European archaeologists is small. Unfortunately, there were no women operating at this level in the past. There are archaeologists, such as the French Paleolithic scholar François Bordes (1919–1981), who are famous for contributions to a specific archaeological period. Sir Arthur Evans (1851–1941) became famous by excavating the spectacular site of Knossos. Scholars from small countries or regional specialists are seldom remembered beyond their homelands. Bohumil Soudský (1922–1976) in the Czech

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Republic, Vasile Pârvan (1882–1927) in Romania, Moritz Hoernes (1852–1917) in Austria, János Banner (1888–1981) in Hungary, Miloje Vasić (1869–1956) in Serbia, Józef Kostrzewski (1885–1969) in Poland, V.A. Gorodtsov (1860–1945) in Russia, Albert E. van Giffen (1884–1973) in the Netherlands, Michael J. O'Kelly (1915–1982) in Ireland, Gero von Merhart (1886–1959) in Germany, Sophus Müller (1846–1934) in Denmark, André Leroi-Gourhan (1911–1986) in France, Richard Indreko (1900–1961) in Estonia, Vikenty Khvoika (1850–1914) in Ukraine, Hasan Ceka (1900–1998) in Albania, Christos Tsountas (1857–1934) in Greece, Josip Korošec (1909–1966) in Slovenia, and Jonas Puzinas (1905–1978) in Lithuania are all considered outstanding figures in their own countries, but not across, or outside Europe. Scandinavia provides partial exceptions; Jens Worsaae (1821–1885) and Oscar Montelius (1843–1921) are widely and justly famous. It should be noted that regional archaeologists supplied the material that enabled synthesizers like V.G. Childe (1929) to produce *The Danube in Prehistory.* The Marxist beliefs of V.G. Childe did not prevent him from interacting with falangist (Spanish Fascist) archaeologists in Spain (Martinez Navarette 1997–1998, Diaz-Andreu 2007). For his syntheses he needed information from archaeologists of various ideological persuasions. Sometimes local archaeologists do not get credit for their methodological and theoretical contributions. According to Lech (2004:40–41), the Polish archaeologist Leon Kozłowski (1892–1944) was the first to define an archaeological culture in 1923. He took his doctorate at the University of Tübingen in 1918, and was probably influenced by German archaeologists. V.G. Childe visited Kozłowski's excavations in Poland in the 1920s and likely discussed with him the definition of archaeological cultures.

Large and rich European countries have much more impact on archaeology than poor, especially small countries. Neustupný (1997–1998) wrote an interesting article about mainstream and minority communities in European archaeology. These communities are mainly based on modern state boundaries. Archaeological power and influence lies with the mainstream communities. "It is difficult to imagine how an archaeological community in a country with several million inhabitants and a poor economy could flourish" (Neustupný 1997–1998:23). Neustupný (1997–1998:14) suggests "that Britain houses a mainstream community, the Czech Republic a minority community, and that Polish archaeology is heading towards mainstream status." It is not only language problems, i.e., publishing in Albanian, Bulgarian, Estonian, Finnish, Hungarian, Latvian, Lithuanian, Portuguese, Romanian, Serbian, Slovakian, Slovenian etc., that hinder the impact of archaeologists from minority communities. Even if they publish in English, French, or German, their theoretical and methodological contributions are ignored, in favor of factual information. It should be noted that archaeologists from mainstream communities are isolationists when it comes to scholarship; they do not read many publications from other countries. For all its talk about science and theory, archaeology is still very geographically compartmentalized, unlike chemistry or physics.

The theoretical trends and various interpretations of the European past cannot be separated from the historical events that have played such important roles in influencing or even determining the direction of the field in the twentieth century. Archaeologists were involved as volunteers or conscripts in wars of the twentieth century, R.E.M. Wheeler being the best known British example. Memoirs, biographies, obituaries, archive documents, and histories of national archaeologies reflect the vast diversity of interpretations of the events that affected their lives and their profession. And as the time goes by, the various developments in European archaeology are being reinterpreted and rewritten; the past and the role that archaeologists played in creating it keep changing. As Stanisław Tabaczynski (2002:72) has stated, "Archaeologists have always acted within society and for a society. The differences of cultural traditions as well as the changing political situations of these societies had and continue to have no small effect on the investigation of their ancient and more recent past."

Archaeologists are not saints; they compete for power, positions, funds, sites, publications, etc. (Milisauskas and Kruk 2008). It would be a mistake to consider archaeology as a nonpolitical discipline in the past. Some noted archaeologists were Nazis, Fascists, or Stalinists (Arnold 1990, 2004, Leube 2002, Galaty and Watkinson 2004). We cannot exclude them from our history and create a myth in which all archaeologists worked for the betterment of all humanity. With the passage of time we tend to forget various misdeeds of archaeologists. Furthermore, we cannot legislate what archaeologists do, or how a society will use archaeology.

The 1930s in Europe can be referred to as the age of dictators; by the mid-1930s there were 18 dictatorships in Europe (Davies 1996:943). Czechoslovakia remained the only democracy in central and eastern Europe until its dismembering by Nazi Germany in 1938. It was an ideal period for archaeologists to advance themselves *via* ideology. Fascist scholars took advantage of the political climate in Germany and Italy to gain great influence over the study of the past (Werner 1945/1946, Härke 1991, Kossack 1999). In Italy, Mussolini was dreaming of recreating the boundaries of the Roman Empire, thus hoping to expand the territory of Italy in the Balkans and Africa. It should be no surprise that classical archaeology played a dominant role in Italy during the Fascist period, 1921–1945 (Guidi 2002). After Franco's victory in the Spanish Civil War in 1939, the falangist archaeologists such as Julio Martinez Santa–Olalla (1905–1972), obtained powerful positions within the scholarly institutions in Spain (Diaz-Andreu 1993, 2007).

Glyn Daniel (1967:222) has pointed out that "without excavation there could be no systematic development of the subject . . .," i.e., archaeology, and from the 1920s up to 1939, numerous major excavations were conducted in various countries. The amount of archaeological data generated by European archaeologists in the interwar period is impressive and in this short historical overview, I can give only a few examples. Miloje Vasić (*Preistoriska Vinča I–IV*, 1932–1936) conducted excavations at Vinča in the former Yugoslavia. Józef Kostrzewski (1936) excavated the Iron Age fortified settlement of Biskupin in Poland. Danuta Piotrowska (1997–1998) wrote an interesting article on how Biskupin became entangled in the Polish and German nationalistic conflicts in the late 1930s and the early 1940s. Werner Buttler and Waldemar Haberey (1936) dug the Linear Pottery settlement of Köln-Lindenthal in Germany. Mortimer Wheeler (1943) excavated the Iron Age hill fort at Maiden Castle in England and he used innovative field techniques such as the grid system.

Before World War II, German archaeology and the German language in publications were very influential in continental Europe. Many central and southeastern European archaeologists received their academic training at German universities. German archaeologists contributed to the foundations of European "archaeology as a discipline by developing methods of chronology, artefact analysis and excavation" (Härke 1991:188). Prehistorians, such as Gustaf Kossinna (1858–1931), Hans Jürgen Eggers (1906–1974), Carl Schuchhardt (1859–1943), Ernst Wahle (1889–1981), and Paul Reinecke (1872–1958) were frequently cited by archaeologists in the Netherlands, Hungary, Poland, Romania, Denmark, Spain, Sweden, Latvia, and elsewhere. If you had asked European archaeologists in 1930 who were the five greatest living prehistorians, Kossinna's name would have figured prominently. Even V. Gordon Childe respected Kossinna for his scholarly achievements in archaeology (Leligdowicz 1998, 1999). "The early publications of VERE GORDON CHILDE, for example, reveal the strong influence of Kossinna's methodology" (Veit 2001:581).

At the end of World War II, however, most archaeologists wanted to forget him as an embarrassment to our profession. "In Germany, both West and East, Kossinna seemed to have vanished into thin air" (Klejn 1999:245). His racist and nationalistic views had been embraced by Nazi Germany; he had throughout his life emphasized the greatness of Germans in the past, although he died in 1931 before Hitler came to power in 1933. Daniel's (1950) book, *A Hundred Years of Archaeology*, only briefly refers to him; he is not even included in the index (Leligdowicz 1998). But Kossinna, nationalistic and racist though he was, contributed notably to the development of European archaeology, and should be credited with the definition of archaeological cultures, cartography (mapping of archaeological cultures), and cultural historical studies. Kossinna's definition of archaeological cultures was refined by V.G. Childe (Kohl 2002:187). Through his "settlement archaeology" method (*siedlungs-archäologische* method) he tried to give ethnicity an archaeological form, arguing that the distribution of distinctive artifact types can reflect cultural provinces, which in turn can be associated with the settlement areas of ethnic groups (Kossinna 1911, Härke 1991, Gramsch 2006). Though now discredited this approach was used in the Soviet Union in the 1950s and 1960s (Klejn 1999). As pointed out by Andrejs Vasks (1999:8) during the Soviet rule in Latvia "One of the directions of prehistoric research which did not incur objections from the censors was the study of ethnicity." Valter Lang (2005:12) has emphasized that in eastern Europe "The fundamental methodology of those works was the same everywhere: the archaeological cultures (treated as internally homogenous) were equated with similarly homogenous ethnic groups, languages and races." Since Kossinna had little training in archaeology, Klejn (1999:245) raises an interesting question. How did he become so important a figure in European archaeology? Klejn (1999:245) suggests that "Kossinna did see and express some of the really vital questions about the possibilities, uses, and developments of archaeology. The ethnic determination of cultures, the possibility of genetic connections with cultures, cultorogenesis (the origin of certain culture), the connection of cultorogenesis with the origin of peoples and their languages – all these questions were brought to archaeology by Kossinna." As time goes by, Kossinna is being gradually "rehabilitated" for his scholarly work (Klejn 1974, 1999, 2001, Smolla 1980, 1985, Veit 1985, 2000, Malina and Vašíček 1990:62–64, Leligdowicz 1998, 1999, Grünert 2002, Brather 2008). C. Becker (1985:117), a distinguished Danish archaeologist, writing some 40 years later after the end of World War II, praises his work: "Today it is easy to overlook the fact that Kossinna's *siedlungs-archäologische* methods were epoch-making for the whole profession." J.P. Demoule (2002:477), a leading French archaeologist has noted that "marginalization of Kossinna as has prevailed in Europe for long time doesn't do justice to his immense influence on the conception of traditional culture-historical archaeology." But we should not forget that "Kossinna saw archaeology as a means of proving territorial claims – as a weapon of interstate geopolitics and a potential rationale for extended international and national conflicts" (Klejn 2001:776). His archaeology was used to justify territorial claims by Nazi Germany. However, Barford (2002:79) suggests that his influence on the rise of nationalism in archaeology has been overemphasized in the post-Nazi reaction. Some European archaeologists were nationalists, i.e., using archaeological data and theories to sustain nationalist political agenda, long before Kossinna. Nationalism in archaeology is still there in some European countries (Atkinson et al. 1996, Diaz-Andreu and Champion 1996, Kohl and Fawcett 1996).

Traditional archaeology, i.e., culture history, dominated the pre-World War II Europe. In the USA, traditional archaeology is referred to as the culture-history mode. At the end of World War I as the great empires of Austro-Hungary, Germany, and Russia collapsed, the previously suppressed nationalities, Croats, Slovenes, Finns, Poles, Lithuanians, Czechs, Slovaks, Latvians, and Estonians could finally write their own prehistories and histories. Various territorial and boundary problems in Germany, Poland, and Hungary inspired higher levels of nationalism. Some archaeologists, as defenders of national interests, became involved in these disputes. For example, Józef Kostrzewski defended Poland's territorial rights against Kossinna's Germanic expansionism. Kostrzewski had received his doctorate under Kossinna in Berlin and he used his teacher's methods to define Slavic territories in the past. The association of archaeological cultures with specific ethnic groups in prehistoric times is, of course, problematic, but in the early twentieth century "One of the prime functions of archaeology was to provide a history for the regions now occupied by modern states, more the better if it could provide information confirming the antiquity and glorious past of the nation currently living there" (Barford 2002:79).

British archaeologists were not involved in continental nationalistic disputes, thus V. Gordon Childe could be a distant observer. However, Childe and some other British archaeologists became fascinated with Marxism, which influenced their archaeological work. Furthermore, they were attracted to archaeological developments in the Soviet Union.

After the Bolshevik Revolution in 1917, most Russian archaeologists continued their research under the traditional mode. However, it would be a mistake to classify the pre-1930s Russian archaeology as being only empiricist (Platonova 2002, 2008). There were different "schools" of archaeology such as the Gorodtsov and the paleoethnological schools. In 1928 the first Five Year Plan was imposed on the country and scholarly disciplines were likewise harnessed to the communist party's goals. V.I. Ravdonikas' (1930) publication, *Za marksistskuyu istoriya material'noi kul'tury* (For a Marxist history of material culture), signaled that from then on only Marxism would be accepted as the dogma guiding Soviet archaeology. He criticized the empiricism of the "old" archaeologists and tried to discredit Russian archaeology before the 1930s. Platonova (2002, 2008) stresses that many western archaeologists have accepted Ravdonikas' distorted history of Russian archaeology before the 1930s. Between late 1929 and 1933 many archaeologists were dismissed, exiled to Siberia, or shot. Tikhonov (2007:454) diplomatically states that "almost all researchers were repressed at the St Petersburg University." A new cadre of young archaeologists came to power to dominate Soviet archaeology. As Tallgren (1936:149) wrote after visiting the Soviet Union in 1935, "How rich humanity must be, if it can dispense with such good men! Not all these people have lost their lives, but they have been deported." It should be pointed out that many Soviet archaeologists were doing empirical archaeology by the 1950s and 1960s as their predecessors did in the 1920s.

World War II had a devastating effect on many archaeologists, sites, museums, collections, and libraries. In the discipline, as in so much else, 1939–1945 was Europe's new Dark Age. Destruction of various institutions and killing of archaeologists greatly affected many European countries. Many archaeologists as volunteers or conscripts fought on opposing sides. The Russians S. Anosov, Evgenij Krichevsky, Andrej Kruglov, and Georgij Podgayetski were killed on the Soviet-German front (Miller 1956:160, Filip 1966, 1969). German archaeologists died on eastern and western fronts. Werner Buttler died in France in 1940, Ernst Petersen and Walter Kersten on the eastern front. Some Polish archaeologists were shot by the Germans (Zdzisław Durczewski, Stefan Przeworski), others by the Soviet Stalinist NKVD-secret police at Katyń (Jan Bartys, Jan Fitzke) (Abramowicz 1991, Blombergowa 1992, Gurba 2005). Scholars fled the occupations of their homelands by the Germans or the Soviets. Latvian archaeologist Francis Balodis and Estonian prehistorian Richard Indreko left their countries for Sweden. Lithuanian archaeologists Jonas Puzinas and Marija Gimbutas moved to the USA. The Polish archaeologist Tadeusz Sulimirski escaped to England as did Gerhard Bersu, to avoid antisemitic persecution in Nazi Germany. Bersu returned to Germany at the end of World War II and again became in 1950 the Director of the Römisch-Germanischen Kommission in Frankfurt (Parzinger 2002). The Spanish Civil War (1936–1939) drove archaeologists such as P. Bosch-Gimpera to Mexico to escape Franco's fascist regime.

The murder of millions on account of their ethnicity, religion, or ideology during World War II had a major impact on archaeological interpretations in western Europe. To forget this great human tragedy, many archaeologists tried to ignore the role of warfare in culture change. Ethnic and linguistic interpretations of archaeological data became unfashionable. It should be pointed out that the tragedy of World War I led Sir Arthur Evans to create a utopian Minoan society, pacifist and matriarchal (Gere 2009).

At the end of World War II some countries, such as Germany, Poland, Czechoslovakia, the Soviet Union, Romania and Italy, received new boundaries. The borders of the less fortunate, like the Baltic countries, simply vanished. These boundary changes drove out floods of refugees, who abruptly found they had the wrong ethnicities in the wrong geographies. Some archaeologists had to move; Polish scholars had to leave Lwów (present day L'viv in Ukraine) to the post-1945 Poland. Changes in place names occurred with bewildering speed: for example, German site names in former East Prussia (at present the Kaliningrad district of Russia) were changed to Russian. The famous Zedmar site (Gaerte 1929) became Serov as Zedmar disappeared from the map.

After World War II, Europe was divided into two major ideological blocks: the Soviet Union and its satellites, and the western democracies. Spain and Portugal remained right wing dictatorships until the1970s. Marxism was imposed as the official state ideology on scholarly fields including archaeology in Albania, Bulgaria, Czechoslovakia, East Germany, Hungary, Poland, and Romania. Yugoslavia and Albania broke away from the Soviet Union's domination and practiced their own brands of

Marxism. This does not mean that non-Marxist approaches in archaeology disappeared in Poland, Hungary, and other countries. True, the Stalinist period (1948–1955) offered little leeway in archaeological interpretation. This is well illustrated by Jacek Lech's (1999:89) translated passage from W. Antoniewicz and Z. Wartołowska's (1955:184) article in Polish about the aims of archaeology during the Stalinist period. "Archaeology, therefore, in accordance with J. Stalin's guiding principles for historical sciences, is concerned with the essential problem of the development of primitive, ancient and early class societies, learning about the history of the producers of material goods, the history of the working masses, the history of peoples" (Antoniewicz and Wartołowska 1955:184). After the mid-1950s, many archaeologists just paid lip service to Marxism by citing Marx and Engels in their bibliographies while actually doing culture-history. In Poland, Hungary, and other satellite countries even Marx and Engels had disappeared from archaeological publications by the 1970s. For example, W. Hensel's (1980) *Polska Starożytna* (*Ancient Poland*) is written as culture-history without any reference to Marxist saints. It was not easy to force archaeologists to produce Marxist scholarship. Karl-Heinz Otto (1915–1989) and Joachim Herrmann, the leading communist prehistorians in East Germany, championed this approach in archaeological research and produced many publications. However, most of their East German colleagues continued to do culture-history, irrespective of Otto's and Herrmann's push for the Marxist-oriented research (Veit 2001).

In the post-World War II period, most archaeologists in Europe, including the communist countries, continued to do what they had always been doing, culture-history, or traditional, or continental archaeology. Very few European archaeologists looked at archaeological developments from the perspective of the entire continent. Most were regional or local specialists in the prehistory of their own country or region (S.J. Shennan 1987).

After 1950 radiocarbon dating had a great impact on the chronologies of various prehistoric cultures. Dates for innovations such as the origins of metallurgy, wheeled vehicles, and monumental structures became earlier. Though V.G. Childe's (1957) *Dawn of European Civilization* still used the short pre-14C chronology, for example that the Neolithic started after 3,000 BC in central Europe, radiocarbon dates located the earliest farmers around 5,600 BC. Thus in central Europe the Neolithic (including the Copper Age) lasted over 3,000 years. Renfrew (1973), using radiocarbon dates, demonstrated that megalithic monuments in Europe were earlier than the monumental architecture of Near East. At present, accelerated mass spectrometry (AMS) dating is yielding much finer chronologies.

Bone chemistry studies, aerial reconnaissance, and remote sensing techniques have increased our knowledge of the past (Lambert 1997; Renfrew and Bahn 2004). Archaeozoology and archaeobotany have become much more common in field projects. Since the 1980s molecular genetics research has made an impact on our understanding of past European populations. Colin Renfrew's involvement in archaeogenetics has helped to spread its popularity (Jones 2004).

Many major archaeological discoveries were made in the post-World War II period; I can give only a few examples: the cave art at Chauvet in France (Chauvet et al. 1995), the Copper Age cemetery of Varna in Bulgaria (Ivanov 1988, Ivanov and Avramova 2000), the megalithic passage grave of Barnenez in Brittany, France (Giot 1987), the Hochdorf burial in Germany dated to the mid-sixth century BC (Biel 1985, Olivier 1999), and the Iron Age spectacular burial mound of Vix in France (Joffroy 1962). Two German hikers in the Tyrolean Alps found the frozen body of the Copper Age man, the Iceman or Ötzi, in 1991 (Spindler 1994).

As in many other scholarly disciplines, women were under-represented in archaeology for many years. Since the 1950s we have many more women archaeologists and they have made significant contributions to European archaeology. A few examples follow: Ella Kivikoski (1901–1990) of Finland, Ida Bognár-Kutzián (1918–2001) of Hungary, Zofia Podkowińska (1894–1975) of Poland, Tat'jana Sergeevna Passek (1903–1968) of Russia, Regina Volkaitė-Kulikauskienė (1916–2007) of Lithuania, Aleksandra Mano (1924–2005) of Albania, Viera Němejcová-Pavúková (1937–1997) of Slovakia, Elvīra Šnore (1905–1996) of Latvia, Hanna Rydh (1891–1964) of Sweden, Johanna

Mestorf (1828–1909) of Germany, Charlotte Blindheim (1917–2005) of Norway, Denise Sonneville-Bordes (1919–2008) of France, Patricia Phillips (1935–1999) of England, and Hortensia Dumitrescu (1901–1982) of Romania. It is still not easy for women to attain the top positions in archaeological institutions; men continue to dominate the field in most countries. There are some positive examples such as Norway, where in the 1990s out of 11 professors of archaeology, five were women (Dommasnes et al. 1998:105). The current director of the Albanian Institute of Archaeology is Shpressa Gjongjecaj.

As pointed out by John Bintliff (2008:147) about Anglo-American archaeology, "Since the late 1950s the discipline has been rent by endless academic disputes about the ways we should think about the past and its material remains, and how to make deeper sense of earlier societies." During the late 1960s and 1970s, processual archaeology or the "scientific anthropology of the past" has been championed by Americans like Lewis Binford and some British like David Clarke (1936–1976). Clarke's (1968) publication the *Analytical Archaeology* had a major impact on some British and Scandinavian archaeologists. Processual archaeologists attempt to explain how and why culture change occurs. There is much greater emphasis on long-term processes in the past.

After 1980, a counter movement, post-processual archaeology appeared in England and later in Scandinavia and other European countries. This embraces a diverse range of post-modern approaches: gender studies, emphasis of ideology and symbolism, Neo-Marxism, critical theory, and the importance of individuals in prehistory. It can be contrasted with the new archaeology in a simple chart (Table 2.1). Although processualist and post-processualist archaeologists disagree on many points, they concur that archaeological research should be theory driven.

The archaeological data remain constant in quality and quantity; only around it swirls a vast cloud of new and old interpretations or reinterpretations. This development is clearly illustrated by Paul Mellars (2009:502) as it relates to the famous Mesolithic site of Star Carr in England, "The repeated re-interpretations of the site have arguably served as a kind of barometer of the successive swings and fashions in archaeological interpretation over the past 50 years, ranging from the strongly ecological and 'functionalist' interpretations of Grahame Clark himself and the ensuing generation of equally ecologically/functionally-oriented adherents of the 'new,' 'processual' archaeology in the 1960s and 1970s, to the current wave of passionately anti-functionalist, 'post-processualist' approaches which has increasingly gripped the younger generations of prehistorians from the later 1980s onwards."

Archaeology borrows theoretical constructs from ethnology, evolutionary biology, the physical sciences, geography, literary criticism, history, sociology, philosophy, and cultural studies. France's *Annales* historical school has influenced a number of archaeologists (Bintliff 1991), as have the ideas of French historians, sociologists, and philosophers, such as Fernand Braudel (1972, 1981), Pierre Bourdieu (1977), and Michel Foucault (1966, 1969). Other non-archaeologists, such as the Italian Marxist philosopher Antonio Gramsci, likewise have had some theoretical influence. Such Europeans have also influenced American archaeologists as the impact of cultural anthropology on archaeology has decreased in the USA. The World Systems approach championed by the American sociologist Immanuel Wallerstein (1974, 1980) and the structuration theory and reflexity of the British sociologist Anthony Giddens (1984) have influenced European archaeologists. These competing theoretical

Table 2.1 New archaeology vs. post-processual archaeology

New archaeology	Post-processual archaeology
Positivism	Relativism
Objectivity	Subjectivity
Seeks explanations	Seeks interpretations
Materialist	Idealist
Environment-centered	Human-centered

approaches have had a greater impact on younger archaeologists, but most European scholars are still doing culture history.

The political map of Europe has changed drastically since 1989 and these changes have mostly been for the better in archaeology. Between 1989 and 1991 the Soviet Union collapsed, leading to the emergence or reemergence of numerous independent states, such as Armenia, Belarus, Estonia, Georgia, Latvia, Lithuania, and the Ukraine. Yugoslavia broke up into Bosnia-Herzegovina, Croatia, Macedonia, Slovenia, and the remainder of old Yugoslavia. Lately the former Yugoslavia totally disintegrated with the separation of Kosovo and Montenegro from Serbia, but not all European countries recognize Kosovo's independence. Now, we have the Czech Republic and Slovakia, instead of Czechoslovakia. East and West Germany have become a unified state. The disappearance of the Iron Curtain created novel opportunities for interaction and research that previously were not possible for most archaeologists (Milisauskas 1990, Bogucki 1993, Marciniak 2007, Lozny 2011). For the first time in many years, archaeologists and historians could write and express their honest views and interpretations in central and eastern Europe without worrying about offending the guardians of a Marxist social utopia or state censors of books. Michelbertas (2001:145) has noted that during the Soviet times in Lithuania, any archaeologist professing processual or post-processual views would have been immediately fired from his/her job. Or again, until the mid-1980s Lithuanian archaeologists could not cite the "bourgeois" archaeologist Jonas Puzinas (Puodžiūnas and Girininkas 1996:252). To be fair, such heavy-handed censorship did not prevail in such Soviet satellites as Poland and Hungary. The number of archaeologists increased greatly during the Marxist period in central and eastern Europe, as, indeed, in western Europe and North America. There were 40 archaeologists in 1947 in Poland and approximately 550 by 1996 (Abramowicz 1991, Tabaczynski 2007). We should not overemphasize the isolation of archaeologists in Marxist countries from archaeologists in western Europe. Although Soviet archaeologists had only little direct contact with the West, such was not the case for most satellite states. Polish archaeologists conducted or participated in archaeological projects in Algeria, Egypt, France, Italy, and Spain (Tabaczynski 2007). A study of citations by Ewa Krupic (2008) in the Polish archaeological journal *Archeologia Polski* between 1957 and 1975 indicates that numerous western European archaeologists were cited. A few American, Austrian, French, German, and British institutions conducted archaeological research in Marxist countries. Archaeological meetings organized by Polish, Czech, Slovak, Hungarian, and Bulgarian scholars brought western, central, and eastern Europeans together. For example, the conference on the Linear Pottery culture in 1981 at Nové Vozokany in Slovakia attracted scholars from Austria, East Germany, France, Hungary, the Netherlands, Poland, USA, West Germany, and former Czechoslovakia (the Czech Republic and Slovakia). There were some problems in obtaining western publications in the so-called socialist countries. However, archaeologists exchanged reprints and books and most European archaeological institutions continue to exchange their publications. By exchanging publications, the Institute of the History of Material Culture, Polish Academy of Sciences, "has built up an archaeological library that is among the best in Europe" (Schild 1993: 146). Now the internet is making it much easier for archaeologists to exchange information, journals, site reports, and discussions.

A number of archaeologists from the former Marxist countries made significant contributions to method and theory in our discipline. Leo Klejn of Russia, Evžen Neustupný of the former Czechoslovakia, and Stanisław Tabaczyński of Poland made contributions to the theoretical debates in archaeology. One of the earliest systematic regional settlement studies in Europe was carried out in the late 1960s by Janusz Kruk (1973, 1980) in the loess uplands of the Cracow region in Poland. He examined the relationship of Neolithic sites to different ecological zones in a specific region and studied changes in land and resource utilization through time. Sergej Semenov (1898–1978), a Russian scholar, pioneered use-wear studies of stone tools that clarified their function in the past. David Anthony (2006:40) mentions that Efremov (1940) of Russia developed taphonomy. The Czech Bohumil Soudský (1922–1976) carried out large-scale horizontal exposures using earthmoving equipment at Bylany and was one of the first archaeologists to use computers for the recording of ceramics (Midgley 2005). Several distinguished archaeologists, such as Jean-Paul Demoule, Jan Lichardus, Ivan Pavlů, and Ruth Tringham, received training in field techniques at Soudský's excavations. Hungarian and Polish archaeologists have carried out ambitious national surveys (Magyarország Régészeti Topográfia – Archaeological Topography of Hungary, Archaeological Map of Poland – Archaeologiczne Zdjęcie Polski) trying to record all archaeological sites in their countries (Barford et al. 2000, Torma 1993). The Polish national survey of sites began in 1978. Hungarian archaeologists conducted microregional research programs (Bánffy 1996, 2006). The spectacular excavations of the Middle and Upper Paleolithic sites by Russian and Ukrainian archaeologists made our field much richer (Vasil'ev 2002).

R. Chapman (1997:279–280) has suggested that since the death of right-wing dictators, Franco and Salazar, Portuguese and Spanish archaeologists should not simply follow the latest theoretical and methodological trends from the English-speaking world. The same might be said of central and eastern European archaeologists. Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, and Ukraine have their own archaeological traditions. The social, cultural, and political conditions were different for archaeology's development in central and eastern Europe (Sklenár 1983). The Slovenian archaeologist Predrag Novaković (2008:42) has pointed out that "Archaeology in central and eastern Europe was, in general much more historical in its approach, simply because this was expected from it in the conditions of continuous competition between nations, religions and states until the mid-20th century, and much of this legacy has pervaded recent times as well." It would be a mistake to replicate the processual and postprocessual debate, by now quite sterile, that dominated Anglo-American and Scandinavian archaeology during the last three decades.

Since the collapse of the Iron Curtain, the former Marxist countries are increasingly influenced by Western intellectual trends including archaeology. Lewis Binford and Ian Hodder became familiar names among the younger archaeologists; for example, Hodder's (1986) *Reading the Past* (*Praeities Skaitymas* 2000) was even translated into Lithuanian. Renfrew and Bahn's excellent book *Archaeology: Theory, Methods, and Practice* has been translated into some 30 languages. As long as local archaeologists do not abandon their research and just try to imitate some western prehistorians, the pan-European influences of Anglo-American archaeologists can have positive results. They can benefit from the delayed exposure to processual and postprocessual archaeology as shown by developments in Spain. The later emergence of processual archaeology in post-Franco Spain was advantageous to Spanish archaeologists as pointed out by Balmuth et al. (1997:XVI): "Spanish archaeology in the 1980s and 1990s is going through a transition from a normativist to a processualist prehistory that resembles the emergence of the New Archaeology in North America and Britain in the 1960s and 1970s. This delay affords Spanish archaeology the opportunity to learn from mistakes of their Anglo-Saxon colleagues." Furthermore, they can skip the processual archaeology and move directly to post-processual.

Stanisław Tabaczynski's (2007:1080) observations about Polish archaeology in the post-communist period are applicable to other former Marxist countries in Europe, "It seems to me that the way forward for Polish archaeology is not to wait for the emergence of some new paradigm, some 'Savior' with a ready blueprint for a new 'ideal' archaeology. Rather we should seek to build the future of our discipline on the basis of reflections, on experiences and efforts, both our own land, those of others, and on frank and open discussion" (Tabaczynski 2007:1080). Polish and Anglo-American archaeology have some similar and different goals. The different goals reflect diverse theoretical approaches. For example, there is little interest in Slavic ethnogenesis in England. At the same time I want to stress that all European archaeologists have many similar goals. This is illustrated by recent conferences and publications, e.g., "The Archaeology of Landscapes and Geographic Information Systems: Predictive Maps, Settlement Dynamics and Space and Territory in Prehistory" conference in 2001 at Wünsdorf in the former East Germany (Kunow and Müller 2003). European, Canadian, and American scholars with common interests participated in this conference. At this conference, Johannes Müller (2003:29) described how settlement studies evolved in Europe, from the discredited method of Kossinna to a contemporary landscape archaeology that "attempts to understand areas of landscape according to the way emotional significance was ordered by prehistoric communities." It should be pointed out that German archaeologists Georg Kossack (1974) and Herbert Jankuhn (1976) made significant contributions to landscape archaeology and their studies have influenced continental archaeologists (Bintliff 2008).

Central and eastern European archaeologists understand the multivocality of our field. Thus Russian, Polish, Czech, Hungarian, Romanian, Ukrainian, Estonian, Lithuanian, archaeologists should decide what kind of archaeology they want to pursue. However, post-processualism and processualism can provide possible new interpretations of data. For example, Neolithic figurines are often interpreted as goddesses in eastern Europe. Is it fruitful for archaeologists to continue to ask "Is this figurine a goddess?" in 2009? Goddess represents just one of many possible alternative interpretations of figurines.

Since the late 1990s the eastern and central European countries that were admitted to the European Union benefited from large sums of money allocated for highway construction. These funds benefited archaeology and numerous archaeologists got involved in the "highway archaeology," what we in North America call cultural resource management (CRM). A number of very successful archaeological projects were carried out in Hungary, eastern Germany, Poland, and other countries.

During the last 25 years, there has been an emphasis on archaeological conservation or heritage management in Europe. This type of archaeology tries to preserve the remains of the past cultures, but at the same time focuses "on historical origins and local histories within the framework of national history" (Kristiansen 2008:10). The local political authorities are in favor of the heritage archaeology since it helps the economy and attracts tourists. The majority of jobs in archaeology are in the heritage sector (Marciniak 2007).

The disintegration of Yugoslavia in the 1990s unleashed nationalistic conflicts that led to the destruction or damage of archaeological heritage in Bosnia-Herzegovina, Croatia, Kosovo, and Serbia (Chapman 1994, Novakovic 2002). It was difficult to imagine for many westerners that extreme nationalism was still alive in parts of Europe.

In the early 1990s the European Association of Archaeologists (EAA) was formed. Some of the aims of this organization include the promotion of archaeological research and the promotion of management and interpretation of the European archaeological heritage. The official language of the EAA is English. Every year it holds meetings and publishes the *European Journal of Archaeology.* There are approximately 20,000 archaeologists in Europe, but roughly only 1,000 (5%) belong to the EAA. There are a variety of reasons for this. Many archaeologists cannot join for financial reasons. The use of English makes it difficult for many archaeologists to participate in conferences. All organizations have hierarchies of membership; English, German, and Scandinavian archaeologists tend to dominate the EAA.

The language issue in European archaeology was discussed by numerous scholars (Lang 2000, Venclová 2007, Bernbeck 2008). Recently Harding (2007) sensibly discussed the positive and negative implications of English as a *lingua franca* in European archaeology. Some archaeologists, such as Bernbeck, are very negative about the dominant role that the English language plays in our discipline. He argues that English forces "non-Anglo" archaeologists "into a pattern of valuations in which the Anglo-American preference for theory over other archaeological concerns reigns supreme" (Bernbeck 2008:168).

We need one or two languages for communication among the thousands of archaeologists of various nationalities. Presently English is the dominant language in scientific fields, thus it is not surprising that it became the most commonly used language by archaeologists. Before World War II German was the dominant language in central, eastern, and northern Europe, but its importance has decreased since 1945. Ideally English, French, and German could be the three official languages, but since most young Europeans study English as the first foreign language, the three-language solution is unrealistic. European 15–24-year-olds "are five times more likely to speak English as a foreign language than either German or French" according to a Eurobarometer survey (*The Economist*, Feb. 14–20, 2009, p. 64). If archaeologists want to reach a wider audience in the first decade of the twenty-first century they need to publish in English. If there is a choice for archaeologists to publish in German or English, they should choose English. Almost all German archaeologists know English, but only a small percentage of the Anglo-American archaeologists know German. Great ideas can be published in Estonian or Albanian, but at best only a few archaeologists know those languages. Even Slavic languages are known only by a small number of archaeologists in western Europe. If archaeologists wish to contribute to a wider audience their methodological and theoretical ideas or deal with certain topics such as GIS, they need to publish in English. Venclová (2007:213) described how Czech archaeologists deal with a language problem for a wider audience. "English is currently used by the Czechs in international communication in contributions on theory, informatics, spatial and landscape archaeology, and of course, bioarchaeology, partly even in medieval or post-medieval archaeology. For other fields, German is traditional and quite common and French may be used for some aspects of Iron Age archaeology." Naturally, Czech is used in many publications.

Since the 1960s over 130 Americans have conducted archaeological research in Europe and they have generally had a positive impact (Milisauskas et al. 2010). Americans usually do not conduct research within the framework of national archaeologies in Europe. They are aware of national archaeologies, but frequently apply research models from other continents or regions such as Africa or Mesoamerica. Americans are active participants in various archaeological conferences in Europe and most of them belong to the European Association of Archaeologists.

We can assume that in the future the new generation of archaeologists will be more pan-European in their outlook. There will be much more cooperation and interaction among archaeologists. At present European Union is supporting heritage studies with large sums of money. The generosity of the European Union will probably decrease toward archaeology in the future.

Hopefully, the European archaeological community will remain multivocal and national, and regional traditions will not disappear in the future. Thus, there will continue to be different versions of the European past; only in a totalitarian system can there be one version. This is clearly expressed by a Latvian archaeologist Sne (1999:110) "The past gets its meaning in our interpretations of it, so it is up to us to create pasts, not the past." European archaeology is entering its golden age in the twenty-first century; archaeology can be practiced at local, national, and international levels (Bartu-Candan 2008). The "Archaeologies East – Archaeologies West: Connecting Theory and Practice across Europe" Conference in 2000, Poznań, Poland shows how far European archaeology has advanced theoretically and how its participants look at national histories without local chauvinisms (Biehl et al. 2002). With the passage of time, the extreme nationalisms and vulgar Marxism will be just a distant memory.

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Chapter 3
The Present Environment: A Geographic Summary

Sarunas Milisauskas

Introduction

This chapter describes the present environment of Europe: topography, climate, and characteristic associations of plants, animals, and soils. It introduces the reader to the geography of the continent, develops the environmental background for the societies of the last 9,000 years, and provides a point of departure against which we can compare the environments of the more distant past.

Topography

Of all aspects of the environment, the topography, that is, the configuration of surface and relief, changes most slowly. Nevertheless, it is important for human societies. It structures space; it interacts with the climate upon which plants, animals, and soils depend; it impinges upon human behavior by creating barriers to movement and trade, transport, and communication. In this sense, the topography can be viewed as the stage for human societies, past and present.

On maps of the Old World, Europe appears as a large peninsula; it is contiguous to Asia and approximately four times smaller than it. The boundary between the two continents is traditionally drawn at the Ural Mountains in Russia and across the lowlands that extend between these mountains and the Caspian Sea to the south. This boundary is rather arbitrary. Human groups, particularly nomadic ones, have moved freely across it during various periods. In the southeast, the Caucasus Mountains define the boundary between Europe and Asia. This alpine chain extends between the Caspian and the Black seas and reaches elevations of more than 5,000 m in places. Thus, it forms a rather effective barrier for travel and communication. Elsewhere, Europe is bordered by water. In the south, we find the Caspian Sea, the Black Sea (with its appendages, the Bosporus, the Sea of Marmara, and the Dardanelles, which separate the European and Asiatic parts of Turkey), and the Mediterranean Sea (with the Strait of Gibraltar). The Atlantic Ocean adjoins Europe in the west, and the North Sea, the Norwegian Sea, and the Barents Sea border the continent in the north (Shackleton 1965).

As Figs. 3.1 and 3.2 indicate, Europe could be viewed as a funnel, lying on its side with its mouth to the east. At its eastern border with Asia (the Ural Mountains), the funnel reaches a width of more than 3,000 km from north to south. More than 4,500 km further west, where the Pyrenees Mountains separate France from Spain, the width of the funnel has decreased to less than 400 km north-south. A number of peninsulas and islands are appended to the body of the continent: the Scandinavian

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Fig. 3.1 Political map of present day Europe

Peninsula and the British Isles in the north; the Iberian peninsula (Spain and Portugal) in the west; and the Apennine (Italy and Sicily) and Balkan peninsulas (south of the Danube, bordered by the Adriatic, Ionian, Aegean, and Black seas) in the south.

The major geographic units of Europe are large expanses of level lowlands (the North European Plain, the Carpathian Basin, and the lowlands west and north of the Black Sea), mountainous zones of intermediate elevation (the German mountains adjoining the North European Plain, the French Massif Central, the Serbian uplands, and the Transylvanian mountains in Romania), level uplands (the Alpine Foreland, the Bohemian Basin, the central Russian Uplands), and high mountain chains (the Pyrenees, the Alps, the Carpathians, the Dinaric Alps, and the Balkan Mountains). The level lowlands and the high mountain chains are particularly important because they helped structure interregional travel and communication and exerted an influence on the climate, thereby affecting the distribution of plants, animals, and soils.

Aside from the large peninsulas, the largest contiguous geographic units are the level lowlands of approximate east-west orientation. For example, the North European Plain extends, without major interruption, from the Ural Mountains in the east to the Pyrenees in the west. At longitudes east of St Petersburg, Russia, one can travel 2,500 km from the Black Sea to the Barents Sea without encountering elevations above 300 m. Further west, in Germany or in France, the plain has narrowed to less than 200 km. A similar wedge of lowlands, also oriented east-west and gradually decreasing in width along the way, stretches from the plains north of the Caspian Sea to the Ukrainian steppes north of the Black Sea, and to the Walachian Plains of Romania.

Like the lowlands, the high mountain chains are arranged in an east-west direction. They form an almost uninterrupted wall from the Atlantic coast of Spain in the west (Cantabrian Mountains,

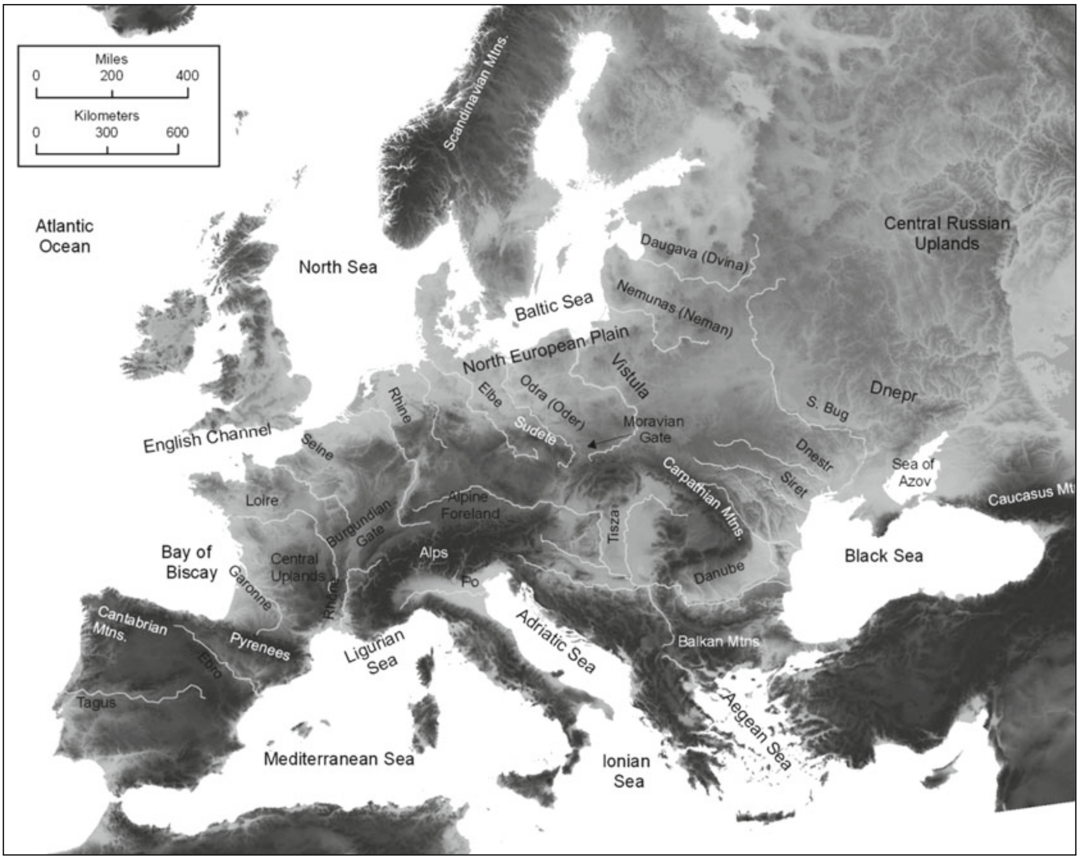

Fig. 3.2 Topographic map of present day Europe

Pyrenees) to the Black Sea coast of Bulgaria in the east (Balkan Mountains, Rhodope Mountains). This wall reaches its greatest width in the center of the continent. Here, the parallel ridges of the Alps, from 2,000 to more than 4,000 m in height, broaden into a zone more than 200 km wide. Further east, the Alps branch into a number of separate chains: the Dinaric Alps and the high mountain chains of the Balkan peninsula to the southeast (Pindus Mountains of Greece, Rhodope and Balkan Mountains of Bulgaria), and the arch of the Carpathian Mountains to the northeast. Another offshoot of the Alps, the Apennines, extends the high mountain zone into the Apennine peninsula of Italy in the south.

Hilly or mountainous zones of intermediate elevation take up much of the remainder of the continent. For example, south of the North European Plain, there is a nearly continuous belt of minor mountain ranges. These comprise a mountain barrier where the alpine chains are interrupted (Massif Central, Serbian uplands), or they constitute a broad belt of hills and mountains between the lowlands in the north and the high mountains farther here toward the west (with the Vosges and Jura Mountains of France and Switzerland) and toward the east (Bohemian Forest, Ore Mountains, Sudetes, and Carpathian Foreland). In this sense, the mountains of intermediate elevation also form a geographic belt on an east-west axis and contribute to the latitudinal arrangement of the European relief.

It is illustrative of the surface configuration of Europe that its geographic center, the Carpathian Basin, can be reached only through a number of well-defined corridors. This complex of interconnected lowlands in and around Hungary is approximately 400 km in diameter. Traversed by the

Danube River and its tributaries Drava, Sava, and Tisza, it is surrounded on all sides by mountains (Bohemian Mountains, Moravian Heights, Carpathians, Serbian uplands, Dinaric Alps, and Alps). The Vardar (Greece, Macedonia) and Marica valleys (Bulgaria) link these plains with the Aegean Sea. The Danube connects the Carpathian Basin with the Alpine Foreland and the Rhine drainage in the west, and with the Black Sea in the east (through the Iron Gates between Serbia and Romania, a 3-km-long gorge cut by the river through the Carpathians). The Moravian Gate, a low saddle between the Sudetes and the Carpathians in the Czech Republic, opens the Basin to the North European Plain. Elsewhere, high mountain passes have to be traversed.

Aside from these larger topographic units, the surface is structured by the valleys of the larger rivers. In the north, these rivers generally follow a northwestern direction. They empty into the Bay of Biscay (Garonne, Loire), the English Channel (Seine, Rhine), the North Sea (Weser, Elbe), and the Baltic Sea Oder (Odra), Vistula, Nemunas (Neman), and Daugava (Dvina). Only a low divide separates these rivers from the ones draining southeastward into the Black Sea (Dnestr, Southern Bug, Dnepr) and the Caspian Sea (Volga and Ural). All these rivers link the plains with the mountains and hills, but only the Rhine and the Oder and their tributaries penetrate deeply into the continent. The most "European" of the European rivers is the Danube whose course traverses or touches upon seven different countries. It ties together the center of the continent with the Black Sea shore, the Balkan Peninsula, and the Alpine Foreland (and thus the Rhine drainage and the Atlantic coast). Its tributaries generally run in a north-south direction and provide entry points into the high mountain chains (Alps, Carpathians, Dinaric Alps). Almost of equal importance is the French Rhône River. Its tributaries connect the Mediterranean coast with the western Alps and central France. In addition, through the low saddle of the Burgundian Gate, the Rhône communicates with the Alpine Foreland, and thus with the Rhine and Danube drainage.

Outside of the lowland plains, large stretches of level land are rare. The largest tend to be either river basins, such as the French Rhône Basin or the Italian Po valley, or intramountain uplands, such as the upper Rhine valley and the Alpine Foreland of southern Germany, the Bohemian Basin in the Czech Republic, and Transylvania in Romania. The remainder of the continent, if not hilly or mountainous, is taken up by discontinuous valley corridors and narrow valley segments. The size of these smaller subunits tends to be related to the age of the mountains in which they are found. They tend to be larger where the mountains are older (like most of the mountain ranges of intermediate elevation). The Alps proper and the younger mountain ranges farther east are more sharply compartmentalized, and the compartments tend to be poorly interconnected. This is most extreme in the limestone mountains of southeastern Europe where small intramontane basins are frequently surrounded on all sides by mountains.

Climates

The topography of Europe is important to its climate for several reasons. First, whereas Europe is relatively small itself, it is part of the world's largest land mass, the Eurasian continent. Large bodies of land tend to be associated with continental climates that is, with hot summers, cold winters, and rapid transitions between seasons. Second, Europe is bordered on three sides by oceans and seas, their branches penetrating deeply into the land. Large bodies of water tend to give adjacent land areas an oceanic climate that is, relatively cooler summers, milder winters, and more gradual transitions between seasons. Third, there are almost continuous mountain walls that act as a climatic divide between the north and south of the continent. Fourth, there are virtually no geographic obstacles with a north-south axis. Combined with the latitudinal arrangement of relief, this implies gradual transitions in climate from west to east. Finally, Europe is located mainly within the temperate zone, from about

65° to 40° north latitude. This zone has a moderate climate compared with the polar climates farther north and the subtropical and tropical climates in the south.

Essentially the continent shares three different climates. The northern and northwestern margins (the Atlantic coast of western and central Europe and Scandinavia) are under the influence of a strongly oceanic climate. Here, temperatures are relatively mild year-round, precipitation is evenly distributed throughout the year, and seasonal changes are comparatively small and very gradual. A continental climate reigns along the eastern margins of the continent (the area north and east of the Black and Caspian seas), with large annual temperature ranges, pronounced and rapid temperature changes between seasons, and a strong peak in precipitation in spring or summer. The southern margins (the Mediterranean coastline south of the high mountain barrier) show a climate of subtropical type with hot summers and mild winters with much of the precipitation concentrated in the winter.

The bulk of Europe is transitional between the continental and oceanic extremes. Annual temperature range, seasonality, and average winter cold increase toward the northeast, whereas summer temperatures increase latitudinally toward the south. Annual precipitation tends to rise with elevation, reaching its peak along the northern slopes of the Alps. Since most of the precipitation is brought by the prevailing northwesterly winds, annual totals decline with distance from the Atlantic Ocean to low points in the Carpathian Basin and beyond. The seasonality of precipitation increases along the same axis. It is particularly marked along the shores of the Adriatic and Aegean seas where most of the annual rainfall is concentrated in winter. Superimposed upon these regional trends are the effects of local topography, particularly altitude, which can produce sharp differences in local climates over relatively short distances.

Biogeography

Topographic and climatic patterns are closely mirrored in the regional associations of plants, animals, and soils. At present, Europe has six major vegetation belts: Mediterranean forests in the south, a broad belt of mixed forest at middle latitudes, boreal forest and tundra in the north, and steppe and semi desert in the east (Fig. 3.3). The mixed forest, dominated by deciduous trees such as oak, elm, lime, elder, or beech, is the largest in area. Its distribution is controlled by cold winter temperatures in the north (approximately 60° north latitude) and along mountain ranges, and by excessive summer drought in the south (Mediterranean climate). This forest accommodates a most diverse fauna, particularly if animals are counted that only recently have become rare or extinct such as aurochs, elk, brown bear, wolf, lynx, otter, and beaver. Today, red and roe deer, wild pig, hare, rabbit, fox, duck, and partridge are its most important prey species. The soils of the mixed forest zone (the so-called podzolized soils of brown-earth type) tend to be rich in nutrients and organic matter. If they are well drained, they are quite attractive to agriculturalists. Another particularly fertile and easily worked soil present in the area is the soil developed on loess. This yellowish fine-grained sediment occurs in a broad, discontinuous belt from the Atlantic coast of France to the Carpathian Basin and beyond. In the Mediterranean Basin, open woodland and parkland replace the deciduous forest. Here, evergreen hardwoods, such as live oak and cork oak, are the dominant trees. Their small, leathery leaves are coated with wax-like substances, allowing them to withstand the pronounced summer droughts. Much the same types of animals are associated with the Mediterranean forest as with the mixed forest farther north. Although the more demanding forest species such as elk, bison, otter, or beaver are rarer, the number of smaller kinds of animals (reptiles, mollusks, and the like) is greater. Few areas remain as forests today, and few of the larger mammals have been able to survive the impact of state societies. While the soils of the Mediterranean Basin can be productive, they have suffered a great deal from erosion in hilly and mountainous areas because of many millennia of intensive agricultural exploitation. They are deepest and most fertile in the occasional lowlands and basins (Rhône Valley, Po Valley).

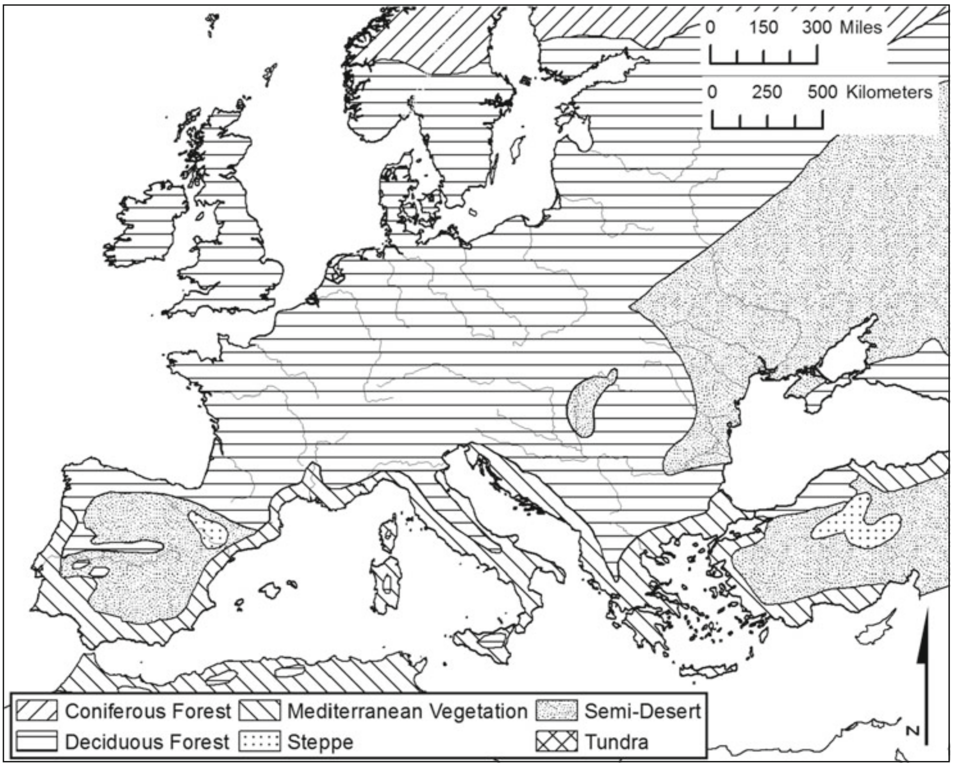

Fig. 3.3 Climatic zones of Europe

To the north, in Scandinavia and in the northern parts of Russia, the mixed deciduous forest gives way to the so-called taiga or boreal forest, a tree association that closely resembles the coniferous forest at the higher elevations of the central European mountain ranges. Only a few species account for practically all of its trees, including, in order of their abundance, these conifers: spruce, pine, larch, and fir. Although the fauna is not as rich and diverse as in the mixed forest, the two vegetation belts share many of the same animals. Today, in the south elk, bear, and deer and in the north reindeer are its largest prey species. In addition, there are a large number of smaller fur bearers: badger, beaver, fox, hare, lynx, marmot, muskrat, etc. Podsols or “ashy” soils, called so due to their grayish color, are dominant in this region. Strongly leached and frequently underlain by a bed of hardpan, they are only marginally productive for agricultural purposes.

Tundra vegetation is at present confined to a narrow belt north of the boreal forest, beyond the Arctic Circle (65° north latitude). A similar plant community is also found above the tree line in the mountain ranges farther south. The true tundra is an association of lichens, mosses, and sedges that lacks trees except for occasional dwarfed birches, willows, and other cold-tolerant species. Only a few animals are natives of the tundra including reindeer, arctic hare, and migratory birds. What it lacks in the number of species, the tundra makes up for in the number of individuals per species. Reindeer form seasonally large herds, and the periodic migration of the lemmings (the area’s dominant rodent) has become proverbial. Crop agriculture cannot be practiced at all; the growing season is too short, the ground is permanently frozen in many areas and often waterlogged, and little soil development takes place.

A gradient of declining precipitation (from northwest to southeast) governs the zoning of plant communities north of the Black Sea, Caucasus, and Caspian Sea. The mixed forest is gradually replaced by forest steppe in the Ukraine; a belt of true steppes (tall grasslands) follows in the southern and eastern Ukraine and finally, semi-desert forms the southeastern edge of the steppes around the Caspian Sea. In this progression, forests become more and more open until, in the true steppe, they are confined to a few sheltered refuges along the major rivers. In the semi-desert even the steppe grasses no longer cover the ground completely. The fauna becomes more rarefied along the same gradient even though, in the absence of agriculture, a number of large, gregarious animal species would roam the steppe pastures including saiga antelope, wild ass, aurochs, and wild horse. The soils of the virgin grassland – the *chernozems*, or black earths – have deep profiles, are rich in organic matter and nutrients, and are generally well drained and aerated, making them very attractive for agricultural uses.

Some Implications for Human Occupants

Several geographic characteristics of Europe are relevant to its history of culture change and cultural developments. First, many of its major vegetation belts extend well beyond, and reach their largest extent outside of, the continent. They include the steppe and semi-desert in the east that attain their maximum size in Central Asia, and the boreal forest and tundra of the north that broaden considerably in Asia east of the Ural Mountains. Similarly, Mediterranean vegetation also covers the coastal areas of the Near East and North Africa. Thus, access to the margins of the continent is not impeded by major environmental or topographic boundaries. The relative ease of travel and communication on the Mediterranean Sea, or on the plains of eastern Europe, suggests that these regions are relatively open to, and can share in, the cultural developments of Central Asia, the Near East, or North Africa. Nomadic peoples from Central Asia, such as the Bolgars and Hungarians in historic times, frequently moved westward across the steppes to settle in Europe, and the empires of Greeks, Romans, and Ottomans repeatedly tied together areas of Mediterranean Europe with the Near East and North Africa.

Second, the mixed forest is the only environment that reaches its greatest extent in Europe. Interposed between the Atlantic Ocean and the environments of Central Asia, and separated from the Mediterranean Basin by a mountain wall, the exploitation of this environment requires adaptations that are specifically European: in terms of hunting strategies, prey, and settlement patterns for prehistoric hunter-gatherer populations, and in terms of domestic animals, crop species, and agricultural technology for early agriculturalists.

Third, while access to the margins of the continent is largely without geographic obstacles, its hilly and mountainous heartland can be reached only through a limited number of well-defined corridors. These corridors are either narrow gateways, such as the Burgundian Gate of France or the Iron Gates along the Danube, or long linear channels like that of the upper Rhine or Rhône rivers. Communication is similarly constrained within the heartland and forced into a number of strategic gateways, passes, straits, and narrows. This tends to concentrate cultural interchange between regions in a smaller number of focal points.

Finally, the main body of the continent is compartmentalized into a relatively large number of subunits of differing size, with differential access to routes of communication, and with other characteristics distinct from that of their neighbors. Compartmentalization and variability both facilitate and impede the integration of the subunits into larger entities and contribute directly to the rich history of culture variability on the European continent.

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Chapter 4
The Lower and Middle Paleolithic

Michael Jochim

Ice Age Europe: Chronology and Environment

Europe in the ice age was a very different place than today, or rather, it was many different places. During the vast time period examined in this chapter the continent underwent numerous, dramatic changes in habitat and climate. Studies of these changes have focused on the geological record of river gravels and soil deposition, on the evidence for climatic changes preserved in deep sea cores, on the vegetational record preserved in pollen, and on the varying evidence of human artifacts. Each of these approaches has developed and modified its own chronological scheme; changes in one sort of evidence, however, tend not to correlate well with changes in others, so that there is an often bewildering variety of terms and stages used to describe the record of the past.

The Geological Record

Beginning about 2.3 million years ago, a fundamental change occurred in earth's climate. Apparently due to changes in the planet's orbital tilt and spin, together with the cumulative effects of mountain uplift that altered air circulation patterns, a pronounced cooling commenced. The ensuing record is one of alternating cold and warm phases called glacial and interglacial periods. This entire time period is called the *Pleistocene*, from its onset until approximately 10,300 BP, when the last warm interglacial period, called the *Holocene*, began.

The geological record created during the repeatedly changing conditions of the Pleistocene varied dramatically through time. Glacial periods generally had a slow beginning of gradual, episodic cooling, marked by warmer phases called *interstadials* alternating with increasingly cooler periods called *stadials*, which culminated in the coldest phase, or glacial maximum. Glacial periods appear to have ended with a much faster, although still episodic, climatic warming. Based upon terrestrial geologic evidence, it has been difficult to determine how many of these glacial periods occurred. Initial descriptions of four major glacial periods were based upon studies of river gravel on the northern flank of the Alps, but this scheme was soon superseded by more elaborate frameworks that recognized a greater number of such events.

Conditions during a glacial maximum differed immensely from those during an interglacial period. At times of maximum cold, huge glaciers formed across Scandinavia and spread southward over northern Europe. Smaller glaciers formed in the Alps and other mountainous regions and expanded

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downslope. Because so much water was locked into the ice sheets, sea level dropped by varying amounts, by as much as 197 meters, exposing large expanses of the continental shelf and creating a land bridge between England and the rest of the continent. The climate was not only cold, but often dry as well, with shifts in ocean currents to the south and alterations in wind patterns.

Under the most rigorous conditions, even the heartiest of trees could not survive, and much of the continent was covered by varying kinds of steppe and tundra, increasingly dry and grass-dominated to the east. The very northernmost parts of the continent, as well as the ice-free part of central Europe situated between the Scandinavian and Alpine glaciers, had very sparse vegetation. The high winds were able to cause significant erosion of the open landscape, transporting and redepositing huge amounts of dust to create thick layers of *loess* in central and eastern Europe. Western Europe was always moister than areas farther east, and southern Europe was always warmer and stabler than the more northern regions, serving as a refuge for many varieties of trees.

The geologic evidence of glacial periods is diverse. The ice sheets scoured basins and carved valleys, leaving behind *ground moraines* (deposits of clay, sand, and gravel) and *end moraines* (ridges of gravel and other material pushed ahead of the glaciers) as they melted. The melting process formed drainage channels and filled basins, creating landscapes of numerous ponds, lakes, and streams in northern Europe and around the Alps. Unglaciated areas often show little evidence of true, humic soils, but rather deposits of loess and other materials. River valleys contain evidence of erosional downcutting in some areas (especially near the coasts as the rivers found their way to the lower sea) and of deposition of sand and gravel in others.

Animal communities, which included numerous now-extinct species, had to adapt to these conditions. In the harshest areas, both plants and animals were much scarcer than in regions farther south and west. The species best suited to these conditions, varying in their distribution during the Pleistocene, included the wooly mammoth, wooly rhinoceros, reindeer, and musk ox. In somewhat more temperate grassy steppes there were horses, bison, antelope, and ass, while red deer and aurochs were more abundant in open parklands with scattered trees, and ibex were frequent in mountainous regions. Carnivores were abundant and included the wolf, hyena, cave lion, and cave bear.

Interglacial periods, by contrast, were much warmer and more humid. Ice sheets melted, pouring water into the sea and raising it to modern levels or higher. At the same time, many areas of the coast were now freed of the weight of the ice sheets and showed a rebounding uplift. River mouths and land bridges were flooded, and many rivers slowed and deposited considerable material along their lower reaches. Trees and other vegetation spread from their southern refuges and virtually the entire continent became forested. True soils formed under this vegetation that stabilized the landscape. Cold-adapted animals retreated northward and woodland communities of elephants (in the earlier Pleistocene), deer, boar, and other animals developed. As lakes gradually filled in, wetlands diminished.

Although the exact number and chronology of these glacial cycles has been difficult to determine on the basis of terrestrial evidence, the alternation of true soils and loess deposits in parts of central and eastern Europe documents far more than four. A few clear indicators have been used to subdivide the Pleistocene into three long periods. The Lower Pleistocene spans the time from the beginning of this epoch until about 730,000 years ago, the date when the earth's magnetic polarity showed the last of a number of reversals called the *Brunhes/Matuyama boundary*. This boundary can be relatively clearly detected in geological sediments. The Middle Pleistocene extends from this boundary until approximately 128,000 years ago, when the last interglacial period before the present started. Finally, the Upper Pleistocene dates from 128,000 to 10,300 BP and includes that interglacial period together with the last glacial period.

The Deep Sea Record

Because geological evidence on land is reflective largely of local conditions and varies across regions, it has not proven appropriate for developing a record of a global, or at least a continent-wide climate change. Much more useful in this respect has been the record of sea-floor deposits obtained by deep coring. Undisturbed deposits essentially contain a record of the sea surface temperatures in the form of the types and chemical composition of the minute shells they contain. As sea surface temperature changed, so too did the species of shellfish in the surface waters, as well as the oxygen isotope ratios in their shells. Long cores contain a record of these changes that can be analyzed and dated.

Studies of such cores have now been done in many parts of the world. Remarkably, they document consistently a general pattern of changes in sea surface temperature and, by extension, in world climate. On this basis, it has been possible to determine eight different glacial/interglacial cycles since the beginning of the Middle Pleistocene, and another 22 back to approximately 1.6 million years ago (Gamble 1999). This amounts to about 50,000 years per cycle, but in fact, it appears that the cycles have become longer in duration through time, with the more recent lasting approximately 100,000 years. True interglacials form a small proportion of this period, about 10,000–13,000 years, while the rest is the glacial period. As van Andel and Tzedakis (1996:481) point out, however, the long glacial periods were not uniformly cold: "the glacial landscapes were for much of the time less barren than is generally assumed." During an interstadial dated to 39,000–36,000 BP, for example, much of the continent was actually forested, largely with conifers or mixed coniferous–deciduous vegetation.

On the basis of worldwide correlations among the deep sea cores, a climatic framework of *oxygen isotope stages* (*OIS*) has been established. These are numbers backward, with the present Holocene warm period as OIS 1, the preceding glacial maximum as OIS 2, and so forth. Warm periods (both interglacials and some interstadials) are odd numbers; colder periods are even. A total of 63 different stages have been recognized extending back to 1.6 million years ago, well into the Early Pleistocene. A clear feature of the Pleistocene climate is its variability.

The Early Europeans: The Biological Record

Coinciding with the Pleistocene geological period is the archaeological period of the *Paleolithic*, or Old Stone Age. Largely on the basis of changes in technology and tool type, the Paleolithic has been subdivided into three substages: the Lower, Middle, and Upper Paleolithic, only the first two of which are the focus of this chapter. Specifying the dates for each of these stages is difficult, as there has been some confusion whether they should be used as chronological or technological indicators. Traditionally, the boundary between Lower and Middle Paleolithic has been drawn at the boundary of the Middle and Upper Pleistocene, that is, at the onset of the warm interglacial approximately 128,000 years ago (Fig. 4.1). Recently, however, archaeologists have noted that some artifacts and assemblages that are technologically "Lower Paleolithic" occur after this date as well, while some assemblages that are undeniably Middle Paleolithic in technology and typology appear much earlier. In general, these discrepancies have led to a shifting of the boundary between Lower and Middle Paleolithic earlier, to perhaps around 240,000 years ago (the beginning of OIS 7). This would have the additional advantage of bringing this boundary in closer agreement with significant changes in the human skeletal record leading to the appearance of Neanderthals at the beginning of the Middle Paleolithic.

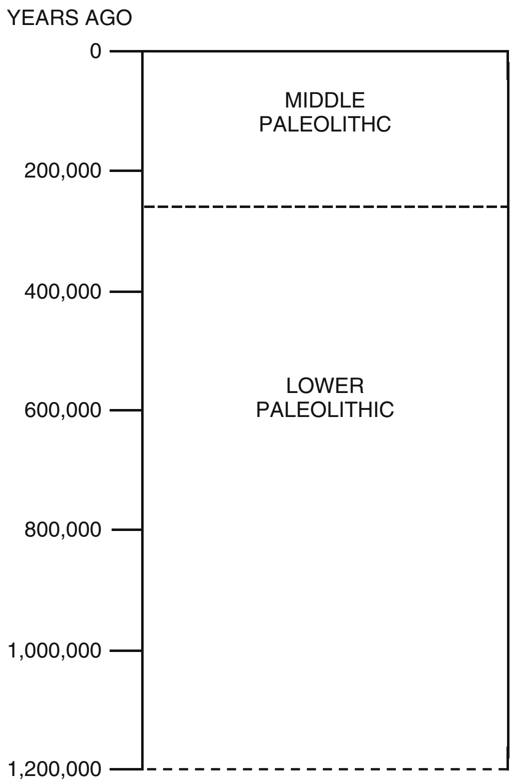

Fig. 4.1 Chronological chart of the Lower and Middle Paleolithic

The Early Europeans: The Biological Background

The record of human evolution began in Africa with the appearance of *Australopithecus* between 5 and 4.5 million years ago. Over the course of the next 2 million years, there seem to have lived several different named species within this genus, varying considerably in size and skeletal characteristics, but all smaller than modern humans and with cranial capacities of up to about 550 cubic centimeters (modern humans show a range of 1300–1600 cubic centimeters). By around 2.5 million years ago a form appears alongside the Australopithecines that is sufficiently different and sufficiently "modern" to merit assignment to our own genus, *Homo*. The earliest representatives, called *Homo habilis*, were small creatures (barely over 3 feet tall) with smaller teeth and larger brains (up to approximately 700 cubic centimeters) than the Australopithecines. It is probably no coincidence that the first known stone tools appear at the same time, primarily crude flakes struck from pebbles.

Finds dating to around 1.9 million years ago indicate that the genus *Homo* underwent rapid evolutionary change, enough so that a new species name has been assigned: *Homo erectus*. Actually there is considerable disagreement about the naming of species, with many paleoanthropologists preferring to call these forms *Homo ergaster*, and to reserve the "erectus" name for later finds in Africa and Asia. However, because these various finds share many characteristics, and because the significance of the observed skeletal variation is not clear, the designation of *Homo erectus* is used here as a broad category for similar forms throughout the Old World, including Europe.

Homo erectus lived alongside the Australopithecines in Africa until approximately 1 million years ago, but differed considerably from them. This was a much bigger hominid, sometimes over 5 feet in stature, with a braincase of up to 1000 cubic centimeters in size. Initially, its stone tool technology continued to resemble that of earlier times, dominated by flake tools and coarse pebble-chopping tools, but around 1.5 million years ago a new tool appears. This is the handaxe, a symmetrical, bifacially flaked implement with two converging sharp edges. Accompanied by an increasing variety of flake tools, this became the hallmark for a complex called the *Acheulean*, discussed below.

It was *Homo erectus* who first left Africa and began the peopling of the rest of the Old World. Recent finds suggest that this occurred relatively fast and early. Dates of between 1.6 and 1.8 million years ago have been obtained for *Homo erectus* finds in Indonesia (Swisher et al. 1994), although not all scientists accept these early dates. Fragmentary bones found in south-central China, claiming to show similarities to *Homo ergaster*, have dates of almost 2 million years ago and are accompanied by a few flake and pebble tools (Larick and Ciochon 1996), but some uncertainty exists about the identification of the bones as hominids. The site of Ubeidiya in Israel, dating back to about 1.4 million years, contained fragmentary hominid remains and stone tools, including crude handaxes, as well. Much discussion surrounds this remarkable expansion. It took place early in the Pleistocene, when world climate was changing significantly. Shifts in the distribution of forest and grassland, in the availability of waterholes, and in the distribution and composition of animal communities no doubt forced adjustments on the African hominids. Greater mobility may have been one of these adjustments, bringing the people into new areas and new habitats. Their relatively large brains and stone tool technology would have facilitated their coping with new environments, assisted, perhaps, by one new cultural development: the mastery and use of fire. Certain evidence of hearths is difficult to determine in the archaeological record, as bones and artifacts can easily be burned by natural brushfires. But some finds in south and east Africa of stone tools and burned animal bones in association with areas of baked clay hint that crude hearths may have appeared as early as 1.6 million years ago. More definite evidence comes from Chinese sites much later during the Middle Pleistocene. There is no doubt that the controlled use of fire for warmth and perhaps cooking would have been particularly valuable as people moved out of tropical Africa into more northern regions, and may have facilitated the expansion into Europe as well.

The First Europeans: Homo erectus

Debates surround the age of the first Europeans, largely because of conflicting interpretations of the validity of the evidence. This evidence of early human presence takes one of two forms: apparently early stone tool assemblages and archaic forms of human skeletal material. A number of finds of stone artifacts have been advanced as candidates for evidence of human presence well before 500,000 years ago, in some cases reaching back to over 1.5 million years. For a variety of reasons discussed below, however, most of these sites have been challenged, either because the purported artifacts may be simply naturally broken rocks, or because their age is in doubt. Finds of human skeletal material obviously provide much firmer evidence, although the problems of dating remain.

The European skeletal record for the Lower and Middle Pleistocene, however, is not rich. Scattered across the continent and across the hundreds of thousands of years are relatively few finds of various fragmentary bones. Skulls or skull fragments are most informative and have been emphasized in monitoring the evolutionary changes of the early Europeans.

The earliest relatively secure finds of material relevant to the initial peopling of Europe come from Dmanisi, Georgia, at the edge of the continent. These finds consist of two skulls as well as a jaw and a foot bone. The skull of an adult male has a cranial capacity of 780 cubic centimeters, while the other, of an adolescent female, measures 650 cubic centimeters. Both show traits nearly identical to the early *Homo ergaster*. Several dating techniques applied to an unweathered volcanic layer immediately below the finds indicate an age of approximately 1.7 million years, which is supported by both paleomagnetic readings of the sediments and associated faunal remains. Along with the bones, archaeologists found stone tools – flakes, scrapers, and chopping tools.

The oldest certain European skeletal finds come from an astounding site complex called Atapuerca in northern Spain. One of the sites in this complex, Sima del Elefante, has yielded a fragment of a mandible with a few teeth, accompanied by stone tools and processed faunal remains (Carbonell et al. 2008). These have been dated to 1.1–1.2 million years ago. An old railway cut revealed a nearby cave, Gran Dolina, which is now completely filled in with sediments, that has produced both human skeletal remains and stone tools dated to roughly 800,000 years ago, before the last magnetic reversal. Excavations continue at these sites, but already they have had a profound effect on our knowledge of European prehistory. Among the highly fragmentary bones at Gran Dolina were the remains of six individuals ranging in age from toddler to young adult. Importantly, facial bones and a number of teeth were among the finds; both of these body parts have been critical in determining patterns of evolutionary change. The bones from both Atapuerca sites share a number of traits with *Homo ergaster* but are different enough (particularly in the "modern" features of the face) that the excavators have suggested a new species name, *Homo antecessor*. They suggest that Europe was first colonized by this species, a descendant of African *Homo ergaster*, perhaps even in a second wave of expansion, separate from the one that led to the Asian groups of *Homo erectus*.

Their reasons for invoking the possibility of a second wave of hominid dispersal out of Africa include not only the differences between the Atapuerca finds and Asian skeletons, but also the delay in the peopling of Europe in comparison to much of the rest of the Old World. If people were already at Dmanisi by 1.7 million years ago, why did it take another half million years to move into Europe? There are two possible answers. First, they did move into Europe earlier, but we simply do not have adequate conclusive evidence. In this case, the disputed finds of early stone tools might, indeed, represent traces of this early occupation. A second possibility, however, is that the delay is real and caused by environmental conditions in Europe that initially posed too great a challenge to groups coming from the tropics. However, temperate regions of China appear to have been colonized before 1 million years ago, and perhaps as early as 2 million years ago, as mentioned above. Ecological frontiers were no insurmountable obstacles to this expansion.

If the initial peopling of Europe was by very small, mobile groups, it is likely that their archaeological record will be sparse and visible only upon accidental discovery. Such discoveries occur frequently in archaeology and often provide surprises that overturn conventional interpretations of the past. The first finds at Gran Dolina were not made until 1976, at Dmanisi in 1991, and Sima del Elefante in 2007. More surprises are probably waiting to be discovered.

One additional feature of the finds at Gran Dolina, Atapuerca deserves mention: many of the hominid bone fragments show signs of cutting and purposeful breakage. The excavators suggest that these are signs of cannibalism, with meat removed from the bones using stone flakes and with bones (especially vertebrae) broken open for marrow. If true, then the hominid bones at the site represent *prey*, not occupants, and the question of who was doing the eating remains open. Other groups of *Homo antecessor* would be likely, but the excavators raise the possibility that other, more "erectus-like" hominids were responsible.

In fact, later skeletal finds in Europe, dating back to around 500,000–400,000 years ago, do represent individuals with features more similar to *Homo erectus*. They have sufficient unique characteristics, however, for yet another species name to have been developed: *Homo heidelbergensis*. The finds include a tibia (shin bone) found at the English site of Boxgrove and a mandible (jaw) at the German site of Mauer near Heidelberg, both dating to around 500,000 years ago. Other bone fragments thought to date to approximately 400,000 years ago include finds from Vértesszöllös in Hungary, Bilzingsleben in Germany, Tautavel in France, and Petralona in Greece. By this period of the Middle Pleistocene, the archaeological record is much richer and occupation is known throughout most of the continent.

Recently, the number of these finds has increased dramatically by discoveries at another location at Atapuerca, the Pit of Bones (Bermudez de Castro et al. 2004). In a deep cleft in a former cave, excavators have uncovered over 4000 bone fragments dating to around 400,000–500,000 years ago. They represent the remains of at least 28 individuals, male and female, who range in age from 4–35 years, with two-thirds between 11 and 20 years. Remarkable about this collection are the extreme differences in skeletal characteristics among individuals. Cranial capacity varies widely, ranging up to 1390 cubic centimeters. The adults appear quite tall and robust, with male height between 5 feet 7 inches and 6 feet. The teeth are heavily worn, but there are few signs of injury or trauma. A number of traits characteristic of later Neanderthals are evident. There is no accumulation of stone tools or bones of other animals with these finds; hence, it is not a campsite. However, one well-made but unused handaxe accompanied the bones. It has been suggested by the excavators that this was a location where bodies were tossed into a pit, possibly in conjunction with ritual activities or simply as a convenient disposal of the bodies.

Later Forms and the Emergence of Neanderthals

The second half of the Middle Pleistocene, after 400,000 years ago, is known for a number of skeletal finds characterized by considerable variability. Again, this variability has fueled many debates over the number and identity of different species to be recognized in our ancestral line. In general, the "erectus-like" populations (including *Homo ergaster, Homo antecessor,* and *Homo heidelbergensis*) are followed in Europe by a group of finds variously called Archaic *Homo sapiens* or Pre-Neanderthals, all characterized by larger brains than earlier forms. Dating between roughly 300,000 and 250,000 years ago, they include isolated skulls found at Swanscombe in England (1325-cubic centimeter cranial capacity) and Steinheim in Germany (1100-cubic centimeter cranial capacity), both dated to around 250,000 BP.

By around 230,000 years ago, sufficient changes had occurred in European populations for most paleoanthropologists to assign them to the Neanderthals, *Homo sapiens neanderthalensis*, as a subspecies within our own. Finds are much more abundant than previously, with more than 30 different individuals represented (Stringer and Gamble 1993:70). The traditional picture of Neanderthals actually applies primarily to the latest forms, dating to the first half of the last glacial period. These "classic Neanderthals" were rather short and stocky individuals with relatively short arms and legs and very robust musculature. Their brains were fully modern in size, but the skull was quite different from ours, long and flat on top, with a large brow ridge over the eyes and a protruding "bud" at the lower back of the skull. The nose was long and wide, perhaps in order to heat cold, dry air adequately, and the jaw and front teeth were quite large. Many of the skeletons show evidence of both arthritis and numerous injuries, suggesting a dangerous and difficult life. They appear to have developed more rapidly than modern humans, reaching physical maturity at around age 15 years, and most died before the age of 40 years (Shipman 2004). Earlier Neanderthals share many of these traits, but are generally less robust.

Sites and Findspots: The Archaeological Record

The archaeological record of Paleolithic Europe (Fig. 4.2) is extremely fragmentary and heavily biased. Thousands of years of sea level change, erosion and deposition, and human occupation have transformed the landscape, destroying or masking sites. Any coastal sites dating to periods when sea level was lower than today are now underwater, except for a few, exceptional areas where the

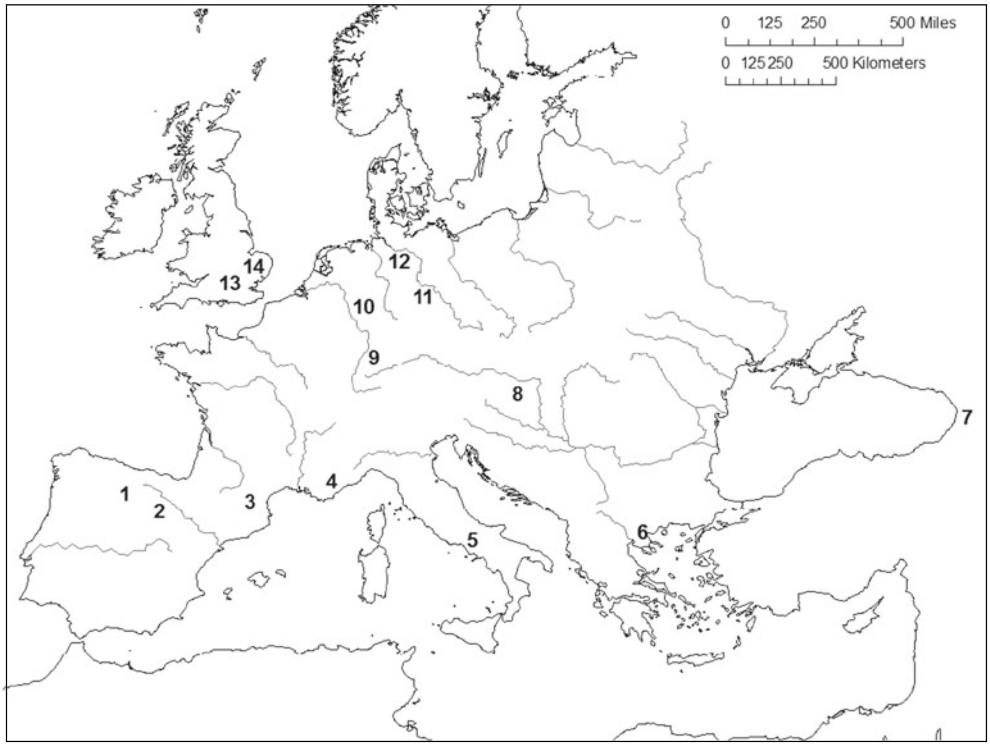

Fig. 4.2 Lower Paleolithic sites mentioned in the text: *1* Atapuerca; *2* Torralba; *3* Tautavel; *4* Terra Amata; *5* Isernia; *6* Petralona; *7* Dmanisi; *8* Vértesszöllös; *9* Mauer, Steinheim, Cannstatt; *10* Kärlich; *11* Bilzingsleben, Wallendorf, Markleeberg; *12* Schöningen; *13* Boxgrove; *14* Swanscombe

continental shelf drops off very steeply or where postglacial uplift has raised the old shoreline. Sites in areas of glaciation (primarily the far north and around the Alps) may have been destroyed by later expanding ice sheets. Sites along rivers may have eroded away completely or may have been buried beneath tens of meters of deposits. Farming and construction activities doubtless destroyed countless other sites. What remains for archaeologists to discover, then, is only a tiny fraction of the sites created in the past. The earlier the period of interest, the more sites are likely to have been destroyed.

Undisturbed sites from these early time periods, consequently, are exceptional, and their discovery is often by accident. Most open-air sites, which seem to be the majority for the Lower Paleolithic and probably the Middle Paleolithic as well, have, in fact, been found by accident. Construction of roads and railways, excavation of building foundation, and quarrying for gravel or travertine have been responsible for a large number of early finds, constituting a very haphazard sample of the past that may not be representative of lifeways or the patterns of land use.

Caves and rockshelters, as visible fixed spots on the landscape, have more often been the focus of deliberate investigation by amateurs and professionals alike. It is likely that they are overrepresented among the known archaeological sites, not only because they are easier to find, but because they have protected and sealed archaeological remains from destructive processes, creating the potential for rich archaeological assemblages of stone and bone. If caves and rockshelters were used prehistorically only for certain activities, however, our interpretations of past lifeways will be significantly biased.

Because archaeology has a long history in Europe, many of the most obvious and important sites were excavated quite early, using techniques that are deficient by today's standards. Common among these early excavations was a lack of attention to the fine details of stratigraphy, resulting in the assigning of materials to very thick “cultural levels,” surely representing multiple occupations over long time periods. Moreover, screening of the excavations surely failed to retrieve many smaller artifacts and bones. Often, only the “most typical” or prettiest artifacts were saved during excavations, leading to the casual disposal of much stone waste and many bones, now considered vital sources of information. Unfortunately, it was also a common practice for collections to be divided and dispersed among several museums and private collectors, making it difficult for modern studies of complete assemblages. The vast upheavals of the world wars led to the loss or destruction of many of these collections, as well as of many of the excavation notes that might have existed.

Another confounding factor has been the typological focus of much of Paleolithic archaeology. In an attempt to bring order out of the chaos of stone tool variability, some classification of techniques, tools, and assemblages is necessary, but it is most useful when the basis of the classification system is explicit and its meaning is clear. This has not been the case. Artifacts have been classified in part according to technology of manufacture, in part on the basis of shape and retouch. Vague, but untested, ideas about artifact function (spear points must be pointed, for example) have driven some interpretations of these tool types, but more often, cultural styles have been sought in the types and proportions of different tools. The facts of European history have played a role in this approach. Europe has a long history of ethnic and cultural variability and a detailed record of different group migrations. Perhaps it is only to be expected that prehistorians would also seek to identify groups and their movements in the Paleolithic record. Unfortunately, it may well be that stone tools are poor indicators of ethnicity or group identity and that vague, intuitive classifications simply make it difficult to investigate either activities or culture.

The Lower Paleolithic

Spotlight on Two Sites

Bilzingsleben

The travertine quarries near Bilzingsleben in central Germany have been known as a place of animal fossil discoveries since at least 1710. In 1969, however, human artifacts were found during quarrying and led to the excavation of roughly 600 square meters over the next 20 years. The site that emerged from these excavations is one of the most intriguing and controversial Lower Paleolithic sites in Europe.

The site (Fig. 4.3) is located on the shore of a former lake, next to a spring. After the site was abandoned, the spring water flowed by and over the site, gradually depositing dissolved minerals in a precipitate that formed a hard layer of travertine, sealing and preserving the site. Based on this work, the excavator has created a remarkable picture of life during the Middle Pleistocene (Mania 1990).

Several fragments of human skulls and teeth found at the site have been attributed generally to *Homo erectus*. Supporting this are the estimated dates for the site based on geological and paleontological evidence, which suggest an age ranging from 350,000 to 400,000 years. The site was occupied during a warm interglacial period, when average yearly temperatures were 2–3 degrees Centigrade higher than today. Winters were mild, summers warm and dry. The surrounding vegetation was a mosaic of moist forest of oak, beech, and alder and open bush and grassland.

The major prey taken by the people camped here were species of forest- and steppe-rhinoceros, but a large variety of other prey were taken as well. The minimum number of individuals of each species is as follows:

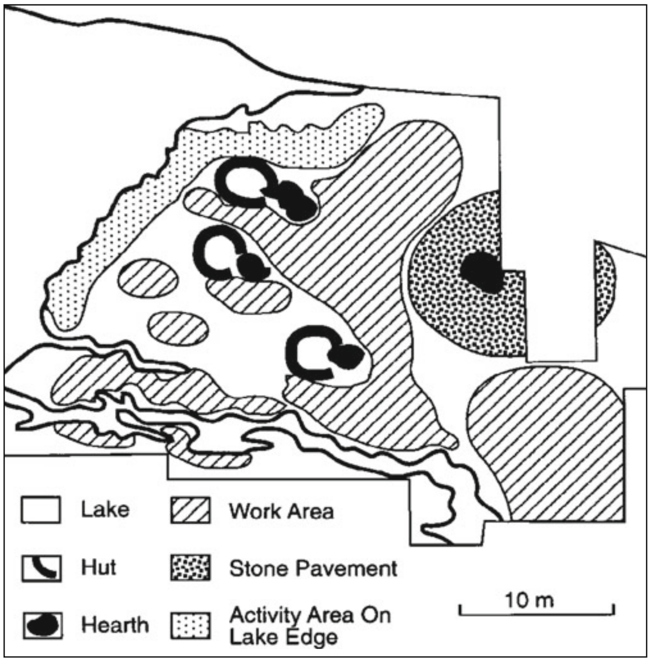

Fig. 4.3 Bilzingsleben site plan (after Mania 1990)

68	Rhinoceros
31	Forest elephant
13	Bovids (aurochs, bison)
7	Horse
32	Red deer
5	Boar
5	Roe deer
29	Bear
3	Lion
1	Wolf
1	Lynx
11	Giant beaver
37	Beaver
12	Other small mammals

In addition, fish bones, mussel shells, eggshells, and wild cherry pits were found.

The excavator suggests that these diverse species were hunted largely with wooden spears, based on finds of such spears in sites elsewhere in Germany and England. The largest animals are represented by bones from only the meatiest portions of the body, suggesting that they were killed elsewhere and only those parts brought back to camp. Smaller prey, such as deer and beaver, are represented by fragments from entire skeletons, indicating that they were killed nearby and could be easily transported whole.

Among the most notable features of these sites are three huts that have been reconstructed. These consist of almost closed circles of large rocks and bones, with the openings all facing the same direction. At the entrance to each is a hearth of charcoal and fire-cracked rock. In comparison to the rest of the site, the interiors of the huts are relatively empty, containing primarily small bones and stones and a large anvil stone.

Outside of the huts, work areas have been identified, consisting of concentrations of fragmented bone and/or chipped stone; some of these have large anvils of stone or bone. Another special area was an oval "pavement" of pebbles, 9 meters long, compressed or trampled into the sediments. The pebbles are said to be foreign to the site location and were brought in. Trash middens, consisting of large scatters of especially small stone and bone debris, lay downslope, both into the lake and behind the huts away from the lake. Other features include a line of large rocks and bones about 5 meters long and a number of whole elephant tusks close to the huts.

Approximately 150,000 stone artifacts were found, of which 22,000 were retouched as informal flake tools used for cutting, scraping, and sawing. These tools were made from a variety of locally available materials, including quartzite, limestone, travertine, quartz, and flint. In addition, many pebbles have traces of battering from use as hammer stones. Over 200 bone fragments appear to have been crudely flaked to create hammers, picks, chisels, knives, and scrapers, and antlers were used as clubs. In addition, four bones were found to bear engraved parallel lines or geometric figures, suggested to represent non-utilitarian art objects.

The excavator interprets this site as a seasonal base camp for a small group of foragers. They were attracted by the fresh water and the location suitable for active hunting in the surrounding forests and grasslands. During their stay they made substantial modifications to the site, structuring the space into different areas of work, sleep, and discard. This interpretation, however, has not gone unchallenged. Gamble (1999:153–172), for example, argues for an interpretation of much more unstructured, opportunistic behavior. In this view, the circular patterns of stones and bones reflect rings of materials discarded by individuals sitting around trees or anvil stones, and the hearths simply burned portions of fallen trees. The site is certainly relatively unique in its complex spatial structure, suggesting that sweeping interpretations of Lower Paleolithic behavior on its basis may be unwarranted.

Terra Amata

The site of Terra Amata was discovered during the construction of an apartment building in 1965 and excavated over a period of 5 months (de Lumley 1969). Situated in Nice on the edge of a hill next to the French Mediterranean shore, it is a deeply stratified site, the age of which is uncertain. Geological estimates suggest a date of approximately 400,000 years ago, while two thermoluminescence dates indicate a younger age of around 230,000 years (Villa 1983:54–55). The artifacts were found deposited in beach and dune sands over a vertical distance of 1.5–2 meters, suggesting repeated occupations. The excavator identified 21 different levels or "living floors," most of which had the remains of a hunt together with stone and bone artifacts.

All the identified huts, many of which were exactly superimposed on earlier ones within the dune, were ovals ranging in width from 4 to 6 meters and in length from 8 to 16 meters. These outlines were visible as lines of small postholes, 7–8 centimeters in diameter, from stakes driven into the sand to form a palisade or windbreak, and as arrangements of large rocks, up to 30 centimeters in diameter outside of the line of stakes. Some of the huts also show evidence of central posts measuring about 30 centimeters in diameter, presumably serving as roof supports. Within each hut was a hearth, recognizable as a concentration of charcoal and heated stones. Some seem to have been constructed on small stone pavements, others in shallow pits. Small windbreaks of piled stones often were placed next to the hearths.

Artifacts of stone and bone were concentrated within the huts. Almost 11,000 stone artifacts were recovered, of which the majority were waste flakes of limestone, silicified limestone, and flint. Among the retouched tools, flaked pebbles and pebble fragments, choppers, and picks predominated, accompanied by a few bifaces and small tools made on retouched flakes. The coarser limestone was used primarily to make the larger pebble tools, while the finer-grained material predominated among the small tools. All of the raw material was available in the vicinity of the site, the farthest source identified being 30 kilometers away. The high proportion of waste flakes suggests that much stone-working took place at the site, an interpretation supported by the fact that a number of flakes and cores can be refitted (Villa 1983). Several bones also appear to have been sharpened as tools, and a few pieces of red ochre mineral pigment were found.

Animal remains, which have not yet been fully analyzed, are not abundant, but contain a relatively high diversity of species, including red deer, forest elephant, rhinoceros, boar, ibex, aurochs, rabbit, and bear. In addition, a few burned shells of mussels and oysters and a small number of fish bones were recovered.

Pollen analysis suggests a largely forested environment with pine and fir, presumably on the slopes, and Mediterranean pines and oaks at lower elevations. Human feces, or *coprolites*, were found and also contained pollen, the analysis of which indicated plants that flower in late spring or early summer. On the basis of these finds, the excavator interprets the site as a repeatedly used seasonal residential camp, utilized largely in spring. A very small group would come to the shore and establish camp by building a hut near a small spring that provided fresh water. While there, perhaps only for a few days, they manufactured stone tools, hunted in the forests, and collected some shellfish and fish as well. This interpretation suggests a highly patterned seasonal round of activities, with groups returning to the same location at the same time of year.

New analyses have raised questions about some portions of this interpretation. Finds of two unshed red deer antlers suggest kills in fall or winter, indicating that the seasonal use of the site may have been more variable than supposed. More importantly, examination of the vertical distribution of the finds, together with refitting of a sample of the stone artifacts, suggests that the site has been considerably disturbed (Villa 1983). Many flakes from different levels can be fit together, reflecting vertical artifact movement by as much as 45 centimeters. The factors causing such displacement are unknown, but may have included human trampling, rainwater percolation, or animal burrowing. The implication of this finding is that the recognized archaeological levels may be artificial and patterns found within each of the supposed living floors of dubious behavioral meaning. This has caused many archaeologists (Fagan 1998:94–95, Gamble 1999:161) to doubt the existence of the huts and other patterns.

Nevertheless, Villa (1983:77) emphasizes that the *horizontal* displacement of artifacts appears to be minimal and concludes that "the fireplaces and the possible structural features strongly suggest that Terra Amata was a living site." Whatever the status of the huts, this site provides strong evidence for repeated occupation of the Mediterranean shore by groups utilizing a variety of large and small animal foods. Using large stones and wooden stakes or posts, they constructed living spaces around hearths, which formed the focus of stone-working and butchering activities.

Lower Paleolithic Stone Tools and Technology

The most obvious feature of Lower Paleolithic stone tool assemblages is their variability. Differences in tool types, technology of manufacture, and tool size present a bewildering array of combinations that have resisted easy classification. Archaeologists have tried to identify and name recurrent groupings, but have been only partially successful. It appears that Lower Paleolithic people had a diverse repertoire of working stone, varying with needs and raw material. As *cultural* markers of different groups, archaeological "cultures" may be inappropriate.

A primary distinction among assemblages that has traditionally been emphasized is between those with *handaxes*, or bifaces, and those without. The handaxe, often considered to be the characteristic tool of the Lower Paleolithic, is a symmetrical tool that has been shaped by bifacial retouch to have two

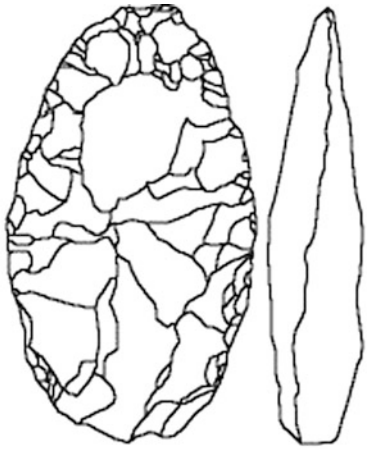

Fig. 4.4 Handaxe, a tool characteristic of the Acheulean

opposing, relatively sharp edges (Fig. 4.4). Its shape varies widely, from oval to pointed to triangular (Callow and Cornford 1986), as did its function. Traces of polish and battering on the tools suggest their use in cutting meat as well as chopping or hammering (Keeley 1980). In addition, they may have served as *cores*, or sources of flakes, to be used for other purposes. At least some handaxes, therefore, may have served as "Swiss Army knives," carried and used for a variety of purposes.

The frequency of handaxes in assemblages also varies widely (Villa 1983), but in general, they appear to be scarcer in occupation sites than in collections of naturally transported artifacts (along with river gravel) or as isolated finds, and also scarcer in cave sites than in open-air situations, at least in western Europe. Many factors probably contribute to creating these patterns. Compared to most other tools, handaxes are large and obviously manufactured by humans. Hence, they are more likely to be found and kept by collectors and archaeologists. If many of them were indeed multipurpose tools, then they may have been carried (and lost) more frequently away from campsites, on trips where the needs for specific tools would have been uncertain. In addition, caves may have been only a small class of camp types used by particular groups, camps where the suite of activities involving handaxes were less important than at other locations.

Assemblages with handaxes have been grouped together into the *Acheulean* culture, or technocomplex, named after a locale in northern France. Along with handaxes, Acheulean assemblages contain other sorts of large tools (picks, choppers, cleavers) together with more numerous flake tools (scrapers, denticulated, and notched pieces). Most notable about the flake tools is their lack of standardization compared to later forms. What seems most important about these tools is their edges, not their overall shape, that were variously used to cut, scrape, and saw. Physical characteristics of the flakes indicate that a variety of techniques were used in their manufacture (Villa 1983:7). Sometimes blocks of stone were struck against fixed "anvil" stones, producing rather thick and crud flakes. Other flakes were created by striking the stone with hammers, either hard (other stones) or soft (bone or wood). The cores with successive flake removals might be rather informal and amorphous, discoidal, or heavily prepared by a variety of techniques (including the Levallois technique discussed later).

Acheulean assemblages were once thought to be found solely in western and southern Europe, over as far as India. This distribution, however, is now known to be not quite so exclusive, with some handaxes appearing in parts of central and eastern Europe and east and southeast Asia as well. Nevertheless, they are by far much more common in Spain, France, England, and Italy than in other parts of the continent.

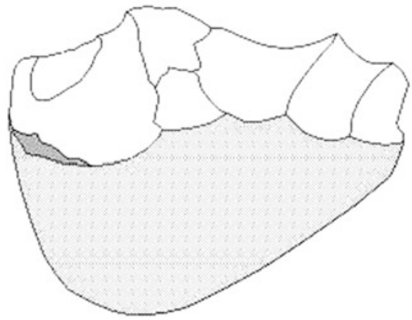

Fig. 4.5 Chopper, a common form of pebble tool

The dominant industries in central and eastern Europe lack handaxes and are characterized by a variety of flake tools, often together with crude larger tools that are minimally shaped to create choppers and chopping tools (Fig. 4.5). Often these were made on rounded pebbles, but they were made on more blocky debris as well. In some cases, such as the site of Vértesszöllös in Hungary, both flake tools and choppers are extremely small, less than 3 centimeters in maximum dimension (Kretzoi and Dobosi 1990). These small-tool assemblages appear to be especially common in forested regions during warmer periods, and their size may be related both to the size of available stone and to restricted functional needs when wood was a more important raw material (Svoboda 1989). Their small size may also have required hafting in wooden handles, a significant technological development.

Assemblages without handaxes are also found in England and France although less commonly. Depending upon other characteristics, including the technology of manufacturing flakes and the types of flake tools, these have been considered to be Acheulean without handaxes, or a different industry entirely, such as the *Clactonian* in England, characterized by large flakes made with the anvil technique. It should be emphasized, however, that so-called Clactonian flakes and tools can occur in Acheulean assemblages, leading some researchers to deny their cultural distinctiveness: "the Clactonian can no long be regarded as a typological, technological, and hence cultural entity distinct from the wider Acheulean" (Gamble 1999:128). Crude choppers and chopping tools, although thought to be more characteristic of sites in central and eastern Europe, also appear in Acheulean assemblages in the west. A few sites scattered across the continent even contain elongated flakes with roughly parallel edges that may be termed *blades*, manufactured by prepared-core techniques and considered typical of later Upper Paleolithic industries. The earliest human tools known anywhere are found in Africa and date back to around 2.6 million years. They are characterized by crudely shaped flakes together with larger pebbles that have had a few flakes removed to create sharp-edged choppers and chopping tools. Assemblages with these traits are usually grouped together into the *Oldowan*, or Pebble-Tool complex. Not until about 1.6 million years ago does the handaxe appear there, along with more finely made flake tools.

Handaxes do not appear in Europe until much later, around 500,000 years ago, and apparently earlier sites contain only pebble tools and crude flake tools, mirroring the sequence seen in Africa. But as mentioned above, pebble tools continue to be found long after the first appearance of handaxes, and are not by themselves an indication of age or primitiveness. Nevertheless, it seems clear that the stone toolkits of the earliest Europeans consisted solely of pebble tools and crude flake tools, and this has caused some of the problems of determining just when the first Europeans appeared. Many naturally broken rocks can resemble these tools; thus determining human workmanship is difficult.

A number of "sites" have been put forward as evidence of an early occupation of Europe. Gamble (1999) lists 20, all of which contain purported pebble and flake tools, and most of which lack human skeletal remains. These sites are found in Spain, France, Italy, Belgium, Germany, the Czech Republic, and Russia. In some cases it seems that the supposed artifacts are, after all, naturally broken rocks. In most, however, the artifacts appear real, but the dating is ambiguous. The major dating techniques involve analysis of the stratigraphic sequence (including determining the environmental conditions of deposition and/or measuring the polarity of the magnetic field) or identifying associated animal remains. In rare cases, an absolute dating technique such as thermoluminescence has been applied to sediments. In many cases the dating of particular sites using these approaches is either coarse-grained or ambiguous. The site of Isernia in Italy, for example, has been dated to a period earlier than the last magnetic reversal at 780,000 years ago on the basis of measurement of the polarity retained in the sediments, but to much later on the basis of faunal remains. Thus, there is considerable room for debate and alternative interpretations (Carbonell et al. 1996). The finds of pebble tools and flakes both at Dmanisi in Georgia (ca. 1.7 million years ago) and Atapuerca, Gran Dolina in Spain (800,000 years ago) do provide strong support for a human presence in Europe during the Lower Pleistocene.

Use of Other Materials in the Lower Paleolithic

Evidence for the use of materials other than stone is scant for the Lower Paleolithic. At Bilzingsleben, Terra Amata, and a few other sites, some large bones appear to have been crudely worked by chipping to form usable edges or ends for use as knives, scrapers, and picks. Evidence for the use of wood is largely more indirect, consisting of possible postholes at sites like Terra Amata suggesting construction of windbreaks or huts. Wood was also certainly used as fuel, to judge from finds of wood charcoal associated with hearths at various sites. The best evidence for wood use, however, consists of the recent remarkable discoveries at the site of Schöningen in northern Germany, where strip-mining of brown coal has cut down into Middle Pleistocene sediments (Thieme 1997). Archaeologists working in advance of the destruction of these sediments have discovered a number of impressive sites in which preservation of organic remains has been favored by mud and peat. Dating to approximately 400,000 years ago, these sites have had a profound impact on thinking about the lifeways of *Homo erectus.*

At one location on an ancient lakeshore, numerous bones of elephant, rhinoceros, red deer, horse, bear, smaller mammals, birds, fish, and reptiles were found together with stone tools and wooden artifacts. Many of the bones show cut marks from butchering. All three wooden implements made of fir have grooves cut into one end and have been interpreted as handles for stone tools. If this is the case, it is the earliest evidence in existence for a composite technology.

A nearby location contained a hearth, thousands of butchered animal bones, hundreds of stone artifacts, and four implements made of spruce wood. One is a stick 78 centimeters long that has been sharpened at both ends. This has been interpreted as either a throwing stick or a short thrusting spear. The other three wooden tools are spears, ranging in length from 1.82 to 2.30 meters. All three have finely sharpened points and similar proportions, with the maximum thickness and weight at the front, similar to modern javelins. These tools, interpreted as throwing spears, suggest, as the excavator states, that "well-balanced, sophisticated hunting weapons were common from an early period of the Middle Pleistocene onwards" (Thieme 1997:810). These finds supplement and amplify the discovery of fragmentary sharpened wooden implements at the English site of Clacton (dating to roughly the same period) and at the German site of Cannstatt (dating to around 300,000 years ago), and testify to a high degree of planning and skill in tool manufacture quite early in the Middle Pleistocene.

Lower Paleolithic Subsistence and Behavior

The successful expansion of *Homo erectus* out of tropical Africa is usually credited to a combination of biological and cultural changes: a larger brain, the mastery of fire, and the development of big game hunting. Their brains were certainly bigger than those of their predecessors, although the implications of this are unclear. Hearths and burned bones are indeed a feature of many Middle Pleistocene sites, but the evidence from the Lower Pleistocene is rarer and more ambiguous. And whether active hunting of big game was the foundation of Lower Paleolithic economies is debated.

There is no denying the frequent association of stone tools with the bones of large animals. Remains of elephant, rhinoceros, aurochs, horse, and red deer occur together with flakes, choppers, and other artifacts not only at Bilzingsleben and Terra Amata, but at many other Lower Paleolithic sites. The English site of Boxgrove contained bones of horse, rhinoceros, and red deer. In the French site of Tautavel were remains of two species of rhinoceros, three species of deer, horse, bison, reindeer, and many other large herbivores. Vértesszöllös in Hungary contained bones of rhinoceros, horse, deer, bison, and bear. Among the most remarkable Lower Paleolithic sites are Torralba and Ambrona in north-central Spain (Freeman and Butzer 1966). Here, the remains of over 30 elephants were found together with a large number of handaxes, scrapers, and other flake tools.

The debates concern the reasons for these associations. One interpretation, of course, is that these large animals were actively hunted, butchered, and sometimes transported, and eaten. The various sites therefore represent kill/butchery sites or base camps to which meat was carried. This interpretation gives the human an active role in a complex economy that probably required considerable planning and cooperation.

Other interpretations, however, are also possible. One is that the bones and stones are accidentally associated due to natural processes. Flowing streams are known to transport materials over considerable distances, often redepositing them in different locations according to their size. Large rocks become concentrated as gravel deposits, while smaller stones tend to accumulate on sandbars. Both larger stone artifacts and large animal bones might easily be eroded out of separate river-edge locations, transported downstream, and deposited together with natural gravel. Lakes, ponds, and marches could also be the locale for a natural mixing of bones and stones. Bodies of water attract both human and animal use; the bones of animals dying naturally near waterholes could easily be mixed with earlier stone tools left behind by humans, especially if there was little natural deposition of sediments between the abandonment by humans and the animal deaths. Finally, the natural shelters of caves might be used alternately by both humans and large carnivores like cave lions; the bones of their prey might easily become mixed with the tools and bones left behind by humans.

Many Lower Paleolithic sites are found in just these types of situations: river gravel, lake edges, and caves. Indications of a natural cause for the association of bones and stones would include a lack of evidence of butchery, which includes disarticulation, cut marks, and fragmentation of bones. The lakeside sites of Cannstatt-Lauster and Kärlich Seeufer in Germany, for example, show precisely this pattern; the bones associated with the stone artifacts contain no indications of butchering. There is no concrete evidence that the people who made the tools even ate, much less killed, the animals represented.

Another interpretation of the associated bones and stones gives a somewhat more active role to the humans, but as scavengers, not hunters. In this interpretation, the animals died as a result of old age, accidents, or carnivore kills and the carcasses subsequently attracted humans, who salvaged what meat they could. In this case there could well be signs of butchery, but animal gnawing would usually also be evident and the body parts with butchering marks might be skewed toward those portions less preferred by non-human carnivores. Scavenging is an activity observed among modern hunter-gatherers, but it rarely makes up the bulk of the subsistence and may be unreliable as a regular source of meat. Its role in human evolution has been much discussed, not only for the Lower Paleolithic, but for the Middle Paleolithic as well. Conservative archaeological interpretations, in fact, are reluctant to recognize active hunting of large animals as a dominant activity until the appearance of fully modern humans in the Upper Paleolithic.

Reevaluations of sites like Torralba and Ambrona have suggested that they represent locations of repeated scavenging of elephants trapped in the valley marshes rather than sites of coordinated kills (Shipman and Rose 1983). In a number of Lower Paleolithic sites, the bones do, in fact, show considerable evidence if animal gnawing, but determining when this occurred in relation to the prey's death and butchering is problematic. Furthermore, many of the faunal collections contain only partial animal skeletons, biased often toward heads and lower limbs, which are portions low in meat. But differential preservation and human transport of different body parts can also cause such biases.

Although the relative importance of natural factors and scavenging in the creation of the archaeological record is unknown, it appears that active hunting of big game was also practiced during the Lower Paleolithic. The evidence of throwing and thrusting spears and possibly clubs and throwing sticks all suggest planned, active hunting. Finds such as a rhinoceros shoulder blade with a circular perforation at Boxgrove may indicate an active kill with a spear rather than scavenging (Dennell 1997). The fact that many sites, such as Bilzingsleben, show a differing condition of different types of prey – only meaty body parts of the largest animals, entire skeletons for the smaller – suggests that a single factor of natural accumulation or scavenging could not be responsible, whereas differing human transport decisions based on prey size could. Differential representation of various animals among levels of stratified sites also argues for human selection. At the site of Vértesszöllös, for example, small mammal remains were found throughout the thickness of the site, whereas both stone tools and bones of large herbivores were concentrated only in certain levels, those with stone artifacts. In this case, the small mammals may well represent natural deaths and/or the prey of carnivores, but it is difficult to avoid inferring a true connection between the tools and the big game.

It appears to be an inescapable conclusion that active big game hunting was a component of Lower Paleolithic economies, perhaps along with scavenging. It does not seem to be the case, however, that this hunting was highly specialized. Except for a few cases like Torralba and Ambrona, faunal assemblages usually contain a high diversity of species, not only big- and medium-sized herbivores, but also a number of smaller animals as well, including rabbit and marmot. In most faunal collections of any size, the number of species taken is quite large, and one species rarely dominates overwhelmingly. The impression this creates is one of a flexible and rather opportunistic hunting economy, geared to the availability and chances of encountering different prey. Birds, fish, and shellfish do appear in some sites, but in very small amounts, and seem to have played a limited role in the economy. Except for a few chance finds of preserved cherry pits and hazelnuts in some travertine sites, evidence for plant foods is nonexistent.

Most known sites of the Lower Paleolithic seem to be residential camps or kill/butchery sites, many of which were reoccupied numerous times. There appear to have been particular spots on the landscape that drew repeated use due to their access to game and water. Open-air camps predominate, and caves and rockshelters apparently become more important later, perhaps related to progressive climatic deterioration and the greater need for shelter during the Middle Paleolithic. At least two Lower Paleolithic sites – Wallendorf and Markleeberg in northern Germany – may have had a special function as stone extraction camps. Both are located by sources of good flint and are characterized by abundant evidence for the shaping of flint nodules into cores, much waste debris, and very few retouched tools.

The Middle Paleolithic

Spotlight on Two Sites

La Borde

In 1971 in the rolling limestone hills of southwestern France, a farmer was having a pumping station installed on his land. Figure 4.6 as the foundation was being mechanically excavated in an area of roughly 100 square meters, a large number of bones were revealed. The work was temporarily halted so that archaeologists could check these materials, salvage what they could, and excavate remaining areas. This site of La Borde has added one more piece to the Neanderthal puzzle (Jaubert et al. 1990).

The site is located on a gentle hillslope in a small sinkhole dissolved into the limestone (Fig. 4.7). Several meters of natural fill covered the remains of a Neanderthal encampment dating either to the last interglacial (OIS 5) or, more likely, to an earlier interstadial in OIS 7. The archaeological materials, found within a homogeneous level 55 centimeters in thickness embedded within gravel, consisted of a rich stone and bone assemblage. Pollen samples were taken from the archaeological level and indicate that the environment at the time consisted of an open parkland of herbs and grasses, with scattered pine, juniper, and birch.

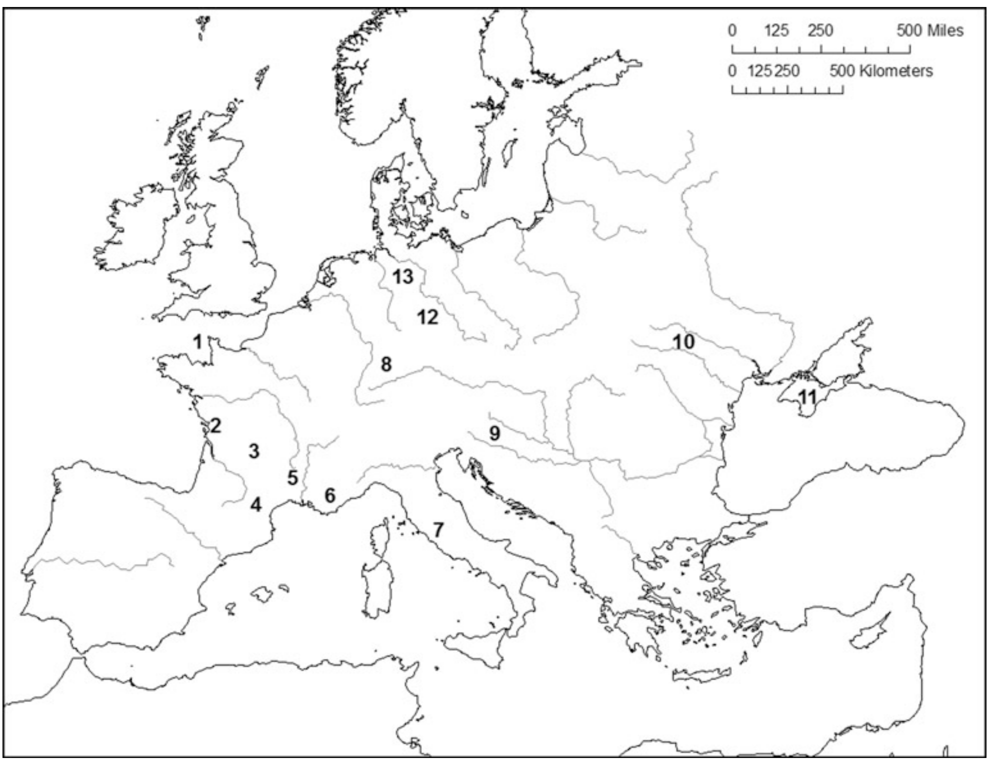

Fig. 4.6 Middle Paleolithic sites mentioned in the text: *1* La Cotte; *2* Saint-Césaire, La Quina; *3* Regourdou, La Ferrassie, Pech de l'Aze, Le Moustier, Combe-Grenal, Roc de Marsal, La Chapelle-aux-Saints, La Borde, Bruniquel; *4* Mauran; *5* Moula-Guercy; *6* La Baume Bonne; *7* Grotta Guattari; *8* Grosse Grotte; *9* Krapina; *10* Molodova; *11* Kiik-Koba, Starosel'e; *12* Königsaue; *13* Salzgitter-Lebenstedt, Lehringen

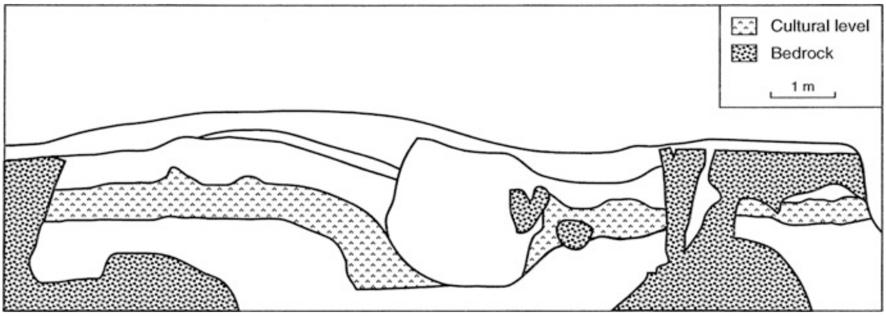

Fig. 4.7 Profile of the site of La Borde (after Jaubert et al. 1990)

Of the thousands of bones found, most could not be identified, as they were too highly fragmented. For only 440 bones could the species be identified, and these present a remarkable picture of specialization:

410	Aurochs
3	Red Deer
15	Wild Horse
2	Wild Ass
10	Wolf

Over 93% of the bones came from a single species, aurochs or wild cattle, and represent at least 40 different individuals of this species. All age groups are represented among the kills, with an emphasis on female adults and young. Study of the animals' tooth eruption and wear indicates that kills were made virtually year-round. Some of the bones are burned, and most long bones were broken open for their marrow.

Over 2,800 stone artifacts were found, the vast majority of which (96.5%) were made of quartz, which is available in the local gravel on the plateau. The remaining artifacts were made of flint and other material from sources about 50 kilometers away. The quartz was worked at the site using a simple flake technology, as witnessed by the many cores in a variety of shapes, including polyhedral, discoid, and informal. The flint appears to have been largely worked elsewhere, in part using a more elaborate technology called Levallois, and brought to the site as finished tools. The tools of both materials include a relatively large number of rather crude denticulated and notched flakes, along with various scrapers with steeper edges and coarse chopping tools.

La Borde appears to represent a location that was repeatedly visited by small groups of Neanderthals at various times of the year. They used the sinkhole as a natural trap, into which they drove wild cattle, targeting particularly the less dangerous nursery herds of females and young. This kill site served also as a short-term camp, where they butchered the prey and consumed the meat and marrow, and represents a persistent, focused part of their economy.

Salzgitter-Lebenstedt

The site of Salzgitter-Lebenstedt in northern Germany was discovered accidentally in 1952, also during construction of a pumping station. It is located on the edge of a former small pond located at the confluence of two valleys. Archaeological materials were found embedded in gravel throughout a thick level measuring about 1.5 meters, but most were vertically more concentrated in a layer of approximately 40 centimeters. The excavation of about 180 square meters followed over the next few months. Pollen evidence from the level bearing artifacts indicates that the environment of the time, dating to early in the last glacial period, was a cool subarctic steppe-tundra with numerous herbs and grasses, and only a few pine, birch, willow, spruce, and alder trees.

Most of the numerous bones were highly fragmented, but a number could be identified to give the following picture:

72%	Reindeer
14%	Wooly Mammoth
5%	Bison
5%	Horse
2%	Wooly Rhinoceros

Plus a few remains of wolf, swan, duck, perch, and pike. The reindeer bones derive from at least 80 different individuals, the mammoth from 16, the bison from 6 to 7, the horse from 4 to 6, and the rhinoceros from at least 2. Most of these bones occur in the pond sediments and appear to have been discarded there after butchering.

At the edge of the pond were several concentrations of stone artifacts as well as a ring of large stones. The stones, which measured up to 50 centimeters in diameter, formed a circle roughly 5 meters across that may have been weights for a tent. Around 2,000 stone artifacts were found, made from flint that is abundant in the local gravel. Many of the flakes were manufactured using the Levallois technique and fashioned into scrapers and points. Other stone tools included bifacially retouched handaxes and long, linear blades. In addition, some bones were used to make tools, including one spear point and a number of mammoth ribs 60–70 centimeters long sharpened to serve as daggers or thrusting spears.

This site was both a camp and a kill location. It offered the advantages of a good view, access to game routes, and fresh water, and seems to have been visited repeatedly for seasonal hunting focused particularly on migrating reindeer and mammoth.

Middle Paleolithic Stone Tools and Technology

The most common industry of the Middle Paleolithic in Europe is called the *Mousterian*, named after the rockshelter of Le Moustier in southwestern France. It is essentially an industry based on the production, shaping, and use of flakes, although handaxes, generally smaller than those of earlier times, continue to be made. These flakes are manufactured in various ways, two of the most common being the use of disc-shaped cores and use of the Levallois technique. In the former, flakes are struck from a core from its edge, moving radially around the circumference to remove successive flakes. The end result is that cores do resemble semi-flattened oval or round discs with scars of flake removals projecting in from the edge on both faces. This is a relatively simple technique that requires little shaping of the core to allow flake removal and is applicable to both large and small stone nodules. The flakes that are produced in this way can vary considerably in size and shape.

The Levallois technique, on the other hand, is more complex. Essentially, this is a process that allows the flintknapper to predetermine the shape of flakes to a much greater degree than other techniques, but at the expense of additional work to prepare the core. Several steps are necessary to shape the nodule around its edge and to shape the broad surface to guide the force of the blow so that ultimately a flake may be removed that corresponds to the desired shape. Many such Levallois flakes are pointed and may have been used, without the need for further retouching, as spear points. Because of the extensive working of the core before flake removal, this technique requires larger stone nodules, and there is a tendency (but not exclusively so) for the Levallois technique to be most common in regions where large flint nodules are available. Many of the flakes, both Levallois and other, are further shaped by retouch, and it is these that have received the most archaeological attention (Fig. 4.8).

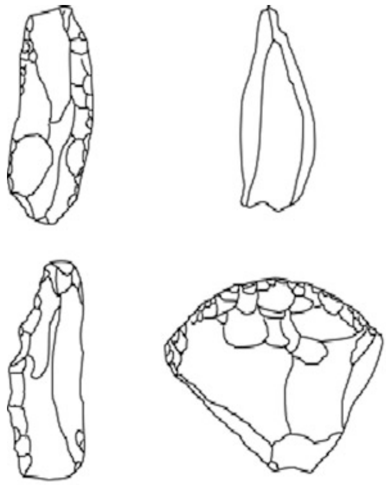

Fig. 4.8 Some Mousterian flake tools (from upper left: side-scraper on Levallois flake; naturally backed knife; denticulate; Quina side scraper)

The French archaeologist François Bordes (1961) developed an elaborate typology for the Mousterian artifacts, with 63 different types of flake tools recognized, based largely on their shape and location of retouch, with some attention to the appearance or kind of the retouch scars as well. He established large categories, such as points, side scrapers, and denticulated or notched pieces, and further subdivided these into recurring types.

One of the most intriguing and heavily debated observations he derived from this typology was that entire assemblages could also be classified on the basis of the relative proportions of the different tool types. He argued that these tools did not occur in all possible combinations of relative frequency at various sites, but rather, that there were recurring patterns in these combinations. Some assemblages are heavily dominated by denticulated and notched flakes, others by side scrapers, others by handaxes or backed knives, and still others show a roughly equal proportion of all categories. These four kinds of assemblage he called *Denticulate Mousterian* (dominated by denticulates and notches), *Charentian Mousterian* (dominated by side scrapers), *Mousterian of Acheulean Tradition* (with many handaxes or backed knives), and *Typical Mousterian* (with more or less equal proportions of all tool types). He further subdivided the Charentian Mousterian into two groups using a different set of criteria: the technique of core preparation. The *Ferrassie Mousterian* is characterized by much use of the Levallois technique, whereas the *Quina Mousterian* is not. In addition, the Quina contains a number of a particular type of side scrapers with overlapping retouch scars that resemble fish scales.

These observations are not simply a sterile, classificatory exercise because of the interpretations Bordes offered for these patterns and the ensuing debates and analyses they provoked. On the basis of presumed contemporaneity of these five different kinds of assemblage in southwestern France over thousands of years (inferred largely from correlations of the stratigraphy at different sites), Bordes argued that they represented five different social groups – or tribes – of Neanderthals (Bordes 1961, Bordes and de Sonneville-Bordes 1970). In other words, he gave social and stylistic meaning to the differences in the assemblages: different groups had different ways of making tools, cultural traditions that were conservatively passed on through the generations. If correct, this interpretation would tell us something important about the cultural capacities of Neanderthals and about the nature of their social organization.

Disagreement and alternative interpretations soon followed, and focused attention on the fact that we really understood very little about the determinants of stone tool shape or assemblage composition.

The debates continue today, but as a consequence of considerable work involving ethnoarchaeological studies of living hunter-gatherers, microscopic analysis of stone tools, experimental replication of tool manufacture and use, and analysis of stone raw material sources, archaeologists can evaluate assemblage variation in a much more informed manner.

Bordes's interpretation prompted a number of questions from other archaeologists. Is it likely that people of one social group would distinguish themselves from others largely by making and using more scrapers? Among modern people it is more common that the kinds of objects (shoes or hats, for example), rather than their amount, vary from group to group. Moreover, how probable is it that different social groups could remain distinct over such a long period in the same small region, especially given observations of modern hunter-gatherers who show considerable mobility, interaction, and flexibility across large areas? Lewis and Sally Binford, American anthropological archaeologists, not only posed such questions, but offered an alternative interpretation of the different assemblage groups (Binford and Binford 1966). In their view, the differences were more likely to have a functional meaning, rather than a social one. That is, assemblages dominated by scrapers suggest that more scraping (of hides, wood, etc.) occurred at these sites, whereas those dominated by denticulates and notches may have shown a predominance of other activities, perhaps the working of plant fibers or wood. In other words, they suggested that the Neanderthals had different functional toolkits for different activities, and that functionally different site types (winter vs. summer, base camp vs. hunting camp) would contain different mixes of these activities and their toolkits in recurring patterns. In this case, the stone tools would tell us little about the social affiliation of their makers.

The British archaeologist Paul Mellars (1969, 1970, 1988) posed a different sort of question: how certain are we that these different types of Mousterian were, indeed, contemporary? Because the stratigraphic correlations among sites upon which the assumption of contemporaneity were based are imprecise, he examined the sequence of Mousterian assemblages in multilevel sites. If different groups were contemporary over long periods in the same area, he argued, then they might occupy particular caves or rockshelters at any time, and the resulting stratigraphic sequences could differ from site to site. Instead, he found a strong tendency for particular patterns through time: the Ferrassie variant tends to be followed by the Quina at many sites, and the Quina, in turn, tends to be followed by the Mousterian of Acheulean tradition. There was, he argued, demonstrable and patterned change through time in assemblage structure, a pattern that has to be taken into account in interpretations. If correct, then one argument against the social interpretation (the unlikely long contemporaneity of five different groups) is weakened. Moreover, the more functional interpretation would have to account for the changing frequency of different toolkits through time.

Subsequent research into Mousterian variability has been prompted largely by this debate. A major focus of this research has been the function of the different stone tools, with microscopic analysis of use-wear playing an important role. Different patterns of wear and abrasion on tool edges and faces can reliably be linked to such actions as cutting or scraping of meat, hides, wood, or bone. These analyses have reached a number of conclusions that are relevant to the disputed interpretations and shed light on Neanderthal behavior. First, many of the unretouched flakes were used as tools, particularly as knives for cutting meat or hide. Consequently, any attempt to infer the activities that occurred at a site solely from the retouched tools will miss a major class of evidence. Second, different retouched tool types were used in the same activities, and many types were used for several activities: there is no one-to-one correlation between recognized tool type and specific activity (Anderson-Gerfaud 1990). As a result, the varying proportions of different types cannot be easily translated into varying proportions of different activities. Third, although archaeologists have usually assumed that retouching was done in order to shape the edge of a tool, in some cases this may not be the case. A study of Quina scrapers with the rather unique, overlapping scalar retouch suggests that it was the retouched surface, rather than the edge of the tool, that was used, in this case on mineral pigments like red ochre (Beyries and Walter 1996). Fourth, a good number of tools that have been examined show evidence that they were hafted or attached to wooden handles with tree resins. It may well be, then, that some of the shaping done to tools was aimed, not at creating functional edges, but at facilitating their attachment.

Other work has examined the suitability of the classification system developed for the flake tools as the basis for inferring anything about function or social identity. How real are the tool types, and what do they represent? It has been long recognized that there is some ambiguity in the definition of types, so that it may be difficult, for example, to differentiate a retouched point from a convergent scraper (in which the two retouched edges converge to a point). More recently archaeologists have suggested that the purpose of retouch in many cases may have been to resharpen an edge, rather than to shape it initially (Dibble 1987, Barton 1990). If this is the case, then many of the supposedly different types may represent nothing more than different stages in the lifetime of a category of tool that undergoes progressive resharpening to prolong its use. Scrapers are the category most implicated in this interpretation, as resharpening of a cutting or scraping edge would create tools of this category. In this view, the frequency of resharpening is a major determinant of both the proportion of scrapers and the proportion of all retouched tools in an assemblage (Rolland 1990, Rolland and Dibble 1990). The frequency of resharpening, in turn, may be related to the kind and abundance of stone raw material. If high quality stone is locally scarce, then tool users may more often resort to resharpening old tools rather than making new ones, whereas if good stone is easily available, old tools may be discarded and new ones quickly made. Determinants of stone availability include both natural factors such as the distribution and accessibility of stones of differing quality and behavioral factors including the degree and extent of mobility. People who normally range over large areas may more easily find and make use of good stone sources, while more spatially restricted or seasonally sedentary people may have to make do with whatever stone is locally available and may resort more often to resharpening.

In seeking to explain the patterns of variation of stone tools and assemblages, therefore, archaeologists have increasingly turned attention to the organization of technology on the landscape (e.g. Kuhn 1991). Where and when are tools made, used, and discarded in relation to the availability of stone and other resources? Many technological decisions may have been situational, varying with the context. In some cases, resharpening an old tool may have been easier than manufacturing a new one; in other cases the reverse may have been true. The remains that archaeologists find ultimately represent the end result of a variety of activities using tools with different use-lives.

What can we say about Mousterian variability, then? First and foremost, it is unlikely that any single factor can explain differences among tools or assemblages. Second, among the important determinants of tool and assemblage appearances are

- function (a knife must be relatively sharp),
- style and cultural tradition (there were certainly different possible ways of initially fashioning a spear point),
- raw material availability (as it influenced the use of the Levallois technique and the frequency of resharpening),
- mobility (as it affected the accessibility of stone material),
- subsistence activities (gathering would require different tools from hunting),
- environment (as it influenced subsistence, mobility, and the availability of wood or other materials).

To this list one might add *time*; any of the factors mentioned above may have changed through time, and apparent differences among assemblages may result from comparisons of materials of different ages.

Outside of southwestern France, different patterns of variation are evident. In adjacent portions of France, for example, often only a single one of Bordes' Mousterian variants may dominate the archaeological record. The Charentian is found at most Middle Paleolithic sites in Charente to the east and in coastal southeastern France, while the Mousterian of Acheulean tradition dominates in central and northern France. It is difficult to see how a strict, narrow functional interpretation could account for these distributions.

Central Europe shows the persistence of the Acheulean into the last glacial period, as well as an industry called the Micoquian, characterized by non-Levallois flake technology, many side scrapers, as well as bifacial tools and handaxes with elongated points. Assemblages similar to the Charentian Mousterian are also common in much of central and eastern Europe.

In a number of sites in northwestern Europe dating largely to early in the last glacial period, long, linear blades form an important part of assemblages alongside the predominant flake technology. Similar finds occur in parts of Russia as well. The production of blades has been normally associated with the Upper Paleolithic, when they do, indeed, constitute the dominant technology, but their earlier sporadic presence indicates that we cannot explain them simply as the result of greater technological sophistication or development. As Conard (1990) argues, their production was probably situational, appearing in certain functional, raw material, and social contexts.

Another striking feature of some Middle Paleolithic assemblages is the appearance of beautifully made leaf-shaped points with bifacial, flat surface retouch. Although these artifacts occur in a variety of areas, there are particular concentrations in south and central Germany, Belgium, and perhaps England (Otte 1981). Dating to the last glacial period, they appear late in the Middle Paleolithic and are frequently associated with a moderate number of blades in addition to the more common flakes. Again, it is unlikely that a purely functional or technological explanation of their occurrence is adequate, and many authors view them largely as stylistic markers of some kind of social grouping (Keefer 1993, Otte 1981).

In summary, Middle Paleolithic stone technology was quite variable within small regions and across the continent. Flakes could be produced through a variety of techniques, some involving advanced planning. Tools could be carefully manufactured or maintained by resharpening or they could be casually made and discarded. Many technological decisions were situational: contingent upon features of the environment, the subsistence economy, and the patterns of settlement. At the same time, some stylistic factors deriving from patterns of social interaction and affiliation do seem to have played a role in stone technology as well; the leaf-shaped points may, indeed, reflect certain culture areas of the Middle Paleolithic landscape. It is probably unrealistic, however, to expect stone tools to be primarily cultural markers; their functional constraints may be so high, and their visibility so low, that they are poorly suited to this role. Whatever cultural identity was expressed may have utilized other media – clothing, body decoration, etc., – that are much less likely to have been preserved in the archaeological record.

Use of Other Materials in the Middle Paleolithic

Largely because of problems of preservation, few artifacts of materials other than stone are known. Nevertheless, it is certain that many activities entailed the use of other materials. The only wooden artifact to have survived is a spear, over 2 meters in length, with a fire-hardened tip, from the north German site of Lehringen (Thieme and Veil 1985). However, in a number of microscopic wear analyses of stone tools in France (Anderson-Gerfaud 1990, Beyries 1990), woodworking was the most common activity identified, appearing on over 70% of the artifacts examined. This was true both in southwestern France, where trees were present throughout all climatic periods, and in northern France, where trees were scarce or absent in the colder phases. The prevalence of woodworking among the wear traces may be partly due to the fact that this activity more readily creates recognizable polish and abrasions than do some other activities using softer materials, but there is no doubt that wood was an important element of Neanderthal technology. This observation, together with the evidence for the hafting of many stone tools, indicates that the manufacture of wooden handles, among other implements, was an important endeavor. An implication of this fact is that woodworking easily dulls the edges of stone tools and would encourage frequent resharpening in some situations, thereby influencing the appearance of stone tool assemblages. In addition, wood was also important as fuel, as evidenced by numerous finds of wood charcoal in hearths.

Bone is another material that was used in technology, but the nature and extent of its use has been much debated. Several smooth polished bone points have been found, but most apparent tools were not nearly so formally shaped. Rather, bones (and antlers) seem often to have been roughly flaked (like stone) to create working ends and edges for use as scrapers, heavy-duty knives, or possible retouchers (Gaudzinsky 1999). With this sort of technology, it is difficult to distinguish intentionally worked bones from those that have been naturally fractured (Binford 1983, Freeman 1983). Bones also served as fuel for fires, particularly in the colder regions and periods.

Other materials were certainly part of Neanderthal technology, but are even more elusive in the archaeological record. Hide-working is another important activity identified through microscopic use-wear analysis, and presumably contributed to the manufacture of clothing and housing. The use of furs is suggested by the high number of skeletal remains of small furbearers in faunal assemblages. Plant products were presumably utilized, as indicated by scant traces of plant polish on some stone tools and by the necessity for some sort of adhesive to attach stone tools to their hafts. Pieces of tree resin with the imprint of stone tools have been found at the site of Königsaue in Germany (Mania and Toepfer 1973). Mineral pigments, especially hematite or red ochre, were also used; abraded lumps have been found in sites, some artifacts (such as Quina scrapers) carry traces of the pigment on their faces, and even an apparent quarry for hematite has been found in Hungary (Patou-Mathis 2000). The uses of these pigments are unknown, but may have included hide preparation or dyeing, body painting, or ritual use. Finally, finds of lignite at the site of Les Canalettes in southern France suggest that this form of coal was occasionally used as fuel, perhaps when wood was scarce (Thery 1996).

Middle Paleolithic Susbsistence

Research into Middle Paleolithic subsistence has been guided, not only by the straightforward aims of determining what Neanderthals ate and how they procured their food, but also by the fundamental underlying question of how “modern” they were in this respect. The reasons for this focus are many. As our closest hominid relatives, they are likely to have been most similar to us in their behavior. Yet they *are* different in appearance; does this reflect significant behavioral differences as well? Explanations of the emergence of modern humans require attention to this question, particularly if modern humans are thought to have had some selective advantage, perhaps in the realm of the effectiveness or efficiency of their subsistence economy.

One striking feature of the economies is their diversity: although the remains of larger animals certainly dominate the record of most sites, smaller mammals are common in many sites as well, and some birds, fish, and shellfish appear in the assemblages of certain sites. Moreover, within these gross categories, a number of different species appear to have been regularly taken: mammoth and wooly rhinoceros among the now extinct megafauna, horse, bison, aurochs, wild ass, red deer, reindeer, ibex, and saiga antelope (and more rarely, roe deer, wild boar) among the smaller herbivores, hare and marmot among other small game. The available animals varied across Europe, both through time as the climate changed and through space according to local habitat conditions, and Neanderthal groups were able to adjust their foraging behavior accordingly. Within local regions, there seems to be a pattern of using several habitats, so that commonly, site assemblages contain representatives of open grassland (such as horse and bison) as well as more forested regions (red deer), or mountainous areas (ibex).

Scavenging or Hunting

One of the ongoing debates about Middle Paleolithic subsistence, as in the Lower Paleolithic, concerns the role of scavenging as opposed to purposeful hunting. In comparison to hunting, scavenging is an activity that largely entails extensive searching for animal carcasses on the landscape, rather than the more elaborate search, pursuit, and capture characteristic of hunting. In this sense, scavenging has been seen as a less demanding activity, one that would accord well with a view of Neanderthals as substantially different from us in organizational capabilities. A number of features of faunal assemblages would be expected if scavenging played a significant role in their formation:

- a diversity of species represented, as scavengers must take what they can find;
- a preponderance of very young or very old individual animals, as these form the majority of carnivore prey;
- a dominance of bones representing body parts with relatively little meat, because the meatiest portions would have likely been consumed by the original carnivores;
- the presence of animal tooth-marks on the bones.

The diversity of assemblages discussed earlier might seem generally to support interpretations of an important role for scavenging by Neanderthals. However, a second general feature of Middle Paleolithic subsistence, unlike that of the Lower Paleolithic, is a tendency for some degree of specialization of one or a few species, only supplemented by a large number of others (Patou-Mathis 2000). So, for example, site assemblages in western Europe are often dominated by horse, bison, aurochs, red deer, reindeer, or mammoth, and sites in southern Russia by wild ass or bison. In some cases this specialization is extreme: in the French open-air site of La Borde, over 90% of the bones are of aurochs (Jaubert et al. 1990); in some levels of the French cave of Combe-Grenal, over 90% of the bones come from reindeer (Bordes and Prat 1965); bison comprise over 98% of the bones at the French site of Mauran (Farizy et al. 1994). To many archaeologists (e.g. Chase 1989), this degree of specialization indicates a selectivity based on preference, not just availability, and is indicative of a Neanderthal capacity for focused and well-planned hunting.

Studies of age distributions among prey populations have produced mixed results. A number of studies of horse, reindeer, and aurochs indicate that prey of all ages, including prime-age adults, are represented among the bones (such as the aurochs of La Borde). Certain larger species, on the other hand, such as wooly rhinoceros, are often represented primarily by very young and very old individuals. It may well be that the largest prey were more often scavenged than hunted. Nevertheless, the predominance of prime-age adults and scarcity of very young and very old among the mammoth bones from the site of La Cotte on the Isle of Jersey suggests that even these large prey could be actively hunted (Scott 1980). Steele's (2004) analysis of red deer remains from Gabasa 1, Combe Grenal, and Lazaret, indicates that Neanderthals hunted prime-aged animals.

The representation of animal body parts shows considerable variation among sites. At a good many sites, such as Grotta Guattari in Italy, particular species show a relatively higher proportion of heads and lower limbs – portions that are relatively poor in meat (e.g. Stiner 1991). This pattern *may* indicate that these species were scavenged, but at least two alternative factors must be considered as well. Hunting may have been organized in such a way that killed animals were butchered at kill sites and only the portions relatively rich in meat were carried away, leaving low-quality parts behind. In such a case, kill/butchery locations would be characterized by the predominance of body parts poor in meat. Moreover, bones from different parts of the body show differing thickness and density, and hence are preserved to differing degrees in the archaeological record. As lower limb bones and teeth are among the most durable portions of the mammalian skeleton, their dominance in some assemblages might simply reflect differential preservation.

The presence of tooth marks on bones is, by itself, an inadequate basis for inferring scavenging of carnivore prey, as such evidence might well reflect visits of animals to sites after they were abandoned by humans. Many faunal collections, in fact, contain evidence of both gnawing by animals and cutting by humans. Detailed microscopic analysis must be done in order to determine which appeared first on the bones, whether the tooth marks are superimposed on the cut marks, or vice versa.

Scavenging certainly may have played a role in Neanderthal subsistence, but it is clear from many studies that active hunting was carried out and probably was the main contributor of food. Moreover, the apparent bias in archaeological evidence for meat consumption over plants may reflect reality. Although living hunter-gatherers utilize plant foods to a great degree, recent chemical isotope studies of Neanderthal skeletons in Croatia suggest a strongly carnivorous diet, similar to that of wolves. At least in the steppe-tundras of much of glacial age Europe, there may have been few available plant foods.

Food Procurement and Processing

Active hunting, particularly of larger animals, requires suitable technology, planning, and often some degree of cooperation. From the available evidence, it appears that the major hunting tool used by Neanderthals was the spear, either made solely of fire-hardened wood (the find at Lehringen) or tipped with a stone point. Studies of Mousterian points have demonstrated that many of these flake tools have fractures on the tips, consistent with their use on spears. It seems likely that these spears were used at close quarters, for stabbing rather than throwing. If so, then hunting of the larger animals probably posed great risks to the hunters, exposing them to attacks by the intended prey. The high frequency of injuries – fractured ribs, elbows, arms, and skulls – identified in Neanderthal skeletons suggests how dangerous their lives were.

Although hunting of solitary prey, perhaps by individual hunters, played an important role in the economy, a more organized and cooperative form of hunting is documented as well. Many of the major prey, such as reindeer, horse, and bison, congregate at least seasonally in substantial herds, and Neanderthals often targeted such seasons for their hunting (Patou-Mathis 2000). A few sites in both eastern and western Europe even document what appear to be true communal kills of a number of animals by driving them over cliff edges (Rolland 1990); the prey include mammoth and rhinoceros at the site of La Cotte de Saint-Brelade on the Isle of Jersey (Scott 1980) and bison at Mauran in the Pyrenees (Farizy et al. 1994). This is likely to have been an organized endeavor, involving advanced planning and coordination.

Because most hunting, whether communal or solitary, seems to have targeted particular prey in specific seasons (Patou-Mathis 2000), Neanderthal subsistence activities probably varied significantly during the year. This would have been especially true in the highly seasonal environments of more northern latitudes and more glacial periods. Longer-term fluctuations of subsistence activities apparently occurred as well. As the forested habitats of the last interglacial gave way gradually and episodically to more open steppe-tundras, animal communities changed as well. The French cave of Combe-Grenal documents a shift in hunting emphasis from red deer at the beginning of the last glacial period to reindeer as the climate cooled (Bordes and Prat 1965). Climate, however, was not the only determinant of subsistence change. As Stiner et al. (1999) have documented for Italian sites, local population growth seems to have been a factor as well. Early in the Middle Paleolithic, economies at these sites included a heavy reliance on small game, particularly easily captured tortoises and shellfish; through time, this emphasis shifted to rabbits, hares, and birds, all of which are more difficult to catch but, because they reproduce more rapidly, represent a more productive food base. The size of shellfish and tortoises decreases at the same time, suggesting overexploitation. Their inference is that growing populations were forced, not only to go after generally more expensive small game, but also increasingly to focus on relatively costly species and to overuse the most easily obtained foods.

Animals were generally butchered – using heavy-duty choppers as well as finer flakes – at the location of kills. Butchering involved slicing off meat and tendons as well as breaking bones to obtain marrow. Portions or entire carcasses of smaller prey were often carried away, presumably to residential camps, whereas large animal kills frequently caused people to move camps to their location. As mentioned earlier, many faunal assemblages show a biased representation of animal body parts; many archaeologists interpret these as reflections of the differential transport of various portions of meat away from the kill. Cooking was surely important in food preparation, as attested by the hearths found at many sites.

The picture that emerges of Middle Paleolithic subsistence is one of considerable variety, sophistication, and flexibility. Hunting, supplemented to an unknown (but possibly small) degree by scavenging and gathering, was a dangerous but productive activity. Its success reflects not only a detailed knowledge of the environment and of animal behavior, but also a significant amount of advanced planning and cooperation. As we have little evidence of food storage, it must have been a constant preoccupation and focus of life.

The Question of Cannibalism

One of the persistent, intriguing questions about Neanderthal behavior has concerned the practice of cannibalism. Fragmentary human skeletal remains are fairly common components of site assemblages; their broken condition, together with the occasional occurrence of cut marks, has led to much speculation about their meaning. Particularly for some sites where such evidence is relatively abundant, such as Krapina in Croatia or Combe Grenal in France, it has been suggested that cannibalism was the cause. The consumption of human flesh was, in turn, thought to be either one more element in the food economy or, more often, a ritual activity.

Critics of these interpretations for the most part argued that the same patterns could have been caused by natural factors, including weathering, frost-cracking, crushing by rock falls, and disturbance by animals. In addition, human activity, but only in the form of cleaning the bones for burial, has also been invoked. As is true of so many other kinds of issues about the Middle Paleolithic, the evidence was ambiguous.

Recent finds at the southern French site of Moula-Guercy, however, seem clearly to indicate that cannibalism was, indeed, a part of Neanderthal behavior (DeFleur et al. 1999). In this site, 78 Neanderthal bones were found and carefully analyzed. Evidence in favor of an interpretation of cannibalism includes the following:

- the human bones were found scattered among the bones of other animals, in generally the same location
- the bones bore cut marks in locations appropriate for the removal of meat or tendons
- the pattern of cut-mark location mirrored that found on deer bones
- many of the bones, both human and deer, were broken in such a way that the marrow or brains were exposed
- there was evidence of impact points at many of the breaks, indicating single, sharp blows rather than diffuse crushing pressure.

In this case, it seems clear that the human bones were treated in a manner similar to that of deer, as a source of meat and marrow. The broader meaning of this behavior, however, is not clear. Whether as a source of food (during periods of nutritional stress?) or as a more social or ritual activity, cannibalism was one component of Neanderthal behavior (just as it has been for modern humans).

Middle Paleolithic Site Organization and Settlement Patterns

As discussed earlier, Middle Paleolithic sites occur in caves, under rockshelters, and in the open. Given their huge variety in age, location, and habitat, their appearance varies widely. A few generalizations, however, are possible. Although detailed measurements of site area are precluded by the lack of complete excavations, occupation areas are rather small, often less than 25 meters in diameter in southwestern France (Mellars 1973), and with little variability in size (White 1982). Even larger cave deposits and open-air scatters of artifacts may represent the superimposition of several periods of occupation (Binford 1982). Neanderthal groups may have been quite small, rarely forming the larger seasonal aggregations that are characteristic of many modern hunter-gatherers. Furthermore, although many sites show some sort of internal patterning, they rarely contain much evidence for substantial modification of the living space. The most common "built" features at sites are hearths, virtually all of which are simply concentrations of wood and bone charcoal and ash. A few have been reported to be more elaborate, with a platform of stone slabs, a circle of rocks, or at least a small depression, but most of these are dubious and could represent natural features of rockfalls and uneven ground surface. A few sites have been reported to have "pavements" of stones laid down, presumably to create a raised, dry occupation surface, but again, the natural distribution of rock debris in caves and shelters might appear to be purposeful. Only in a few cases (e.g. La Baume Bonne in southern France), where smooth river cobbles appear in caves or on plateaux far from the river, is it clear that human activity is responsible. A few sites contain pits that have been interpreted as evidence of food storage, but these are rare.

Some exceptional sites do contain more evidence for modifications, even for the possible construction of housing. Several sites, including the German cave of Grosse Grotte (Keefer 1993) and the French cave of Moula-Guercy (DeFleur et al. 1999), contain drystone walls built of rock that partially close off the cave mouths. Deep in the French cave of Bruniquel is an apparent structure foundation built of fragments of stalactites and stalagmites and measuring roughly 4 × 5 meters (Berkowitz 1996). The most well-known (and debated) constructions are huts at the Moldavian sites of Molodova I and V (Klein 1973). At Molodova I, this consisted of an arrangement of large mammoth bones forming an oval measuring 5 × 8 meters. Inside the oval were 15 hearths and large amounts of stone and bone debris. The hut at Molodova V was similar, with mammoth bones defining a space of 7 × 9 meters that contained much debris and five hearths. Both have been interpreted as tents made of hides, presumably supported by wood or bone posts and weighted down by the large bones. Their large size alone casts doubt on this interpretation, as it would have been difficult to construct and support roofed tents of these dimensions. Moreover, the distribution patterns of bones and other debris are not as clear as these reconstructions suggest, and a more recent interpretation is that these constructions represent a series of overlapping windbreaks (Soffer 1989).

Most Middle Paleolithic sites, however, show no structural modifications. Instead, they consist of scatters of debris, sometimes in several concentrations, some of which are adjacent to informal hearths. Larger debris is often more peripheral in these distributions than are small bone fragments and stone waste, consistent perhaps with the discard of these larger materials by tossing away from the primary living space. This lack of structure, together with the generally small size of sites, suggests to many that Neanderthals were highly mobile and lacked complex social arrangements that would require or facilitate large group aggregation.

If groups were indeed quite mobile, and varied their hunting activities with the seasons, it should be possible to determine seasonal changes in settlement, to put together yearly patterns of the seasonal round. So far this has not been possible in any one region of the continent. Instead, interpretations of settlement behavior depend on sparse samples of sites scattered over large areas. As Svoboda et al. (1996:88) observe, "… small groups have left their 'visiting cards' (sites, bones, and artifacts) all over Central Europe." The same could be said for the rest of the continent as well. A notable feature of site distributions is a location that provides access to several different habitats, a feature that agrees with the relative diversity of the subsistence economy. Proximity to good sources of flint or other stone also seems to be important. In many mountainous areas, such as northern Spain, Italy, Greece, and Moravia, most sites are in the lowlands, with little evidence of settlement at higher elevations (Freeman 1973, Rolland 1990, Svoboda et al. 1996). Throughout the continent, the edges and slopes of river valleys are a favored location, although a good number of open-air sites are known on the plateaux between valleys in southwestern France (White 1982). In addition to providing access to a variety of vegetational communities, such valley-edge locations probably offered shelter from wind and perhaps proximity to animal herds moving through the valleys.

Differences among sites in location and contents have been used to infer differing site functions within larger systems of settlement, but in many cases the interpretations are not obvious. Many sites are characterized by stone tool assemblages that are very diverse, suggesting that a wide range of activities occurred. This would be consistent with a residential function, in contrast to specialized assemblages that would indicate more special-purpose hunting camps. The diversity of artifacts at a site, however, could be the result of many different occupations, each consisting of a different mix of activities. This may be particularly true of deeply stratified caves such as Combe Grenal, where over 60 different levels have been identified, each of which might derive from a number of different occupations. A clearer interpretation is provided by sites such as Lehringen in north Germany, which consists of a few stone artifacts associated with an elephant carcass and a wooden spear. In this case, an interpretation as a kill site appears reasonable. Other types of specialized sites that have been identified include the previously mentioned ochre mine and a flint-mining site, both in Hungary (Rolland 1990).

Over a much larger area, some changes in site type and number are evident. Cave sites are much more common during the colder, early last glacial period than during the preceding warm interglacial (Patou-Mathis 2000). This shift – together with the observation that many of the selected caves, at least in southern France, face south and receive maximum solar exposure – suggests that protection from the cold was a major consideration in site location as conditions changed. Moreover, despite the many vagaries of dating sites, there seems to be a clear pattern of changes in site distribution as climatic conditions varied. In Russia and Ukraine, for example, sites of the early Middle Paleolithic are quite widespread, whereas those of the later Middle Paleolithic are restricted to just the southerly regions, concentrated especially in the most topographically varied portions of the Crimea and the Dnestr Valley (Soffer 1989). These latter areas may have offered the most abundant and predictable food resources in an increasingly cold and hostile environment. Southern Germany and other parts of north and central Europe also contain more evidence for occupation during warmer periods of interstadials than during the colder stadial periods, while to the south, France, Italy, and Spain appear to show greater stability of site numbers through time (Gamble 1983). Runnels (1989) has suggested that much of the Greek Middle Paleolithic is relatively late, dating largely to early in the last glacial around 60,000 BP, and represents an influx of Neanderthals from more northern regions as the climate became cooler. Somewhat later, toward the very end of the Middle Paleolithic, between 40,000 and 37,500 BP, large areas, including Britain, northeast Europe, and northern Italy, were abandoned, coinciding with the progressive development of increasingly cool and arid conditions (Bocquet-Appel and Demars 2000). It would appear that the distribution of Neanderthal settlement varied considerably through time, heavily dependent upon local conditions of climate and food availability.

Middle Paleolithic Movement and Exchange

Virtually *no* materials from sources farther than 20 kilometers away appear in Middle Paleolithic sites in all regions, including Spain (Straus 1992), France (Feblot-Augustins 1993), Moravia (Svoboda et al.

1996), and Russia (Soffer 1989). Neanderthals apparently procured most needed materials within a small radius of their camps, and carried little with them when they left.

In southwestern French sites, for example, Feblot-Augustins (1993) documents that most stone (60–95%) comes from within 5 kilometers of each site; that another 5–20% derives from sources up to 20 kilometers away; and that only up to 5% comes from sources farther than 20 kilometers. The greatest distance a material was transported in this region was 100 kilometers. He suggests that these short transport distances reflect the direct procurement of stone by the Neanderthals during their normal seasonal movements. By tracking the distribution of various stones among different sites, he further suggests that group mobility was normally confined within areas of about 13,000 square kilometers. This would correspond to an idealized, perfect circular territory with a radius of approximately 65 kilometers. These territories, he noted, contained regions of considerable ecological diversity and may have encompassed the normal seasonal ranges of major prey animals during the year.

The patterns observed in Poland, Moravia, Slovakia, and Hungary are similar. Most material comes from sources within 5 kilometers away, and only up to 3% was transported more than 20 kilometers. The defined areas of raw material distribution are similar as well, measuring roughly 10,000 square kilometers and corresponding to circular territories with a radius of about 56 kilometers. One difference between this region and southwestern France is the maximum distance that material was transported – 300 kilometers in central Europe – but such materials are quite rare.

These studies also document a concern for economy in the use and transport of raw materials and a differential treatment according to how far they were transported. In both areas, very locally available stone was brought to the sites largely as nodules or coarsely worked blocks. Material from more distant sources, by contrast, frequently appears in sites mainly in the form of smaller flakes or retouched tools. Often these tools are heavily resharpened, reflecting an effort to prolong their useful lives.

The resulting picture of Neanderthal mobility is one of frequent, short moves within fairly small territories. Little material was transported over great distances and what little was brought from previous camps was conserved by resharpening. No evidence of systematic exchange with neighboring groups exists.

Burials, Rituals, and Art in the Middle Paleolithic

No aspect of the archaeology of Neanderthals has excited scientific and public imaginations more than the possible appearance of the first practice of intentionally burying the dead, perhaps with accompanying rituals. If any behavior separates us from the rest of the animal kingdom, it is this. From such evidence, many have argued for the birth of religion, the belief in an afterlife, and other “modern” cognitive abilities.

The European finds (there are also a number in the Near East), as originally reported by the excavators, are truly impressive. Complete or nearly complete skeletons have been found in the French caves and rockshelters of La Chapelle-aux-Saints (one individual), Roc de Marsal (one), Regourdou (one), Pech de l’Aze (one), Le Moustier (two), La Ferrassie (seven), La Quina (one), and Saint-Césaire (one), in Belgium at the site of Spy (two), and in the Crimea at the sites of Kiik-Koba (two), and Starosel’e (one). The situation of the finds varies considerably (Gargett 1989). At La Chapelle, for example, the body of an adult man was found in a nearly rectangular pit covered with stone slabs; an animal’s foot was placed on his chest and the body accompanied by pieces of jasper, quartz, and ochre. At Starosel’e, a child was buried in a pit and covered with stone slabs, but without any accompanying goods. At La Ferrassie the bodies were found toward the back of the shelter. Two adults, a man and a woman, were placed head-to-head on the former ground surface, not in pits. The man’s head was encircled by three stone slabs and he was accompanied by a number of stone tools. The remaining bodies, found in pits, were children and infants, some of whom also had grave goods in the form of stone tools. Along with the bodies were nine conical earthen mounds, measuring roughly 1 meter in diameter, one of which surmounted one of the graves.

In addition to a burial ritual involving nearly complete skeletons, the existence of a “skull cult” has been suggested by finds of isolated skulls, suggesting that the head was separated from the body and given special treatment. In Europe the most striking of such finds was made at the Italian cave of Grotta Guattari at Monte Circeo. Here a man’s skull was found surrounded by a circle of stones accompanied by bones of boar, aurochs, and deer. The skull showed evidence of both a blow to the head (ritual murder?) and an enlarged foramen magnum (cannibalistic removal of the brain?).

A third aspect of Neanderthal ritual behavior is the presumed existence of a “bear cult.” This derives from finds that suggest special treatment given to the remains of brown bear or cave bear. At several Swiss caves, for example, cave bear bones were found in stone cysts or boxes, in some cases with long bones shoved into the skull’s eye sockets. At the French cave of Regourdou, the excavator reported the burial of a complete bear in a pit, together with the construction of mounds and other pits.

To judge from these reports, Neanderthals had a rich ceremonial life, including a burial cult, a skull cult, and a bear cult. Comparative studies of the burials have added further elaboration. In an examination of 36 Middle Paleolithic burials from both Europe and the Near East, for example, Harrold (1980) found that most bodies were placed in a flexed position on their sides, that both men and women were likely to be buried, but that men tended to have more accompanying grave goods and greater elaboration of the graves in the form of rock slabs or other modifications. This conclusion might be indicative of the relationship between the sexes and their relative status, important aspects of social organization.

Such sweeping inferences about Neanderthal ritual and social life, however, have prompted a critical reexamination of the finds. Many of the assertions about ritual have been severely criticized, if not discarded, in this revisionist critique. Disagreements about the evidence still exist, focusing primarily on the role of natural processes as opposed to human behavior in forming the deposits. Gargett (1989) questions the existence of any burials at all. Instead, for at least four of the French examples, he argues that a variety of natural factors could account for the condition of the skeletons. These include erosion by water to create depressions or “pits,” rock falls to create coverings of slabs, and slopewash to move sediments into depressions to fill the “pits.” He also suggests that the supposed grave goods are simply portions of the normal archaeological deposits that have come to rest in or on the graves through natural disturbance processes. In a reevaluation of the child burial from the Crimean site of Starosel’e, Marks et al. (1997) suggest that it is not Middle Paleolithic at all, but rather represents an intrusive medieval burial similar to others found in the cave.

The existence of the skull and bear cults has been questioned as well. Careful reexamination of the skull at Grotta Guattari, for example, showed no evidence of human modification, but rather gnawing by hyenas (White and Toth 1991) and the supposed stone ring may be just part of the stone rubble on the cave floor. The peculiar arrangement of bear bones in the Swiss and French sites is now also considered to be the result of natural rock falls and disturbance of the remains by animals.

Although many of these arguments have proven convincing, most archaeologists still believe that Neanderthals buried some of their dead, albeit not necessarily with any accompanying goods or ritual (e.g. Chase and Dibble 1987). The reason for this view is not simply a preference for seeing Neanderthals in this way, but rather a particular set of factors that are difficult to explain by natural processes alone. One of these is the occurrence of nearly complete skeletons. Neanderthal remains are relatively common throughout Europe, but usually as scattered, individual bones or fragments. This is probably the normal fate of skeletons left abandoned, in light of the destructive effects of weathering and carnivores. Something special – either purposeful burial or extremely rapid soil or rock deposition – may have been necessary for virtually intact skeletons to survive. Furthermore, many of the excavators noted that a number of the pits had flat bottoms or squared sides, features that are rarely the outcome of natural processes. In addition, the repeated position of the bodies on their sides, tightly flexed, seems unlikely if they represent independent, random cases of accidental preservation.

So while there may be little definite evidence of elaborate cults or ritual among Neanderthals, it does seem reasonably clear that they did, in fact, bury some of their dead. These included men and women, children, and infants. It is possible that the act of burial had special significance, but in light of the current evidence, it may represent simply one means of disposal of a dead relative, with no necessary implications about a belief in the afterlife. Nevertheless, it is a new feature in the European archaeological record and a new feature of human behavior, one that will assume greater visibility and meaning in later periods.

One other category of finds that has been much debated consists of supposed evidence for artistic or symbolic activity. Here again the importance of the debates hinges on its link to the emergence of fully "modern" cognitive abilities. Because what we call "art" is so common in the subsequent Upper Paleolithic, associated with biologically modern humans, the question of its existence among Neanderthals is a natural focus of research.

Excluding one exceptional group of artifacts from the site of Arcy-sur-Cure, which is discussed in the next chapter, the number of non-utilitarian objects that seem to indicate some artistic or esthetic sense is extremely low. Most definite among these are a section of mammoth tooth from the Hungarian site of Tata that has been shaped and highly polished and that bears traces of red ochre pigment, perforated or engraved bone fragments from a handful of sites in France, Belgium, and Bulgaria, a block of limestone with small, artificially made depressions from La Ferrassie in France, and a number of pieces of red ochre from various sites, some of which bear striations from apparent rubbing (Chase and Dibble 1987, Duff et al. 1992). Other purported objects, such as pierced bone whistles, a flute, and an engraved shell, appear to represent simply the result of natural agents such as animal gnawing.

Not only are such objects rare, but each is unique. Nowhere in the archaeological record is there evidence of repeated patterns of design that would suggest that they express a coherent system of symbolic meaning. As summarized by Mellars, "Everything that's ever claimed to be Neanderthal is so amorphous, so lacking in crisp representation . . . There's always this massive question of whether it's just someone doodling" (Appenzeller 1998:1452). The few objects that do exist suggest at most a capacity for abstract manipulation of materials, a capacity that is realized to any degree only at the very end of the Middle Paleolithic.

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Chapter 5
The Upper Paleolithic

Michael Jochim

The Transition to the Upper Paleolithic

Introduction

The beginning of the Upper Paleolithic is a watershed in European prehistory (Fig. 5.1). It is *generally* characterized by a number of significant changes in stone and bone technology. It also *roughly* coincides with the appearance of fully modern humans on the continent. However, the precise nature of both the archaeological and biological changes, as well as the relationship between the two, is much debated (Nitecki and Nitecki 1994). In order to discuss these debates and the conflicting interpretations of evidence, a simple, traditional scenario is first briefly presented.

A Simple Version of the Transition to the Upper Paleolithic

In this interpretation, one that was to be found in most textbooks until recently, there was an equation between evolutionary stage and archaeological culture. Neanderthals made Mousterian tools, fashioned primarily on stone flakes, accompanied by relatively little evidence for sophisticated use of bone and antler or for the creation of objects of art or adornment. In stark contrast, fully modern humans – biologically distinct from the Neanderthals – manufactured very different sorts of stone tools largely on blades rather than flakes. In addition, they possessed an elaborate bone and antler technology and made sophisticated works of art and jewelry. These changes in material culture were thought to reflect real differences in cognitive and creative abilities between the two hominid forms. As a further elaboration to this scenario, modern humans were thought to have colonized Europe from Africa via the Near East, expanding rapidly throughout the continent and replacing the Neanderthals.

However, the evidence indicates that the transition was much more complex than this simple scenario would suggest. In order to recognize this complexity, and to evaluate a variety of new interpretations of the processes underlying this crucial change in prehistory, the different classes of evidence are discussed. The focus is primarily on the period of ca. 45,000–30,000 years ago, during which the transition occurred.

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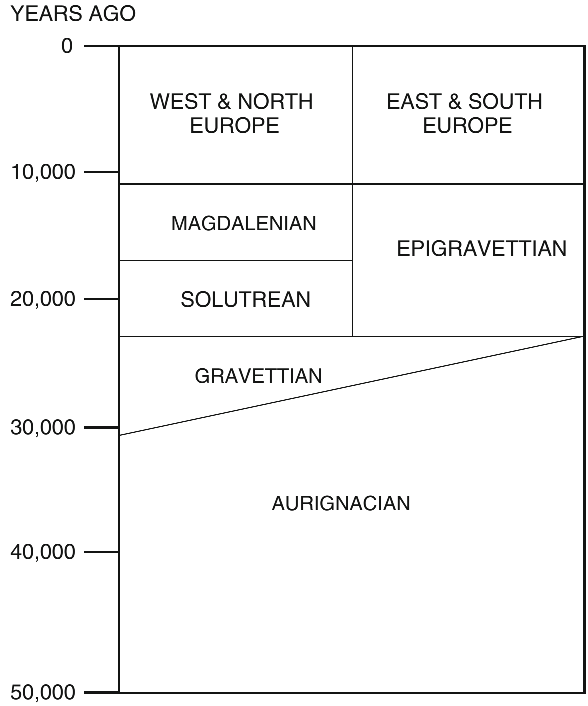
Fig. 5.1 Chronological chart of the Upper Paleolithic



The Skeletal Evidence

In general, modern humans, *Homo sapiens sapiens*, differ considerably from the classic Neanderthals. Although the cranial capacity of the two forms is much the same, from around 1300 to 1600 cc, the shape of the skull differs. Modern humans lack the pronounced brow ridge, large nose, and protruding face so characteristic of Neanderthals. Overall robustness of the skeleton and thickness of the bones is much less among the moderns, and the traces of muscular attachments indicate smaller muscles as well. Modern humans have flatter faces, higher foreheads, smaller teeth, and a protruding chin, and are generally much more delicate or gracile with relatively longer arms and legs. They may have matured more slowly and had somewhat longer lifespans.

Although human skeletal material associated with the entire Upper Paleolithic is relatively abundant, the number of finds from the earliest phases, up until 30,000 years ago, is not great. The cave of Bacho Kiro in Bulgaria has produced some fragmentary teeth and jaw remains, possibly dated to >43,000 years back, but this dating is not accepted by all archaeologists, as it lies around the maximum limit of radiocarbon dating. Of greater chronological reliability are the remains of about eight individuals found at the two Czech caves of Mladec, which date to the period of 35,000–30,000 BP (Svoboda et al. 1996). Several other, less complete finds from the Czech Republic, Slovakia, Germany, Croatia, and Hungary date to roughly the same period. The best-known finds of this period are the remains of five individuals from the rockshelter of Cro-Magnon in southwestern France, but these are probably late, dating back to around 30,000 years (Stringer and Gamble 1993:180).

What is remarkable about this admittedly small sample is its variability in many characteristics. More importantly, these finds are not uniformly and completely "modern" in appearance; in a number of cases they posess what seems to be a mixture of modern and archaic traits, particularly in the skull and jaw, leading some anthropologists to suggest a relationship with the Neanderthals.

According to Vlček (1996:59) in discussing the finds from Bohemia, Moravia, and Slovakia, "these oldest modern Central European humans show certain relationships to the forms of the intermediate Neanderthals of Central Europe." Frayer (1997:221) asserts that "Mladec 5 shows some truly distinctive Neanderthal features, such as its low angular skull, lambdoidal flattening, and a distinctive occipital bun." Furthermore, Frayer (1992) argues for considerable continuity in such features as the shape of a hole in the jaw, which gradually changes from Neanderthals through early moderns to later European populations.

Other anthropologists, such as Stringer and Gamble (1993:180), challenge this interpretation, arguing instead that early moderns were simply primitive (not Neanderthal-like) in comparison to later human populations. Their position is that there is a clear discontinuity in many skeletal features between Neanderthals and early moderns in Europe. This question of discontinuity in skeletal traits is important in evaluating the origins of modern humans in Europe. If modern populations developed elsewhere and moved into the continent, rapidly replacing Neanderthals, then the skeletons of the two groups should look radically different. Unfortunately, it may be that investigations into the degree of continuity between the two groups are hampered from the outset by the use of different skeletal criteria and measurements by different researchers (Willermet and Clark 1995).

Outside of Europe, the skeletal evidence is clearer. Modern human skeletons have been discovered in both Africa and the Near East, apparently dating in both areas to approximately 100,000 years ago. These are the earliest modern humans in the world. In both areas they look quite different from the Neanderthals (in the Near East) or archaic *H. sapiens* (in Africa). Interestingly, these early moderns also differ in several ways from many of the more robust early European moderns, such as the shape of the hole in the jaw studied by Frayer (1992). Based on the early date alone, a single African origin for all modern humans seems reasonable. On the other hand, if this population then spread out across Europe and Asia, it is difficult to understand why many of them would come to resemble European Neanderthals. Two possible explanations might be offered in support of the migration hypothesis. First, the traits in question might reflect similar adaptations to northern, more glacial environments by both populations. Other than nose size and perhaps the facial shape, however, it cannot be demonstrated that most traits have any bearing on adaptation to cold. Second, the apparent mixture of characteristics might be the result of interbreeding between immigrant moderns and resident Neanderthals. If this were the case, then "displacement" is not really the correct description of the processes leading to the emergence of modern humans in Europe. Neanderthals would have contributed substantially to the genetic make-up of later populations, and would, in this sense, be ancestors of modern Europeans.

In fact, two recent discoveries have been interpreted as reflecting interbreeding between the two groups. One is actually a redating of old finds. Two skull fragments from Vindija, Croatia, which had formerly been thought to be around 45,000 years old, have been now determined by the accelerator radiocarbon technique to be only 28,000–29,000 years in age. These finds are Neanderthals, but are claimed to show a number of traits midway between those of Neanderthals and moderns (Smith 2000). In the Portuguese rockshelter of Lagar Velho, the skeleton of a child, covered in red ochre, has been found, dating back to about 24,500 years. This find, too, is said to contain a combination of Neanderthal and modern traits that suggest interbreeding (Zilhão 2000). If these discoveries do represent products of interbreeding, rather than local evolutionary transitional forms, they suggest a considerable period of contemporaneity between the two groups.

So based upon the skeletal evidence alone, complete displacement and replacement of the Neanderthals by incoming modern humans is difficult to reconcile with the record of "transitional" or "mixed" forms. Immigration with some interbreeding or local evolution from Neanderthals appears to be more consistent with the data. However, it should be emphasized that the degree of differences, and more importantly, the meaning or significance of differences, among various skeletal finds is still poorly understood.

The DNA Evidence

If the skeletal evidence is ambiguous and allows for differing interpretations, genetic studies appear to be clearer, or at least have led to more unanimous conclusions. A number of recent studies of portions of DNA of modern populations have been undertaken in an attempt to determine patterns of ancestry. Some of the assumptions underlying these studies are (1) the sections of chromosomes studied have not been affected by natural selection; (2) the sections have not been altered through genetic recombination; (3) the major process responsible for change in base pairs of these sections has been mutation; and (4) average mutation rates can be estimated. Given these assumptions and calculations, estimates can be made about how much time separates groups whose DNA segments differ, that is, how long ago an ancestor common to both probably lived.

DNA in the mitochondria of cells, rather than the nucleus, has been most studied because it seems to meet the assumptions best. Mitochondria from the egg are passed intact into the fetus, supposedly without undergoing recombination (although this has been recently questioned). Thus, there is an unbroken transmission of mitochondrial DNA through the maternal line from generation to generation. Studies of mitochondrial DNA among modern populations have documented considerable variability, especially within Africa, and have suggested that the last common ancestor of all modern humans lived approximately 100,000–200,000 years ago (Cann et al. 1987). The researchers view these results as consistent with an African origin for modern humans, with subsequent dispersal into the rest of the world.

Other studies of mitochondrial DNA have addressed the specific question of migrations into Europe. A large comparative investigation of living people in Europe and the Near East suggests that one such migration from the Near East took place during the period of 45,000–55,000 BP, which would coincide reasonably well with the skeletal and archaeological data on the appearance of modern humans and the development of the Upper Paleolithic (Richards et al. 2000).

Nuclear DNA on the Y chromosome may also meet the assumptions underlying the techniques, as this chromosome, present only in men, does not undergo recombination with others. Recent studies of various portions of the Y chromosome of modern men have been interpreted as indicating a common ancestry for 80% of European men about 40,000 years ago (Semino et al. 2000). This ancestral population, in turn, shared an earlier common ancestry with groups in Asia. On this basis, the researchers suggest that there was a major immigration of people into Europe around 40,000 years ago, roughly contemporary with the appearance of modern *H. sapiens sapiens*, and in close agreement with the mitochondrial DNA studies.

Research has also been done on portions of the X chromosome, found in the cell nucleus in both women and men. One study documented a distinct difference in one X chromosomal segment between modern Africans and modern non-Africans, dating back at least 200,000 years. This result suggests a much earlier divergence of modern human groups than other studies indicate, and has been viewed as a challenge to the idea of a common African origin and subsequent migration of modern humans around 100,000 years ago (Pennisi 1999).

A very different approach to genetic studies was taken by a German team, who extracted mitochondrial DNA directly from a German Neanderthal bone and compared it to that of modern populations around the world (Krings et al. 1997). They found that the Neanderthal DNA differed considerably from that of all modern humans, including Europeans, and suggested that the Neanderthals are unlikely ancestors of the modern population of Europe. On the other hand, some researchers have suggested that the degree of difference measured between the Neanderthal skeleton and living modern humans, while apparently great, is actually within the range of other single species of primates (Clark 1997). More direct analysis of Neanderthal DNA would certainly be worthwhile, but this may be difficult, as ancient DNA may not be preserved in most cases. A study of animal bones associated with Neanderthal and early modern skeletal remains in European sites found that DNA was not recoverable, suggesting that the DNA in the human bones would have deteriorated as well (Cooper et al. 1997).

All of the genetic studies have their critics, many of whom emphasize the difficulty of determining the genetic "clocks" or mutation rates, which are critical in estimating the timing of evolutionary divergence. Many of the rates used actually have large ranges, and the derived dates have large margins of error. Moreover, rates of mutation may have varied through time, and other factors, such as recombination, may have affected the DNA segments studied. It has also been suggested that variations in past regional population sizes may have influenced the degree of modern genetic diversity, quite independently of rates of evolutionary change.

For the most part, the various genetic studies do generally support the idea that Neanderthals were not directly ancestral to modern humans, and therefore contrast with the skeletal evidence discussed above. There is a third class of evidence – the archaeological record – that can be examined, but unfortunately, this only increases the ambiguity and uncertainty about the transition to the Upper Paleolithic in Europe.

The Archaeological Evidence

A variety of different archaeological "cultures" or industries have been identified in the Upper Paleolithic record of Europe (Fig. 5.2). Here the focus is on the earliest of these, found during the time period of the transition, roughly 45,000–30,000 years ago.

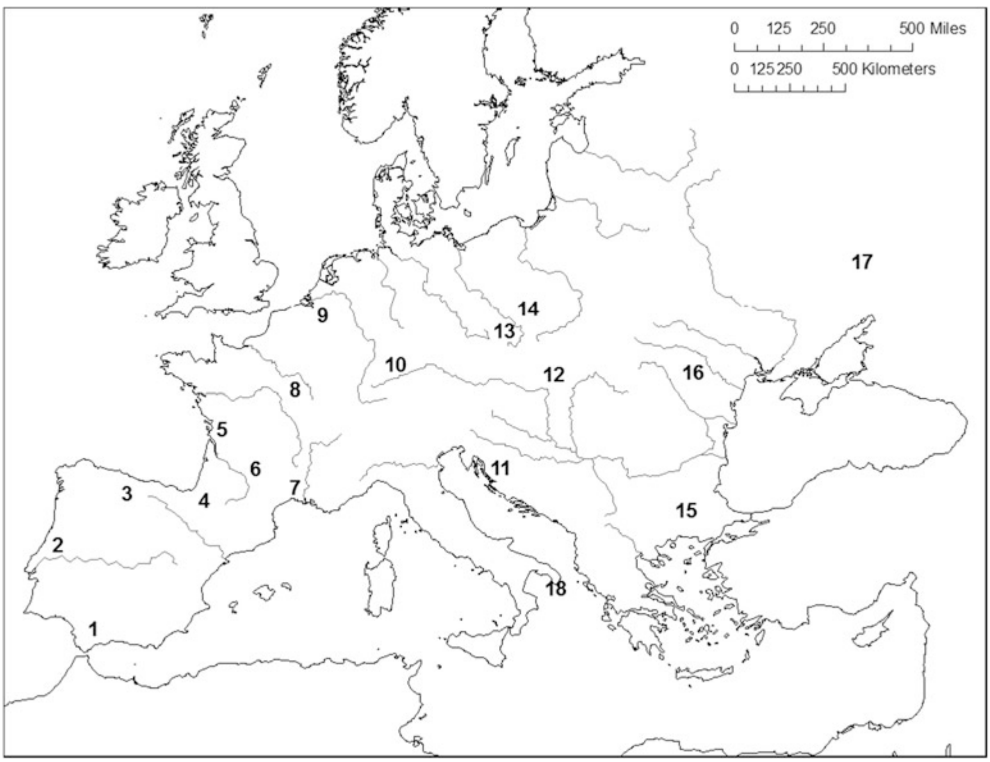


Fig. 5.2 Early upper Paleolithic sites mentioned in the text: *1* Zafarraya; *2* Lagar Velho; *3* El Castillo; *4* Brassampouy; *5* Saint-Césaire; *6* Castanet, Blanchard, Les Rois, Cro-Magnon; *7* Chauvet; *8* Arcy-sur-Cure; *9* Couvin; *10* Vogelherd, Geissenklösterle, Hohlenstein-Stadel; *11* Vindija; *12* Bohunice, Stránská Skála, Vedrovice; *13* Mladeč; *14* Dzierżysław; *15* Bacho Kiro; *16* Molodova; *17* Kostenki; *18* Grotta del Cavallo

The Aurignacian

The earliest true Upper Paleolithic industry with a widespread distribution across much of the continent is the *Aurignacian*, named after a site in France. Found across much of Europe from Bulgaria to Iberia, Aurignacian assemblages are quite different from Mousterian ones in many ways. First, they contain a considerable number of stone blades, which contrast with flakes in being long and narrow, often with parallel sides (Fig. 5.3). Blades are manufactured in various ways, some of which, like the Levallois technique, were seen in the preceding Middle Paleolithic, and others, like prismatic core technology, are new. This latter technique entails the preparation of a nodule to form a flat striking platform, and then the removal of blades around the periphery, using either a natural edge in the material or creating by retouch an artificial ridge along the side, to guide the force down the length of the nodule. The resulting core, with numerous blade removals, resembles a prism with its straight, parallel facets. Flakes still comprise a substantial amount of the stone assemblage, varying in proportion significantly from site to site.

Many of the retouched tools were made from blades, often using a flat, invasive retouch (Fig. 5.3). The tools include a number of types that were either rare or absent in the Mousterian. End scrapers, made on the end of blades or thick flakes, are more common than side scrapers. Tools with a chisel-like end, called burins, are common. Specific forms of these general categories are characteristic of the Aurignacian, such as steep, thick, carinate scrapers, nosed scrapers, and beaked burins. Heavily retouched blades, often narrower in the middle than at either end, are also typical.

Aurignacian assemblages display considerable variability, both spatial and temporal. In France the Aurignacian has been subdivided into a number of chronological stages that differ in terms of the relative proportions of different tool categories (scrapers versus burins, for example) as well as the presence or absence of various specific tool types.

Recent appraisals suggest that what has been called "Aurignacian" is, in fact, so variable that it should not be considered a unitary phenomenon (Clark and Riel-Salvatore 2005/2006, Kozłowski

Fig. 5.3 Some Aurignacian tools (from *left*: end scraper on waisted blade; nosed end scraper; burin)

and Otte 2000). In Italy and other parts of southern Europe, for example, some "Aurignacian" assemblages are dominated by small retouched bladelets, which have not normally been considered to be characteristic (Kuhn and Steiner 1998).

Tools made from bone and antler are regular components of Aurignacian assemblages. These differ considerably from the few examples known for the Lower and Middle Paleolithic. They are well made, often by carving and polishing rather than chipping, and show a variety of repetitive, standardized forms. Common types include finely pointed bone awls, perforated antler batons, bone and antler rods incised with regular lines, and different forms of antler points, some with split bases, others with forked or beveled bases.

One of the most remarkable aspects of the Aurignacian is the abundance of objects of ornamentation. Thousands of beads and pendants have been discovered, fashioned from a variety of materials in various shapes. Ivory beads, made from segments of cylindrical rods taken from mammoth tusks, are particularly common in France, Belgium, and Spain. These were made in different, standardized shapes: "basket-shaped" with one perforation in France, elongated forms in Belgium, and double-perforated types in Germany. Experiments suggest that the French forms each took about an hour to manufacture (White 1993). Some sites, such as Castanet and Abri Blanchard in southern France, contained hundreds of these beads. Pendants and beads were also made from animal teeth (fox, red deer, beaver, moose, bovids), shells, fossils, limestone, steatite, hematite, bone, antler, and other materials. The distribution of jewelry is as widespread as the Aurignacian itself, from Spain through France, Belgium, Germany, and Moravia over to Bulgaria. Studies of the distribution of different types of beads suggest the existence of different cultural regions within the area of the Aurignacian (Vanhaeren and d'Errico 2006). The production of what we consider as "art" also proliferated during the Aurignacian period. Most notable is a group of three-dimensional ivory carvings found in three south German caves, Vogelherd, Geissenklösterle, and Hohlenstein-Stadel, all located on tributaries of the upper Danube River (Hahn 1983). Twelve animal figurines, ranging in length from 5 to 9 centimeters, include representations of mammoth (5), felines (4), rhinoceros (1), bison (1), and horse (1). They are carved in fine detail, including eyes, ears, and hair, and a number bear other marks, such as cross-hatches or dots. Some of these figures, such as the horse, are highly polished suggesting long use, and perhaps were suspended as pendants. In addition, three other figurines have been interpreted as human or anthropomorphic. One is a small (6.9 centimeters) ivory cylinder with a spherical portion on one end, interpreted as a head. The entire figure is covered with rows of dot-like depressions. Another is actually a rectangular plaque, measuring only 3.8 centimeters in length, which has carved onto one face the schematic figure of a human with outstretched arms and legs. On the opposite face are rows of incised marks. The third figure is much larger (28.1 centimeters) and perhaps more remarkable: the upright human body has the face of a cave lion. Such detailed carvings are unique in the archaeological record of this period, but one ivory carving of a woman's head, with details of hair and face intricately carved, was found at the French site of Brassempouy and may date to the Aurignacian (Bahn and Vertut 1988:85).

Various other types of Aurignacian art are known, particularly from France. A number of stone blocks have been found with engravings of triangular, schematized vulvas, indicating that female imagery was an important artistic theme. Some engravings of animals and geometric shapes, as well as traces of painting, on the walls of caves are also thought to be of Aurignacian age (Delluc and Delluc 1991). Very early evidence of possible cave painting has been found at Fumane Cave in northern Italy, where painted slabs, possibly fallen from the cave roof or walls, have been dated to 35,500–32,000 years ago.

Without a doubt, however, the most impressive recent find of Aurignacian art is the painted cave of Chauvet. This site, located in southeastern France along a tributary of the Rhône River, was discovered in 1994, and has revolutionized our knowledge of Paleolithic art. Over 300 individual animal figures are painted or engraved on the walls of this deep cave, together with motifs of hands, dots, and other geometric forms. The paintings are done in black (charcoal) or red (hematite), and include details of hair, ears, and shading. The predominant animals depicted are rhinoceros, lion, mammoth, and horse, which in a preliminary count together made up 67% of the animal figures (Clottes 1995:96–97). Three samples of charcoal figures on the walls were dated directly by the accelerator radiocarbon technique and produced dates between 32,000 and 30,000 years ago, that is, of Aurignacian age. This early date for such sophisticated and abundant cave art has posed a real challenge to traditional schemes of stylistic evolution of the art, which would have placed this cave at a much more recent date. Arguments for a significant cognitive discontinuity between Neanderthals and early moderns have been considerably strengthened by this find, which seems to have no earlier counterparts or preliminary stages. Further confirmation of the precocity of cave art is provided by the recent discovery of painted slabs found buried within sediments in the north Italian cave of Fumane (Balter 2000). The sediments have been dated to between 32,000 and 36,500 BP. These slabs, which apparently fell from the cave ceiling, bear images painted in red ochre, one identified as an animal and another as a human with an animal head, echoing the theme from the German carving of a lion-headed man.

One of the earliest dates for an Aurignacian assemblage is greater than 43,000 BP from Bacho Kiro Cave in Bulgaria, but as mentioned above, this date has been considered uncertain. However, it is now supported by several dates in the range of 44,000–46,000 BP from two other sites in Bulgaria and Hungary (Mellars 1992). Dates of approximately 40,000 years ago have been obtained for Aurignacian materials in southern Germany at the site of Geissenklösterle (Richter et al. 2000) and northern Spain at the sites of El Castillo and L'Arbreda (Bischoff et al. 1989, Cabrera and Bischoff 1989). No human remains have been found associated with these earliest Aurignacian assemblages. The vast majority of Aurignacian sites in France and central Europe have however been dated to the period of about 34,000–27,000 years ago and are associated with remains of modern humans at such sites as Vogelherd in Germany and Le Rois and Cro-Magnon in France (Mellars 1992).

The abundance of sites varies considerably across the continent. In France alone, 211 Aurignacian sites have been discovered, primarily concentrated in the south (Demars 1996). Spain and Portugal together contain 43 known or probable sites of this period (Straus et al. 2000). Belgium has at least 17 (Otte 1985) and Moravia at least 37 Aurignacian sites (Svoboda et al. 1996), while Hahn (1971) estimates approximately 100 in Germany, Austria, Hungary, and Bulgaria. This distribution does not appear to be static, however. Earlier Aurignacian sites in Spain are confined to the northernmost portions of the country, spreading to the south only around 30,000 years ago (Straus et al. 2000). In France, early Aurignacian sites are found largely in the southeast and gradually spread to the west and north (Harrold 1989). Mussi (1990) points out that the earliest Aurignacian in Italy appears to be concentrated in the north and expands southward by 31,000 BP. A general overview of the Aurignacian across the entire continent suggests an initial appearance in southeastern Europe, followed by a relatively rapid expansion in a contiguous area to the north and west, as well as occupation of separate areas in southern France and northern Spain (Bocquet-Appel and Demars 2000). These areas expand as well, so that by 30,000 BP, the entire continent except for the southwestern portion of the Iberian Peninsula is occupied by the Aurignacian, and by 27,500 BP, even this last refuge disappears.

Supporting this pattern is the late date of 28,000 BP for a Middle Paleolithic assemblage in the southern Spanish site of Zafarraya (Smith 2000). Whereas in much of Europe the typical Middle Paleolithic appears to end by around 40,000–35,000 BP, it appears that southern Iberia, to the south of the Ebro River, retained a Middle Paleolithic character for another 10,000 years or so. It is significant that Neanderthal remains from the same site have been determined to be similarly late, dating to around 30,000 BP.

The archaeological record of the Aurignacian and Middle Paleolithic, consequently, displays a number of features that support the idea of an immigration of modern humans into Europe and the gradual displacement of Neanderthal populations. Beginning in the southeast, the Aurignacian, identified at least in its later stages with modern humans, spread north and westward, while typical Middle Paleolithic industries and classic Neanderthals show a shrinking distribution, ultimately concentrating in the southwestern part of the Iberian cul-de-sac. From the outset, the Aurignacian shows a number of novel characteristics: a much greater importance of prismatic blade technology, new stone tool forms, a much greater and more standardized use of bone, antler, and ivory to manufacture tools, a proliferation of beads and pendants, and the production of sophisticated portable and cave art.

Other European Archaeological Evidence

Both the archaeological data just discussed and the genetic studies offer strong support for the replacement model of the transition to modern humans in Europe. As discussed earlier, however, the skeletal evidence is more ambiguous, at least to some physical anthropologists. A number of forms that display a mixture of both modern and Neanderthal characteristics are difficult to explain in a strict replacement scenario. There is also another body of archaeological data that is at odds with this scenario and that has fostered considerable debate. These data consist of a number of archaeological "cultures" or industries that appear intermediate between the Middle and Upper Paleolithic. Like some of the fossil skeletal material, they are "mixed," and have been interpreted as evidence of either local development of Upper Paleolithic characteristics or of interaction between modern and Neanderthal populations.

In southern Russia and the Ukraine there is no true Aurignacian, although some Aurignacian tool forms do appear sporadically in various assemblages, particularly in the west (Hoffecker 1988, Soffer 1990). Perhaps the most notable feature of the early Upper Paleolithic assemblages is their variability within and among regions. Two areas of site concentrations exist: the middle Dnestr drainage in the west and the middle Don Basin farther east. Although relatively few absolute dates are available, both areas appear to have a number of sites dating to a period before 30,000 BP. Assemblages in the west, at sites like Molodova V, have a mixture of characteristics: Middle Paleolithic side scrapers, discoidal cores, and Mousterian points, together with some irregular prismatic cores, a few blades, end scrapers, and burins. In the east, two different groups of assemblages have been identified. The *Streletskaya Culture*, found at such sites as Kostenki VI and XII, 3 is characterized by a predominance of Middle Paleolithic tools, together with rare prismatic cores, blades, and end scrapers, as well as some small bifacial points. By contrast, the *Spitsynskaya Culture*, occurring in nearby sites or even other levels of the same sites (Kostenki XVII and XII, 2), shows a predominance of prismatic blade cores, burins, end scrapers, and retouched blades, together with bone awls and points. No art or ornaments are known from either the western sites or the Streletskaya sites, but the Spitsynskaya site of Kostenki XVII has produced a number of perforated teeth, fossils, and stone pendants. These Russian and Ukrainian sites, therefore, display a varying mixture of Middle and Upper Paleolithic traits, and there seems to be a correlation between the more Upper Paleolithic stone technology and other Upper Paleolithic features such as bone tools and ornaments.

In east-central Europe, two "transitional" or "mixed" industries have been recognized (Allsworth-Jones 1986, Oliva 1991, Svoboda et al. 1996). They are similar in possessing "well-determined Upper Paleolithic tool equipment, while the technologies, as if they were more 'retarded,' retained and modified various Middle Paleolithic traditions" (Svoboda et al. 1996:107). The *Bohunician*, which has dates of around 42,000–38,000 BP, is found at relatively few sites in Moravia, including Bohunice and Stránská Skála. Core preparation is by a modified version of the Levallois technique and the tools include blade end scrapers and burins, together with Mousterian side scrapers and points. The

Szeletian, dating back to roughly 40,000–35,000 years, is more abundant and widespread, extending into southern Poland and Slovakia. Important sites include Dzierżysław in Poland and Vedrovice V in Moravia. This industry has more blades than the Middle Paleolithic, but fewer than the Bohunician. Leaf-shaped points with bifacial retouch, similar to those from the preceding central European Middle Paleolithic, are common, as are side scrapers. End scrapers and pointed retouched blades, on the other hand, are also common elements of assemblages.

Another industry with a mixture of traits has been found across much of the north European Plain, from England through Belgium and Germany to Poland (Otte 1990). At the Belgian site of Couvin it has been dated to approximately 45,000 BP. It is characterized by the regular production of both blades and thick flakes. Bifacial leaf-points, similar to those of the late Middle Paleolithic, are the most common tool form.

In the central and southern portions of Italy is an industry called the *Uluzzian*, dating to a period of at least 32,000–36,000 BP and probably earlier. At every major site where it occurs, such as Grotta del Cavallo, it is followed by an Aurignacian level, suggesting that it precedes this culture, rather than being its contemporary (Mussi 2001). The Uluzzian is largely a flake industry with very few blades. Side scrapers and notched and denticulated pieces are common, as are so-called scaled pieces, which may have been wedge-like tools or exhausted cores.

Upper Paleolithic forms include end scrapers and backed points, with occasional burins. Only a few bone points and perforated marine shells have been found in Uluzzian contexts, contrasting significantly with the Aurignacian assemblages, particularly in terms of the evidence of bone-working.

France and northern Spain contain the best known of these "transitional" or "mixed" assemblages, designated as the *Chatelperronian* (de Sonneville-Bordes 1960). The admixture of traits shown by this industry is underlined by the fact that in traditional French chronological frameworks, the Chatelperronian was once considered to be a developmental stage from the Mousterian of Acheulean Tradition to later Upper Paleolithic industries called the Upper Perigordian or Gravettian. It does, in fact, share a number of characteristics with both of these and was used as evidence for a local evolution of the Upper Paleolithic. It contains a number of Mousterian flake tools (side scrapers, points, denticulated flakes) along with blade tools (end scrapers, burins, borers) and, most characteristic, several types of steeply retouched, curved back points or knives (Fig. 5.4).

Fig. 5.4 Chatelperron point, characteristic of the Chatelperronian

These sites also contain a number of well-made bone tools and other objects. The most prolific site is Arcy-sur-Cure, Grotte du Renne in north-central France. Chatelperronian levels at this site contained a total of 142 worked pieces of bone, including projectile points, awls, pins, and polishers, as well as a variety of rods, carved rings, and tubular sections of bird bone (d'Errico and Zilhão 1998). This same site contained 36 ornaments in the form of grooved and perforated animal teeth, ivory beads, and grooved and perforated bones and fossils.

Dates for the Chatelperronian have been much debated. Most determinations place these sites in the time period of roughly 37,000–33,000 BP, although some dates as early as 45,000 BP have been obtained. Thus, the question has been posed whether the Chatelperronian is solely contemporary with the Aurignacian in this part of Europe, or whether it actually first appeared before the Aurignacian. The importance of this question derives from the fact that this is the only one of the "mixed" industries for which we have identifiable skeletal remains. At two sites, Arcy-sur-Cure, Grotte du Renne and Saint-Cesaire, skeletal remains of Neanderthals have been found in direct association with Chatelperronian assemblages. It appears indisputable that Neanderthals were responsible for the manufacture of these assemblages. Whether this is true for the other "mixed" industries is still unknown. As more research is done, the number of these "transitional" industries is proliferating and it is clear that archaeological changes occurred at different rates and in different ways across the continent during this period.

In France and northern Spain, therefore, evidence suggests that Neanderthals were behaving in a quite "modern" manner, manufacturing Upper Paleolithic stone tools (along with those characteristic of the Middle Paleolithic), fashioning an array of bone implements, and creating a variety of personal ornaments. The significance of this has been interpreted in various ways:

1. Neanderthals gathered tools and ornaments that had been abandoned by modern humans
2. Neanderthals obtained these objects through exchange with modern humans
3. Neanderthals made the objects in imitation of their modern neighbors
4. Neanderthals developed this technology on their own, independent of and before the arrival of modern populations
5. Neanderthals developed the technology on their own, in the course of a local biological and cultural development into what we recognize as modern humans and Upper Paleolithic culture.

Evidence against the first two interpretations is the presence of much bone and ivory waste material at Grotte du Renne, interpreted as the by-products of manufacturing and therefore as indications that the Neanderthals, indeed, made the objects themselves. If the fourth interpretation were true, then the very early dates for the Chatelperronian would have to be demonstrated as valid, indicating that it precedes the Aurignacian. It is true that whenever both the Chatelperronian and Aurignacian occur at the same sites, the former usually underlies the latter, but there are also a number of cases where the two are interstratified, suggesting contemporaneity (Mellars 1992). Furthermore, it seems unlikely to many archaeologists that Neanderthals would independently develop many of the behaviors that happen to be associated with immigrating populations, just before their arrival, after so many thousands of years of European occupation.

Arguments against the fifth interpretation have much ammunition. The growing body of genetic evidence increasingly suggests an immigration of modern humans from outside of Europe. The African skeletal evidence supports the position that modern humans evolved on that continent long before they appeared in Europe. There is a growing body of chronological evidence for an east-to-west expansion of the Aurignacian within Europe. Arguments for a purely local evolution of biology and culture within Europe are increasingly difficult to maintain.

Summary of the Transition to the Upper Paleolithic

The third interpretation for the features at Grotte du Renne is currently the most accepted, which suggests the following processes for the transition to the Upper Paleolithic in Europe:

- There was an immigration of biologically modern humans into Europe, ultimately from Africa via the Near East, perhaps around 45,000 years ago.
- These populations brought with them many of the features considered to be "Upper Paleolithic," in the form of an emphasis on prismatic blade technology, bone, antler, and ivory manufacture, and the creation of ornaments and artwork.
- They were contemporary with Neanderthals for a considerable period of time.
- The Neanderthals, exposed to these new behaviors, began to imitate some of them, creating many of the "mixed" industries.
- More controversially, the Neanderthals and the modern humans interbred to some extent, creating some of the skeletal material with mixed traits.
- Biologically and culturally unaffected Neanderthals persisted longer in some areas such as the southern portion of Iberia.
- By approximately 28,000 years ago, the entire continent was populated by groups practicing much the same behaviors, making similar tools, and looking more uniformly modern.

Early Upper Paleolithic Subsistence

If modern humans immigrated into Europe and were ultimately more successful than resident Neanderthal populations, there should be evidence of more effective or adaptive behavior during the early Upper Paleolithic. Although the early Upper Paleolithic witnessed a number of dramatic changes in technology, ornamentation, and art, it does not appear to show major alterations in the subsistence economy (Chase 1989). The admittedly biased archaeological record continues to document an emphasis on big game, with little contribution to the diet of plants, fish, or birds. Hockett and Haws (2005), however, suggest that early modern populations had greater dietary diversity than Neanderthals. This is based in part on studies of bone chemistry, but unfortunately the data for modern populations come from skeletons that postdate the Aurignacian.

This period witnessed a number of climatic fluctuations that doubtless had a major impact on local economies (Van Andel and Tzedakis 1996), but our chronological resolution is generally not precise enough to detect patterns. Mellars (1973), focusing primarily on southern France, has argued that the Upper Paleolithic shows a greater specialization on fewer herbivore prey than the Middle Paleolithic, but while this is the case for later Upper Paleolithic groups, it is not so clearly true for the Aurignacian. Freeman (1973) points out that Aurignacian groups in northern Spain hunted a variety of species from different habitats – forest, grassland, and mountains – including red and roe deer, boar, horse, bovids, ibex, and chamois. Straus (1988) adds that these Spanish sites usually contain the remains of only a few animals, suggesting individual hunting, rather than any communal techniques. The mountain species, although not numerically abundant as prey, do represent a new addition to the diet, having been largely ignored during the Middle Paleolithic. In Germany, the major Aurignacian preys were reindeer, horse, mammoth, and rhinoceros, but there is no evidence of a specialization on a single species (Hahn 1987). Single individuals of horse or mammoth are the most common faunal remains in Moravian Aurignacian sites (Svoboda et al. 1996:127). On the other hand, Soffer (1990) documents a narrowing of the diet in sites in the Ukraine, from a total of 12 large herbivores exploited during the

Middle Paleolithic to only six during the Early Upper Paleolithic in the Dnestr Valley. She interprets this change as indicative of less opportunism and greater planning and targeting of prey during the early Upper Paleolithic. The major changes in the subsistence economy throughout much of Europe, however, appear to lie in the equipment used. In addition to stone points, a variety of bone and antler points are now documented. Unfortunately, the extent to which they may have contributed to greater hunting effectiveness is unknown.

Early Upper Paleolithic Settlement and Exchange

Settlement patterns similarly show a varied pattern across the continent, with some evidence of differences from the Middle Paleolithic. In France and Spain, much the same regions and often the same sites are occupied in both periods (Straus 1988). In Russia and the Ukraine, on the other hand, while the middle Dnestr Valley is occupied in both periods, the middle Don is newly colonized during the early Upper Paleolithic. In Italy, Aurignacian sites appear at higher elevations than those of the Middle Paleolithic and also constitute the first occupation of the island of Sicily (Mussi 2001). Svoboda documents an "out-of-the-caves" movement for the Aurignacian of Moravia: the cave-rich limestone hills that were the focus of Middle Paleolithic settlement were replaced by topographically more open locations at lower elevations during the early Upper Paleolithic (Svoboda et al. 1996:118–119). In both Italy and Moravia, these changes in settlement have been interpreted as a reflection of changes in the organization of land use to include higher mobility and more frequent extablishment of special-purpose camps in distant areas to hunt or collect stone raw material.

Although the Aurignacian persisted for thousands of years and is found at numerous sites, knowledge of many other aspects of behavior for this period is quite limited. Many sites have suffered severe erosion and displacement of materials. Cave assemblages are often mixed by geologic processes and other animals. Hahn (1987) discusses major geomorphological changes that occurred throughout central Europe toward the end of the Aurignacian, characterized by severe erosion and a general flattening of relief. Hilltops were eroded away and valleys were filled with up to 5 meters of deposits. As a result, it has proven difficult to reconstruct internal site patterns, site functions, and regional organization of settlement for the Aurignacian.

Both a higher degree of mobility and a greater importance of exchange among groups are suggested by the distribution of stone and other materials in some areas. Although many sites contain mostly materials available quite nearby, some long-distance transport is evident. The majority of tools of all Spitsynkaya sites on the middle Don in Russia are made of flint from sources 150–300 kilometers away (Soffer 1990:732), and the site of Kostenki I contains shells from even farther away, perhaps 600 kilometers (Hahn 1971). The middle Dnestr sites also have small amounts of exotic stone. Sites in Lower Austria, such as Krems-Hundsteig, contain shells from either the Mediterranean, about 300 kilometers away today, or the Black Sea, approximately 600 kilometers away (Hahn 1971). Small amounts of stone or fossils in Aurignacian sites of Moravia, southern Germany and the Rhineland can be traced to sources from 50 to over 200 kilometers away (Hahn 1987, Svoboda et al. 1996). French Aurignacian sites frequently contain stones from the Pyrenees and shells from the Atlantic or Mediterranean, with transport distances of 200–300 kilometers or more (White 1993). In a few cases, such as the Moravian sites, the amount of exotic material is large enough to suggest that the occupants procured it themselves, during the course of their seasonal movements. In most cases, however, only small amounts are present and have been interpreted as exchange items in wide-ranging social networks. The greater amount of evidence for such exchange may reflect a more structured and important set of regional social relationships during the Aurignacian as compared to the previous period. These networks, which could have facilitated movement into other areas during times of environmental stress, may have been an important adaptive innovation of modern humans.

The Developed Early Upper Paleolithic: The Gravettian

The Aurignacian disappeared from the archaeological record in many regions by around 29,000–27,000 years ago. In some areas, however, assemblages with many Aurignacian characteristics have been dated to a considerably later time. In southwestern France, for example, the sites of Abri Pataud and Le Flageolet I both have late Aurignacian levels dated to approximately 24,000 BP (Mellars 1987), and southeastern France similarly appears to show a late persistence of Aurignacian-like assemblages (Rigaud and Simek 1990). In addition, three sites in lower Austria have Aurignacian assemblages dating to the period of 25,000–20,000 years ago (Svoboda et al. 1996:137).

The subsequent archaeological culture is known generally as the *Gravettian* or *Upper Perigordian* in France, Spain, and Belgium and as the *Gravettian* or the *Eastern Gravettian* in central, southern, and eastern Europe (Fig. 5.5). Despite many regional differences, sites of this period show a number of strong similarities across the continent, and are referred to here simply as *Gravettian.* The Gravettian appears between approximately 30,000 and 27,000 years ago in different parts of Europe.

The overlap in dates between the Aurignacian and Gravettian raises important questions about the meaning of differences between the two. In many ways, the questions are similar to those posed about differences in Middle Paleolithic assemblages discussed in the previous chapter. In this case, however, the differences are of another sort entirely. Rather than involving primarily (although not exclusively) differing proportions of the same tools, as was the case in the Middle Paleolithic, the Aurignacian and Gravettian are distinct in a variety of ways (de Sonneville-Bordes 1963):

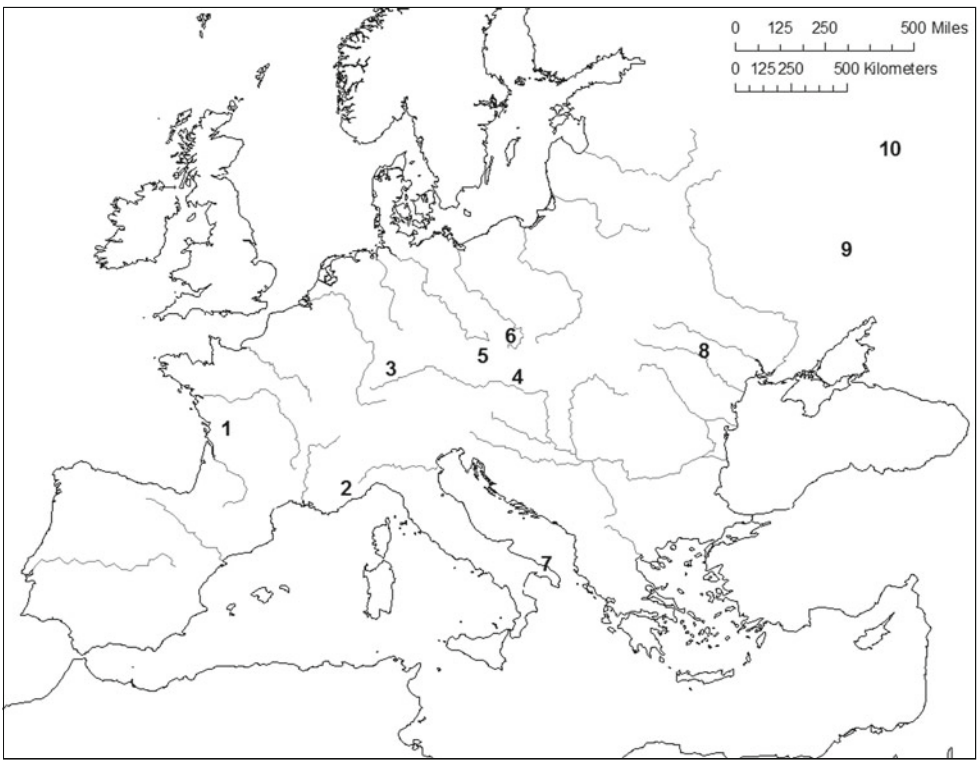


Fig. 5.5 Gravettian sites mentioned in the text: *1* Corbiac, Solvieux; *2* Balzi Rossi, Barma Grande, Arene Candide; *3* Brillenhöhle; *4* Stillfried; *5* Pavlov, Dolni Věstonice, Předmosti, Brno; *6* Petrkovice; *7* S. Maria di Agnano; *8* Molodova; *9* Kostenki; *10* Sungir

- The technology of blade manufacture, with Gravettian blades much more finely made;
- The dominant type of retouch, which is steeper and more abrupt in the Gravettian;
- The presence of particular stone tool types, differing in their distribution, such as straight-backed points with abrupt retouch along the back, backed bladelets and other small tools, or microliths, tanged and shouldered points, and small multiple burins in the Gravettian;
- The proportion of general tool classes, with burins more abundant in the Gravettian;
- The lack of particular stone tools, such as the absence of steep and nosed scrapers in the Gravettian;
- The lack of certain characteristic bone and antler artifacts, as exemplified by the absence of typically Aurignacian split- and bevel-based points in the Gravettian; and
- The presence of new forms of artwork, including female figurines in the Gravettian.

The magnitude and variety of these differences suggests to many archaeologists that they truly represent two different cultural traditions, and perhaps even two different biological populations. Recent DNA studies have given some support to this interpretation. For example, the research on mitochondrial DNA discussed earlier suggests several later migrations into Europe after the earliest identified between 45,000 and 55,000 BP (Richards et al. 2000). One of these occurred in the period of approximately 30,000–38,000 BP, the other between 20,000 and 33,000 BP. Either or both of these might reflect the influx of "Gravettians," perhaps from central Asia into an Aurignacian Europe. Studies of the DNA on Y chromosomes similarly indicate a second immigration into Europe some time around 25,000 BP (Semino et al. 2000).

Taken together, the archaeological differences and the genetic studies strongly support the view that the prolonged transition between the Aurignacian and Gravettian involved different cultural traditions. On the one hand, many archaeologists are loath to attributing ethnic or cultural significance to Paleolithic material culture (Clark 1994). There are many good reasons for this. Stone tools may be particularly inappropriate for the active and recognized expression of ethnicity, in part because they are so strongly influenced and limited by characteristics of the raw material and the needs for particular functional designs. Moreover, ethnicity is more likely to be actively expressed by material culture in situations of reasonably high population density, which would encourage intensive within-group interaction and promote competitive relations with others. In such situations, highlighting distinctions between groups may foster group cohesion and persistence. In Paleolithic Europe, however, population densities were surely low.

On the other hand, differences in material culture need not derive solely from patterns of interaction within and between groups. They may also arise from different histories and reflect simply different, learned traditions of doing things. If two groups from different areas and histories happen to come together in the same region, their material culture can be expected, at least initially, to differ. What happens subsequently, whether these traditions remain distinct, or blend, or one disappears, depends on the nature of the interactions between the two groups. In light of the growing genetic evidence for periodic immigrations into Europe of biologically different groups, this type of scenario should be evaluated in attempts to explain the archaeological record.

Spotlight on a Gravettian Site: Pavlov I

The site of Pavlov I is part of an important cluster of sites lying within 2.5 kilometers of each other in the foothills of southern Moravia (Svoboda 1994). These sites are situated just south of the Moravian Gate, a series of passes and river corridors linking the middle Danube Valley with southern Poland. The site was discovered through accidental finds of mammoth bones in a vineyard and systematically excavated from 1952 to 1972. Over the course of this work, the methods of excavation changed;

the plotting of artifact location, first by grid square and later by precise, three-dimensional coordinates, and the water-screening of sediments were introduced only after the first season. Altogether, approximately one million stone artifacts were recovered, together with bones and other materials. The analysis of finds is still in progress; only those from the first two seasons have been published to date and form the focus of discussion here.

The cultural level, 50 centimeters in thickness and in places recognizable as two separate layers, probably represents a number of episodes of occupation, which radiocarbon measurements place between 24,500 and 27,000 BP. Studies of pollen and charcoal from this and nearby sites suggest that the environment at the time was a cool forest-steppe, with considerable open vegetation, but with significant amounts of pine, spruce, larch, fir, juniper, elm, and yew. Rather small growth rings visible in the wood charcoal suggest fairly rigorous conditions limiting tree growth.

The central feature of the excavated area was originally interpreted as a hut (Klima 1994), but may have been more like a lean-to, open to the south. This consists of an irregular oval depression, measuring about 3.4 × 7.5 meters. The depression is most pronounced along the north side, and is further delineated by a rough outline of large bones, primarily of mammoth. Four ashy hearths lie inside the shelter, with another seven nearby. Both bones and stone artifacts are abundant in this area, but the shelter contains relatively fewer artifacts than the outside spaces. Over 1800 pieces of chipped stone are concentrated within 7 square meters adjacent to two hearths north of the shelter and are associated with the bones of reindeer, rabbit, and polar fox (Tomášková 1994). Microwear analysis indicates that tools in this area were used on both soft (meat, hides) and hard (bone, wood) materials. Within the shelter itself, artifacts are clustered around two of the hearths and extend to the south, suggesting a doorway or open side. The bones in this concentration consist mainly of wolf and fox, and the tools show wear traces from both soft and hard materials. The primary outside activity area is located to one side of the hut. Here, a large amount of both stones and bones is concentrated in semicircular patterns around five hearths. The bones include reindeer, wolf, horse, fox, rabbit, and mammoth. Several pits in this area have been interpreted as boiling pits for cooking. It is clear that the hearths were the focus of activities, which appear to have included a variety of different tasks. Subsequent excavations revealed a number of other structures and hearths.

Over 52,000 stone artifacts were recovered during the first two seasons. The raw materials – flint, radiolarite, chert, quartz – come primarily from distances of over 100 kilometers away to the northeast and southeast. Very little local raw material was used. Blades are very numerous and approximately 16% are retouched as tools. The tools include burins (about 33%), end scrapers (10%), backed microblades and points (29%), other microliths (14%), and various other implements (14%).

A large variety of different species, including many carnivores, was found among the bones at the site (Musil 1994). These include (together with the percentage of bones represented by each) the following:

18.5%	Hare
16.9%	Polar fox
12.5%	Wolf
10.7%	Red fox
10.1%	Reindeer
8.3%	Birds
7.5%	Mammoth
4.6%	Horse
4.4%	Badger
0.7%	Brown bear
0.5%	Panther
0.5%	Wildcat

0.2%	Cave bear
0.2%	Aurochs or bison
0.2%	Red deer
0.2%	Lynx
2.7%	Other or indeterminate species

It is likely that many of the carnivores were hunted primarily for their furs and that most meat came from the various herbivores such as hare, reindeer, mammoth, and horse. A number of bones, or portions of bones, from specific body parts are missing from the assemblage, suggesting their use in the manufacture of tools.

Over 250 pieces of bone, antler, and ivory that were partially worked or made into finished tools were uncovered at this site (Klima 1994). These include a large variety of different forms such as points, knives, and awls, shovels, spoons, clubs, and axes. Many of these are decorated with engraved, parallel lines along the side. In addition, more than 300 objects of art and jewelry were also recovered, again in great variety. Bracelets, rings, and decorated hair-clasps were fashioned out of mammoth ivory. Bone, ivory, animal teeth, and shells were shaped and perforated to create pendants and beads. A few carvings and engravings of animal and human figures and over 1000 fragments of red ochre pigment were also found.

Among the most remarkable of the finds are over 4000 pieces of clay, a number of which were fired to temperatures of up to 800 degrees Centigrade (Soffer and Vandiver 1994, 1997). Most of these finds are concentrated within one of the hut-like structures. The vast majority of these are simply small lumps less than 1 centimeter in diameter, but most of these do show definite signs of purposeful smoothing. A few are clearly portions of figurines, including the body of a bear, the head of a rhinoceros, and a human leg. Details were fashioned through the use of tools or fingernails. Many

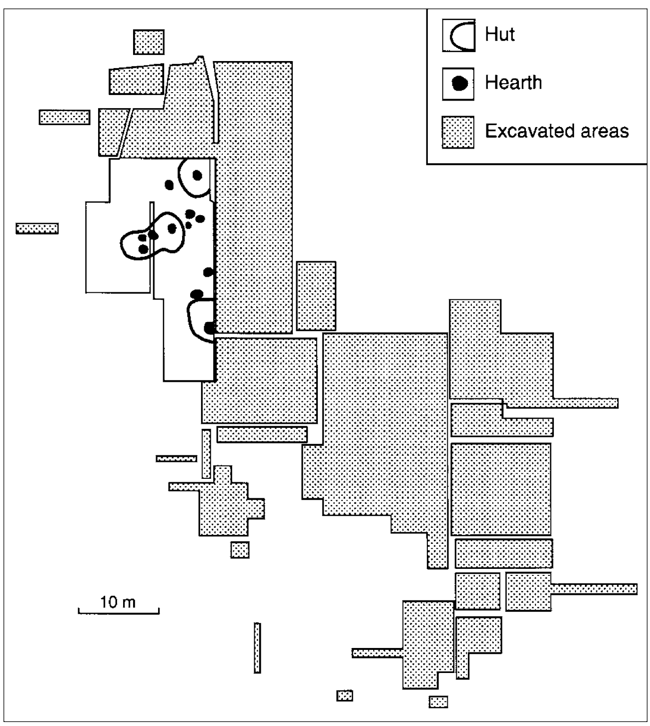


Fig. 5.6 Pavlov I site plan (after Svoboda 1994)

of these figurine parts show evidence of thermal shock, that is, abrupt shatter caused by exposure to fire when still wet. Clay may also have been used in other ways as well. The original excavator reported that a number of mammoth bones were coated in clay to create a windbreak around one of the hearths. Furthermore, several of the clay fragments had traces of the impressions of textiles or basketry, manufactured from interwoven twine made of plant fibers (Adovasio et al. 1996).

This site of Pavlov I was apparently occupied a number of times as a complex, residential camp in the forest-steppe of southern Moravia (Fig. 5.6). The occupants devoted considerable labor to the construction of huts or shelters and hearths, perhaps with clay-lined windbreaks. They carried out a diverse array of activities, including the hunting of large and small game for both meat and pelts, and subsequent butchering and hide-working around the hearths. Stone, brought in from a considerable distance, as well as bone, ivory, and antler, was used to manufacture a variety of different tools and even twine was made and interwoven to fashion various objects. An impressive amount of material documents a rich aesthetic sense and perhaps ritual life. Figurines were created from clay and fired, perhaps sometimes with the intent that they shatter. Numerous objects of art and adornment suggest that personal identities were brightly displayed.

Gravettian Technology

As discussed earlier, Gravettian stone technology throughout the continent is characterized by a preponderance of fine blades and of steep retouch used both to shape tools and to create blunt backed edges on points and knives (Fig. 5.7). Local distinctions, however, are evident in the manufacture of particular tools. In France and adjacent parts of Spain and Italy, for example, specific types of points and burins appear to be characteristic of particular phases and have been used to establish a multistage chronology of the Gravettian. In central and eastern Europe, other forms of points and

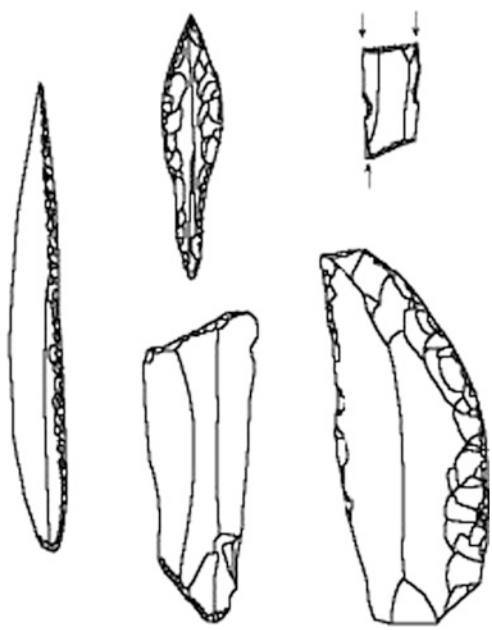


Fig. 5.7 Some Gravettian tools (from *left*: gravette point; font-robert point; noailles burin; bitruncated blade; side scraper)

knives show changing distributions in space and time, suggesting patterns of interaction, movement, and chronological development.

Ground stone technology is also an important feature of some Gravettian sites, particularly in eastern Europe. Upper and lower grinding stones made of sandstone and quartzite appear in significant numbers, for example, at Molodova V in the Ukraine and at Kostienki IV in Russia (Kozłowski 1986). In France, a few sandstone labs with artificial depressions have been found, apparently representing lamps that burned animal fat as fuel and used lichen or bark as wicks (De Beaune and White 1993).

The manufacture of objects of bone, antler, and ivory is considerably more evident than in earlier times. As indicated by the finds at Pavlov I, a large variety of tools and ornaments was fashioned from these materials. One notable innovation for which we have evidence is the first eyed needles, which suggests that sewing, perhaps even of tailored clothing, was now practiced (De Baume 1993). Slotted bone handles for stone tools are another new development, including one find of a grooved antler with a retouched bladelet still in place at the site of Stillfried in Austria (Kozłowski 1986). Certainly, one of the richest areas for such finds is Moravia, which contains not only the site of Pavlov I, but other extremely impressive sites as well, such as Dolni Vestonice I and II, Predmosti, and Petrkovice. Sites rich in such artifacts are also found in Austria (Willendorf), the Ukraine (Molodova V), and south Russia (Kostienki sites). Again, some regional differences are evident. The east European sites, for example, contain some tools not seen in the Moravian sites, such as mattocks, needle cases, and pins with triangular heads (Grigor'ev 1993). In contrast to central and eastern Europe, sites in France, Spain, and Italy contain far fewer objects of these materials and fewer different artifact types (de Sonneville-Bordes 1963).

Entirely new in the Gravettian are industries based on the use of fired clay and cordage. This technology – the oldest in the world – was not designed to make pottery vessels, however. Rather, as the finds at Pavlov I suggest, the primary use was the manufacture of figurines, largely of animals, as well, perhaps, as the use as daubing to create barriers to the flow of air as windbreaks or of liquid, in the form of basketry containers. Gravettian fired clay objects have been found, not only at Pavlov I, but at other Moravian sites (Pavlov II, Dolni Vestonice I and II, Predmosti, and Petrkovice) and at Kostienki in Russia. By far the most productive site in this respect is Dolni Vestonice I, located less than 1 kilometer from Pavlov. This site which, like Pavlov, has evidence of multiple occupations and numerous hearths produced over 6000 pieces of clay, many of which were worked and fired. More than 3700 of these are broken fragments of figurines. Analysis of these materials indicates that the figurines were built out of separate pieces of clay: torsos were modeled, then legs and heads attached and given some detail by smoothing and etching. Only a few can be identified, including a bear, a horse's head, and a probable mammoth leg (Vandiver et al. 1989). The most famous figurine from this site, however, is clearly that of a woman, the so-called Venus of Dolni Vestonice, which differs significantly from the others in its fine quality and detail. Made out of baked clay and measuring about 11 centimeters in height, the figure displays large, pendulous breasts and pronounced hips and buttocks, with small, stylized arms and tapered legs. The head has no facial features indicated save for two slanting grooves that may represent eyes. Just below the large navel, a groove encircles the figure, suggesting a belt or sash.

Two kilns have been found at this site. One, which contained over 2300 ceramic fragments mixed with ashy deposits, was found in a circular hut about 80 meters from the main concentration of the site. The kiln was a depression measuring 140 × 40 centimeters and 40 centimeters deep. Along the north edge it had a clay wall forming a partially domed enclosure. The other kiln, some 40 meters away, also contained a mix of ashes and figurine fragments, and was walled in clay around much of its perimeter. Virtually all the figurines are broken, with many, including the Venus, showing physical signs consistent with thermal fracture. Experiments with the local clay suggest that such thermal fracturing does not occur often by accident, leading to the conclusion that the high incidence may be intentional (Vandiver et al. 1989). In essence, the ceramic industry may have focused on the production and explosion of figurines, perhaps as part of a ritual performance of hunting magic or divination. The concentration of these activities inside structures and often away from the main habitation area may underscore their special, ritual nature.

Another major technological innovation at this time was the development of cordage and basketry (Adovasio et al. 1997, Pringle 1998). Preserved from this early period solely as impressions in clay, the evidence for a highly developed industry is nevertheless clear and compelling. Analysis of impressions from Dolni Vestonice and Pavlov indicates that the variety of produced materials was great. Some fine-mesh, woven textiles resemble linen; others have a wider weave and appear similar to basketry. Intriguingly, some of the impressions show evidence for knotting, similar to patterns seen in nets. Such finds revolutionize our ideas of Gravettian people, outfitting them now perhaps with woven clothing in addition to hides and furs, providing them with basketry mats and containers, and possibly even equipping them with nets for hunting small game. The abundance of hares at sites like Pavlov I, in fact, may reflect the importance of this hunting technique.

Gravettian Subsistence

There is considerable variability in the nature of Gravettian subsistence economies across Europe. In Spain and Italy, for example, faunal assemblages are generally small and contain varying amounts of herbivores and carnivores. Because virtually all of these assemblages derive from caves and rockshelters, the possibility must be considered that many of the carnivores and smaller herbivores represent simply accumulations of natural predators and their prey. Among the larger game, red and roe deer, ibex, horse, and bovids are most common, reflecting environments of mixed forest and steppe. French Gravettian sites, although much more numerous, are largely caves and rockshelters as well. Examination of 21 occupation levels from 6 sites indicates that a total of 16 large herbivores are represented in the often large faunal collections, suggesting a highly diverse food base. The bones of these big-game species account for 70–99% of the bones in each collection, which may mean that these caves were rarely used by non-human predators. In 16 of these collections, reindeer are the dominant prey, accounting for 85–98% of the big-game bones. Other species of importance include red deer, ibex, horse, and bovids. One or two bones of mammoth occur only in five of the levels. In addition to the big-game animals, smaller prey includes hare, various fur-bearing carnivores, birds, and occasionally a few fish. In southern Germany, faunal assemblages, which are generally quite small, also derive from caves and include a high proportion (50–70%) of small carnivores, hare, birds, and fish. Among the bigger game are reindeer, bear, horse, and some mammoth. Again, the role of natural accumulations of bones in these shelters is unknown, but may be significant.

In central and eastern Europe, Kozłowski (1986) has documented a variety of different patterns in faunal assemblages. Many of these assemblages are quite large and derive almost exclusively from open-air sites. The most northern sites, in southern Poland and the upper Dnepr and Desna basins of Russia, contain assemblages dominated by mammoth (around 80% of the assemblages), with a few remains of a variety of other species such as reindeer, polar fox, and grouse. These areas were characterized by largely treeless tundra in which mammoth would have been the major game animal. Farther south, sites along the middle Dnepr and Desna have fewer mammoths and greater amounts of hare and fox. Sites in Moravia constitute a third group, in which the numbers of mammoth are further reduced (less than 20% of the assemblages) and other species, both large (reindeer, horse, rhinoceros, bear, and bison) and small (hare, fox, wolf, wolverine, and lynx) are numerous. In Ukrainian sites, reindeer often dominate together with horse and mammoth, and farther east in the drier steppes north of the Black Sea, bison and horse are the most common prey.

The role of mammoths in the eastern Gravettian economies has been much debated. Some sites in Moravia, Russia, and the Ukraine contain huge amounts of mammoth bones. Often these form discrete areas adjacent to the habitation areas and are relatively free of remains of other species. At Dolni Vestonice I, these bones lie in water-laid sediments in a ravine alongside the site itself, and they have been variously interpreted as dump areas for food remains and as locations of natural mammoth deaths. Soffer (1993) has argued for the latter, suggesting that Gravettians were drawn to these natural bone beds because they provided sources of raw material for the construction of huts and the manufacture of implements. In support of this interpretation, she notes that often the bones in these beds show different degrees of weathering and deterioration, as though they were deposited gradually over a long period of time. She also suggests that mammoth would have been extremely difficult to hunt and that it is unlikely for mammoth bones to have been discarded in an area separate from all other food waste. On the other hand, Grigor'ev (1993) and others argue for at least some active role for hunting of mammoth, noting evidence of butchery marks, the lack of bone beds at some sites, and the overwhelming preponderance of mammoth at some of the northern sites.

Big-game hunting, including at least some mammoths, was apparently carried out largely with spears equipped with stone or ivory points. If nets were indeed manufactured, and used for hunting, then communal drives of hare and other small game may have been practiced. Birds might also have been caught with nets or snares. Fish and shellfish clearly appear to have played a very small role in subsistence.

Plant foods, however, have also become the topic of some debate. As is typical for Paleolithic archaeology in general, direct remains of plant foods are virtually nonexistent. Recently, however, a sample of charred material from a hearth at Dolni Vestonice I was examined for carbonized plant material. It was shown to contain several plants of the daisy and aster family that have edible roots, as well as what appeared to be a pulverized mush of plant material (Mason et al. 1994). This at least raises the possibility that plant foods could have been gathered in the steppe-tundra environments. Furthermore, the often numerous grinding stones at some sites may have been used to process plant foods, although they may also have been used to grind mineral pigments. Any conclusions about the role of plant foods in Gravettian diets clearly remain speculative.

Gravettian Settlement

One of the most impressive features of the archaeological record of this period is the abundant evidence of huts or other forms of shelters. The vast majority of this evidence comes from central and eastern Europe, where open-air sites are most frequent. A typology of the structures found in this region based upon building materials and shape reflects their considerable variability (Kozłowski 1986). Most are semi-subterranean, consisting of round or oval depressions measuring 2–6 meters in diameter. The framework for the structure is either wood, as indicated by rings of postholes, or mammoth tusks. Frequently, large rocks or bones encircle the structure, apparently having served as weights to hold down the hides used as a tent. Hearths and pits are common features both inside and outside of the huts. As many of the pits contain bones, they have been interpreted as cooking pits. In a few sites, much larger structures have been found, so large that it is unlikely that they were roofed. Rather, they may represent windbreaks or some other form of partially sheltered living space. At one of the Kostenki sites in Russia, for example, an area with three hearths and measuring roughly 30 × 5 meters has been interpreted in this way.

Evidence of structures in western Europe is much scarcer. The open-air site of Corbiac in southwestern France contained evidence of two oval huts outlined by postholes; one measured 3 × 1.4 meters, the other 2 × 1 meters (Bordes 1968). Neither contained hearths, but three were found in the space between the two huts. The larger hut had a large flat stone placed at its center. Another open-air site in the region, Solvieux, had some linear and circular concentrations of stone, but no clear evidence of a structure (Sackett 1988). Structures were also built inside of caves, presumably to provide shelter in addition to the cave itself against the cold and wind. In southern Germany, for example, an arrangement of large stones against the back wall of Brillenhöhle Cave outlined an oval measuring roughly 9 × 3.5 meters and probably formed supports for a wooden framework of a hide tent (Riek 1973).

The patterns of settlement are poorly known for this period. In central and eastern Europe, large sites, particularly those with several substantial huts, are usually interpreted as residential camps for sizeable groups, but it is difficult to establish the contemporaneity of the different huts. It may be the case that such sites were simply occupied many times by small groups of people. In a number of cases, some of the larger sites contain faunal evidence of kills in all seasons of the years, suggesting the possibility of year-round residence (Kozłowski 1986). Again, however, several occupations in different seasons could create the same pattern. It does seem clear that functional differences among sites exist. Pavlov I, Dolni Vestonice I, Molodova V, and some of the Kostenki sites, for example, are large sites that were reoccupied repeatedly. These are often the sites with the most diverse tool and bone assemblages, the location of most of the evidence for specialized activities, such as ceramic production, and the source of the majority of finds of art and ornamentation. These sites must represent major residential camps where occupants stayed at least several months, where the greatest variety of activities was carried out, and where most ceremonial activity took place. Other sites, often with one hut, appear to be seasonal residential camps that were occupied briefly, perhaps by only a family or two, and less often reoccupied. Finally, there appears to be a category of more specialized sites, such as short-term hunting camps in some of the Moravian caves or workshops near outcrops of stone raw material. The settlement pattern, therefore, may have entailed seasonal movement of residence, perhaps with changes in group size and periodic gatherings of larger groups, who exploited the surrounding countryside from small, satellite camps (Kozłowski 1986).

In western Europe, a similar interpretation of settlement patterns has been made, but the evidence is often poorer. Most of the sites known are caves and rockshelters, which may reflect only a portion of the settlement record, and which may represent hunting camps more often than residential bases. There are differences among these sites, however, differences in size, assemblage diversity, and quantity of artwork that may reflect differences in site function (David 1973). Analysis of some faunal collections from sites in the narrow valleys of southwestern France indicates reindeer kills largely in fall and winter, suggesting both seasonal movements and the targeting of the animals during their annual migrations (Spiess 1979).

The range over which people moved annually appears in many cases to have been larger than was true in earlier times. Studies of stone raw material distributions document in many areas the regular transport of substantial amounts of material over distances of more than 100 kilometers. Although sites in some areas, such as the Dnestr basin in the Ukraine, which is rich in high-quality stone, show little import of exotic material, sites in eastern Russia along the Don River brought in stone from sources 150 kilometers to the west (Kozłowski 1986). Moravian sites such as Pavlov I obtained over 90% of their material from sources 150 kilometers to the north, as well as some from areas 80–100 kilometers southeast (Svoboda 1994). These materials were brought in as raw nodules or partially worked cores and further processed at the sites. While much of the material used in south German sites was locally available, some seem to be derived from more distant sources, up to 150 kilometers along the Danube corridor (Hahn 1987). Rigaud and Simek (1990) emphasize the large stone source areas for sites in southwestern France as well, although here, too, local materials are most abundant in the assemblages. Some of these transported materials may reflect exchange activities, but in many cases the amount of material is sufficient to suggest that it was gathered during the course of annual movements. Gravettian groups in many regions were apparently quite mobile, at least seasonally, and covered large areas in the course of their annual movements.

Gravettian populations were not evenly distributed across Europe, nor did their distribution remain stable. France stands out as one area of concentrated settlement, with 175 sites identified, mostly concentrated in the southwest (Demars 1996). Iberia has 59 recorded sites clustered in three areas: northern Spain, southeastern Spain, and west-central Portugal (Straus et al. 2000). Other centers of occupation occur in the Meuse Valley of Belgium, the middle Rhine and upper Danube portions of Germany, central Moravia, the middle Danube of lower Austria, the Dnestr basin in the Ukraine, and the upper Dnepr and Don Valleys of Russia. South and southeast Europe have relatively few known sites, with certain areas, such as northeastern Italy and the Balkans virtually empty (Mussi 2001). Some of the patterns in this distribution may reflect the differential effects of environmental conditions favoring site preservation and of varying research intensity, but it seems clear, after so many years of archaeological research, that particular portions of the continent were population centers. Environmental factors may have played an important role in these patterns, since certain unfavored areas such as northeastern Italy were extremely dry and relatively poor in resources (Mussi 2001). It is likely that the paucity of sites in northern Europe is similarly due to the more rigorous climatic conditions at higher latitudes.

Some regions, such as southern France, appear to have been centers of occupation throughout the entire period of the Gravettian. Other areas, however, were inhabited for shorter periods. Italy, for example, shows no Gravettian occupations until around 25,000 years ago (Mussi 2001). In fact, this peninsula appears to have been largely abandoned around 30,000 years ago and was virtually empty until the Gravettian appeared, probably deriving from southeastern France. Part of the reason for this abandonment may have been a series of large volcanic eruptions centered in the area around Naples, some of which dateback 40,000, 36,000, 33,000, and 29,000 years. This period of great volcanic activity must have had periodically devastating effects on vegetation and wildlife, particularly as one of the eruptions seems to have deposited materials, in some locations up to 60 meters in thickness, over an area of at least 14,000,000 square kilometers.

Moravia is another area that was not continuously occupied. Most of the Gravettian sites in this region date to the period between 28,000 and 24,000 years ago, after which time occupation becomes scarce and finally disappears by around 22,000 BP. In this case the precipitating factor seems to be the gradually deteriorating climate with the onset of the last full glacial episode. Similarities between the stone tools and artwork of Moravian sites and those of later sites in the Dnepr, Dnestr, and Don River valleys suggest that as people gradually abandoned Moravia, they moved eastward into the Russian Plain, which became a new population center in the later Gravettian (Grigor'ev 1993, Soffer 1993). Southern Germany is another region that, like Moravia, had a larger Gravettian presence early in the sequence, with the later Gravettian characterized by fewer, smaller sites with thinner occupation levels (Hahn 1987).

Gravettian Exchange

The most probable evidence of exchange among Gravettian groups is the presence of shells and fossils in sites far removed from their sources. In some areas of Europe, such materials were transported over very large distances, suggesting far-flung networks of exchange linking groups together. A number of sites in Russia contain shells brought from the Black Sea over distances of 800–1000 kilometers, as well as fossils from central European sources over 1000 kilometers away (Kozłowski 1986). Mediterranean shells appear in sites in the middle Rhine Valley, at least 800 kilometers away from the sources (Hahn 1987). Similar materials appear in Italian and French sites, but the distances involved are not as great. One motivation for this exchange was simply the desire for objects of adornment, which generally proliferated during this period. In addition, however, and perhaps more importantly, such networks would have provided a social and economic safety net, one in which the relationships created by exchange were more important than the goods themselves. In a variable and often harsh environment, resource failure must have been a major threat, one that could have been dealt with partly by moving into new areas. The social ties forged by exchange would have made such moves easier; exchange partners would have been more likely to accept immigrants than total strangers would have been. Moreover, the populations were scattered and their density low; the need to find mates would also have encouraged maintaining social ties with neighbors. Exchange may have been primarily a cultural solution to economic and demographic problems.

Gravettian Art and Ornament

Widespread communication and interaction seems also to have fostered broad similarities in both stone tools and artwork across the continent, as well in the expansion of *Homo sapiens* in the New World (Whallon 1989). The manufacture of what we see as works of art flourished in Europe during the Gravettian. As suggested by the finds discussed at Pavlov I, art objects were both abundant and extremely varied. Beads and pendants of shell, fossils, bone, ivory, and other materials are numerous. Objects of ivory, often heavily decorated with incised geometric designs, are especially common in eastern Europe. Although they are, for the most part, poorly dated, it is clear that some of the painted and engraved cave walls of France and Spain were produced during this time as well (de Sonneville-Bordes 1963).

Two recent discoveries are among the best dated and most impressive decorated caves. Cussac, in southwestern France, contains engravings of horse, bison, mammoth, rhinoceros, birds, and even humans. These are located deep within the cave and are associated with the skeletal remains of five humans, one of whom was placed in a depression created by bears. One skeleton has been firmly dated to the Gravettian. The cave of Les Garennes, also in southwestern France, contained some paintings, including a hand stencil, together with the partial remains of a man. These are also dated to the Gravettian.

Among the most impressive finds, however, are the numerous female figurines called "Venuses." These figurines, which were made from a variety of materials, including fired clay, bone, ivory, sandstone, steatite, and marl, are extremely diverse, but share a number of general characteristics (Gamble 1982). Most are nude, or have only hints of clothing, such as grooves representing belts or engraved marks that may be hair or headdresses. Generally, faces contain little detail, except for occasional incisions that may be eyes. Similarly, feet and hands receive little attention and are usually absent. On the other hand, breasts, stomachs, hips, and buttocks are accentuated and are generally the most striking features of the figures. The figurines have a broad distribution, occurring in sites in France, Italy, Austria, Moravia, the Ukraine, and Russia. Female images are also found in the form of stone engravings and low reliefs at a number of French sites of this period (de Sonneville-Bordes 1963).

Many different interpretations have been devised to explain these figurines. They have been seen as reflections of a goddess or a fertility cult, examples of prehistoric pornography, instructional aids for pregnant women, and icons of widespread social alliances. It is unlikely that any of these interpretations is correct. Their location within sites shows no patterning to suggest that the figurines were sacred objects of veneration. Their extreme diversity in proportions, position, and emphasized features argues against their serving as "badges" of membership in social alliances (Soffer 1987). This diversity is particularly marked among the numerous Italian finds, 15 of which come from the Balzi Rossi cave (or two adjacent caves) in the northwestern portion of the country (Mussi 2001). Several of these figurines, as well as a few from other parts of Europe, display a pairing of the female image with that of another – a male human, a female human, or an animal. This principal of duality, which was seen in the Aurignacian lion-man from southern Germany, appears in later Paleolithic art as well. The meaning of these diverse figurines is not at all clear, and may simply lie beyond our modern understanding.

Gravettian Burials

Burials are reasonably numerous for this period, but are not uniformly distributed across the continent. France, for example, which has a rich Gravettian archaeological record, has no recorded burials (Quechon 1976). By contrast, burials are abundant in Moravia and Italy. Rich burials have been discovered at a variety of Moravian sites, including Dolni Věstonice I and II, Pavlov I, Brno II, and Předmosti (Svoboda 1994). Many are single burials, with the individuals flexed or on their side, and frequently covered with red ochre and accompanied by ivory pendants, perforated teeth, or other grave goods. One burial at Brno II was particularly rich, containing over 600 perforated fossil shells, two perforated, incised stone disks, an ivory figurine of a man, and other goods. In most cases, these burials occur within the site boundaries, often covered with the debris of later occupations, and men, women, and children are all represented. Large mammoth shoulder blades and stones often lie around or on top of the skeletons and seem to be coverings for the graves. A child's grave was discovered at Dolni Věstonice I in which the skeleton showed signs of having been partially burned. Clearly, some ritual activities accompanied the burying of the dead. Multiple graves are also known. At Dolni Věstonice II, for example, a triple burial of a man and two women was recently found. Most spectacularly, a large burial pit at the site of Predmosti, which was excavated in the nineteenth century, was found to contain the remains of at least 20 individuals, most side-by-side, but some lying above others, suggesting reuse of this location as a burial site. An analysis of a number of the skeletons revealed evidence of healed wounds to the skull, suggesting violence or perhaps ritual fighting.

Italy has also produced numerous Gravettian burials, with the remains of 21 individuals found in 16 graves (Mussi 2001). Most are single burials, but some contain more than one body, as, for example, a grave of a woman and a newborn child at the site of S. Maria di Agnano and the triple grave of a young man and two young women at Barma Grande. The skeletal sample is quite biased, dominated by adolescents and adults, and by males, with pronounced underrepresentation of children and females. Most are buried in an extended position close to the back wall of caves and a number have stones placed near the head. Men, women, and adolescents are all accompanied by goods, primarily beads of shells or stone. The young man at Barma Grande had a necklace made of several strands of fish vertebrae, perforated shells, and deer canines. A young man buried in the cave of Arene Candide must have worn a cap that had been decorated with hundreds of shells and teeth that were found about his head and shoulders. Here, as in Moravia, there is evidence that considerable preparation and ritual accompanied the burial, but the Italian sample is more biased. Adult men were given preferential treatment, but apparently only some of them, in particular, the taller men. A study of a number of the skeletons indicated that the average male height was between 180 and 190 centimeters (roughly 5 feet10 inches–6 feet 2 inches), a remarkable and unusual height surely indicating some differential treatment.

One of the richest sets of graves was found at the Russian site of Sungir, approximately 150 kilometers east of Moscow (Pettitt and Bader 2000). This large site, which covers more than 1500 square meters, dates to approximately 28,000–27,000 BP, but the burials found here within the occupation area are later, dating to 24,000–23,000 BP. Two graves were found, one containing the skeleton of an adult man, the other the remains of two adolescents, possibly one male and one female, lying head-to-head. All three bodies had been covered with red ochre and all were accompanied by a wealth of grave goods. These include over 13,000 beads made of mammoth ivory, stone tools, ivory spears, daggers, and bracelets, antler rods, animal carvings, perforated fox teeth, bone pins, and disk-shaped pendants. These grave goods represent a tremendous investment of time and energy. The beads alone took at least 9000 hours to manufacture, with the adolescents receiving the greater part, perhaps indicative of inherited status differences within this society (White 1993).

Europe During the Last Glacial Maximum

Beginning around 25,000 BP, a period of climatic deterioration began that culminated in the glacial maximum between 20,000 and 18,000 BP, by which time ocean surface temperatures reached their minimum and continental ice sheets attained their greatest extent (CLIMAP 1976, COHMAP 1988). (Figure 5.8) Various areas of Europe were affected differently by this climatic cooling. Northern and central Europe were most seriously affected, northern Europe because of its high latitude and proximity to the Scandinavian ice sheet, and central Europe because it was situated between the Scandinavian and Alpine glaciers. Both areas experienced low average temperatures, long winters, permafrost formation, and high winds. As human habitats, they were increasingly harsh places, characterized by a decreasing abundance and diversity of plants and animals. Duplessy et al. (1976) characterize northwestern Europe as a polar desert between 25,000 and 14,000 BP. Montet-White (1984) describes the entire plains of northern Europe as an arctic desert after 22,000 BP. On the basis of detailed studies of pollen records for southern Germany, Frenzel (1983) suggests that in this area, vegetational productivity and large herbivore biomass decreased between 90 and 95% from the early glacial to the glacial maximum.

Southern Europe was much less adversely affected by these climatic changes. Biological studies suggest that many species of plants and animals retreated into or persisted in glacial refuges in southern France and Spain, Italy, and southeastern Europe (Willis and Whitaker 2000). For example, although southwestern France during the glacial maximum was generally characterized by tundra

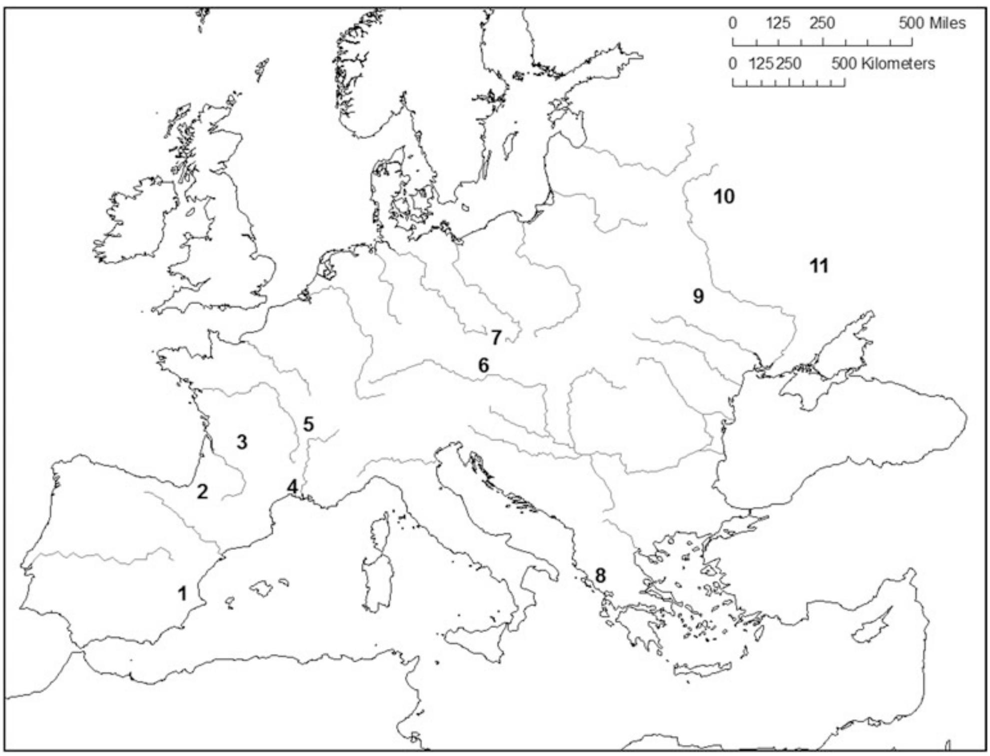


Fig. 5.8 Sites of the glacial maximum mentioned in the text: *1* Parpallo; *2* Montaut; *3* Le Placard, Roc de Sers, Fourneau du Diable, Cougnac; *4* Tète du Lion; *5* Solutré; *6* Grubgraben; *7* Stránská Skála; *8* Kastritsa; *9* Kirillovskaya, Radmyshl'; *10* Pushkari; *11* Kostenki

vegetation, it was low in latitude, high-insolation tundra with some trees present, at times including warmth-loving species like elm, oak, and beech (Paquereau 1976). An indication of the relative hospitality of this region is provided by an examination of estimated average summer and winter temperatures. For the occupation period of the site of Abri Pataud in southwestern France, roughly 34,000–22,000 BP, Wilson (1975) estimates average summer temperatures to have been 12–15 degrees Centigrade and average winter temperatures to have been 0 degrees. By contrast, for approximately the same period, Frenzel (1983) estimates that in southern Germany average summer temperatures were 14–19 degrees and average winter temperatures –10 to –18 degrees. In this period before the glacial maximum, southern Germany was much more continental in climate and had much harsher winters. Additional confirmation of the contrast between the two areas is provided by an examination of the number of large herbivores available as prey. During the Gravettian, French hunters chose from among 16 species of large game, whereas those in Germany had access to only 9 species (Delpech 1975, Boessneck and von den Driesch 1973, Hahn et al. 1973). Even in the period before the glacial maximum, therefore, central European habitats were less diverse and probably less productive. With the climatic deterioration of the glacial maximum, southern Europe would have retained and increased its productive advantage and would have been attractive as northern and central Europe became increasingly inhospitable.

These environmental changes were accompanied by demographic changes as well. Beginning around 25,000 BP there appears to have been a progressive decrease in population of parts of Europe in conjunction with the process of climatic deterioration. Britain and Belgium were apparently unoccupied between 25,000 and 14,000 BP (de Sonneville-Bordes 1974, Evans 1975, Mellars 1974, Otte 1976). Much of northern and eastern France has few sites dating to the period of 20,000–15,000 BP (de Lumley 1976). Germany was sparsely inhabited between 23,000 and 15,000 BP (Hahn 1976) (Fig. 5.8). Settlement in Poland is rare during the height of the last glaciation (Kozłowski 1983) and Moravia shows only a few traces of occupation from about 21,500 to 14,000 BP (Valoch 1980, West 1997). The site of Grubgraben was occupied during the glacial maximum, but otherwise, Austria has very few sites dating to this period (Montet-White 1988, West 1997). Similarly, northern areas of the Ukraine and the Russian Plain show significant decreases in the number of sites around the glacial maximum (Soffer 1987). It appears that huge portions of the continent were largely abandoned during the height of the last ice age, and that, like other animals, human populations sought refuge in southern areas of Europe (Jochim 1983, 1987). These glacial refuges – Spain, southern France, Italy, the Balkans, and south Russia – show evidence of continuous occupation throughout the glacial maximum.

Western Europe: The Solutrean

Roughly coinciding with the peak of the last glaciation, there appeared in Spain and France a new archaeological culture, the *Solutrean*. Dating between approximately 21,000 and 17,000 BP, this culture is characterized, above all, by a number of well-made stone points (de Sonneville-Bordes 1963, Smith 1965). These implements, which are frequently considered the most impressive examples of Paleolithic stone-working, were shaped by fine pressure-flaking, on either one face or both, to create a variety of forms, called laurel leaf, notched, and willow leaf points (Fig. 5.9). The different types form a temporal sequence, allowing for the establishment of a stylistic chronology of Solutrean development. Among accompanying tools, end scrapers are common, burins are rare, and surprisingly, a number of Mousterian-like side scrapers and points appear.

The function of these special points has been much debated. Most commonly, they are considered to have been used as spear points and perhaps knives. One variety, with concave bases, has been found almost always as fragments, suggesting that they broke during use and the remnants discarded

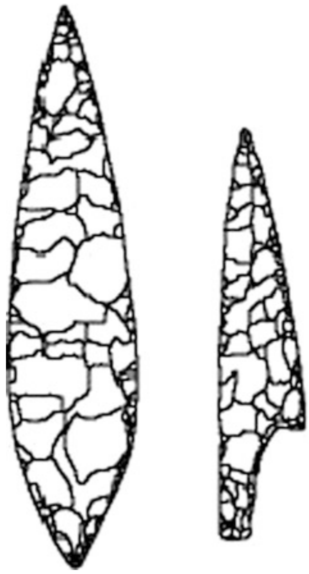


Fig. 5.9 Solutrean points (from *left*: laurel-leaf point; shouldered point)

(Straus 1977). Other evidence, however, suggests a more specialized and perhaps even ceremonial use for at least some of the points.

- Their raw material is usually of particularly high quality and often banded in several colors, indicating a careful selection of stone.
- The amount of work invested in the manufacture of the points exceeds that of other tools by a considerable margin.
- A number of the points are so thin and delicate that they would surely have shattered upon use.
- Some specimens are so large (with lengths exceeding 28 centimeters) that it seems unlikely that they could have been effectively hafted as spear points.
- Some sites have exceptional amounts of the points; the site of Le Placard in southwestern France, for example, has more than 5000.
- At the site of Volgu in southern France, an isolated cache of 17 large points was found, not associated with an occupation site.

Consequently, it may well be that at least some of the points, made of selected stone, carefully worked, and concentrated in special locations, were important nonutilitarian goods, used perhaps in ceremonies or exchange.

Spotlight on a Solutrean Site: Solutré

Most Solutrean sites are caves or rockshelters. Because of the variety of natural disturbance processes operating in such sites (rockfalls, water erosion, activity of other animals), they provide little information on the organization of prehistoric behavior. The site of Solutre, however, which gave its name to this culture, is exceptional. It is a large, open-air site covering an area of over a hectare, located in east-central France. Situated near the base of a cliff in blind canyon, the site appears to have been used for mass animal drives sporadically over a period of at least 20,000 years (Olsen 1989).

Its 9 meters of cultural deposits contain materials from the Middle Paleolithic and all periods of the Upper Paleolithic. A variety of excavations have been carried out over the past 100 years, but most of the site remains untouched.

Stone artifacts are relatively scarce at the site, but the Solutrean levels include a number of points that are characteristic of the middle and later phases of this culture. Bones, on the other hand, are extremely abundant in all levels. In all periods of the Upper Paleolithic, horse was the dominant species represented, making up 94% of the identified remains. Based on the small sample excavated, it has been estimated that the entire site may contain the remains of over 32,000 horses. In the Solutrean levels, both reindeer and a bovid, either bison or aurochs, were also present, with the following estimated minimum number of individuals of each:

5 Horse
5 Reindeer
1 Bovid

Analysis of the entire sample collection of bones suggests some patterns in the economic activities carried out. Most horses appear to have been hunted during the summer, perhaps during migrations. Reindeer, on the other hand, were killed largely in winter and spring. The horses are mostly prime-age adults, with an underrepresentation of very young or very old animals. It appears likely that the animals were driven into the box canyon and killed. The fact that the horse carcasses often show some articulation of body parts and relatively few butchering marks suggests that successful drives produced an overabundance of meat and that much was wasted. Because storage of meat during the warm summer months would have been difficult, only portions of the kills were used. The reindeer, by contrast, show much more evidence of butchery. During winter, the animals may have been rather solitary and been killed individually. The lesser amount of meat from these kills, together with the potential for meat storage by freezing, may have led to the more complete butchery of these animals. Solutré is consequently a kill site where animal drives and butchery were practiced on a recurring basis. The topographic situation channeled game through the valley and allowed hunters to trap their prey in the blind canyon. Meat was sufficiently plentiful, at least during summer, so that much appears to have been wasted. Like many other specialized kill sites, Solutre lacks abundant stone tools or features such as huts. It was one component in the settlement system, a component that retained its role for thousands of years.

Solutrean Subsistence

Despite the evidence for the importance of horses at Solutre, these animals appear to have played a rather small role in Solutrean economies. Instead, the reindeer was the primary prey in France at this time, and faunal assemblages are more specialized than at any previous time (Delpech 1975, Rigaud and Simek 1990). Although this region was richer in resources than central and northern Europe, it nevertheless was significantly affected by the climate of the glacial maximum. In comparison to their Gravettian counterparts, Solutrean hunters in southwestern France had fewer big-game species available as prey (Jochim 1987). Moreover, the reindeer of this period are smaller in body size than previously, suggesting greater environmental stress (Delpech 1988). During the Solutrean, big-game hunting appears to have intensified and focused in particular on the most abundant species, reindeer. Along with this greater emphasis on the hunting of a few large game species there appears an important technological development: the spear-thrower. This device, usually made of carved antler and sometimes decorated, increased the distance and accuracy of thrown spears and must have led to much greater hunting efficiency.

In northern Spain, subsistence practices also changed in relation to earlier periods, but in a different way. Big-game hunting was certainly the mainstay of the economy, but it became more diversified. Alongside red deer, bovids, and horse, ibex now became an important focus of hunting, necessitating specialized exploitation of mountainous habitats (Straus 1987). In addition, birds, fish, shellfish, and even seals were included as regular parts of the diet (Straus 1985). The full glacial climatic changes, although not as severe here as farther north, apparently forced people into economic diversification to cope with declining environmental productivity.

Solutrean Regional Interaction

If there was an influx of population into southern France during the glacial maximum, the number of known sites does not indicate this clearly, either in the southwest (Rigaud and Simek 1990) or the Pyrenees (Bahn 1983). Approximately 121 Solutrean sites have been found in France, compared to 175 for the somewhat longer Gravettian (Demars 1996). In Spain and Portugal, on the other hand, site numbers show a dramatic increase: 164 Solutrean sites compared to only 59 Gravettian sites (Straus et al. 2000). The Solutrean sites are concentrated in the northern, southeastern, southern, and western portions of the peninsula, with the southern area of Andalucia showing the largest relative increase. As Straus et al. (2000:561) conclude, "Andalucia may have been a most favored refuge within a refugium," due to its location far to the south.

Sites tend to be distributed in discrete concentrations, for example in the Perigord region of southwestern France, the lower Rhone Valley, coastal valleys in northern Spain, the Gulf of Valencia, and west-central Portugal. Many of these clusters seem to have had specific local styles of points. The area of western Santander and eastern Asturias in northern Spain, for example, is characterized by unique concave-based points, while other styles predominate in the Rhone Valley, the central Pyrenees, and the western Pyrenees (Straus 1977). Nevertheless, studies of stone raw material distributions in southwestern France (Rigaud and Simek 1990) and of stylistic similarities in stonework and art in France and Iberia (Bahn 1982, Straus et al. 2000) suggest that Solutrean groups maintained wide areas of communication and interaction. Seashells from both the Atlantic and the Mediterranean appear in Solutrean sites in France and apparently represent exchange networks. Some degree of specialization for exchange is suggested by the existence of possible workshop sites. The site of Montaut in the Pyrenees was also a workshop for local flint that supplied nearby residential camps with tools. The large number of virtually identical Solutrean points found at this site has been interpreted as the output of specialists, whose products have been found distributed throughout the Pyrenees and into northern Spain (Bahn 1982). Similarly, the site of Le Placard in southwestern France, which contained over 5000 stone points, may have been a workshop and distribution center for these artifacts.

Solutrean Art, Ornaments, and Ritual

Like earlier phases of the Upper Paleolithic, the Solutrean contains evidence for the production of personal decoration. Pendants, beads, and bracelets were made of bone and ivory, and notched bone pins may have been used for clothing or hair arrangements. A number of sites contain pieces of mineral pigments – red and yellow ochre, black manganese – that could have been used for face or body painting. Portable art objects such as engravings are also known, but are not particularly common. One notable feature of the Solutrean is the appearance of deeply carved bas-reliefs of animal figures on large blocks adjacent to the occupation areas of caves (de Sonneville-Bordes 1963, White 1986). Two of the best-known examples come from southwestern France. In the cave of Roc de Sers, a series of carved blocks, which lined the back of the cave, contained figures of horses, bison, reindeer, ibex, and humans. Two decorated blocks were found in the cave of Fourneau du Diable, one of which bears the carved figures of two aurochs, one in front of the other.

Despite the difficulties of dating cave art, it is clear that some caves were decorated during Solutrean times as well. The caves of Tete du Lion in the Rhone drainage and Cougnac in southwestern France, as well as a number of sites in southern Spain and central and northern Portugal all have wall paintings or engravings that have been reasonably well dated to Solutrean times (Lorblanchet 1993, Straus et al. 2000, White 1986). In addition, the eastern Spanish cave of Parpallo contains thousands of painted stone slabs within its Solutrean levels (Straus et al. 2000).

Evidence of burials from the Solutrean is completely lacking. Whether this is simply an accident of discovery, or truly reflects a fundamental change from the Gravettian, is unknown. Direct evidence of other ritual activity is also absent. It may well be, however, that the increased production of wall art, the placement of engraved blocks at some sites, the accumulation of painted slabs at Parpallo, and even the abundance of elaborate worked stone points at a number of sites all reflect some type of ceremonial or ritual activities. A number of archaeologists have argued that the rigors of full glacial climate and the compression of populations into circumscribed glacial refuges necessitated a number of economic and social changes (Clark et al. 1996, Gamble 1991, Jochim 1983, 1987, Mellars 1985). During the Solutrean, big-game hunting, particularly of reindeer, was intensified in France, whereas in Spain, the economy changed to include a greater diversity of terrestrial and marine resources as regular components of the diet. Socially, there is some indication that small, regional groupings emerged, each characterized by stylistic variants of both stone tools and artwork. Such local groups may have developed in part as a response to increasing competition for diminished resources. In the absence of leaders (for which there is no evidence), mediation of relations within and between groups may have increasingly relied upon ceremonial or ritual events and the emergence of special locations for their occurrence.

Southern and Southeastern Europe: The Epigravettian

Other parts of southern Europe that were occupied during the last glacial maximum showed industries that were essentially a continuation of the Gravettian into the so-called *Epigravettian*, characterized by much variation in types of points and other tools. In part because much less archaeological research has been done in most of these areas, however, the record is sparse in comparison with that of France and Spain. In Italy, for example, Mussi (1990) discusses 13 sites that date to approximately the glacial maximum, many of them characterized by particular leaf-shaped points. The adjacent Balkans have little evidence for occupation during this period; one of the few known sites, Kastritsa in Greece, has only traces of occupation dating to around 20,000 BP, interpreted as reflecting brief visits (Bailey and Gamble 1990). As mentioned earlier, Moravia and Austria were largely abandoned during this time, but the Moravian site of Stranska Skala, with dates around 18,000 BP, was probably used seasonally and episodically as a specialized horse hunting camp (Svoboda 1990) and the contemporary site of Grubgraben in Austria was used in the specialized hunting of reindeer and horses (Montet-White 1988, West 1997). Western Slovakia actually contains a number of sites from this period, largely clustered in an area of hot springs that may have created a favorable microclimate (Kozłowski 1990). The Carpathian Basin in Hungary has three known sites of this time, all large sites with several levels of occupation and a stone tool industry called the Sagvarian (Dobosi 1998–1999). One of these sites has the remains of at least four dwelling platforms about 5–6 meters in diameter.

Farther to the east, in the Ukraine and Russia, the record is somewhat more impressive. In comparison to earlier times, the southern Dnestr Basin shows an increase in the number of sites dating to around the glacial maximum (Kozłowski 1990). Although the Dnepr and Desna Basins of the central

Russian Plain have only five known sites from this period, these represent a similar increase in occupation intensity. On the other hand, the Don Valley has only one known site, reflecting a decline in site numbers from earlier times (Soffer 1990). Three of the sites in the central Russian Plain – Kirillovskaya, Pushkari I, and Radomyshl’ – have been interpreted as winter residential camps with impressive remains of mammoth bone dwellings, hearths, and work areas. Their economy was based on the hunting of bison, horses, reindeer, hares, and probably some mammoth. The most significant features at these sites are numerous storage pits dug into the permafrost. Their appearance suggests a fundamental change in the economy, one geared to intensive hunting in autumn and the amassing of food stores for the winter. Farther east, the one known site in the Don Valley, Kostenki 19, also had a number of features, including two dwelling structures, pits for roasting food, and complex hearths with channels to guide air flow (Soffer 1990).

If there were glacial refugia in south and southeastern Europe, only the Ukraine and the central Russian Plain contain evidence of this role. Both show an increase in relative numbers of sites and the Russian Plain, at least, has evidence of important economic changes. As Soffer (1985) has argued, the development of storage technologies coupled with big-game hunting allowed larger groups (perhaps over 50 individuals) to remain more sedentary than previously, staying perhaps as long as 9 months in their residential camps.

Responses to the Glacial Maximum

As the above evidence indicates, human responses to the harsh climatic conditions of the glacial maximum were varied. Large areas of northern and central Europe were abandoned or used only sporadically by sparse populations on a seasonal basis. The portion of the continent to the south of the Alpine barrier continued to be occupied, but with little change from earlier times. On the other hand, two areas stand out as glacial refuges that probably witnessed some population influx from areas farther north: southwestern Europe (Iberia and southwestern France) and southeastern Europe (the Ukraine and central Russian Plain). In both areas, significant economic changes occurred. In southwestern France, economies intensified their focus on big-game hunting, particularly reindeer, and developed new technologies like the spear-thrower to increase their hunting efficiency. In Iberia, the economy remained focused on big game, but was diversified to include the regular use of additional species like ibex, as well as birds, fish, and shellfish. Economies in the Ukraine and Russia also continued to emphasize large mammals, but developed a storage technology to increase their economic security and to allow larger resident groups and greater sedentism. In both refuge zones there are also hints of changes in settlement patterns, social arrangements, and perhaps ritual. In terms of cultural development, the glacial maximum was truly a watershed in European prehistory.

The Late Glacial Period

The climatic record after the glacial maximum is one of warmer and colder phases, alternating with increasing frequency until approximately 10,000 BP, when the glacial period finally came to an end. Vegetational communities responded to these changes. During the warmer intervals, the density and productivity of herbs and grasses in the tundras and steppes increased. Trees increased somewhat in density and expanded their distribution out of the glacial refuges, only to retreat again during colder periods. Some animal species thrived under these conditions until quite late in this period, especially reindeer, horse, bison, ibex, and, for a time, saiga antelope (Delpech 1988). Other species, however, suffered stress in the changing and gradually warming conditions, responding by gradually shifting their distributions and, ultimately, becoming extinct. The best documented case is that of mammoths, which were numerous in eastern, central, and northwestern Europe before the height of the last glacial period (Soffer 1993). During the glacial maximum, these animals largely disappeared from central Europe but continued to thrive farther east in Russia. By 12,000 BP, however, they disappeared from this region as well, persisting to the east in northern Asia another few 1000 years. Studies of mammoth skeletons from several areas just before their local extinction document a number of signs of nutritional stress, including small body size, younger ages of death, and various pathological conditions. A similar pattern of a gradually shifting distribution and ultimate extinction, but with a different spatial pattern, has been observed for the giant deer, which disappeared from southeastern Europe during the Middle Paleolithic, but persisted in northwestern Europe until the beginning of the postglacial period. A number of other species also became extinct or abandoned Europe during the late glacial period, including wooly rhinoceros, muskox, fallow deer, cave bear, and cave lion. Toward the very end of the late glacial, when reforestation had occurred throughout much of the continent, other species retreated to the north (reindeer) or east (horse, bison, antelope), to be replaced by woodland communities of red and roe deer, aurochs, and wild boar.

Initially, humans remained confined within the glacial refugia, but beginning perhaps as early as 16,000 BP, or more certainly by 15,000 BP, groups began expanding to the north and repopulating central and northern Europe (Jochim et al. 1999, Otte 1990, Soffer 1985) (Fig. 5.10). As will become evident, the late glacial was a period not only of significant population movements, but also of remarkable cultural developments.

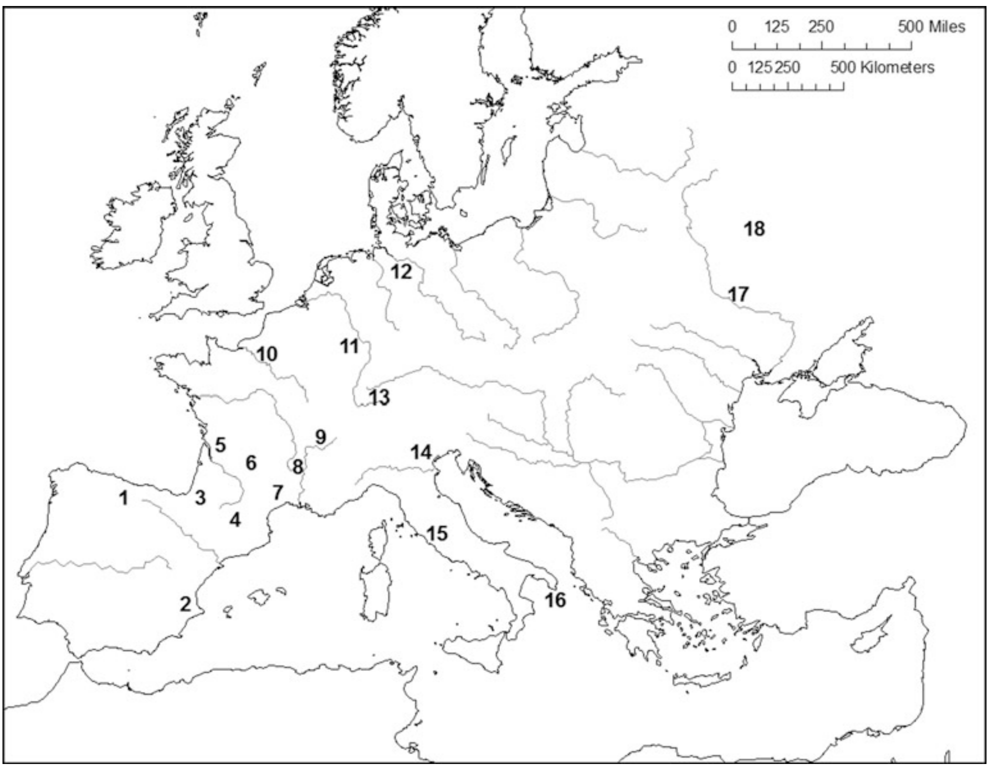


Fig. 5.10 Late Paleolithic sites mentioned in the text: *1* El Juyo, La Riera, Altamira; *2* Parpallo; *3* Isturitz; *4* Mas d'Azil, La Vache, Enlène, Tuc d'Audoubert, Trois Frères, Montespan, Niaux; *5* Saint Germain La Rivière; *6* Guillasou, Le Cerisier, Plateau Parrain, Le Breuil, Lascaux, Le Placard; *7* Aldène; *8* La Marche; *9* Champréveyres, Montruz; *10* Verberie, Etiolles; *11* Gönnersdorf, Andernach; *12* Meiendorf, Poggenwisch, Borneck, Stellmoor; *13* Schussenquelle; *14* Riparo Tagliente; *15* Grotte Polesini; *16* Grotte Romanelli; *17* Mezhirich, Dobranichevka; *18* Mezin

Western Europe: The Magdalenian

The archaeological record of western Europe during much of the late glacial is dominated by a culture called the *Magdalenian.* This is truly a spectacular culture, with abundant evidence of economic innovation, complex social interaction, and elaborate artistic and ritual activity. On the basis of stone and bone tool types, a stylistic chronology of the Magdalenian has been developed, but in recent years, some problems with this chronology have been identified. The very earliest is now considered sufficiently different from other stages that it has been renamed as the *Badegoulian.* This short-lived culture, found only in France, has abundant flakes, star-shaped borers, and an abruptly retouched "raclette" scraper. The true Magdalenian is characterized by abundant blades and bladelets, numerous burins, and particularly large numbers of backed bladelets that probably formed insets in composite tools (Fig. 5.11). Accompanying these stone tools are a series of bone points, initially smooth, but later carved to have one or two rows of barbs. These latter are considered to be harpoons, with points that would detach upon impact and remain in the wound.

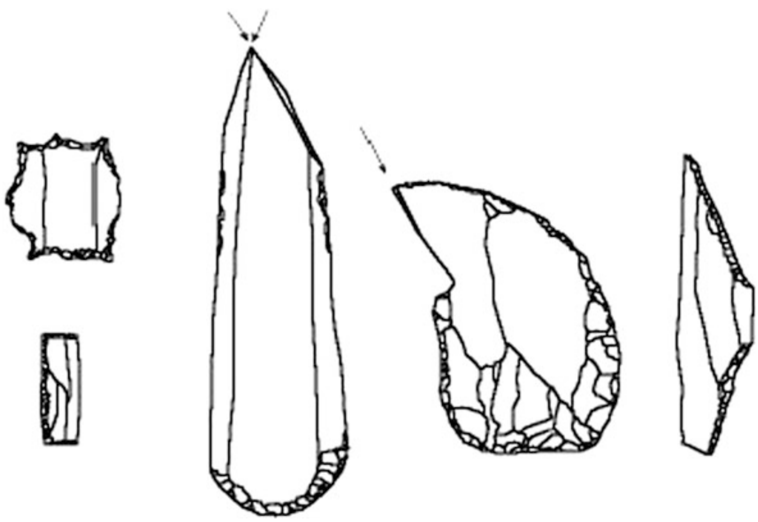


Fig. 5.11 Some Magdalenian tools (from *upper left*: multiple star-borer; rectangular backed bladelet; combination burin-end scraper; parrot-beak burin; shouldered point)

Spotlight on a Magdalenian Site: Verberie

The open-air site of Verberie is situated on a low terrace in the floodplain of the Oise River in the northern Paris Basin (Fig. 5.12) (Audouze 1987, Audouze and Enloe 1991, Enloe and David 1997). Unique depositional processes have preserved materials here with a remarkable degree of spatial integrity. Flooding by the river, which buried the site in alluvial loam, was so gentle that the artifacts were relatively undisturbed, leading to the preservation of the living floors intact. Radiocarbon dates of 12,900–12,450 ± 150 BP have been obtained, which would place the occupation during a warm period called the Bolling.

Three different concentrations of materials were identified, one of which (Locus 2) is the focus of discussion here. This area, excavated over more than 300 square meters, contains two hearths that appear to have been the focus of activities. Both are shallow basins lined and surrounded by rocks and slabs. Stones and bones are distributed around these hearths, forming clear concentrations. Over 6000 stone artifacts were found. Stone-working was aimed primarily at the production of blades, bladelets,

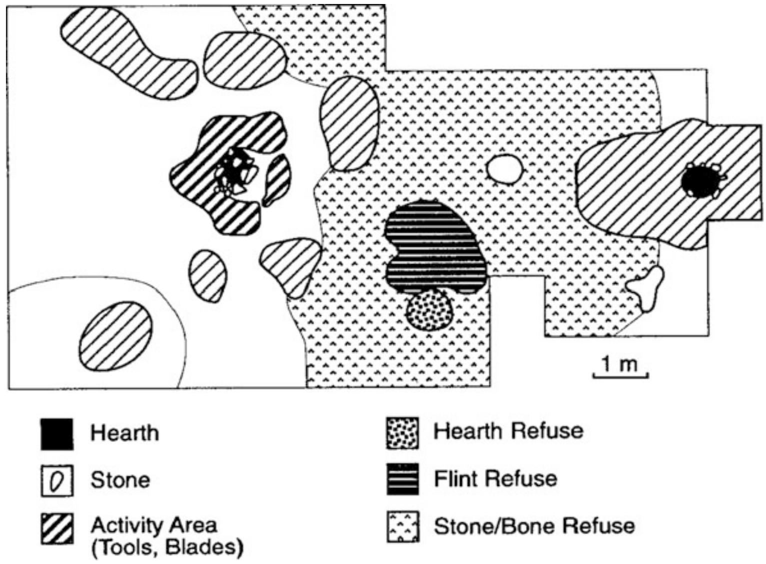


Fig. 5.12 Verberie site plan (after Audouze 1987)

and tools using locally available high-quality flint. The primary tools include burins, end scrapers, perforators, truncated blades, and backed bladelets. Many of the tools show evidence of having been hafted in bone handles (Keeley 1987). Microwear analysis indicates that the bladelets were primarily used not only in projectiles but also for cutting meat, and that scrapers were used in the working of hides.

Bones are numerous and well preserved. Over 99% of them come from reindeer and represent at least 24 different individual animals of all ages, including juveniles. The majority of them appear to have been killed during the early fall. Bones of all body parts are represented and are highly fractured, indicating intense butchering. A number of rib portions are still articulated with the vertebrae, suggesting that slabs of ribs may have been cut off from the vertebral column, perhaps for storage. The bones are distributed throughout the site, but some relatively empty areas have been interpreted as the locations of butchery, surrounded by discard zones for the refuse. In addition to reindeer, a few bones of horse, birds, and ground squirrel were found.

Verberie apparently was a small, short-term camp focused on the interception of migrating reindeer herds across the plains of northern France. During the fall migration, when the animals were fattest and their hides in best condition, the hunters stationed themselves along the route, killed, and processed the animals and may have stored some meat in anticipation of winter. The kills must have occurred close to the camp, as entire carcasses were brought back and butchered. During their stay, the hunters used the local flint to manufacture new tools, which they carried away with them. The fresh hides of the animals were processed and taken as well. They also did some bone- and antler-working, but left only two bone points and a needle behind. If they built tents or huts for shelter during their stay, they must have been simple structures that left no trace.

Magdalenian Subsistence Economies

The earlier Magdalenian began during a period of still rigorous environmental conditions. Although a warming trend began episodically immediately after the glacial maximum, populations were still largely confined to the southwestern refugium. Badegoulian sites, coinciding with a warmer interstadial period, do appear farther north in France, but subsequent site distributions show a retreat southward with the onset of colder conditions again (Schmider 1990). As a result, economic activities during the Magdalenian remain much the same as they were during the Solutrean. Hunting was emphasized, with big herbivores making up between 91 and 100% of the bones at many sites in southwestern France (Jochim 1987). Reindeer, still of small body size indicative of environmental stress, continued as the major prey, but horse increased in frequency and a number of other species regularly occur at many sites, suggesting a diversification of big-game hunting. Small mammals, fish, and birds played a small role in the subsistence during the earlier Magdalenian.

During the later Magdalenian, however, a number of changes occurred. Site economies became more variable and big game, although still dominant, apparently played a somewhat smaller role. Reindeer and horse continued as the major prey, but now were supplemented by fewer other large mammals. Instead, small mammals, birds such as ptarmigan and grouse, and fish all began to occupy a larger role in the diet (Le Gall 1992). Economies of this time appear to have diversified considerably.

Some major innovations of this period may have had a profound effect on hunting success. During the earlier Magdalenian, small backed bladelets became common and may indicate the development of bow and arrow technology. Although the earliest definite evidence of arrows is not found until the end of the late glacial period, these small stone artifacts were doubtless set into wood or bone shafts as part of composite projectiles. This innovation, if it indeed occurred at this time, would have given hunters a greater striking range and greater accuracy, and would have increased hunting efficiency immensely. A second innovation, again visible toward the end of the late glacial period, may have been the domestication of the dog. Although disputed (Soffer 1985:201–203), a number of skeletal finds, especially in Russia, have been interpreted as the remains of domesticated dog. Their presence during the succeeding early Mesolithic is widely accepted; if the process of domestication began in the late Paleolithic, it may have had important consequences for hunting practices. In modern hunting societies, the use of dogs to drive and chase game greatly increases hunting success and efficiency. If Magdalenian hunters were, indeed, armed with both bows and dogs, their hunting would have been much more effective than that of earlier groups.

In Spain, the Magdalenian also continued the pattern of economic changes that began earlier, increasing the effectiveness and diversity of the economy. Red deer and ibex were intensively hunted, along with bison, horse, chamois, and other large mammals. In some sites, such as El Juyo in northern Spain, the age and sex ratios of the red deer skeletal material suggest that mass hunting of herds was practiced, presumably by driving the animals into blind valleys (Klein et al. 1981). Birds, fish, and shellfish all increase in importance through time, indicating further diversification of the economy. In some sites, such as La Riera, shellfish decrease in size through time, a pattern interpreted as reflecting gradual overexploitation of this stationary resource (Straus and Clark 1986). Grinding stones found in a few sites may indicate the use of plant foods, although mineral pigments were certainly processed as well (Straus 1985). In both Spain and France, the late glacial period was characterized by continuing technological innovation as well as economic diversification and intensification.

Magdalenian Settlement and Migration

With the beginning of the Magdalenian in France there is a large increase in the number of sites as well as shift in the type and location of sites. During the earlier Magdalenian (Badegoulian and early Middle Magdalenian according to typological schemes), 118 sites have been found (Demars 1996). For the first time, a considerable number of open-air sites are known: 53, or 45%. The vast majority of these sites are concentrated in the southwest, with occupation absent in the Pyrenees and sparse and episodic in areas farther north. During the later Magdalenian there is a veritable "explosion" of site numbers. For this period, 456 sites are known in France, of which 120, or 26%, are open-air camps. These sites are distributed throughout most of France, including the north, the east, and the Pyrenees.

In Spain and Portugal, on the other hand, the number of Magdalenian sites is lower than that of the Solutrean (Straus et al. 2000). This decline in site numbers is due to a large decrease in eastern and southern Spain and in Portugal, particularly during the earlier Magdalenian. The number of earlier Magdalenian sites in northern Spain, on the other hand, remains essentially the same as that of the Solutrean at 59. During the later Magdalenian, the number of sites remains roughly constant (53) in northern Spain but increases again in the other three areas. In addition, there is evidence of increasing penetration into the center of the peninsula, a region lacking much evidence for occupation during most of the Upper Paleolithic.

A dramatic feature of Magdalenian settlement is its expansion to the north and east through time (Jochim et al. 1999, Otte 1988). With the climatic improvements after the last glacial maximum, conditions in north and central Europe gradually became more hospitable. Colonization out of the southwestern refugium carried the Magdalenian culture far into the heart of Europe. Traditionally, it was thought that this expansion coincided with a pronounced warm period called the Bolling, which dates to approximately 13,000 BP. More recently, however, it has become clear that the process started much earlier. A number of sites, possibly dating to before 15,000 BP, have been found outside of France. A number of these appear to be brief summer camps aimed especially at the seasonal hunting of reindeer or the procurement of raw materials like high-quality stone and reindeer antler. By the period of 13,000–11,000 BP, the Magdalenian was flourishing in northern France, Belgium, central and southern Germany, northwestern Switzerland, Moravia, and southern Poland, and occupation of these regions was year-round.

In both the heartland and the newly colonized areas, caves and rockshelters rather high above the valley floor continued to be the most common types of sites, but in addition, new locations were used especially in the later Magdalenian. Low-lying caves and shelters, barely above the valley bottom, were now frequently occupied, and in particular, sites close to natural river fords were sought (White 1985). These locations may have been chosen because they were crossing points for reindeer migrations or because they offered particularly rich fishing opportunities, or both. South-facing caves were preferred, presumably because they offered greater warmth from insolation. As mentioned above, open-air sites are now abundant and have been found in a variety of locations. A remarkable series of sites on the top of plateaux has been discovered in the Isle Valley of southwestern France (Sackett 1988). In the Paris Basin, a number of sites in addition to Verberie have been found on valley bottoms adjacent to the rivers (Audouze 1987). Later Magdalenian sites were also situated on the shores of large lakes, such as the Swiss sites of Champreveyres and Monruz on Lake Neuchatel (Affolter et al. 1994, Benkert et al. 1984), and next to springs, as exemplified by the south German site of Schussenquelle (Schuler 1994).

Huts or other structures are known for large number of sites. At the site of Etiolles in the Paris Basin, a ring 6 meters in diameter is formed of large stones surrounding a large hearth and a concentration of artifacts (Audouze 1987). Also in the Paris Basin, the site of Pincevent is well known for its numerous occupations and remains of over 100 huts within an excavated area of approximately 3500 square meters (Bahn 1983, Leroi-Gourhan and Brezillon 1972). Most of these structures were small circles or ovals of roughly 3 meters diameter, each with a central hearth. The German sites of Gonnersdorf and Andernach have several large structures measuring 6–8 meters in diameter characterized by postholes, pits, slate slabs, a central hearth, and numerous artifacts (Bosinski 1982, Veil 1982). In addition, Gönnersdorf has four smaller structures, each with a central hearth. In the Isle Valley of southwestern France, the sites of Guillassou, Le Cerisier, Plateau Parrain, and Le Breuil are all characterized by rich archaeological layers and rock "pavements" that appear to have been hut floors (Sackett 1988). The cobble pavements range in size from approximately 2×2 meters to 4×4 meters and presumably were built to create a dry surface above the soil surface. Interestingly, in some cases artifact distributions are confined to the pavement surface, whereas in others the pavements are largely empty, a difference that may reflect seasonal differences in site occupation, with activities during the warmer seasons more likely to have occurred outside the huts.

Much speculation has been done about the seasonal pattern of settlement during the Magdalenian (Burke 1995). Ethnographic analogies with modern reindeer-hunting groups in Canada, in particular, have been used to infer seasonal migrations associated with the movements of the reindeer. There are several problems with such analogies. Although European glacial environments were largely tundra, they differed considerably from those of northern Canada. European tundras were situated at low latitudes and consequently received much greater solar energy. As a result, they were probably richer in a diversity of plant species than their Canadian counterparts. In addition, whereas Canadian hunters had a limited array of large mammal species available, European populations, even during the glacial maximum, had a much greater variety, including not only reindeer, but also horse, bison, saiga antelope, ibex, chamois, red deer, mammoth, wooly rhinoceros, and muskox. Finally, in the Canadian Barrenlands the topography is largely flat and reindeer undertake long-distance seasonal migrations of hundreds of kilometers in huge herds, whereas the more broken topography of much of Europe probably encouraged much shorter annual migrations and smaller groups. Uncertainty about prehistoric reindeer behavior has allowed for the construction of several different models. Sturdy (1975), for example, suggested that reindeer in central Europe moved over huge distances, from northern Europe along the Rhine corridor into the Alpine foothills and back again each year. Bahn (1977) suggested animal movements between southwestern France and perhaps the Alps or the Pyrenees. Gordon (1988) postulated regular north-south herd movements across the Aquitaine Basin of western France. Most scholars, however, have suggested shorter movements, for example from either the higher elevations of the Massif Central or the coastal plain in southern France in summer to the protected valleys of the Perigord region in winter, from the southern edges of the Paris Basin in winter to more northerly areas in summer, or from the Pyrenees in summer down to the adjacent lowlands in winter (Bouchud 1954, Spiess 1979, Straus 1983, White 1985).

Regardless of the specific migration patterns postulated for reindeer, it has often been assumed that reindeer was the single most important prey, that hunters intercepted the herds and made mass kills during the spring and fall migrations, that they stored meat for the winter, and that they aggregated in large groups for the migration hunts and dispersed into smaller groups for summer and perhaps winter. Growing archaeological evidence suggests that this interpretation is much too simplistic. Sites in the Paris Basin, such as Verberie, do indeed appear to have been situated so as to intercept migrating reindeer, but the sites are relatively small and briefly occupied, with no indication that they were inhabited by large aggregations of people. In a number of areas, such as Spain, southwestern France, central Germany, and Moravia, horse was an important part of the diet, sometimes more so than reindeer.

Moreover, studies of reindeer and horse teeth indicate complex patterns in the seasons of kills that do not easily fit the simple models of seasonal settlement shifts (Burke 1995, Boyle 1990). Reindeer were hunted in the narrow valleys of the Perigord largely in winter and spring, apparently using two different hunting techniques. During the spring migrations, some form of communal hunting was practiced, with kills of sufficient numbers of animals that only the meatiest parts show evidence of butchering. During winter, hunting must have been practiced by individuals on an encounter basis and the carcasses were more fully processed. Horses were hunted in this area during most of the year, both cold and warm seasons, and seem to have been seasonally complementary to reindeer in their availability and importance. Burke (1995) has argued that a clear seasonal round of settlement shifts is not evident in this area, at least for the early Magdalenian. Rather, many sites were occupied in several seasons, but the prey and hunting techniques may have shown seasonal changes within sites. This pattern makes sense if, in the mosaic environment of southwestern France, many different habitats and resources were accessible from each site.

By contrast, the evidence from southern Germany suggests rather clear seasonal contrasts in site occupations, with large sites occupied largely in fall and winter and focused on reindeer hunting, and smaller sites occupied in spring and summer and emphasizing horse and a variety of other resources (Weniger 1982). In this region, a clear seasonal round of shifting settlements and activities seems to have occurred. Most of the reindeer were killed in winter and occur in large numbers in several large sites. Germany at this time had a more highly seasonal climate and a more monotonous, open-tundra vegetation, which may have imposed a clearer pattern of seasonal migration on the reindeer herds.

Magdalenian Exchange

The long-distance transport of materials is well documented for the Magdalenian (Fig. 5.13). Bahn (1982) has documented a number of imports into Pyrenean sites, including stone from the Perigord region and shells from both the Atlantic and the Mediterranean. Sites in the Perigord also contain both Atlantic and Mediterranean shells, as well as fossils from northern France, Belgium, and possibly the Isle of Man and Isle of Wight (Bahn 1977). The site of Monruz in western Switzerland contains fossils from southern Germany and the Paris Basin (Affolter et al. 1994). Shells from the Mediterranean and fossil shells from the Paris and Mainz Basins appear in sites in Switzerland, southern Germany, and the Rhine Valley. The south German sites also contain shells from the Atlantic. This pattern is also seen in other areas of Magdalenian expansion. Fossil shells from the Paris Basin occur in Belgian

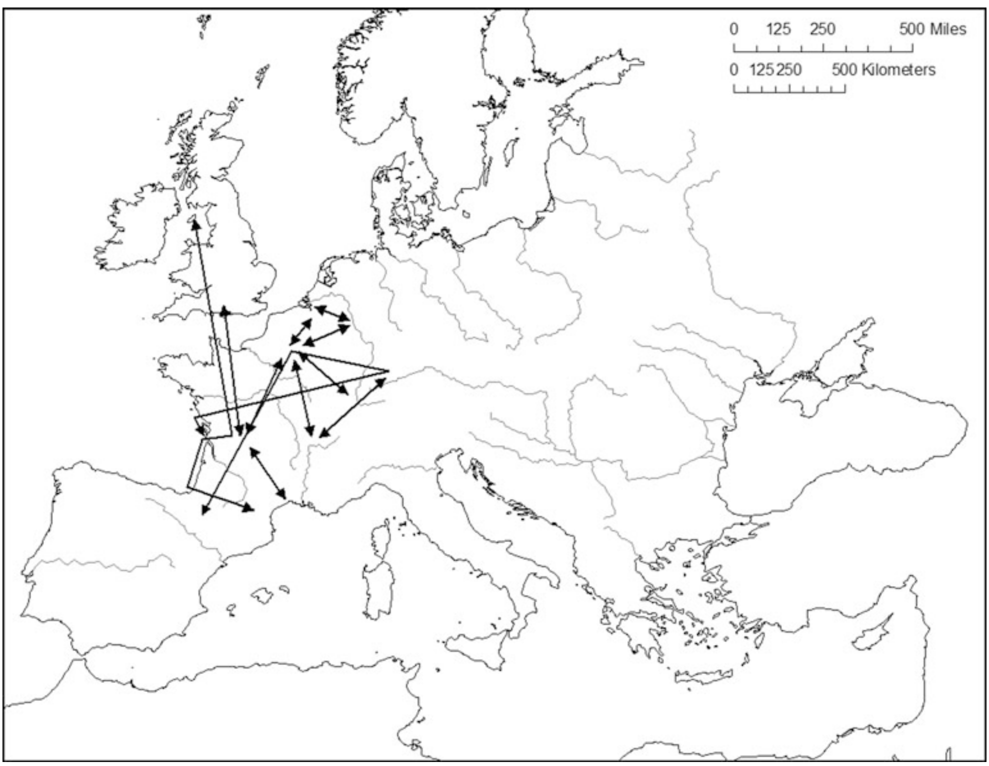


Fig. 5.13 Regional exchange connections of the Magdalenian

sites, and Belgian flint appears in sites in the Rhineland. These patterns suggest a complex web of interconnections across the entire region, linking dispersed groups in social and economic networks. For the Pyrenees, Bahn (1982) has suggested that two of the sites – Isturitz and Mas d'Azil – contain so many imports, as well as portable art objects, that they deserve the title of "supersites." Both sites are huge cave-complexes and river tunnels and both have wall art in addition to the rich archaeological assemblages. He suggests that both may have served as storehouses (for raw materials such as antler and for imports), as meeting places, and as centers for group aggregations and rituals. Other, smaller sites rich in art and imports may have also been scenes of aggregations, forming a chain spaced about every 50 kilometers along the length of the Pyrenees.

Magdalenian Portable Art

Approximately 80% of all known portable art objects from western Europe has been found in Magdalenian sites. Although art was becoming increasingly common during the course of the Upper Paleolithic, the Magdalenian truly represents an explosion of artistic activity. Ornaments were manufactured in profusion, utilitarian tools were decorated with great care, and special art objects were created in abundance. The variety of materials and forms used is enormous. Using bone, animal teeth, imported shells and fossils, and the increasingly scarce mammoth ivory, beads and pendants were made for necklaces and ornaments on clothing. Among the decorated tools are spear throwers intricately carved with three-dimensional figures of animals, bone spatulas with carved designs, and sandstone lamps with engraved geometric decorations on their handles. Other, more enigmatic objects include elaborately carved perforated antler batons, incised antler rods, sculptures and figurines of ivory, clay, bones, and stone, engraved fragments of animal ribs and shoulder blades, intricately decorated and often perforated bone discs, and engraved stone plaquettes.

The two major classes of motifs used in the portable art are animals (including humans) and abstract or geometric designs. Although they are less common than geometrics, the animals are the most striking. Among the designs found on the carved spear throwers, for example, the following animal motifs have been identified:

- A leaping horse
- Two horses
- Horse heads (several examples in France and Switzerland)
- Two fighting ibexes (headless)
- An ibex or fawn defecating, accompanied by birds (10 examples in the Pyrenees)
- A reindeer
- An ibex
- A muskox
- A standing bison
- A galloping bison
- A bison licking its flank
- A mammoth
- A hyena
- Two birds
- Three birds
- Three fish
- A salmon
- Two salmon

A number of features of this one class of items stand out. First, the variety of different images is large. Second, much of the art is dynamic, depicting animals in motion. Third, the motifs are not all associated with big-game hunting, although they occur on spear throwers presumably used in that activity. The more common geometric designs include parallel lines, chevrons, wavy lines, spirals, and circles.

The engravings on perforated antler batons, which may have been used as shaft straighteners in the manufacture of spears, show a similar variety, but include a number of different motifs as well. Horse, deer, bison, ibex, and reindeer stand out as important elements, but there are also a number of carnivores (lion, bear), humans, seals, salmon, birds, and plants portrayed on these objects. Again, some of these animals are portrayed as active: ibex are running, a stag is braying, a bear is spurting blood. Also, these images include more than simply the targets of spear hunting.

Bone discs were common primarily in the early part of the later Magdalenian, dating to around 14,000–13,000 BP (Sieveking 1971). These thin, circular disks, which range in diameter between 3 and 8 centimeters, are usually decorated. Their use is unknown, but they may have been pendants, since most have a central hole. France has produced the majority, with over 150 known from 19 sites, but they are also found in Germany and Moravia. Although animal designs are much less common than geometric motifs, again the variety of depictions is great. Reindeer are relatively common, but in addition there occur horses, mammoths, bison, ibex, bears, and men. Sometimes there seems to be a sense of artistic composition. For example, one disc from a Pyrenean site has a cow on one side and a calf on the other, while a site from the Perigord has an adult chamois on one face and a juvenile chamois on the reverse. A remarkable example from the Pyrenees shows a man with an erection being threatened by a large bear paw and associated with a horse head. The more abstract designs take the form of lines radiating from the central hole to the edge or a line encircling the disc near the edge, often with incisions between the line and the edge.

Engraved stone plaquettes, usually made on slabs of limestone or schist, or on pebbles, and measuring less than 30 centimeters in maximum dimension, are even more common forms of portable art. At least 680 have been found in 58 sites of southwestern and central France, 515 from 24 sites in the Pyrenees, 241 from 21 sites in the Basque region of France and northern Spain, 77 from 22 sites in northern and eastern France, and over 500 in Germany, Bohemia, and Moravia (Sieveking 1987, Svoboda 1976). They were thus most common in southwestern France and the Pyrenees, particularly during the later Magdalenian. Although many of the designs are meandering lines difficult to interpret, a large number of animals are depicted as well, most frequently red deer, reindeer, horse, bison, and ibex. Humans are a particularly common theme at the French site of La Marche (men and women) and the German site of Gönnersdorf (largely women).

In all classes of portable art, the animals are not depicted in order of their economic importance. Although reindeer were generally the most important prey, other animals, especially deer, horse, and bison, are frequent artistic motifs as well. At the site of La Vache in the Pyrenees, the art motifs are dominated by bison, but the food refuse indicates that ibex was the major prey. Nor does the frequency of animal depictions in portable art match that of the wall art. Reindeer, carnivores, fish, birds, plants, insects, and humans are more commonly portrayed in portable art than on the walls of caves.

The portable art objects are not distributed evenly among sites. In general, the largest sites yield many more art objects than smaller sites, even when only small areas have been excavated. In an inventory of portable art of the Perigord, for example, although over 2000 objects were identified from 72 sites, approximately two-thirds were found in only four of these sites (Bahn and Vertut 1988). Four sites in the Pyrenees have produced over 75% of all known flat-bone animal carvings. Engraved plaquettes are concentrated in a few sites, such as Parpallo in eastern Spain (over 5000), the French sites of La Marche (over 1200) and Enlène (over 1000), and the German site of Gönnersdorf (over 500). Only a few sites are rich in both portable and wall art, including Mas d'Azil, Isturitz, and Enlène-Trois Frères in the Pyrenees and Altamira and El Castillo in northern Spain. The rich sites appear to have a greater diversity of art motifs independent of their larger sample size. In one study, the cave of Altamira in northern Spain was found to contain many unique elements in its portable art, as well as elements common in a number of smaller sites nearby (Conkey 1980). This pattern was suggested to reflect the site's role as a central aggregation site used for communal rituals by the regional population. The "supersites" of Isturitz and Mas d'Azil in the Pyrenees, with their abundance of art and imports, may have served a similar purpose.

There are regional stylistic patterns to the art that may hint at the nature of social groupings at this time. Engravings in the art of the Perigord, for example, tend to be more deeply cut than those in the Pyrenees or northern Spain. Moreover, the former region contains more "scenes" than the latter. The Pyrenees contain all of the spear throwers with ibex and bird motifs, most of the bone discs, and all of the antler semi-cylindrical rods carved with spiral motifs. At the same time, similarities among regions are clear and indicate ongoing contact and interaction. Carved horse heads, for example, are stylistically very similar in both the Pyrenees and the Perigord, as are certain engravings in the eastern Pyrenees and the Rhone Valley. Objects in central Europe share many similarities in motifs and style with those of the west, reflecting their place or origin, but lack a number of objects as well, suggesting that some elements of artistic expression were lost or abandoned with the movement into the new areas (Svoboda 1976). Nevertheless, the artistic similarities persist throughout the course of the later Magdalenian, indicating that continuing contact was maintained across this large area, as is also suggested by the evidence for exchange.

Because animals are common themes in portable art, interpretations of this art have emphasized hunting magic. The fact, however, that the depictions of animals show little relation to their dietary importance, together with the scarcity of artistic evidence of kills or wounds, suggests that hunting magic played little role in the production of art. The relatively abundant female figures in the portable art, like the earlier Gravettian Venus figurines, have been interpreted as indicating a concern for fertility and reproduction, the importance of female deities, or the preoccupation of bored hunters waiting for game. Again, the meaning of these engravings remains elusive. A novel approach to the meaning of some of the portable art has been taken by Marshack (1972), who suggests that the marking of time and of seasons was reflected in many of the engraved objects. Some highly decorated bone and antler objects, for example, are thought to contain images of plants and animals characteristic of particular seasons – plant blooming and animal births in the spring or ripening of plants and animal ruts in fall. These would have been important economic periods for the hunter-gatherers, perhaps worthy of artistic note. In addition, he interprets some of the objects decorated with lines or dots as "calendars" marking the passage of time, perhaps the phases of the moon. Such notation has usually been considered to be beyond the capacities of Paleolithic people, but their successful survival in ice age Europe indicates that they possessed and communicated a complex knowledge of the natural world.

Magdalenian Cave Art

The most impressive feature of the entire Paleolithic is without a doubt the decorated walls of caves. Paleolithic cave art has attracted widespread attention and has been the focus of numerous coffee-table books. It is through their cave paintings that the people of the ice age seem both most human and most mysterious. Suggestions about the purposes of this art variously include hunting magic, sexual imagery and fertility, and shamanistic visions. What is lacking from most popular discussions, however, is the variability of this art and its remarkably limited distribution in time and space.

Over 270 sites with Paleolithic wall art have been found within Europe. France, with at least 137 decorated caves, has the most, followed by Spain (106), Italy (21), Portugal (2), Russia (2), the former Yugoslavia (1), and Romania (1) (Bahn and Vertut 1988). Thus, approximately 90% have been found in France and Spain, and most of these are concentrated in the small area of southern France and northern Spain. Dating of the art has proven to be extremely difficult. In a few cases, decorated walls are associated with well-dated occupation debris on the cave floor, but many painted caves were not occupied. Until recently, the primary approach to dating was through stylistic analysis. In some cases, for example, styles in portable art objects of known age can be linked to similar styles in wall art. More generally, schemes of stylistic development have been postulated, bolstered by the few cases of walls dated by associated debris and superposition of different styles. The most elaborate of these stylistic chronologies was proposed by Leroi-Gourhan (1968), who proposed four stages in artistic development through the course of the Upper Paleolithic. This scheme, however, was based on a number of unverified assumptions about how style would have evolved through time and about its uniformity across space. Recently, some cave paintings have been directly dated using accelerator radiocarbon techniques on the pigments and the results contradict portions of this chronological scheme. The cave of Chauvet, for example, contains sophisticated images that correspond to Leroi-Gourhan's latest style, contemporary with the later Magdalenian, but the direct dates indicate an Aurignacian age for much of the painting. It seems likely, however, based on all associated information and the few currently available direct dates that the vast majority of the decorated caves belong to the Magdalenian.

Engravings on cave walls are by far the most common type of decoration. To these must be added the recently discovered engravings on open-air boulders in the Coa Valley of northern Portugal, where 194 different panels of animal figures have been found (Zilhão et al. 1998–1999). Tracings in wet mud, mostly of dots or meanders, are also common but often neglected in general discussions. Clay figurines placed against cave walls or on the floor have been found in the Pyrenees, including figures of bison at the site of Tuc d'Audoubert and the body of a bear at Montespan. In the Dordogne region, deeply carved bas-reliefs of animals were created. By far the most well-known wall decorations, however, are the wall paintings. Executed in black, red, and yellow, these paintings portray a number of different motifs. Hands, in the form of stencils made by spraying pigments by mouth against a hand placed on the wall or as positive prints, are common in many caves. These show some patterns that have been difficult to interpret. More left hands than right are depicted, and in a number of cases the hands have missing fingers. This has been variously interpreted as signs of injury or mutilation (perhaps as part of initiation rites) or even as a form of sign language.

Geometric designs, including lines, dots, rectangles, and even checker board patterns, are very common elements of the cave paintings. These, too, have been interpreted in a variety of ways. Linear marks, often with small angular branches, have been viewed as spears and arrows or as growing plants. Some scholars have interpreted rectangular figures as traps for hunting. Various other marks have been suggested to represent animal tracks. Opposed to all of these utilitarian interpretations, others emphasize a likely abstract, symbolic meaning for such marks, one that is inaccessible to modern viewers.

Humans are less commonly represented in the wall art than in portable art, and when they are, they are not as realistically portrayed as animals are. Some noteworthy figures do, however, occur, such as a sketchy, stick-like human depiction in Lascaux Cave in southwestern France.

Animal figures are quite common and impressive (Fig. 5.14). Most are shown in profile, often as single animals rather than as part of scenes or herds. Many are quite realistic in portrayal, with details of hair, ears, and coloring depicted. Large herbivores are most common, followed by carnivores and fish and birds. Relatively few images of the economically important reindeer appear on the walls; instead, horse and bison are the most common animals painted. Some regional differences exist in the motifs, with bison dominant in the paintings of northern Spain and mammoth more common in the Rhone Valley.

Because different figures are frequently superimposed and appear somewhat haphazard in their placement, it has usually been assumed that the paintings show no underlying organization. Rather, they have been thought to represent the accumulation of isolated depictions over many centuries.

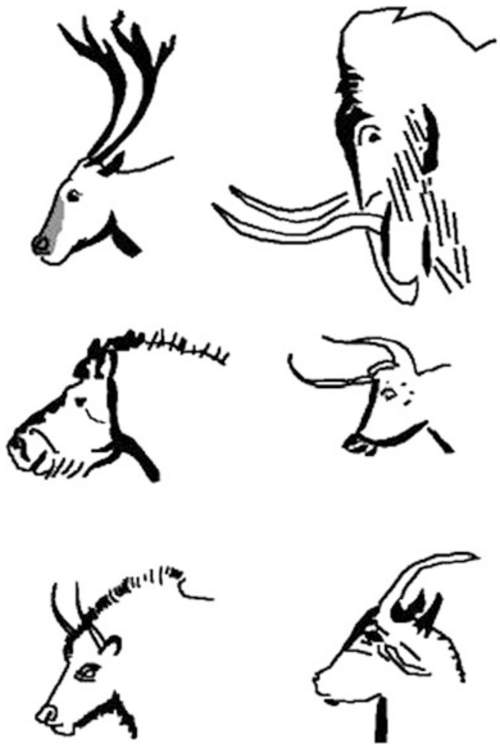


Fig. 5.14 Some common animals in cave art (from *upper left*: reindeer; mammoth; horse; aurochs; bison; ibex)

Leroi-Gourhan (1968), however, has argued that there is, indeed, a pattern in the paintings, one that was maintained despite frequent reuse of the walls. Based on a study of over 60 decorated caves, he found that certain animals – bison, aurochs, and horse – tended to occur in the center of large wall panels or in very prominent locations, whereas others – deer, ibex, and mammoth – appeared in more peripheral locations. Furthermore, the broader geometric signs such as triangles, vulvas, and squares are more often found in the central locations, while the more linear geometric figures occupy peripheral locations. Based on these patterns, he suggests that principles of sexual opposition were used to organize the paintings, with female signs and associated animals placed in central locations, flanked by male imagery on the periphery.

One of the best-known painted caves is that of Lascaux, situated 90 meters above the Vezere River in southwestern France (Leroi-Gourhan 1982, Naber et al. 1976). Discovered in 1940 and initially open to the public it was closed in 1963 because the paintings were beginning to deteriorate due to the warmth of electric lighting and the introduction of moisture and fungi. The entire cave is approximately 140 meters long, with a series of branching passages and chambers. A large number of paintings and over 1500 engravings have been found on walls and ceiling. Some animal figures are very large, over 5 meters in length, and many images are superimposed upon older ones. Some artifacts have been found on the cave floor that date to approximately 17,500 BP, that is, to the earlier Magdalenian. It was not used as a residential site; the materials consist of the equipment of the painters (stone palettes, fragments of mineral pigments, and burins for engraving) along with remnants of meals of reindeer meat. Horses, deer, bison, aurochs, and ibex are the most common animals represented, painted in black, yellow, red, and white. The paints were made from charcoal and mineral pigments mixed with cave water that was high in calcium and helped bind the paint to the wall. Fingers and brushes made of twigs or hair were used to apply the paint. Lighting was provided by torches of branches as well as by stone lamps that used animal fats as fuel and lichen as wicks (de Beaune and White 1993). Over 130 such lamps have been discovered at Lascaux. In one passage, traces of the use of scaffolding have been found. These consist of 17 holes cut high into the rock walls on both sides of the passage, all at the same level. The holes were packed with clay, which bears imprints from wooden poles pushed in. Apparently a wooden platform was built across the top of the passage to allow the painters to reach the ceiling and upper walls. A fragment of twine found in the cave suggests that the elements of the platform were tied together.

Many of the paintings and engravings lie deep within caves, particularly during the earlier Magdalenian. By the end of the Magdalenian, cave decorations are known near cave entrances or in more open rockshelters, but overall the paintings seem to decrease considerably. This decrease coincides with the maximum expansion of the Magdalenian across Europe.

Magdalenian Ritual and Sanctuaries

There is some evidence that at least a few of the major decorated caves served as ritual centers or sanctuaries, where groups gathered to carry out some type of ceremonies. The Aurignacian-age cave of Chauvet, for example, had a "bear altar" in which the skull of a bear was placed up on a stone slab beneath a panel of painted bears. From the Magdalenian, a number of French caves, such as Aldène, Niaux, and Fontanet, have imprints of children's footprints, suggesting not only that they were present and barefoot, but also perhaps that initiations of children could have occurred in the caves. Certainly some of the "supersites" with abundant art and imports may have served important ceremonial functions. Above all, however, it is the evidence from three remarkable sites that suggest a ritual and deeply symbolic meaning for the painted caves (Bahn and Vertut 1988, Freeman and Echegaray 1981).

The first is actually a pair of Pyrenean caves, Trois Frères and Tuc d'Audoubert, which were once linked underground. A river runs through the deep, tortuous passages of these caves and the chambers found at the end of each. At Trois Frères, this chamber is highly decorated with paintings and engravings, particularly of animal figures. One panel has approximately 25 bison depicted, together with a half-human/half-bison figure. One painted figure in the cave is also part human and part animal, again exemplifying the dualistic imagery seen in some of the art of earlier times. Tuc d'Audoubert has no paintings or engravings, but instead has a variety of unique finds. Over 200 engraved stone plaques occur in clusters along the passageway, and meander designs were made in the soft mud on the ceiling. Also along the passage there are modified bear bones, including a smashed skull and a jaw with teeth removed, and a snake skeleton. On a ledge were found three teeth, all perforated and painted with red ochre, from juvenile individuals of fox, bison, and aurochs. A small side-chamber had over 50 heel-prints of children in the clay floor. In the small chamber at the end of the passage were found two clay sculptures of bison, each around 2 feet long and made of unbaked clay. They were propped upright against a rock.

Another site in the Pyrenees, Montespan, also has a river running through its long passage. In a widened gallery chamber were found the remains of 24 clay sculptures on the floor. Most have been ruined by water, but one figure is possibly a horse, and another is more clearly a bear, over 3 feet high. This bear statue has no head, but much detail in the rest of the body. It is possible that a bearskin with head was originally draped over the figure. Engravings of horses are found on the walls and ceiling.

In the mountains of northern Spain, the cave of El Juyo was found to contain remarkable remains. Deep in the cave interior is a walled area with a number of unusual features. A huge horizontal stone slab, over 6 feet long, rests on smaller upright stones. Nearby are a hearth, an earthen ramp, and a cache of 26 intact bone points. Three artificial clay mounds were created in this area, each over 3 feet in height and made of successive layers of clay laid out in patterns. These patterns take the form of a rosette of smaller mounds (looking much as if some pail-like container had been dumped upside-down) and each layer was covered by a coating of colored clay. The layers were separated by deposits of charcoal and burned bones of red and roe deer. A few feet from the mounds was an upright stone that had been modified to create what the excavator interprets as a half-human, half-feline figure. Running under the mounds was a trench filled with limpet shells. In addition, the cave had numerous pits containing bones, shells, and bone needles.

Magdalenian Burials

Like artwork and imports, burials are more abundant during the Magdalenian than in earlier periods. Of all known French Upper Paleolithic burials, 85% date to this period (Quechon 1976). Actually, the remains of 232 individuals have been found in French Magdalenian sites, but the majority of these are fragmentary finds with no trace of burial (Le Mort and Gambier 1992). Approximately 13 definite burials have been documented, mostly in the southwestern region of France. Adults of both sexes as well as children were interred in a variety of body positions, from tightly flexed to extended. Grave goods in the form of tools, bones, and ornaments accompany approximately half the graves. One notable grave in the cave of Saint Germain La Riviere in southwestern France dated to 15,780 ± 200 BP. This grave contained the body of a young woman placed flexed on her left side, accompanied by beads, animal bones, and a small stone structure consisting of four uprights capped by two horizontal slabs. A recent analysis of the grave goods suggests that they indicate a relatively high social status in relation to other Magdalenian graves and, by extension, a degree of social inequality in the Magdalenian of France (Vanhaeren and d'Errico 2005). In addition to the formal graves, there is evidence that the remains of another 94 individuals, especially the skulls, received some type of special treatment (Le Mort and Gambier 1992). For example, one skull had small plaquettes placed in the eye sockets, another skull was deposited within a small chamber, and yet another skull had a trepanation hole cut into it after death. A recent analysis of the cranial remains of 24 individuals found at the site of Le Placard showed a number of modifications, including defleshing of the skulls and purposeful breakage (Le Mort and Gambier 1992).

Complexity in the Magdalenian of the South-West

In the entire landscape of Paleolithic Europe, the region of Franco-Cantabria or southwestern France and northern Spain stands out as exceptional, particularly during the period of the Solutrean and earlier Magdalenian. It is in this area that we see an explosion of artistic activity that created most of the decorated caves and most of the portable art objects at this time. It is this area that contains most of the burials and other indications of elaborate mortuary ritual. This is the region where most of the evidence for long-distance exchange occurs. It is here where most of the impressive accumulations of materials in "supersites" occur.

This concentration in time and space of such a rich archaeological record suggests the appearance of much greater social and cultural complexity in this area than in most other portions of the continent. Consequently, these developments have attracted considerable attention from archaeologists trying to understand their causes (Clark et al. 1996, Gamble 1991, Jochim 1983, 1987, Mellars 1985). All of these attempts agree that a primary causal factor is the role of this region as a glacial refugium. This was the northernmost area of western Europe to have continuous, dense occupation throughout the last glacial period. It served as a refuge zone for many plants and animals during the height of the last glaciation, and perhaps for humans as well. As a result, it contained a diversity of plant and animal resources not available elsewhere and, because of the broken topography of the region, these diverse biotic communities were in close geographic proximity and accessible from individual sites. Human populations were confined by the harsh climatic conditions farther north and east, and thus faced limits to their mobility. These populations may have been augmented by an influx of some groups from areas to the north and east as conditions worsened. The essential elements of the refugium, then, were a relatively concentrated rich and diverse set of resources, a limit to human movements, and possibly a degree of population pressure. Under these conditions, social interactions may have intensified and competition may have increased. Art, ritual, and exchange may have all intensified as responses to this situation. The peaceful mediation of intergroup relations may have taken the form of ritualized meetings and elaborate exchange. The maintenance of within-group harmony may have increasingly utilized ritual aggregations and the development of symbolic representations of affiliation. Competition among individuals and groups may have led to the development of regional styles of art and artifacts as well as the elaboration of individual ornamentation. Whatever the specific role of each of these factors, it seems likely that the spectacular developments in Franco-Cantabria are the reflection of changes in *social* relations within a favored environment. In response to the easing of harsh climatic limits during the course of the Magdalenian, people spread out and moved into previously uninhabited regions. Along with this expansion, they abandoned the practice of decorating caves as well as some of the forms of portable art. The mechanisms of mediating intense social relations were less necessary in the new conditions of the late glacial period.

Toward the very end of this period, around 11,500 BP, a pronounced warming period called the Alleröd occurred. Closed forests took over most of southwestern France and spread into central and northern Europe. Profound readjustments by the groups living there were necessary as the herds of reindeer moved out of the area northward. The stone tool industry of this period is called the *Azilian* and is characterized by generally smaller tools and fewer specific types, which included projectile points with arched retouched backs and short scrapers. Hunting shifted focus to forest game such as red deer, roe deer, and boar, along with a variety of other resources. Remarkably, portable artwork and objects of adornment decline precipitously, with pebbles painted in red and black designs of dots and stripes comprising the major artifacts of this type. In central Europe, similar changes occurred and a similar industry, here called simply the Late Paleolithic, developed.

Southern Europe

The late glacial period in the Balkans has not been studied nearly as intensively as in France and Spain, but Italy has seen a considerable amount of research focused on this period (Mussi 2001). This was a time of highly variable climate, with several oscillations between colder and warmer, drier and wetter phases identified. The full glacial vegetation, which was largely dry steppe, gave way episodically to richer grasslands and more forested habitats. With the melting of glacial ice, sea levels rose and flooded coastal areas, especially in the northern Adriatic. A number of animals became locally extinct, including cave bear and lion, as well as elk, fallow deer, giant deer, and bison.

A number of rich sites are known from this period, all containing Epigravettian stone tool industries. Backed bladelets and end scrapers are the major tool forms, with smaller geometric microliths increasing in frequency toward the end of the period. This was a period of gradual colonization of nearly empty lands. Northeastern Italy and the higher elevations of the Apennines and Alps show increasing numbers of sites during this period. Economies in the lowlands emphasized red deer, aurochs, and wild boar, while those in the highlands focused on ibex. Diets became increasingly diversified, with fish, shellfish, and birds appearing in greater numbers at many sites.

Art objects continued as important features of the archaeological record. The rockshelter of Riparo Tagliente near Venice, for example, contained a number of bones and rock pebbles and slabs with engravings of animals and geometric motifs, as well as perforated teeth and shells. Farther south, in the large cave of Grotte Polesini, many engraved and painted pebbles were found in the Epigravettian levels, together with engraved bone tools, ochre-stained bones, and hundreds of perforated shells and teeth. The cave of Grotte Romanelli, in the southern tip of the peninsula, contained engravings of animals and geometric figures on both stone slabs and the cave wall.

Burials are relatively common as well. Riparo Tagliente had the grave of an adult man placed on his back in a pit and covered with stone slabs, some of which were engraved. Grotte Polesini contained a number of human bones representing at least 14 adults and children, and although no burial pits were discerned, a number of the bones were stained with red ochre, suggesting some type of mortuary treatment. Grotte Romanelli also contained a number of burials of adults and children. The north Italian cave of Arene Candide contained approximately 20 Epigravettian burials, both single and double inhumations (Formicola et al. 2005). These are largely adult men and children and are accompanied by rich grave goods including beads, animal bones, and decorated antlers.

This region, consequently, shows similar developments to those of France and Spain, but not nearly as intensively elaborated. Hunting remained the mainstay of the economy, but now may have included the bow and arrows armed with microliths as an important technological innovation. Economies diversified as well to include greater amounts of fish, birds, and shellfish. Just as the Pyrenees were recolonized during the middle of the Magdalenian, so, too, were the Apennines and the southern Alps as the glaciers retreated. Portable art in the form of stone and bone engravings were common, as were ornaments and some imports. Mortuary rituals accompanied the burials of all ages and both sexes, and include concentrations of several individuals at specific sites. Even decorated caves, although rare, occur and may have served particular ceremonial purposes.

Eastern Europe

The Ukraine and the Russian Plain had continuous occupation during the glacial maximum, like other areas of southern Europe. With the onset of the late glacial period, this area, too, underwent a series of climatic oscillations and fluctuations in vegetation. Grasslands were initially widespread, but shrank with the gradual expansion of forests. For much of the period, the overall pattern was a mosaic of different vegetational communities, with the greatest productivity of graze for animals concentrated along the river valleys. Mammoth thrived here until around 12,000 BP, accompanied by reindeer and bison. The most southerly regions near the Black Sea were consistently drier and supported largely herds of bison.

Spotlight on a Site: Mezhirich

The spectacular site of Mezhirich was discovered in 1965 during excavation of a storage cellar. Situated on a river terrace near the confluence of two tributaries of the Dnepr River, its cultural remains cover approximately 10,000 square meters, only a small portion of which has been excavated. The abundant artifacts lie within a 20-centimeter thick layer that may represent two major cultural levels (Gladkih et al. 1984, Soffer 1985, Soffer and Vandiver 1997).

The most impressive finds at this site are the remains of four huts (Fig. 5.15). Measuring 4–6 meters in diameter, these huts consist of round depressions with encircling wall foundations of mammoth skulls. Above the skulls are bones of other body parts, with each hut utilizing different parts such as mandibles or long bones. It has been suggested that the huts had a complete dome of mammoth bones

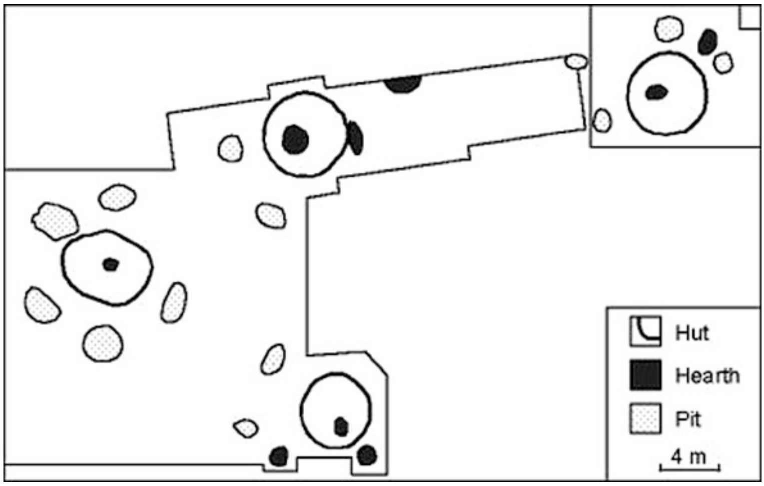


Fig. 5.15 Mezhirich site plan (after Soffer and Vandiver 1997)

supported by posts. Although no postholes have been found, bones with holes cut into them have been interpreted as post supports. In turn, the bone structures would presumably have been covered with animal hides. These huts are much more elaborate than most others on the Russian Plain and it has been estimated that each took 40–50 man-days of labor to construct.

Inside the huts are hearths and large concentrations of bone and stone. Areas outside of the huts have fewer artifacts except for a few areas of concentrated trash discard, suggesting a winter occupation when most activities would have been carried out inside. Analysis of the remains in one of the huts identified a variety of activities that occurred:

- Stone tool manufacture and repair
- Use of red and yellow ochre pigments
- Use of bone needles in sewing
- Skinning of fox and weasel, leaving the complete skeletons intact
- Cooking of large and small mammals
- Use of bones as primary fuel in the fires
- Some possible use of berries and seeds.

The dwellings may have been occupied several times; in one hut, two clear levels of artifacts were found, separated by a layer of sterile sand that was apparently laid down purposefully.

Outside of the huts are a number of pits, some as deep as 1.5 meters. Some of these were used for trash, others for food storage. Sterile layers in some of them indicate that they, too, were reused several times. Because these pits cluster around each hut, rather than in more "public" space in the center of the site, it has been suggested that the hut occupants were relatively independent of each other in procuring and storing food. The food remains include mammoth, rhinoceros, horse, bison, muskox, hare, fish, and birds. Carnivores were apparently killed largely for their furs.

This site contains abundant objects of art and exchange. Many pieces of mammoth bone, including skulls, are painted with intricate designs of red ochre. One piece of mammoth ivory has a complex engraving that has been interpreted as a "map," with depictions of the river and the huts of the site. Objects of adornment include shells from the Black Sea, amber, perforated teeth, and bone beads. Anthropomorphic figurines of carved ivory have also been found.

Dating to between 18,000 and 14,000 BP, the site of Mezhirich appears to have been a complex winter base camp, occupied several times by up to about 50 people. Its occupants depended upon a wide variety of food resources, some of which they stored in pits dug into the permafrost. During summer, they presumably moved elsewhere, returning again in subsequent winters.

Complexity on the Russian Plain

Like the other glacial refugium of Franco-Cantabria, the Russian Plain witnessed a number of developments suggesting the evolution of considerable cultural complexity. Mezhirich is just one of many sites in the Dnestr, Dnepr, and Don drainages where considerable investment was made into the construction of mammoth bone dwellings. Although generally not as elaborate as those at Mezhirich, they share a number of features. They have diameters of 4–7 meters outlined by mammoth skulls with interior hearths where bone was the primary fuel, as trees would have been relatively scarce. Storage and trash pits commonly surround the huts, as do additional hearths. Many sites have 3–6 such huts, arranged in a row at the site of Mezin or in a circle at Dobranichevka. These are all winter camps occupied by at least 30 people, located on or near river floodplains, and depending largely on food stores. During summer, it appears that these groups remained together, but moved to camps located farther from the rivers, and carried out a variety of subsistence activities.

Soffer (1985) has identified three major site types for the Russian Plain during the late glacial period: summer camps, winter camps, and complex winter camps. The latter two both have mammoth bone huts, storage pits, and hearths, but the complex camps have more of these features, huts with more labor investment, more decorative items, art objects, and imports, a larger amount of meat represented among the food remains, a greater number of fur-bearing animals among the fauna, and more evidence of site planning. Mezhirich is one of these complex winter camps. In many ways they stand out on the landscape and may correspond to the “super-sites” identified in the Magdalenian of western Europe, serving perhaps as central places for social and ceremonial activities.

Exchange is well documented in this area by the presence of exotic stones, fossils, and amber at many sites (Soffer 1985). Amber beads appear in sites up to 250 kilometers from their source in the central Dnepr basin, the number decreasing with distance from this source. This pattern suggests a simple exchange from group to group, the amount declining at each step. From a source near the Black Sea, fossil shells were transported as far as 650 kilometers to sites in the north. Interestingly, they are more common at northern sites located farther from the source, than they are at sites to the south. This pattern suggests a different pattern of exchange than was used for the amber, perhaps special expeditions by northern groups to the south to trade furs for the fossil shells.

At this time, all of the sites in the Russian Plain show great similarities in the styles of stone tools, artwork, and structures suggesting a large area of intensive interaction. There are, however, some indications of social distinctions. These include the existence of complex winter sites as different from the normal winter sites, the variability of hut size within and among sites, and the concentration of greater numbers of storage pits around some of the huts in each site. On the other hand, the few known burials, all from the Don Valley, contain no grave goods indicating status differences. If social distinctions were important, they appear to have been expressed during life, not at death.

Northern Europe

Northern Germany, Poland, Denmark, southern Sweden, and England were deglaciated by 14,000 BP as part of the process of late glacial warming (Bratlund 1996). Tundra and steppe vegetation spread into these areas, followed by willow, birch, and poplar. By around 11,500 BP, the beginning of a period known as the Alleröd, much of this area had become forested. This reforestation was interrupted, however, between 10,800 and 10,000 BP by a return of cold conditions and a decline in forest vegetation during the period known as the Younger Dryas, which was the last cold period of the glacial. Temperatures warmed and forests began to expand again with the beginning of the Holocene at 10,000 BP. Thus, climatic and vegetation changes in northern Europe were episodic during the late glacial period, and human populations and their economies responded accordingly.

Gradual expansion from the glacial refugia in the southwest and southeast brought Magdalenian and Epigravettian populations to the southern edges of the North European Plain by 13,000 BP (Housley et al. 1997). As these groups moved into new areas and coped with the changing environmental conditions, a variety of different archaeological cultures emerged. Among the first was the *Hamburgian* of northern Germany and southern Denmark and the related *Creswellian* of England. Known best from the German site of Meiendorf, dated to around 12,000 BP, Hamburgian groups appear to have been specialized hunters with a technology that included shouldered stone points and numerous antler tools (Rust 1972). Meiendorf, for example, contained the remains of over 100 reindeer, together with a few individual horses, hare, carnivores, and birds (Bratlund 1996, Clark 1975). The evidence indicates that the animals were killed during the fall migration, at least partly by driving them toward a small lake. The nearby sites of Poggenwisch and Borneck contain evidence of small huts, measuring approximately 5 meters in diameter, marked by a circle of stones. The Hamburgian is known from southern Scandinavia as well, probably as a result of seasonal excursions into this more northerly area.

With the development of forests during the Alleröd period, the lowlands of northern Germany were occupied by groups armed with a different type of stone point, with an arched retouched back, that gave its name to the culture: *Federmesser* (pen-knife). This is very similar to the points of the Azilian and Late Paleolithic industries farther south. Although Federmesser sites are common, those with faunal remains are not. The few known assemblages of bones indicate that elk was a major prey of these groups. Contemporary with this culture, but farther to the north in the more open woodlands of Denmark and southern Sweden, the *Bromme-Lyngby* culture thrived, characterized by large, tanged stone points and various antler tools. Again, faunal remains are scarce, but the evidence suggests a mixed diet of reindeer, elk, and fish.

During the cold Younger Dryas, reindeer hunting again dominates the economies of the north, as the vegetation became more open and reindeer populations moved south. The *Ahrensburgian* and *Masovian* cultures are found throughout much of the northern plains, characterized by small tanged stone points and barbed antler harpoons. The site of Stellmoor, next to a small lake in northern Germany and dating to around 10,000 BP, contained the remains of 650 reindeer, along with a few individual elk, horses, bison, pigs, and beaver (Clark 1975). A remarkable find at Stellmoor was the remains of over 100 wooden arrows. Although the Hamburgians and late Magdalenians may have possessed bow and arrow technology, these finds are the oldest in Europe. The arrows were made of pine wood, with a separate foreshaft fitted onto a main shaft. The points were both of stone and sharpened wood. The reindeer bones show a number of injuries included embedded stone points, suggesting that numerous arrows were shot into the animals as they fled toward the lake (Bratlund 1996). Stellmoor apparently represents the accumulation of a number of different occupations, some involving such large kills that the animals were only incompletely butchered. Other Ahrensburgian sites, for example in Belgium, show a greater variety of prey, including pig and red deer, suggesting that economic activities varied with season and local availability.

Summary of the Upper Paleolithic

The period of 40,000–10,000 BP was clearly one of remarkable developments. Biologically it marks the appearance of fully modern humans in the continent. Technologically, this was a time of numerous innovations. Changes in stone technology, such as the perfection of prismatic blade techniques, the introduction of pressure flaking, and the development of bladelets and other microliths, led to greater control over the use of stone and the shaping of tools. The development of methods of working antler, bone, and ivory provided considerably more flexibility in tool making and allowed for the manufacture of many new tool forms. Other technological innovations included the development of systematic food storage, the appearance of cordage and perhaps nets, the first uses of fired clay, and specific inventions such as the spear thrower, the eyed needle, and the bow and arrow.

Economically this was a period of both increasing specialization and greater diversification. In many parts of the continent, a strong focus on a particular prey, such as reindeer, became evident and coordinated drives were carried out. At the same time, however, fish, birds, shellfish, and hare now contributed substantially to the diet and may have been partially linked to the development of nets and harpoons.

From some areas during this period there is evidence that greater amounts of energy were invested into site construction and planning. Substantial huts, carefully made stone-lined hearths and kilns, storage pits, and overall camp layout demonstrate a greater effort to the modification of space. It is likely that many of these sites were occupied a number of times as people repeated their yearly round of activities.

Exchange increased in frequency and extent during this time, with some materials moving up to 1000 kilometers across the continent. Partially supported by this exchange of shells and fossils, there was an increase in personal decoration, with beads and pendants and even perhaps body painting now abundantly evident in the archaeological record.

Art exploded on the archaeological landscape in the form of carvings, engravings, figurines, decorated tools, and paintings. Some evidence hints that communal rituals occurred, particularly concentrated in a few spectacular "supersites." Evidence of mortuary ritual is more common and includes abundant grave offerings accompanying the dead.

A review of the archaeological record demonstrates clearly that these developments did not appear gradually and uniformly across the continent. Instead, they were episodic and patchy in their occurrence, developing in a context of changing environments and population movements. Their appearance can perhaps be best understood as innovative cultural solutions to an ever-changing set of economic and social problems. Correlated with the evidence for cultural elaboration are signs of environmental and physiological stress. Analyses of skeletons from southwestern France indicate that from the Aurignacian/Gravettian to the Solutrean/Magdalenian there was a decrease in human stature and an increase in evidence for nutritional stress. As these problems dissipated at the end of the glacial period, much of the evidence for social, artistic, and ceremonial complexity disappeared.

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Chapter 6
The Mesolithic

Michael Jochim

Introduction

The Mesolithic is the period of the last hunter-gatherers of Europe. By convention it begins with the onset of the Holocene, around 10,300 BP, when full postglacial climatic conditions began (Fig. 6.1). As discussed in the last chapter, however, the process of warming began much earlier and by the beginning of the Alleröd period, much of Europe was already reforested. Human adjustments to these new conditions, consequently, also began much earlier, transforming the economies, technology, social arrangements, and ritual life considerably. The Mesolithic continued these processes as the environmental changes progressed, but there is great continuity with the latest Paleolithic, particularly in southern Europe where the postglacial changes began earlier and proceeded more slowly.

The end of the Mesolithic is characterized by the appearance of agricultural economies, usually along with a suite of other changes such as permanent villages and ceramic vessels. Because this economic transition occurred at different times and rates throughout the continent, the dates for the end of the Mesolithic differ across Europe. In general, hunting and gathering persisted longer as the dominant economy in the north, and hence the Mesolithic lasts considerably longer in the northern parts of the continent.

Postglacial Environmental Changes

As the last cold phase of the glacial period, the Younger Dryas, came to an end, temperatures began to rise at a rapid rate, reaching a maximum around 5000 BP. The retreating ice sheets quickened their pace and as they melted, huge amounts of water flowed into the seas. Worldwide sea levels rose rapidly, as much as 100 meters from their low during the glacial maximum. The rising seas flooded coastlines and river mouths, particularly in areas where the coastal plain was low. Large areas were submerged in the northern Adriatic, the North Sea, and the Baltic. As the North Sea region became inundated, the former peninsula of Britain became an island, finally separate from the continent between 8500 and 8000 BP.

Once free, areas that had been compressed beneath the enormous Scandinavian ice sheet began to rebound, rising considerably as the weight of the ice was removed. Northeastern Denmark, for example, rose sufficiently that by around 8500 BP it formed a land bridge to southern Sweden, closing off the Baltic Sea as a freshwater lake. Only when sea levels had risen further, by around 6000 BP, did

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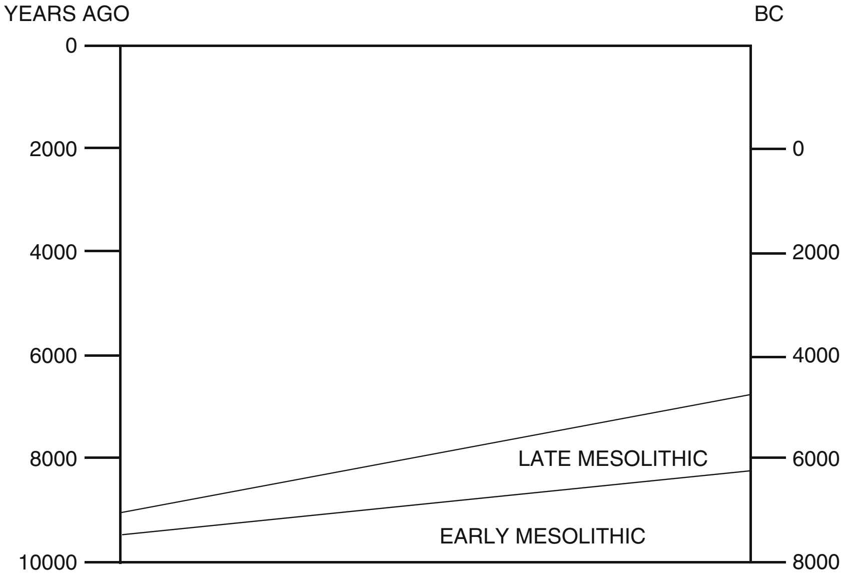

Fig. 6.1 Chronological chart of the Mesolithic

the Baltic reunite with the North Sea and become salty again. In newly ice-free areas of the north and around the Alps, morainic deposits of clay, sand, and gravel were left by the melting ice and numerous depressions and basins filled with meltwater to create landscapes dotted with lakes and ponds.

Vegetational change was caused by the differential migration of various plant species from their glacial refuges, each at a different rate and each with its own requirements for soil, water, and temperature conditions. Each region of Europe underwent a succession of largely forest vegetation, creating a variable mosaic across the landscape. General patterns, however, can be discussed. Throughout most of northern and central Europe a succession of periods based upon changes in pollen diagrams has been established. Three of these periods occur during the early Holocene and coincide with the Mesolithic. These periods, with their approximate dates, are

Preboreal	10,300–8700 BP
Boreal	8700–8000 BP
Atlantic	8000–5000 BP

During the Preboreal, temperatures rapidly reached modern levels and seasonal variations were pronounced. The pioneer trees of birch and pine formed the dominant vegetation in much of the area, although a number of deciduous trees such as oak, elm, and lime, together with hazel, were present as well. Generally warmer but drier conditions prevailed during the subsequent Boreal, which is marked in pollen diagrams by a large increase in hazel and a rise in deciduous trees as well. Finally, during the Atlantic, the postglacial maximum temperatures were reached and precipitation generally increased, encouraging the development in most areas of a mixed-oak forest containing substantial number of elm and lime as well. By this time, pine was relegated to higher elevations and drier regions. Much of southern Europe similarly saw the spread of a mixed-oak forest, usually occurring considerably earlier than in the north. Parts of Italy, however, contained Mediterranean evergreen oak forests and even open grasslands in the south. In portions of eastern central Europe spruce occupied a prominent position in the vegetation, and in the dry, continental areas north of the Black Sea, open grasslands were much more widespread. Finally, in regions to the far north and northeast, coniferous trees were much more abundant, often forming mixed forests of conifers and deciduous trees.

The Archaeological Record

Although precise numbers are difficult to determine, it is clear that Mesolithic sites are generally very abundant (Fig. 6.2). Southern Germany and Switzerland together, for example, have over 1500 known sites of this period (Cziesla 1998, Jochim 1998, Kvamme and Jochim 1990, Naber 1970, Nielsen 1996, Rieder and Tillman 1989). Over 400 are known from France (Demars 1996) and more than 2000 from Austria, the Czech Republic, northeastern Germany, and southern Poland (Vencl 1991). Mesolithic sites appear to be also abundant in the British Isles, Holland, Belgium, Scandinavia, Russia, Italy, and Spain, but estimates are not available. By contrast, portions of southeastern Europe, notably Bulgaria and Greece, appear to have relatively few known Mesolithic sites, but whether this represents simply a lack of investigation or of preserved sites, rather than a true sparseness of occupation, is not known.

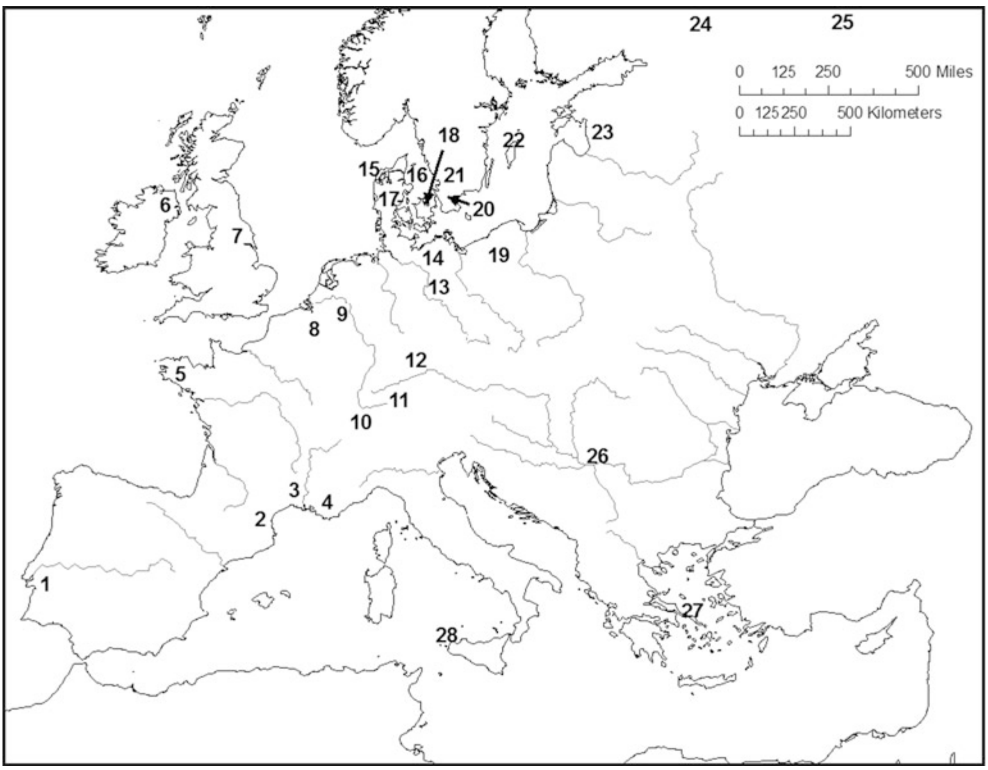

Fig. 6.2 Mesolithic sites mentioned in the text: *1* Cabeco da Amoreira, Cabeco da Arruda, Moita do Sebastiao; *2* Dourgne, Gazel; *3* Montclus; *4* Châteauneuf; *5* Téviec, Hoëdic; *6* Mount Sandel; *7* Star Carr, Seamer Carr; *8* Bois Laiterie, Margaux, Remouchamps; *9* Bedburg-Königshoven; *10* Mannlefelsen; *11* Henauhof Nord II, Hohlenstein-Stadel, Grosse Ofnet; *12* Schellnecker Wänd, Hexenküche; *13* Friesack; *14* Hohen Viecheln; *15* Prejlerup, Ertebølle; *16* Ringkloster, Dyrholmen; *17* Tybrind Vig, Dejro; *18* Vig, Vaenget Nord, Vedbaek-Boggebakken; *19* Svaerdborg, Holmegaard V, Stroby Egede; *20* Skateholm; *21* Loshult; *22* Kams; *23* Zvejnieki; *24* Oleneostrovski Mogilnik; *25* Vis; *26* Lepenski Vir; *27* Franchthi; *28* Uzzo

The vast majority of these sites are open-air camps, unlike the record of the Upper Paleolithic. Unfortunately, most of these, probably over 90%, are surface artifact scatters in which only stone is preserved. Not only do such sites lack organic materials and features, they also often lack clear chronological diagnostics or, on the other hand, contain diagnostics from several time periods, reflecting mixed occupations. For example, in a study of 746 sites northern Bavaria, Naber (1970) was forced to disregard 362 because they lacked clear temporal diagnostics. A recent survey in southern Germany discovered 282 surface sites, but only 55 could be attributed to specific periods (Jochim et al. 1998). These characteristics of the surface sites pose serious problems to studies of both site activities and patterns of land use.

As a result, the interpretive burden for Mesolithic lifeways falls largely on the relatively few excavated sites with organic preservation. Many of these are caves or rockshelters found in the limestone regions of the continent, which at least often preserve bone as well as stone. By far the most informative sites, however, are campsites preserved in peat around the edges of former lakes. By creating an oxygen-free environment, peat bogs prevent bacterial decay and allow for extraordinary preservation of materials. Because lakes and peat bogs are most common in the morainic landscapes of northern Europe, it is this region that dominates reconstructions of Mesolithic behavior.

The Early Mesolithic (10300–8000/7500 BP)

Although chronological frameworks vary considerably across the continent, a useful distinction can be made between the Early and the Late Mesolithic. This distinction is made primarily on the basis of differences in stone tool technology, but many other aspects of life appear to differ between the two as well. The transition occurs between 7500 and 8000 BP, that is, around the beginning of the Atlantic period of the pollen record. In the central and southern parts of Europe, the Early Mesolithic was essentially a continuation of the processes of adjusting to postglacial forests that had begun in the Late Paleolithic. In northern Europe, however, this was a period of considerable change.

Early Mesolithic Technology

The hallmark of stone technology during this period is the *microlith*, a small, retouched tool made to be inserted into shafts of wood or bone (Fig. 6.3). Microliths, consequently, are part of a composite tool technology involving replaceable parts. Based on a very few archaeological finds as well as analogies with ethnographically known tools, it is usually assumed that microliths were used primarily as points and barbs of arrows. A wooden arrow with a stone point and a stone barb still in place, for example, was found in a peat bog at Loshult, southern Sweden (Clark 1975). At both Vig and Prejlerup in Denmark, skeletons of aurochsen were found with associated microliths, apparently representing prey that had escaped after being shot (Aaris-Sorenson 1984). Studies of microlith wear and breakage patterns have generally supported this interpretation (Bradley 1985, Dumont 1988), but Findlayson (1990) has found microwear traces on microliths indicating other uses as well, including cutting, sawing, and piercing. Consequently, it may well be that some microliths formed parts of composite knives or other tools. Nevertheless, the majority of these tools do appear to have been associated with hunting weapons.

Microliths were made in a variety of shapes throughout the Early Mesolithic. They were manufactured from small blades, flakes, or, most commonly, segments of large blades, often using the *microburin technique.* This technique involved the notching of a blade by retouch, snapping the blade at the notch, and further retouching one of the segments to create the desired shape. Common

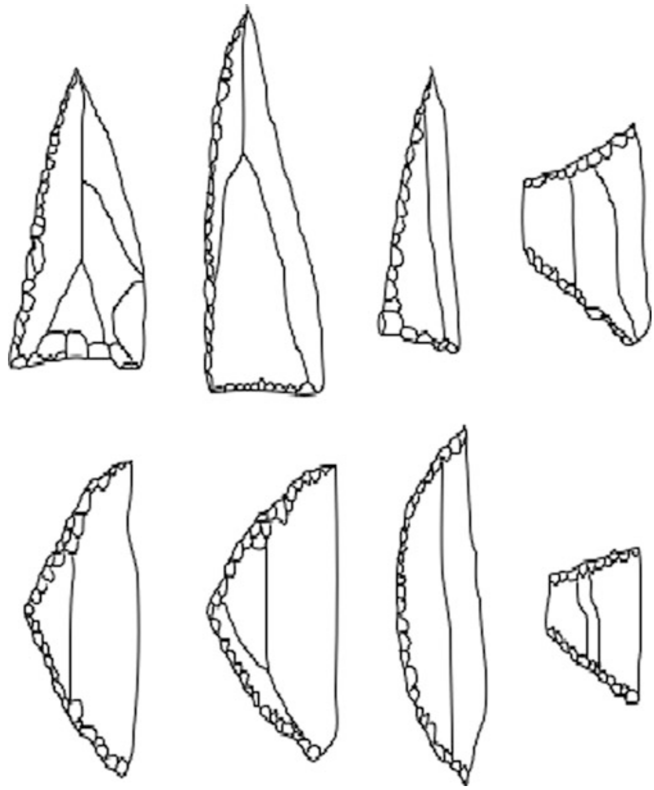

Fig. 6.3 Microliths typical of the Mesolithic (from *left*: points, triangles, lunate, trapezes)

microlith shapes during the Early Mesolithic include obliquely blunted points, triangles, crescents, and more rarely, irregular trapezoids. Because the predominant shapes tend to show patterned changes through time, they are used to establish stylistic chronologies of the Early Mesolithic in many parts of the continent. Studies indicate that many of these microliths were highly standardized in shape and size, suggesting that they may have been manufactured in batches and designed to fit into pre-made shafts (Eerkens 1998, Hayden and Gargett 1988, Zvelebil 1986).

Another common tool, also used as an insert into shafts, was the backed bladelet, which also may have formed part of composite knives or arrows. In addition, short and round scrapers, burins, retouched blades, and borers are all frequent components of stone tool assemblages. In northern Europe an important part of the tool kit was the chipped stone axe, made on both flakes and cores. This tool, which would have been extremely useful for felling trees and wood-working in the postglacial forests, is surprisingly absent, however, from the central and southern parts of the continent. Another, less common tool known only from northern Europe is the perforated stone, or mace-head, which may have been used as a digging-stick weight or as the head of a club.

Antler was an important material for the manufacture of a wide variety of different implements found primarily in north European peat-bog sites. Antlers of elk and red deer were shaped and perforated to make mattock heads. When mounted on wooden shafts, these tools could have been used for digging roots or may have served as clubs. Perforated antler was also used to make sleeves to hold stone axes, serving to absorb some of the shock when felling trees. A variety of different points and barbed spearheads were also made of antler. One of the most intriguing uses of antler was in the creation of "headdresses." Modified portions of deer skull with antlers still attached have been found at a number of sites in northern Europe, including Star Carr in England, Hohen Viecheln in northeastern Germany, and Bedburg-Konigshoven in northwestern Germany (Street 1991). In a number of cases portions of the antler and bone have been cut away, apparently to reduce the weight, and holes have been drilled into the bone, perhaps to facilitate attachment as headgear. The function of these headdresses is unknown, but ethnographically known cases suggest that they may have been hunting disguises or part of a shaman's costume.

Bone was also used intensively in the manufacture of a range of tools. Long bones of large mammals, such as aurochs, were often cut and beveled to make mattocks and hide-working tools. Scrapers, picks, daggers, awls, and needles made of bone are also common artifacts, as are smooth and barbed spear or arrow points. A new device, the fish hook, was made from dense red deer bones and occasionally from roe deer antlers (Clark 1975). In Scandinavia, a number of bone leister points have been found, used in composite, multipronged fish spears (Larsson 1990). The teeth of wild boar were sometimes used as knives, scrapers, or even hafted adze blades.

In the heavily forested postglacial habitats, wood was an extremely important raw material and numerous wooden artifacts have been discovered preserved in the waterlogged peat of north European sites. The Early Mesolithic site of Star Carr in England, for example, contained a wooden post and a number of split planks of aspen that had apparently been laid down at the water's edge to form a dry trackway (Mellars and Dark 1998). Earlier excavations at this site uncovered a wooden paddle and a portion of a handle still in place within an antler mattock (Clark 1954). A large number of wooden artifacts were discovered at the bog site of Friesack in northeastern Germany. These include spears and arrows, a bow, a digging stick, paddles, and a trough. Fragments of a net made from plant fibers were also found at this site and others. These finds suggest a rich technology in wood and fiber that survives only under the exceptional conditions of the peat bogs and hints at what may be lacking from many dryland sites. Although no boats have been found from this period, the paddles, together with the location of some sites on islands (for example, in the Federsee Lake of southern Germany and on Gotland in the present Baltic), provide strong evidence for the presence of watercraft.

Spotlight on a Site: Svaerdborg II

The site of Svaerdborg II was discovered during reconnaissance of a peat bog on the island of Zealand, Denmark in 1945 and excavated in 1946 (Brinch Petersen 1971). It is located on the tip of a peninsula jutting into a small former lake, now grown over and filled in. The archaeological materials were found in a thin layer of peat overlying the lake marl and lying under a layer of mud, suggesting that the campsite was situated on the swampy lakeshore and subsequently flooded by a rise in water level. In addition to some scattered test pits, the main excavation covered approximately 60 square meters (Fig. 6.4). Analysis of pollen cores taken from the site indicate a forested environment with abundant hazel, pine, birch, alder, willow, poplar, oak, elm, and linden, as well as reeds, ferns, and other shoreline plants. Based on the known vegetational history of the area, this array of plants suggests a date of approximately 8000 BP.

In agreement with this date, the stone tool assemblage belongs to the Danish Early Mesolithic industry called the *Maglemosian.* A total of 18,706 stone artifacts were found, consisting of 209 retouched tools, 202 cores, 1496 microblades, 832 blades, and 15,967 flakes and pieces waste, all made of a fine local flint. Virtually all of the tools are made from microblades and blades; only 18 were made from flakes. By far the most common tool is the microlith, consisting mostly of various forms of triangle and constituting almost 54% of the total. The remainder of the tools includes obliquely blunted points, notched and denticulated pieces, burins, scrapers, perforators, and truncated pieces, as well as six core and flake axes.

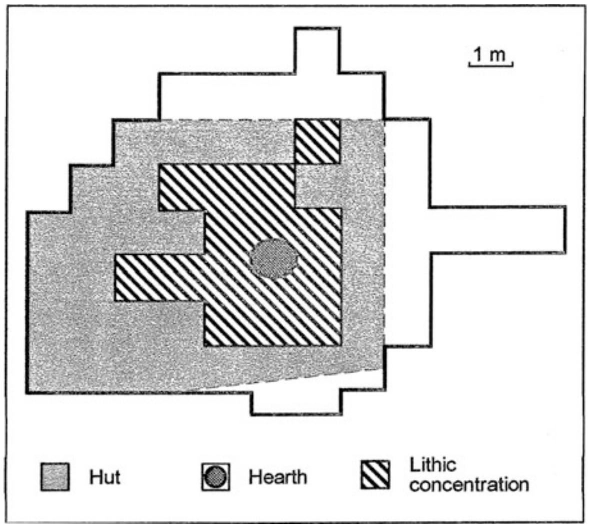

Fig. 6.4 Svaerdborg II site plan (after Brinch Petersen 1971)

Most abundant among the bone tools are 59 whole or fragmentary bone points, many of which have a single barb near the tip, but some with as many as four barbs. Two of these have several incisions near the base, probably to create a rough surface to facilitate attachment to a shaft. The bones of both red and roe deer were used in making the points, and three long bones were found from which splinters had been removed, presumably for their manufacture. One long bone of an aurochs was cut and beveled to create an adze or scraping tool, and a piece of elk antler was perforated to serve as a pick. In addition, three canine teeth from otters were cut and perforated to form pendants.

A total of 182 pieces of bone and antler could be identified from the faunal materials. These include the following:

50	Red Deer
40	Roe Deer
25	Wild Boar
2	Aurochs
1	Elk
2	Otter
8	Badger
1	Pine Marten
22	Beaver
7	Waterfowl
22	Pike

Although the red deer appears numerically most important, many of the finds are fragments of antler that might have come from a single animal, whereas the boar and roe deer remains derive from several animals each. All of the larger mammal bones represent fully grown individuals.

Most of the stone and bone is concentrated within an area of approximately 25 square meters, suggesting the existence of a small hut similar to those found at other Maglemosian sites. A concentration of burned bone fragments in the center indicates that a hearth was located within this hut, again mirroring finds from other sites. The entrance to the hut was likely at one end, as indicated by a diffuse scatter of artifacts extending toward the lake.

This site represents a lakeside campsite occupied for a brief period and then abandoned. It appears likely that a small hut was constructed and that a variety of activities were carried out, including hunting, fishing, fowling, stone-working, and bone tool manufacture. Although no seasonal evidence is available from this site, by analogy with other sites in the region it is likely to have been a summer encampment, one portion of a seasonal round of camps and activities.

Early Mesolithic Subsistence

Throughout most of the continent, Early Mesolithic subsistence economies were based largely on hunting, with red deer, boar, and roe deer most important among the prey. This was a period, however, of considerable diversification, with more resources regularly appearing in the diet and substantial differences emerging among different regions. Among big game species, elk and aurochs were also frequently hunted, as were ibex and chamois in mountainous regions such as the Alps, Pyrenees, and Apennines. Dogs, which are commonly found at sites of this period, may have been particularly useful in big-game hunting. Small mammals increased in significance as well. In southern Europe around the Mediterranean, rabbits were consistently targeted and sometimes, as at Chateauneuf in southern France, were numerically more important than any other prey. In central and northern Europe, fur-bearers such as pine marten, beaver, otter, lynx, wildcat, and wolf were commonly taken, perhaps largely for their pelts, as in many cases their whole skeletons appear unbutchered among faunal assemblages. In southern Europe, especially France, Italy, and Greece, land snails appear to have been an important supplemental food, as witnessed by the large number of often burned shells found in sites.

Fishing is abundantly represented in faunal assemblages throughout Europe, especially pike in interior sites of northern and central Europe. The common occurrence of sites around former lakes together with the appearance of fishhooks, bone harpoons, and bone leister prongs suggest that fishing must have made a substantial contribution to the diet in many areas. Birds, especially waterfowl, were also a regular component of diets, usually represented by a few individuals of a number of species, suggesting that their hunting or netting was rather casually pursued.

The importance of marine resources is difficult to determine because many coastal areas have been lost due to sea level rise. However, Franchthi Cave by the coast in southern Greece shows evidence of both marine fish and shellfish, as do a number of sites in Italy, southern France, Portugal, northern Spain, and Ireland. Although most known Scandinavian sites are in the interior, underwater exploration off the coast of Denmark has located several inundated sites suggesting that coastal occupation may have been important here as well. By as early as 8500 BP, seal bones appear in some interior Scandinavian sites, suggesting either seasonal movement to the coast or food exchange with coastal groups.

The Early Mesolithic provides the first good evidence for the regular gathering of plant foods as an important component of the diet. Franchthi Cave in Greece, for example, contains the remains of wild vetch, pea, lentil, pistachio, and almond, and similar finds have been made in sites in Italy and southern France (Jacobsen 1981, Price 1987). At the site of Uzzo in Italy, tree fruits, legumes, and wild grape were recovered (Constantini 1989). In eastern Spain, plant remains include acorns, walnuts, pine nuts, cherry and plum stones, and various seeds. In more temperate regions of Europe, hazelnut shells are frequently found in sites, sometimes in huge quantities. The evidence at some Danish sites indicates that the nuts were heated in layers of sand placed over hot coals (Larsson 1990). Other plants found in north European lakeside sites include water nuts, water lily seeds, and wild raspberry (Rimantienė 1994).

A few chemical studies of human skeletal remains have been done in an attempt to determine the relative importance of various components of the diet. Carbon isotope studies of remains from inland Danish sites, for example, indicate a predominance of terrestrial foods in the diet, suggesting that marine foods played little role for these groups (Tauber 1986). On the other hand, analysis of skeletal material from Seamer Carr in England indicates the presence of some marine food in the diet, as does an analysis of a burial from the island of Gotland. Although the evidence for a largely meat- and fish-based diet is strong, recent analysis of human remains from the site of Bois Laiterie, Belgium, suggests a largely vegetarian diet for this individual (Leotard et al. 1999). A high rate of caries in human teeth from the site of Uzzo in Italy is also consistent with a diet rich in carbohydrates derived largely from plant foods (Tarli and Repetto 1985).

In sum, the Early Mesolithic was a period of adjustment to the increasing reforestation of the continent. Available plant foods became more abundant and were incorporated into the diet to varying amounts. Diets were also diversified to include a wider range of other foods and, in particular, a greater emphasis on fish and shellfish. Many of the new foods would probably have been time-consuming to procure and especially to process. It is likely that the loss of large game herds required this dietary expansion and the additional work it may have incurred. It is interesting to speculate about the impact of these changes on gender roles in the societies. Among many ethnographically known groups of hunter-gatherers, women are largely responsible for the collection of plant foods and shellfish, and often for much of the fishing. These postglacial changes in the subsistence economy may have shifted much subsistence work to women, increasing their economic contributions to the groups.

Early Mesolithic Settlement

Sites of the Early Mesolithic are abundant and widespread in many areas. One of the notable implications of their distribution is that many mountainous areas are colonized at this time due to the retreat of glaciers and the spread of vegetation upslope. In northeastern Italy, for example, a number of sites have been found at altitudes of up to 2300 meters (Broglio 1992), in central Italy, up to 2400 meters (Fedele 1999), in northwestern Italy, up to 1500 meters (Biagi and Maggi 1984), and in central Italy, up to 1900 meters (Notini and Tozzi 1999). Early Mesolithic sites have been found at elevations of 1700 meters in the Alps of eastern France (Bintz 1999), and surveys have discovered sites up to 2000 meters in elevation in the Austrian Alps (Leitner 1988/1989) and up to 2200 meters in the Swiss Alps (Crotti and Pignat 1992).

Another area of colonization is the northern part of the continent, also newly free of ice and progressively forested during the early postglacial period. Recent research has demonstrated that Ireland's occupation dates are from at least 9000 BP, while that of Scotland is at least as early as 8600 BP. Mesolithic expansion up the coast of Norway was well underway by 9000 BP as well, and sites became numerous in western Sweden (Larsson 2000). In Lithuania, Mesolithic sites show a much more northerly distribution than sites of the Late Paleolithic (Rimantienė 1994).

With this expanded distribution, a variety of topographic locations were occupied. Many of the high-altitude sites are open-air camps near mountain lakes, but caves, rockshelters, and open-air sites are also situated in various other locations, including mountain passes and near outcrops of stone raw material. Numerous lowland sites are located directly on the shores of lakes or the low terraces of rivers and streams, usually interpreted as reflecting the importance of aquatic food resources. Sites are also found, however, far from water on hilltops or the edges of plateaus (Kvamme and Jochim 1990). In regions where early postglacial coastlines are still above sea level, sites are often located close to coastal estuaries (Larsson 1990).

Because of the excellent preservation of materials in the northern peat bogs, the remains of a good number of Early Mesolithic huts have been found. These generally consist of a rectangular flooring of bark laid down in the swampy edges of the former lakes. They measure from 2 to 6 meters on a side and usually have a central hearth placed on a layer of sand. The walls and roofs were presumably also made of bark or of reeds around a framework of posts, some of which have survived. Artifacts are generally found inside the huts, including stone, bone, and frequently, numerous hazelnuts (Bokelmann 1981, Larsson 1990). In a number of cases, two different concentrations of microliths and other stone artifacts have been found within individual huts, suggesting perhaps that two families occupied each (Grøn 1983). Traces of huts have also been found in other kinds of sites. The open-air camp of Mount Sandel in Ireland, for example, contained the remains of a hut in the form of depressions roughly 6 meters in diameter together with postholes and hearths (Woodman 1981). Other huts, consisting of circular arrangements of stones or depressions, have been found at sites in Belgium, France, Switzerland, and Germany (Hahn and Scheer 1983, Nielsen 1997, Price 1987, Schönweiss and Werner 1977).

Most of the evidence suggests that Early Mesolithic groups were quite small and highly mobile (Rimantienė 1994). The majority of Early Mesolithic sites, like Svaerdborg II, are quite small. Some, however, do extend over larger areas, including the nearby Svaerdborg I, of which more than 600 square meters were excavated. Many surface scatters found in plowed fields are even larger, covering over 2000 square meters. These larger sites are generally thought to represent repeated occupations that only partially overlap. Based on stone tool typology and pollen diagrams at Svaerdborg I, for example, the occupations here began well before that of Svaerdborg II and persist after this latter site was abandoned (Brinch Petersen 1971, Henriksen 1976). It has also been suggested that the small, single-hut bog sites were actually components of larger settlements, with a wide spacing of roughly 40 meters between huts (Grøn 1988), but most consider these to be independent, discrete sites. A number of caves and rockshelters throughout Europe show deeply stratified layers of material, indicating repeated occupations of these fixed shelters over long periods during the course of annual movements.

Reconstructing the seasonal patterns of settlement in any area is hampered by the biased sample of sites available. Virtually all of the north European bog sites, for example, were occupied during summer or summer and fall (Larsson 1990). Winter camps are thought to have been also situated near lakes, but back from the shore on more solid ground. In southwestern Germany there appears to have been a pattern of seasonal movement between caves and rockshelters in narrow valleys during the fall, winter, and spring to open-air camps around lakeshores during the summer (Jochim 1976). The high-elevation sites in the Alps and Apennines were occupied during the warm summers in a pattern of seasonal transhumant migration between lowlands and uplands. In each case, the scale of movement was not great.

Based upon stylistic similarities of microliths and the distribution of stone raw materials, groups appear to have confined their movements largely within areas of roughly 80–100 kilometers in diameter (Jochim 1998). These areas of habitual use, however, form portions of larger regions of lithic similarity. For the late Boreal period, for example, Kozłowski (1973) has defined three large areas of differing cultural tradition – the northern, western, and northeastern – which in turn can be subdivided into 16 smaller areas of roughly 200 kilometers diameter. In a different approach, Newell et al. (1990) developed a hierarchical geographic classification based on similarities in ornaments such as pendants and beads. Their large subdivisions separate northwestern Europe from north-central and southern Europe, with further subdivisions primarily distinguishing smaller areas in both northern and southern Europe. These various identified patterns, although different in detail, emphasize the rather open nature of social boundaries and interaction throughout much of the continent. Local groups must have maintained flexible and changing contacts and affiliations with neighboring areas in a fluid social structure.

Early Mesolithic Exchange

Some evidence indicates that local groups were, indeed, in indirect contact over large areas. Although most sites contain primarily local stone raw material, a small proportion sometimes comes from considerable distances. Sites in southwestern Germany, for example, frequently contain a banded chert from sources 200 kilometers away in Bavaria. Fossils and shells also moved long distances and were used as ornaments. Again, the southwest German sites contain fossils from regions 200 kilometers to the northwest and east. In most areas, however, clear evidence of long-distance exchange is lacking. Nevertheless, the broad, regional similarities in artifact styles and the lack of discrete boundaries in stylistic attributes (e.g. Gendel 1984) suggest that interaction and communication extended over considerable areas. Recent research indicates that such interaction may even have extended over the Alpine chain from northern Italy to southern Germany (Schäfer et al. 2006).

Early Mesolithic Burials

Burials are not common from this period. Although a number of sites contain fragments of human bone that might represent disturbed graves, only a few true burials have been found. Near the bog site of Holmegaard V in Denmark, for example, two skeletons were discovered, but they lacked associated grave goods. Three graves were found at the site of Kams on the island of Gotland, one of which dates to around 8000 BP (Larsson 1990). At the site of Uzzo in Sicily, the graves of seven individuals were excavated (Tarli and Repetto 1985). One of the more remarkable recent discoveries comes from seven small caves in southern Belgium, where a series of single and multiple graves dating between 9600 and 9000 BP has been found (Straus and Otte 1999). One of these, Margaux, has a pit containing nine individuals, covered and surrounded by stones. In most cases they lack grave goods, but a few contain several stone tools placed with the bodies.

Early Mesolithic Art and Ornaments

Ornaments, decoration, and objects of art are all most common in the north European bog sites, but compared to the ensuing Late Mesolithic, art objects are relatively scarce (Larsson 2000). The most common form of decoration in the Early Mesolithic of Denmark was the engraving of bone and antler tools (Brinch Petersen 1973). Most of the motifs are geometric, but some humans and animals are also depicted. Perforated pendants and a small carving of an elk head out of amber are also known, primarily from Denmark. In addition, a few flint nodules that have been incised and then shattered have been found (Larsson 1990). The English site of Star Carr contained beads and pendants of amber, animal teeth, and stone, as well as fragments of red ochre (Clark 1954). In their monumental study of Early Mesolithic ornaments from much of the continent, Constandse-Westermann and Newell (1988) document the presence of pendants and beads made of amber, stone, bone, animal teeth, shells, and fossils, with varying regional patterns. Sites in southern Germany, for example, are notable for their ornaments made from fish teeth, fish vertebrae, fox canines, fossil shells, and rectangular plaques of bone (Jochim 1998).

Early Mesolithic Summary

The Early Mesolithic was a period of considerable adjustments to the spreading postglacial forests and the disappearance of the herds of reindeer and horse. Economies still emphasized large game animals, but these were more solitary and encouraged technological innovations such as the dominance of the bow and arrow and the use of dogs. Diets expanded to include more small mammals, birds, fish, shellfish, and plants now available in the habitats. High mobility, small groups, and fluid patterns of movement and association appear to have been characteristic. The relative scarcity of art suggests that ritual and ceremonial life was considerably less than had been true during the Magdalenian, perhaps related to a reorganization of social life as part of these new adaptations.

The Late Mesolithic

With the increasing temperature and rainfall at the onset of the Atlantic period, dense forests of oak, elm, and other deciduous trees spread throughout most of Europe. Only in the far north and the drier areas of the south and southeast did vegetation differ substantially. Monotonous coniferous forests dominated in northern Scandinavia, while more open forests and parklands occurred in the far south. The tree line rose in the mountainous areas, limiting open alpine tundra to only the highest elevations. Sea levels continued to rise, leading to the final separation of Britain from the continent and to the inundation of many areas of previous coast.

These new environmental conditions doubtless required adjustments by the Mesolithic groups. In the North Sea and the northern Adriatic, large areas of land were flooded and populations were packed into more restricted regions. The dense forests would have posed difficulties for both travel and hunting visibility. Many of the small lakes in northern Europe completed the process of filling in, removing what had been an important focus of exploitation. On the other hand, vegetation was more diverse and more potential plant foods were now available. Animal movements may have become somewhat more predictable as vegetational communities stabilized. New estuaries were created along the coasts, offering concentrations of aquatic and marine resources.

Late Mesolithic Technology

The beginning of the Late Mesolithic in much of the continent is characterized by several technological and typological changes. A new microlith form, trapezoidal in shape and fashioned from a segment of a blade, appears and gradually comes to dominate the microliths. Smaller triangular microliths decrease in abundance and practically disappear from many areas. The trapezes are made from wide blades, often manufactured by pressure techniques to be larger and more regular in shape. They appear earliest in Greece, where they have been dated at Franchthi Cave to around 9000 BP. They spread rapidly along the Mediterranean, reaching southern France around 7900 BP, and through the Balkans into central and northern Europe, where they have been dated in southern Sweden around 8000 BP (Larsson 1978). They did not reach Britain, which was now an island separate from the continent.

Trapezes appear to have replaced other microliths as points for arrows, mounted so that their long, sharp edge faced forward. The remarkable spread of this implement suggests that it offered a considerable advantage in hunting. Larsson (1978) argues that this new arrow point could do more damage by cutting larger areas of body tissue rather than simply penetrating the prey as the old microliths did. He further suggests that this difference would have been important in the new, denser forests, where hunters could usually hope to shoot only at short range with less force than previously. In other words, trapezes may have been much more efficient in the Atlantic habitats of the Late Mesolithic.

Other changes in stone tool technology occur as well, but often in more limited regions. Microliths are less common overall, probably because fewer were used in individual arrows. In the north, flake axes also become much more common toward the end of the Mesolithic. Perforated mace heads increase in abundance, perhaps related to a greater dietary importance of roots (if these artifacts were weights for digging sticks). In some coastal regions, such as Scotland and northern Spain, particular pick-like tools appear that may have been used in the collection of shellfish. Hammerstones are a common feature of many assemblages, possibly used in breaking bones or nuts. In various parts of the continent, from Belgium to Greece, grinding stones or slabs may have been used in the processing of plant foods as well. A new technique of stone-working appears in Scandinavia and the eastern Baltic region with the appearance of pecked and polished axes and chisels, and in Finland, ground slate points were manufactured. This period clearly witnessed a remarkable diversification of uses of stone implements.

A number of changes occur in technologies using other raw materials as well. Bone and antler continue to be important as raw materials, with new forms of tools appearing. One of the most common, particularly in the north, is the slotted bone point, into which stone microblades were set with birch resin. These sharp-edged points, which could also have been used as knives, are known in considerable numbers from sites in Denmark, Sweden, Russia, and Slovakia. In Germany and Switzerland, red deer antler assumes greater importance as a raw material, with barbed harpoons and perforated axes and adzes now common. Smooth bone points, perhaps used in fishing, are also frequent finds across central Europe.

Wood and other plant materials were important in a number of innovations at this time. Bog finds from the site of Vis in Russia and other northern sites include the remains of sleds and skis, both of which would have greatly facilitated winter travel through the northern woods (Burov 1990). Short bows and wooden arrows with blunt tips have also been discovered at these sites, the latter probably used for hunting fur-bearers so that the pelts would not be damaged. Fishing was intensified by several innovations. Complex wooden traps and weirs were constructed and placed in streams and lakes and along coasts to facilitate bigger catches (Andersen 1995). These were manufactured from branches of cherry, alder, or birch and bound together with split pine roots. Wooden leister prongs are now common and seem to have largely replaced those of bone. Nets and fishhooks continue to be important and the use of double-pointed gorges and small bait fish has been documented by several finds. Fragments of twine made from plant fibers have been found still attached to some of the hooks. The Danish site of Ertebølle contained the remains of looped textiles also made from plant fibers. Bark was used not only for hut floors, but also for basket containers and net floats.

Another important development for which concrete evidence now exists is the dugout canoe, the earliest boat known anywhere. Although to judge from the location of sites, boats of some type apparently existed during the Early Mesolithic, the Late Mesolithic of both Holland and Denmark has yielded remains of the boats themselves. Several boats have been found at each of a number of Danish sites, the most impressive at the site of Tybrind Vig (Andersen 1985). One of these is a dugout made from the trunk of a linden tree and measures 9.5 meters in length. The sides were smoothed and rounded, and a clay hearth was built inside, perhaps reflecting the boat's use in night fishing for eels. A large stone was found in the boat and presumably used as ballast. A total of 10 wooden paddles were also found at this site. The development of boat technology must have greatly facilitated travel and communication as well as fishing.

An unusual development in western Denmark and southern Sweden was the appearance of ceramic vessels around 5600 BP (Larsson 1990). The technology of their manufacture shows considerable variability, but the shapes are rather uniform, consisting of shallow bowls and wide-mouthed vessels with pointed bases. The latter would presumably have been stable when placed in soft sand or other sediments. Several of these have been found with food remains still encrusted inside. Analyses of these remains have documented the presence of fish, hazelnuts, other plants, and blood.

Spotlight on a Site: Vaenget Nord

The site of Vaenget Nord lies on a small island in a former fjord on the Danish island of Zealand (Brinch Petersen 1990, Price and Brinch Petersen 1987). The low island measured approximately

10 × 20 meters and was 40–50 meters off shore during the period of occupation around 7000 BP. Over 40 Late Mesolithic sites have been found around the edges of this fjord, which has now filled in with peat and forms a protective context for archaeological materials. Excavations from 1980 to 1983 uncovered much of the surface of the island as well as the offshore areas in the peat.

Several areas of different activities were located by the excavations. A small, irregular depression about 1.5 meters in diameter that may have been created by trampling seems to have been the location of a hut on the shoreward side of the island. In and around the hut were a number of cooking pits with charcoal and heated stones, as well as hearths marked by accumulations of charcoal in depressions. Scattered around the site were over 200 postholes, 15 of which contained the remains of sharpened wooden stakes. A cache in the form of a pit containing a flint core and 30 flakes that could be refit to the core was also found. On the low rise behind the hut, a pit that has been interpreted as a burial was uncovered. Although no skeletal remains were preserved, the size and shape of the pit resembles those of burials found nearby. Two stone axes and a blade found in the pit have been interpreted as grave goods.

Microliths and burins were concentrated in their distribution in and around the hut. Microwear analysis of the burins indicates their use primarily in bone-working. Thus, the hut may have served as the location of arrow manufacture and repair together with the making of other bone tools. Adjacent to the hut was a concentration of stone scrapers which, according to microwear analysis, was used mainly in the working of hides. Surrounding this area was a large scatter of stone chipping debris. The messier activities of stone-working and hide-cleaning apparently took place in open areas away from the major focus of occupation.

Downslope into the peat of the water's edge were found the garbage dumps, areas where stone and bone were discarded into the water. In addition to a variety of forest mammals, a number of species of fish were represented among these remains. Charcoal and fire-cracked rock are also abundant in the discard areas, suggesting that hearths and cooking pits were periodically cleaned and emptied. One small concentration of flint flakes appears to represent one episode of discard, as the flakes all derive from the manufacture of a stone axe. Scattered, broken hazelnut shells indicate that the collection and processing of these nuts was another important activity at the site.

Although no clear seasonal indicators are present at the site, the importance of fish and hazelnuts suggests a summer and fall occupation. Vaenget Nord was probably a brief, warm-weather camp occupied by one or two families as part of their seasonal round of activities. It was a residential camp where a variety of activities of food-getting and manufacture were carried out. The subsistence activities were varied, focused on resources from plants and animals, land, and sea.

Spotlight on a Very Different Site: Lepenski Vir

Lepenski Vir is the most remarkable site in a region of remarkable sites located along the Danube in an area called the Iron Gates (Prinz 1987, Radovanović 2000, Srejović 1972). In this sheltered area of high cliffs, narrow river terraces, and swirling river whirlpools a unique microclimate existed and an extraordinary Late Mesolithic culture developed. This region stands out for its exceptional evidence of houses, sedentism, and artwork. The site, which is situated on a narrow, shelf-like terrace cut into the riverbank, was discovered in 1960 and excavated over several years in the late 1960s. From the period of Mesolithic occupation, roughly 8000–7200 BP, three main trapezoidal structures face the river. House floors were plastered with a mixture of crushed limestone, sand, gravel, and water that hardened when it dried. Around the sides and back of each house, trenches were dug and posts set into them to hold a sloping roof. The back end of many of the structures was actually dug into the hillside.

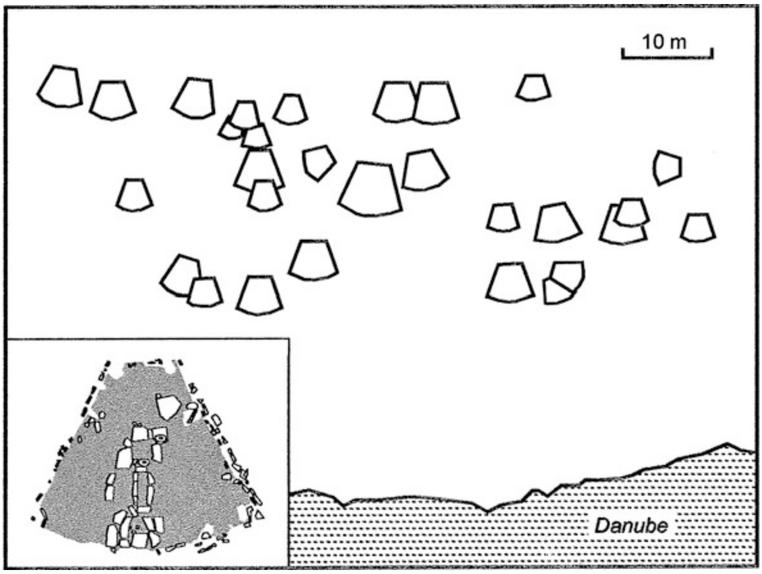

Fig. 6.5 Lepenski Vir site plan with inset of one hut (after Srejović 1972)

Throughout the course of the Lepenski Vir I occupation, houses were constantly being rebuilt and new houses were constructed, sometimes on top of older ones, allowing for a subdivision into five subphases, Ia–Ie. Phase Ia contained at least 22 houses and perhaps as many as 30, varying in area from 5 to 28 square meters. The largest house was located in the middle of the settlement. During Phase Ib, 22 new houses were built and 4 older ones renovated. Phase Ic saw the construction of 10 new houses and the continued use of 17. The site plan now contained two equally large houses as well as two new, very small ones less than 2 square meters in area. During Phase Id, 17 new houses were built and one old one rebuilt. The site plan reveals a separation of the settlement into two parts, with one large house in each. Phase Ie witnessed the construction of a new, very large (36 square meters) central house together with a number of other new, smaller houses. During Lepenski Vir II, 44 new houses were built and no older houses were reused. Inside each house, central hearths were constructed. These consisted of elongated pits lined with blocks of limestone. Beginning in Phase Ic, thin limestone slabs were placed upright in the floors to form a series of triangles surrounding the hearth and pointing inward. Adjacent to many of the hearths were carved flat stones, usually with circular depressions and engraved designs, which the excavator interpreted as altars. Flat stone slabs were set into the floors of many houses to provide work areas or "tables," according to the excavator.

Beginning in Phase Ib, many of the houses have a carved boulder sculpture placed near the hearth. These sculptures were made of sandstone obtained from the hills about 10 kilometers away and measured 20–60 centimeters in height. Designs of a variety of types were carved into the stones. Many represent human or human-like figures with exaggerated facial features. The majority, however, are more abstract designs with flowing, curvilinear elements. The sculptures are placed in depressed sockets set into the house floors (Radovanović 2000).

Numerous burials occur in the houses, taking a variety of forms. These include 34 infants and small children placed under house floors before the houses were built, a number of adults and children placed in graves dug through the floor of an existing house, burials placed on the floor of abandoned houses, burials outside of houses in other parts of the site, and the placement of certain body parts such as skulls, mandibles, and ribs, in houses, often near the back of the structure or near the hearth. Frequently these body parts were embedded in the floor or built into the construction of the hearth.

Chipped stone tools, made from local flint and quartzite, were found only inside the houses and include various microliths, scrapers, burins, and borers. Polished or pecked stone tools were made from a variety of sedimentary and volcanic rocks. Among these are large stone clubs of sandstone or schist, which measure 25–50 centimeters in length and were smoothed and engraved with a variety of geometric designs. Sandstone boulders were grooved, perhaps to serve as weights or mallet heads. Bone and antler tools include borers, awls, scrapers, and spatulas and many beads and pendants of sandstone, limestone, fossils, bone, and opal were found.

The faunal remains indicate a rich and varied subsistence base for the inhabitants. For levels I and II combined, the identified specimens include the following:

46	Domestic dog
21	Aurochs
226	Red deer
5	Roe deer
16	Boar
9	Pine marten
3	Badger
2	Beaver
7	Birds
296	Fish

Among the fish remains, carp and sturgeon were exceptionally large and may have weighed up to 200 kilograms. Analyses suggest procurement of these food resources throughout much of the year.

Lepenski Vir is clearly a unique site. Within the context of the rest of Europe during the Late Mesolithic, it stands out for the impressive investments of time and energy into relatively permanent housing, the large population, the abundant and diverse burials, and the monumental art. Its rich and diverse economy focused on a combination of terrestrial foods and predictable runs of large fish appears to have encouraged or allowed a high degree of sedentism. The variations in house size and placement suggest that differences in social position, wealth, or influence had begun to emerge.

Late Mesolithic Subsistence

Hunting continued to be a major subsistence activity during this period. The new form of arrow, the evidence for a variety of types of bow, and the continuing presence of domesticated dog must all have contributed to the efficiency of this activity. Across the continent, faunal assemblages show a continuing emphasis on red and roe deer, wild boar, aurochs, elk, and ibex as important prey. Similarly, despite problems of preservation, the use of plant foods is well documented. Particularly in the Mediterranean region, sites such as Franchthi Cave in Greece and Montclus in southern France, the collection of wild legumes, such as peas, lentils, and vetch, as well as fruits and wild barley appear to have been an important part of the economy. In more northern parts of Europe, water nuts, water lily seeds, and hazelnuts appear with some regularity.

A striking feature of the Late Mesolithic is the much greater importance of shellfish in the diet. Although this development may, in part, simply reflect the greater visibility of coastal sites due to stabilization of the sea level, the appearance of true coastal shell middens at this time is noteworthy. These sites are most concentrated in a few rich areas, including Portugal, northern Spain, Scotland, and eastern Denmark. Remains of marine fish are also increasingly numerous, such as salmon, cod, and eel. At Franchthi Cave, deepwater species such as tuna as well as near-shore fish are represented among the fauna of the Late Mesolithic levels, suggesting technological innovations to facilitate open-sea fishing. In the coastal sites of northern Europe, sea mammals such as seals, dolphins, and whales occur with regularity. Although never an important component of the remains, they nevertheless reflect the increasing emphasis on marine resources in coastal regions. Not every coastal site, however, focused exclusively on marine foods. The Danish site of Ertebølle, for example, which gave its name to the Late Mesolithic culture of the region, has abundant freshwater fish remains together with marine shellfish in its assemblage (Andersen and Johansen 1986).

Analyses make it increasingly clear that there were major differences in subsistence across the continent. Rates of caries in human teeth, for example, probably reflect the importance of carbohydrates, and therefore plant foods, in the diet. These vary considerably, with higher rates in the southern groups from Italy and Portugal, and very low rates in southern Scandinavia (Meiklejohn and Zvelebil 1991). A chemical analysis of human bone from the site of Ofnet in southern Germany documents a high intake of animal protein and suggests a largely carnivorous diet (Bocherens et al. 1997). Studies of carbon isotopes in skeletal samples allow an estimation of the role of marine and terrestrial foods in the diet. The chemistry of coastal Danish skeletal samples suggests a strongly marine diet, similar to that of modern coastal Eskimo groups (Tauber 1981). Samples from the interior of Denmark, by contrast, indicate a largely terrestrial diet including freshwater fish (Noe-Nygaard 1983, 1988). Analyses of Portuguese coastal groups indicate a mixture of terrestrial and marine foods in the diet (Lubell et al. 1994). A general summary of Late Mesolithic diets concludes that there appear to have been two patterns in Europe: in the western Mediterranean, plants, fish, and meat dominated the diets and caries rates were generally high; in northern Europe, the Iron Gates area, and Greece, fish and other aquatic foods were more important and caries rates were low (Meiklejohn and Zvelebil 1991). Somewhat surprisingly, the latter group shows more evidence of nutritional stress in the form of cranial hyperostosis and dental enamel hypoplasia, which may reflect a high incidence of fish tapeworms and other intestinal parasites among these fishing communities.

In terms of general health, skeletal studies suggest that severe dietary insufficiency was rare (Meiklejohn and Key 1984). There is little evidence for infectious disease either, except to some extent among the more sedentary Iron Gates populations. Arthritis was certainly present and tooth wear was severe, probably reflecting a rigorous life and the use of teeth as tools for working leather and even chipping stone. People were rather short, with men averaging 168 centimeters (5′ 6″) and women averaging 156 centimeters (5′ 1″). Inland populations seem to have been somewhat taller than coastal groups. Life expectancy was roughly 30–34 years.

One last component of the economy deserves mention: the possibility of domesticated livestock in the Late Mesolithic. Several sites in southern France, including Dourgne and Gazel, have been reported to contain bones of domesticated sheep or goat in clear Late Mesolithic contexts (Geddes 1985). Recently, however, doubts have been cast upon the stratigraphic context of such finds or on their identification by confusion with wild ibex bones (Binder 2000). It is presently impossible to be certain of the presence of domesticated animals other than dogs in the Late Mesolithic.

Late Mesolithic Settlement

One striking feature of this period is the great increase in coastal settlement, particularly in Denmark, Sweden, Norway, Britain, France, Spain, Portugal, and Italy. By this time, many of the small lakes in Denmark had filled in and the number of settlements decreases in the interior. The abundant sites are concentrated on the coast, particularly around lagoons and inlets. Connected with this new coastal emphasis, a number of the islands offshore of the Scottish mainland appear to have been colonized at this time and contain a number of shell midden sites (Mellars 1978). Lakeside sites do continue to be important, however, in the inland areas of southern Sweden, southern Germany, and Switzerland, and locations next to rivers and streams are favored throughout much of Europe. Sites at high elevations in the Alps decrease in frequency at this time, such that very little Late Mesolithic use of the uplands can be demonstrated. This abandonment may be due to the increasing expansion of forests upslope with the warmer conditions, restricting the amount of available open grazing land for ibex and chamois.

An intriguing feature of Late Mesolithic settlement is the varying density of sites across the continent. In much of northern Europe, from the Low Countries across to the Baltic, Late Mesolithic sites are extremely abundant, suggesting a population increase in comparison to the Early Mesolithic. In areas of central Europe, on the other hand, such as central and southern Germany, Late Mesolithic sites are much scarcer than those of the Early Mesolithic. It has been suggested that populations in these areas decreased, but a more likely interpretation is that settlement patterns underwent a reorganization resulting in less archaeological visibility. Late Mesolithic sites have been found on low river terraces and directly on floodplains in southern Germany (Kind 1995). If such locations were newly favored at this time, then subsequent erosion and deposition could easily have destroyed or buried them, biasing the archaeological record in favor of sites situated in higher locations, which may date largely to the Early Mesolithic.

Other than the houses at Lepenski Vir, structures at Late Mesolithic sites generally resemble those from the previous period. Areas of bark found at the peat bog site of Henauhof Nord II in southern Germany may have been a flooring laid down in the marshy ground (Kind 1992). The site of Remouchamps in Belgium contained the remains of a circular hut marked by stones with a hearth inside (Price 1987). In the cave of Montclus in southern France, a hut was found in the form of circular depression 4 meters in diameter containing most of the artifacts (Escalon de Fonton 1976). Huts in southern Sweden take the form of oval depressions dug into the beach, ranging in size from 4 × 5 to 6 × 11 meters, and similar structures have been found in northern Sweden as well (Larsson 1990).

Research in Denmark has discovered a wide variety of site types that hint at the complexity of settlement patterns during this period (Price 1985, Larsson 1990). Large coastal sites, which appear to have been occupied year-round, contain a variety of marine and terrestrial foods, often including large shell middens. Smaller coastal sites are more specialized, but focus on various resources such as fish, seals, or migratory swans. In the interior, large sites appear to be more seasonally occupied, showing a preponderance of either summer or winter occupation. At the largely fall and winter site of Ringkloster, for example, most of the faunal assemblage consists of wild boar and pine marten; skeletons of the latter are almost complete and bear cut marks indicating that they were hunted or trapped primarily for their pelts. A variety of plant foods, including hazelnuts and acorn, were also found. Smaller sites in the interior appear to have been short-term seasonal camps. In sum, the evidence suggests a considerable degree of residential sedentism, at least on the coast. Consistent with this decrease in mobility is the great abundance of material belongings including ceramics. In Holland, a similar pattern of larger, more permanent settlement has been suggested (Price 1987).

If some groups in northern Europe were becoming relatively more sedentary, they were also occupying a greater diversity of more specialized sites. The variety of small seasonal camps in Denmark is mirrored by similar developments in the eastern Baltic, where a number of sites show subsistence specialization on various resources, including fish, seals, aurochs, and waterfowl (Zvelebil 1990). To some extent, this development of specialized seasonal camps is characteristic in other areas as well. In the Pyrenees and the Cantabrian Mountains of northern Spain, for example, specialized ibex-hunting sites are known. In southern Germany, the lakeside site of Henauhof Nord II appears to have been a specialized fishing camp, to which the occupants brought stone blades and tools manufactured elsewhere, presumably at a residential camp (Kind 1992). Such "gearing-up" in the preparation of tool kits is characteristic of settlement patterns in which limited residential mobility is paired with a number of temporary, more specialized extraction camps.

It appears that in many parts of Europe there was a significant change in the organization of settlement from the Early to the Late Mesolithic. Residential movement of entire groups appears to have decreased, with some areas, notably the Danish coast and the Iron Gates, showing year-round occupation at some sites. At the same time, smaller hunting or fishing parties continued to be quite mobile, establishing short-term seasonal camps to focus on particular resources, which were then brought back to the home bases. Their movement would have been facilitated by innovations in transportation technology, including canoes, snowshoes, and skis. Along with this change in settlement patterns, the subsistence economies become at once more diversified and more specialized, including a greater variety of food resources, but obtaining them in more specialized episodes and locations. At Danish Late Mesolithic residential sites, the number of different animal species found is approximately 50% greater than that in Early Mesolithic sites, testifying to the increased overall diversity of the diet (Clark 1975).

In a pattern that reflects this decrease in residential mobility, all of the measures of "social territories" using artifact styles display a reduction in such areas from the Early to Late Mesolithic. Just within southern Scandinavia, clear distinctions in the distribution of various artifacts are evident. As summarized by Larsson (1990), Jutland, the eastern Danish islands, and southern Sweden appear to represent different social areas, differentiated by the distribution of antler and stone axes, bone combs, bird-bone points, fine-toothed bone points, slotted bone points, burial practices, and details of decoration on bone tools and ceramics. For the broader region of the entire North European Plain, Price (1981) notes a general trend of decreasing size of social territories during the course of the Mesolithic. During the Late Mesolithic, at least 15 distinct groups have been identified from Holland to Poland, based on the distribution of stone raw materials and styles of microliths. Similar patterns across much of the continent have been identified by Newell et al. (1990) in their study of bead and ornament styles, with increasing regional differentiation into smaller stylistic areas by the Late Mesolithic. The size of these areas is variable, but diameters of 100–200 kilometers are common.

Late Mesolithic Exchange

As in the previous period, most raw materials used by Late Mesolithic groups derive from the immediate surroundings of the sites, often within 10–20 kilometers. In a few cases, however, more exotic materials appear with site assemblages that indicate sources at much greater distances. Wommersum quartzite, for example, is a raw material found in southern Belgium and used during both the Early and Late Mesolithic. During the Late Mesolithic, however, the distribution of this material expands greatly outward from its source, forming an area roughly 250 kilometers in diameter (Gendel 1984). In southern France, a particular Mediterranean shell, *Columbella rustica*, was used for pendants in earlier periods, but during the Late Mesolithic its distribution extends up the Rhone Valley into Switzerland and southern Germany, over 600 kilometers from the source. During the Late Mesolithic occupation of Franchthi Cave in Greece, obsidian from an Aegean island more than 150 kilometers across the water appears in small amounts among the stone raw materials. If the habitual territories of social groups were becoming smaller at this time, it appears that these groups were simultaneously expanding their contacts with others through exchange, perhaps to provide alliances in case of subsistence problems or outbreaks of violence.

One last aspect of exchange that deserves mention is the presence of Neolithic artifacts in Late Mesolithic contexts. Because Neolithic agricultural societies appeared earlier in some parts of Europe than in others, some Late Mesolithic groups were contemporaries of farming communities who had distinctive material cultures. Polished stone axes typical of some of these agricultural societies appear in Late Mesolithic contexts in Denmark, suggesting the existence of exchange between the two groups

(Fischer 1982). Similarly, in southern Germany, a few typical Neolithic artifacts – polished stone axes and grinding stones – have been found in Late Mesolithic sites and indicate contact and possibly exchange in this area as well.

Late Mesolithic Art and Ornaments

The evidence for art and adornment is somewhat more abundant and varied in this period than in the Early Mesolithic (Larsson 2000). Some traditions from the earlier period continue. Antler axes and shafts, slotted bone daggers, and harpoons are frequently decorated, usually with complex geometric motifs. Pendants and beads made from a variety of materials, including animal teeth, bone, stone, shells, fossils, and even hazelnuts are widespread. In the north, amber is used for both pendants and figurines.

Evidence now exists, however, for two new media for expression – wood and pottery. A small wooden carving of a human, for example, has been found in Holland and dated to 6400 BP (Price 1987). Most impressive are two wooden paddles from the underwater Danish site of Tybrid Vig. The broad blades of the paddles had been carved with elaborate geometric designs that were then filled in with a dark brown substance to stand out against the lighter background (Andersen 1985). One of the wooden skis from the Russian site of Vis was decorated with the carved head of an elk. Some of the pottery that appears in northern Europe late in the Late Mesolithic, especially the pointed-base jars, is decorated with impressions in similar patterns throughout the area (Larsson 2000).

Also new in this period are the unique stone carvings at the site of Lepenski Vir. The motifs on the boulder statues have been interpreted as representing symbols of fish and water, and linked to the importance of the Danube fishing to the site's economy (Srejović 1972). The "altars" have relatively deeply incised designs that indicate a considerable investment in these items of site furniture, but their meaning is indecipherable.

Rock art also seems to reappear in this period after an absence in Europe for several thousands of years. A number of impressive rock paintings have been found in eastern Spain, some of which may be Late Mesolithic in age (Beltran 1982), although the view that they are largely Neolithic in age is finding increasing acceptance. Occurring on relatively open cliff walls, the paintings are predominantly red, together with black and tan, and differ noticeably from Upper Paleolithic paintings. Coherent scenes are commonly shown, with humans and animals together. The humans are portrayed as relatively simple stick figures, while the animals are more realistic. The scenes depict episodes of hunting, honey-gathering using rope-ladders, dancing, and fighting with bows and arrows. These paintings lend a remarkable vitality to prehistoric life. Another area of rock art development is northern Scandinavia. In western and northern Norway and northern Sweden, a large number of rock carvings have been found. Dated largely on the basis of associated shorelines and stylistic elements, these seem to have appeared first around 5500 BP (Nygaard 1989). As in Spain, the depictions are quite realistic, with representations of elk, reindeer, birds, humans, and boats, and scenes that may depict bear hunts, processions, and dances (Larsson 2000).

Late Mesolithic Burials

Burial customs of this period are quite diverse. Individual graves are known from a large number of sites in Sweden, Denmark, Lithuania, Germany, Luxembourg, Switzerland, France, Italy, and Spain. A study of 34 of these graves demonstrated that most were of adults (18 men vs. 8 women and

8 undeterminable) placed either on their backs or in a flexed position, with a few sitting upright in the pit (Clark and Neeley 1987). About half of these burials were accompanied by various grave goods. One grave in Lithuania, for example, contained a woman placed supine, with red ochre concentrated around her head, accompanied by two stone tools and seven perforated teeth of moose and boar (Rimantienė 1994).

The most striking new development is the appearance of true cemeteries. In addition to the concentration of graves in and around the houses at Lepenski Vir, a number of sites have cemeteries either within the occupation area or closely nearby. Several shell middens by the mouth of the Tagus River in Portugal, for example, contain the burials of a number of individuals. These include Cabeco da Amoreira with at least 28, Cabeco da Arruda with 175, and Moita do Sebastiao with over 40 (Ferembach 1974). Two French shell midden sites on the south coast of Brittany, Téviec and Hoëdic, contain the graves of 28 and 13 individuals respectively (Pequart and Pequart 1954, Pequart et al. 1937). Near the site of Vaenget Nord in Denmark, at Vedbaek-Bogebakken, 23 burials have been excavated (Albrethsen and Brinch Petersen 1976). The site of Skateholm in southern Sweden has three separate cemeteries all within about 600 meters of one another; cemetery I contained 64 individuals, II had 22 individuals, and III was destroyed by gravel quarrying (Larsson 1984). In Latvia, the graves of around 60 individuals were originally excavated at the site of Zvejnieki (Zagorskis 1973), with recent excavations producing an additional 13 (Stutz et al. 2008). Finally, on an island in Lake Onega, Russia, at the site of Oleneostrovski Mogilnik, 170 out of an estimated total of 400 graves were excavated (O'Shea and Zvelebil 1984).

The mortuary treatment in these cemeteries shows considerable variability. Bodies were placed in a variety of positions, including supine, flexed, and sitting. Adults, children, and infants are all represented, and at least half of each age category is accompanied by grave goods. Multiple burials as well as single graves occur in most cemeteries and many of the graves are stained red with ochre. Some patterns do exist, however. The clearest distinction in grave goods is between men and women. At Vedbaek-Bogebakken, for example, men were generally accompanied by stone blades and bone daggers, whereas women more often had associated jewelry. The diversity of grave goods is nevertheless enormous. Burial goods include stone flakes, blades, points, axes, scrapers, and knives, bone knives, points, harpoons, polishers, awls, pins, and fishhooks, perforated or grooved teeth of elk, red deer, bear, boar, beaver, pendants of bone and stone, and carved figurines of elk, snakes, and humans. Several graves at Vedbaek-Bogebakken contained large antlers of red deer placed under the skull; in another, a child's head was placed on the wing of a swan.

Some evidence suggests a degree of social complexity in these Late Mesolithic societies. That is, in addition to age and sex, other ways of socially categorizing people may have existed and affected burial treatment (Clark and Neeley 1987, O'Shea and Zvelebil 1984). Differences in status, for example, are often reflected in mortuary treatment. An analysis of grave goods at Oleneostrovski Mogilnik revealed significant differences among graves in the quantity and nature of accompanying goods, differences that may reflect variations in status and wealth achieved during the life of the individuals. The richest graves in this case were largely those of adult males. Very rich children's graves, by contrast, are often interpreted as reflecting an inherited position of high status, as children would not have been able to achieve status on their own in their short lives. Some of these cemeteries do include elaborate children's graves. At Zvejnieki, one child was accompanied by 23 tooth pendants and red ochre, another by two bone daggers, one perforated tooth, 46 unperforated teeth, and red ochre, and a third by 37 grooved elk teeth, 4 grooved boars' tusks, and red ochre.

Other types of social distinctions have also been noted. At Oleneostrovski Mogilnik, two groups of graves were distinguished, not on the richness of grave goods, but on the types of goods, especially carved figurines and animal teeth. Each group contained adult men, women, and children, and has been interpreted as a lineage or clan (O'Shea and Zvelebil 1984). A third type of distinction may be evident in exceptional graves of certain individuals. Again at Oleneostrovski Mogilnik, four individuals were buried in an unusual standing position in shaft graves, accompanied by abundant grave goods. These have been interpreted as the graves of shamans or other special individuals.

These cemeteries are important in many ways. Their use over a number of years as a burial place suggests that a strong emotional and cultural attachment existed between groups and their territories. Cemeteries might even be interpreted as a type of territorial marker, investing the area with the spirits of the ancestors. This also implies a considerable degree of sedentism that allowed their use and reuse over time. It is probably no accident that the cemeteries appear largely in coastal areas or by large lakes, where the concentration of terrestrial and aquatic resources would have facilitated a more sedentary way of life. Cemeteries are also invaluable sources of information, not only about social distinctions, but also about diet, health, and disease.

There are also a number of other aspects to Late Mesolithic mortuary behavior. Multiple graves exist, for example, apart from formal cemeteries. One of the more impressive of these is a find at the site of Stroby Egede on the Danish island of Zealand (Brinch Petersen 1988). Here, in a single pit, were found the skeletons of eight individuals. These include 1 older woman, 1 young woman, 1 man, 1 girl, 1 boy, and 3 newborns. The females had their heads at the south end of the pit, the males at the north end. Accompanying the skeletons were stone and bone tools and perforated animal teeth. Some individuals at Skateholm were cremated, not buried, and others appear to have been disarticulated before burial (Larsson 1984). Finally, at the Swedish underwater site of Dejro, a canoe was found that contained human skeletal remains, interpreted as a special burial rite (Larsson 1995).

At both Skateholm and Lepenski Vir, dog burials have been found. In some cases these are separate burials, in others they are found with humans. Also at Skateholm, the remains of a structure were found within cemetery II (Larsson 1988). This took the form of a 4 × 4-meter pit filled with ash and sand, bounded by a band of red ochre and sand. A number of artifacts of bone and flint were concentrated in the area of red ochre. This has been interpreted as some type of structure associated with mortuary ceremonies.

In central Europe, several finds have been made that have led to the interpretation of a "skull cult" during the Late Mesolithic. The finds occur in eastern France (Mannlefelsen), Baden-Württemberg (Hohlenstein-Stadel), and Bavaria (Grosse Ofnet, Hexenküche by Kaufertsberg), and consist of skulls with associated vertebrae, but no additional body parts. The dating of some of them has been much disputed, but recent radiocarbon dating has confirmed the Late Mesolithic age of all but the Kaufertsberg find (Orschiedt 1998). The finds at Grosse Ofnet are the most impressive, consisting of two shallow pits, each containing a number of skulls, jaws, and vertebrae. A third pit between these two contained charcoal and charred bone fragments, which may represent the postcranial skeletons. The skulls face west and are covered with ashes and red ochre. Originally, 27 skulls were reported to be in one depression and 6 in the other, for a total of 33, but more recent analyses suggest totals of 34 (Orschiedt 1998) or 38 (Frayer 1997). Because of this discrepancy in numbers, it is difficult to ascertain the exact age and sex distribution of the skulls, but it is clear that children outnumber adults, and females outnumber males (in the original analysis there were 20 subadults, 9 adult females, and 4 adult males). Evidence of bludgeon wounds to the head have been found on 18 of the skulls, but differentially distributed by age and sex: they occur on 100% of the adult men, 23% of the adult women, and 58% of the children (Frayer 1997). As these wounds show no signs of healing growth, they are assumed to have occurred around the time of death, and to be the likely cause of death. A number of the skulls also show cut marks suggesting defleshing. The vertebrae also bear cut marks indicating decapitation by slitting the throat. Goods accompany many of the skulls, perhaps originally as part of necklaces or caps: 215 perforated deer teeth and 4250 shells (Orschiedt 1998). In contrast to original reports in which only women had such associated ornaments, men appear to have some as well, although not as abundantly as adult women and children.

At the cave of Hohlenstein-Stadel, three skulls and associated vertebrae were found on a stone pavement in a depression together with red ochre and accompanied by perforated fish teeth (Orschiedt

1998). These skulls belong to an adult man, an adult woman, and a 2–4-year-old child, all facing southwest. Here, too, the vertebrae show evidence of decapitation and all three skulls bear signs of blows to the head. An interesting detail is the determination of hydrocephalus in the child's skull.

The finds at the other two sites are similar (Probst 1991). At Kaufertsberg an adult man's skull and two vertebrae was found in a depression, covered with red ochre. An adult male skull was also found at Mannlefelsen, together with jaw and vertebrae, on an arrangement of stones and surrounded by a stone alignment. Cut marks were found on the jaw and possibly on the base of the skull.

As might be imagined, these finds have fueled much speculation. That they were intentionally buried is not in dispute, and it is clear that it was *heads*, not skulls that were buried, as the jaws and vertebrae were usually in articular position, presumably held there by soft tissue. In the case of Ofnet, however whether they were buried in one episode or many is debated. Frayer (1997) argues that they were interred in one episode, based on the undisturbed articular positioning and lack of evidence for rodent gnawing that might result from prolonged exposure. Consequently, he also suggests that they represent an example of a "Mesolithic massacre" in order to account for such a large number of simultaneous deaths. By contrast, Orschiedt (1998) suggests that they were buried over a long period, and that, although some individuals certainly may have died a violent death, this need not imply a group massacre.

Other evidence supports the suggestion that violent conflict was a feature of this period. At the cemetery of Skateholm I, for example, a trapezoidal microlith was found embedded in the pelvis of a man's skeleton, suggesting that an arrow wound was the cause of death (Larsson 1984). A microlith was found embedded in the vertebra of a man's skeleton at Téviec as well (Pequart et al. 1937). In a grave at Vedbaek-Bogebakken, a bone arrowhead was found between the ribs of an adult and was probably the cause of death (Albrethsen and Brinch Petersen 1976). These finds support the image of conflict between archers as portrayed in the Spanish rock paintings.

Violence seems to have continued after death as well. In addition to the evidence of wounds and decapitation at Ofnet, other finds suggest that humans were sometimes dismembered (Larsson 1990). At the site of Dyrholmen, Denmark, human long bones show evidence of cut marks and fractures to reach the marrow, suggesting possible cannibalism. Some skulls show cut marks as well, in locations that suggest scalping, and at one Swedish site a human skull was modified and apparently used as a container. Finally, several of the skeletons at Skateholm are lacking limbs, indicating dismemberment.

These various finds document both burial practices and rituals distributed across much of the continent and a high incidence of interpersonal violence. Their appearance during the Late Mesolithic may confirm the development of increasing levels of competition and conflict during this time, as well as a growing tendency to establish spiritual claims to particular areas by the burial of kin. Both may reflect an increasingly differentiated and disputed economic and social landscape.

Summary of the Mesolithic

The Mesolithic was a period of massive readjustments to the environmental changes at the end of the last ice age. As the tundra and large animal herds of the Paleolithic disappeared, people adapted to the new, forested habitats. Hunting continued its importance, but shifted to focus on deer and other woodland animals. Small game, fish, birds, and plants increased their importance as subsistence diversified. By the end of the Mesolithic, economies in some regions were strongly focused on marine or inland aquatic resources. Accompanying these changes in subsistence were a number of technological innovations that led to greater efficiency of hunting and increased ease of travel. Initially, people were quite mobile and utilized many different parts of their habitat, but gradually they began to restrict their movements to limited areas and to concentrate their settlements in only parts of the landscape.

In some regions, notably coastal Denmark and south Sweden and, especially, the Iron Gates area of the Danube, residence appears to have become virtually sedentary. Art proliferated, largely in the form of decorations on implements and personal ornaments, and some materials were exchanged over great distances. Cemeteries appear in certain rich areas and document a rich complex of ceremonial activities focused on death. Social distinctions become increasingly evident, suggesting greater complexity in roles and status. In some regions, interpersonal violence is well documented and suggests an increasingly crowded and competitive social landscape.

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Chapter 7
Early Neolithic, the First Farmers in Europe, 7000–5500/5000 BC

Sarunas Milisauskas

Introduction to the Neolithic: Chronology and Trends

In most of Europe the Neolithic is defined as the time segment starting with the appearance of farming communities and lasting until the appearance of bronze metallurgy, which marks the beginning of the Bronze Age. The east Baltic, Belarus, and Russian Neolithic however is defined by the appearance of pottery and polished stone tools (Gimbutas 1956, Dolukhanov 1979, Rimantienė 1996, Dolukhanov et al. 2005). Zhilin (2000:287) has pointed out that if the Neolithic were defined by the presence of farming, then there would be no Neolithic in the forest zone of eastern Europe.

In some countries, archaeologists terminate the Neolithic with the appearance of copper metallurgy. To describe the period of copper artifact use before the onset of the Bronze Age in Europe, archaeologists employ the term "Eneolithic," in the Czech Republic, Slovakia, and Ukraine, and Copper Age, or Chalcolithic in Hungary, Romania, Macedonia, Serbia, Bulgaria, and Iberia (Lichardus 1988, 1991, Makkay 2003:500).

There are various divisions of the Neolithic used by archaeologists, e.g., Jens Lüning (2000:7) divides the southern German Neolithic into five phases: Early, Middle, Later, Late, and Final (Table 7.1); Janusz Kozłowski (1998:44) classifies the Polish Neolithic into the Early Neolithic and Late Neolithic. He places cultures dating between 4100/3900 and 2300 BC, i.e., before the Bronze Age, into the Early Eneolithic and Late Eneolithic. Cooney (2000) breaks down the Irish Neolithic into the Early Neolithic, the Middle Neolithic, and the Late Neolithic. Henrieta Todorova (2003) divides the Bulgarian Neolithic into the Monochrome Neolithic, the Classic Early Neolithic, the Middle Neolithic, and the Late Neolithic. A general regional sequence of Neolithic cultures is presented in Fig. 7.1.

We divide the European Neolithic and Copper Age into Early Neolithic (7000–5500/5000), Middle Neolithic//Early Copper Age (5500/5000–3500 BC), and Late Neolithic/Late Copper Age (3500–2200/2000 BC) chronological phases whose beginnings and ends vary across the continent. For example, by the time Early Neolithic farming was established in central Europe, the Copper Age had already begun in southeastern Europe. We can discuss Early Neolithic trade and settlement in central Europe, at a time when hunting and gathering societies were still flourishing in Scandinavia and the east Baltic area. It should be emphasized that this subdivision of the Neolithic, as of other periods in European prehistory, is for analytical purposes only. These different periods are not separated from one another by any sharp breaks, for the changes occurring in the various aspects of different cultures seem generally to have been gradual.

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Table 7.1 Neolithic sequence in southern Germany

Period	Culture	Date
Final Neolithic (End-neolithikum)	Bell Beaker Corded Ware	2800–2200 BC
Late Neolithic (Spät-neolithikum)	Wartberg Cham Horgen	3500–2800 BC
Later Neolithic (Jung-neolithikum)	Michelsberg Aichbühl	4400–3500 BC
Middle Neolithic (Mittel-neolithikum)	Bischheim Rössen Stroke Ornamented Pottery Grossgartach	5000–4400 BC
Early Neolithic (Alt-neolithikum)	La Hoguette Linear Pottery	5500–5000 BC

After (Lüning 2000:7)

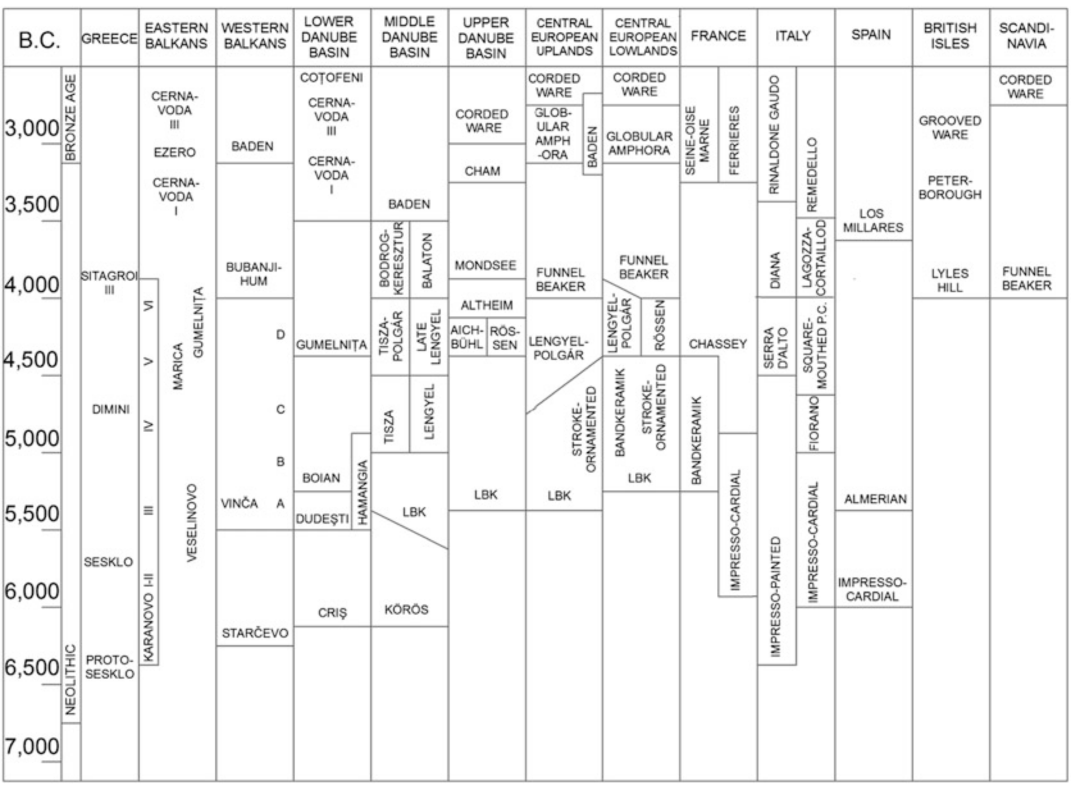


Fig. 7.1 Chronological chart of Neolithic Europe (after Kozłowski 1999:153 and Mantu 1998, with modifications)

In the territories east of the Carpathians and south of the forest zone, the Eneolithic period has traditionally been ended about 3500/3000 BC, when the Early Bronze Age began, although the majority of metal tools were probably still made of copper. The steppe Early Bronze Age ended about 2700/2500 BC and the Middle Bronze Age transition was about 2000 BC, just at the time when the Early Bronze Age began in the Carpathian Basin (David Anthony pers. comm. June 2001). In a survey like this one, choices must be made, and the period names used here are useful for most of Europe. But the reader should be aware that there is a terminological "fault line" east of the Carpathian Mountains.

There are several possible explanations usually given for the appearance of domesticated plants and animals in Europe: a diffusion of plant and animal species in question, along with the idea of domestication; a gradual expansion of the farmers themselves from Anatolia; and the independent domestication of certain species in Europe. The processes of the transformations of European societies from foraging to farming varied from region to region.

The use of the term Neolithic does not imply that uniform sociopolitical developments took place among the various societies in Europe. In some areas, hunting and gathering cultures persisted throughout the period, while other regions witnessed the development of the earliest societies with hereditary inequality.

Each Neolithic society had its own cultural developments and it is assumed that those societies that shared archaeological traits were linked in some way by language, ethnicity, history, or myth. Thus many Neolithic societies are named for their unique material culture, especially ceramic types. Hence, we have the "Linear Pottery," "Square-Mouthed Pottery," "Funnel Beaker," "Globular Amphora," "Corded Ware," and so forth.

Between 7000 and 6500 BC the earliest farming groups appeared in Greece and Bulgaria. Archaeologists have traditionally emphasized the economic changes that occurred with the appearance of Neolithic societies. For example, Ofer Bar-Yosef (2004:S2) stresses the importance of such changes "the dichotomy between Mesolithic hunting-and-gathering lifeways and sedentary Neolithic agriculture is not imaginary but real. A shift in economy or realignment of subsistence strategy is and was a catalyst for social and ideological changes." During the Early Neolithic people appeared with new skills or "occupations" such as the "farmer," the "herder," the "potter," the "polished stone tool-maker," and perhaps the "brewer" (Chapman et al. 2006:162). A term such as "potter" need not imply a full-time occupation or specialization, or even the only or essential identity of an individual. It emphasizes the kind of activities through which persons were recognized by their possession of distinctive skills. "These new types of person co-emerged with new foodstuffs and objects, such as flour, bread, lamb chops, barley beer, pottery and axes – the one could not have occurred without the other"(Chapman et al. 2006:162).

We should not overemphasize the impact of strictly economic changes during the Neolithic throughout the continent, since changes also occurred in social organization, settlement pattern, population, landscape, diet, rituals, values, and beliefs. For example, Hodder (1990), Cauvin (1994), and Thomas (1991) stress the importance of the ideologies and new ideas that were part of the Neolithic transition. They see Neolithization as a profound social, ideological, and conceptual change. The Neolithic is a new way to think, reflected by new symbols, rituals, and social organizations, new gods, goddesses, and heroes. Hodder (1990) stresses the social domestication of humans; the development of "domus." Marija Gimbutas (1991) idealized the peacefulness and gender equality of Early and Middle Neolithic societies; she left us with an enduring vision of a Neolithic utopia with its unifying myth of a mother goddess.

Most probably the genetic make-up, ethnicity, and languages of European populations were affected by the Neolithic transition, a transformation that had various effects on native European foragers. In some areas farmers pushed them out and occupied their territories while in other regions foragers managed gradually to change their ways of life. We can postulate several scenarios for relations between foragers and farmers during a transition that lasted 3000 years. One year they may have been fighting, the next, trading, and the next, exchanging marriage partners. These events are so ephemeral that archaeologists have difficulty in identifying them. The events may have been ephemeral but the results, surely, were not.

We assume that gender roles varied among the different Neolithic societies. Gender is not only a task-oriented distinction but also indicates differences in attitude or relationship based on age, sex, or power. Linguistic constructions also indicate gendered relations. Many assumptions about gender roles are based on ethnographic comparisons that suggest horticultural and small-scale agricultural societies are matrilineal and that modes of production are related to sex and age groups, e.g., women are potters. Hodder (1990) considers the house or "domus" as a gendered space associated with women. Many tasks that took place within the house are commonly associated with women's roles, such as cooking, food preparation, and weaving. Atalay and Hastorf (2006) argue that many food-related tasks, such as processing, cooking, and storage, fell within the realm of women. Cemetery studies have shown patterning indicating social distinctions based on sex and age related to the treatment of the dead (van de Velde 1979). For example, Marjorie de Grooth and Pieter Van de Velde (2005) point out that grinding stones are found in women's graves in Dutch Linear Pottery culture cemeteries. These types of treatments become more pronounced during the late Neolithic (Haak et al. 2008). Clues about gender roles are more clearly observed in Europe by the Copper Age with the appearance of metal working (Sofaer Derevenski 2000). The numerous figurines of women in the prime of their life indicate that they are much more represented than men in Neolithic cultures such as Cucuteni-Tripolye (Talalay 2000).

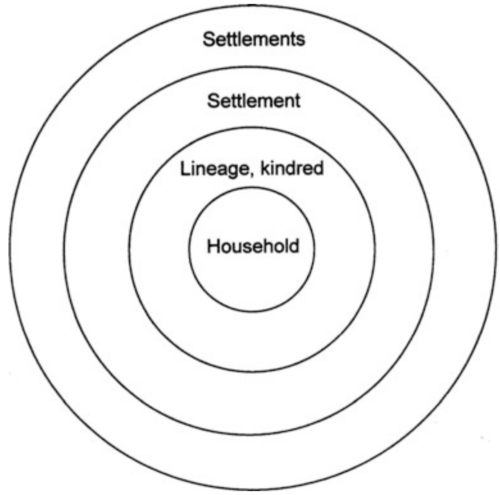
There are many issues, such as the role of children, in these societies that probably were different from our contemporary western perspective. As in many traditional societies, most likely children were involved in daily activities or tasks. We can imagine children doing many tasks, herding animals, collecting wood, helping with harvesting of cereals, etc. Marriage or betrothal probably occurred at an early age. More than likely 11- or 12-year-olds were treated as adults.

Many archaeologists have associated the Neolithic with the first tribal societies in Europe (Parkinson 2002). There are problems with classifications of prehistoric societies as tribes, complex kin-organized societies, or chiefdoms and the loose application of such concepts to prehistoric and historic societies has been criticized (Godelier 1977, Yoffee 1993). Here we assume that we are dealing with small-scale societies lacking centralized political or economic organization, whose individual members were not ranked in permanent hierarchies (Sahlins 1968). Communities may rarely have exceeded 250 people. They are assumed to have been politically and economically autonomous, their inhabitants linked by kin relations, or perhaps by membership in sodalities, nonresidential institutions such as warrior societies, or age groups. These societies are egalitarian, with status based on age, gender, personal talents, achievements, and charisma. For example, a man may have attained the role of war leader or ritual practitioner through his own abilities without gaining the power to coerce his fellows, or to invest his position with the permanent authority of office. Such leadership was probably not inherited. However, some temporary leaders such as Sahlins's (1963) "Big Man" in Melanesia can greatly affect the decision making especially in household production within the villages even if they do not have institutionalized political authority.

Corporate groups, lineages, clans, and kindreds, may have been important in Neolithic societies, not only structuring social relations but perhaps also functioning as landholding units, even if individual families worked their own plots. Voluntary or task-oriented associations may have brought people together to carry out a variety of economic, social, military, and ritual activities.

Individuals may well have had greater social obligations and exhibited greater generosity toward close kin. As social relations expanded, sociability and generosity probably declined. Robbing or killing strangers may well have been considered morally acceptable, whereas such behavior toward kin would likely have been unacceptable.

Fig. 7.2 Generalized small-scale society design



In Neolithic societies, rituals played an important role in governing life. At the household level, families may have conducted rituals for personal well-being. Planting and harvesting, disease, or lack of rain may have involved the entire community. Reliance on domesticated plants and animals very probably differentiated the rituals of Europe's first farmers from those of their hunting-and-gathering neighbors or predecessors.

This discussion of a small-scale society proceeds from the viewpoint of the individuals who participated in their societies. Archaeologists are not situated to perceive such systems as concentric nests of ever-widening social relations. For them Neolithic small-scale societies appear as arrays of settlements, cemeteries, camps, and specialized sites, with varying time depths, the integration of which would eventually resolve itself into a rather impersonal interconnected system of groups and communities (Fig. 7.2).

In traditional chronology, the Middle Neolithic/Early Copper Age falls within the period (5500/5000–3500 BC). In Germany, Poland, England, and Scandinavia, copper artifacts, mainly ornaments, are rare at most sites, thus it is difficult to talk about the Copper Age. In Bulgaria, the Copper Age begins around 4800–4700 BC and in Hungary at 4600–4500 BC. Herein when I refer to Middle Neolithic and Late Neolithic I actually mean Middle Neolithic/Early Copper Age and Late Neolithic/Late Copper Age.

During the Middle Neolithic (4000 BC) farming societies appear in the British Isles and Scandinavia. An expansion of farming settlements occurred in the alpine foreland. In central Europe and the Low Countries, more farmers moved into non-loess areas. For a long time Linear Pottery farmers were limited to the southern Netherlands and "groups of hunter-gatherers who made little or no use of agricultural products continued to live" in other regions (Fokkens 1998:90). In Scandinavia, there was a transition to farming by local hunter-gatherers after a millennium or more of contact with farmers in northern Germany and northern Poland.

During the Middle Neolithice some innovations, such as ards (simple plows), and domestic horses appeared in Europe, which influenced changes in economy, warfare, transportation, gender relations, and beliefs.

Another issue is the relative importance of local ("nativist") or nonlocal ("diffused") inspirations for the various Middle Neolithic innovations. Before 1960 diffusion was almost always and unthinkingly invoked, then after that time indigenous causes were equally uncritically invoked. Özdoğan (1997:1) has discussed the absurdity of an autochthonous or Eurocentric development model "which rejected the presence of any intrusive elements in the prehistory of Europe up to the 1980s."

Since 1990, the pendulum of intellectual fashion has somewhat swung back, with Sherratt (1997) challenging "nativist" claims.

Sherratt (1981) suggests that a "Secondary Products Revolution" occurred toward the end of this period. This "Revolution" is associated with the exploitation of domesticated animals for dairy products, wool, and traction. Chapman (1982), Vosteen (1996), Lüning (2000), and others have questioned Sherratt's interpretations of the data relating to these developments. It is not easy to determine when, for example, the first use of sheep for wool, wheeled vehicles, or other "secondary" innovations appeared in Europe. It seems the use of cattle, sheep, and goats for milk first occurred during the Early Neolithic (Craig et al. 2005). The earliest evidence for wheeled vehicles and sheep-keeping for wool occurs around 3500–3000 BC, during the Late Neolithic/Late Copper Age.

Changes are seen in Middle Neolithic/Copper Age economy, society, ecology, politics, rituals, and ideology. A fascinating manifestation of human creativity during this period is the construction of megalithic monuments in western and northern Europe. Technological innovation, demographic growth, improved subsistence, warfare, and novel ideologies are all implicated in these changes. These suggested sources of change are interrelated, and no single cause drove for the greater diversity and complexity of this period. At the same time, individuals were making conscious or unconscious choices, but our ability to reconstruct their roles is very limited.

By the beginning of the Late Neolithic/Late Copper Age most of Europe was occupied by farmers. Only the coniferous and tundra areas of northern Europe remained inhabited by hunters and gatherers. In some areas politically complex societies already existed. However, there is a discontinuity in some aspects of the archaeological record after 3500–3000 years of farming societies, which may reflect crises or major changes at the end of the "Old Neolithic" or Old Europe. There are certainly Late Neolithic developments requiring explanation. Some archaeologists, of whom Gimbutas is the best known, argue that the onset of the period coincided with large-scale movements of pastoralist cultures and new language groups in Europe.

Around 3500–3000 BC, most large settlements disappear in central Europe. Gimbutas (1991) has suggested that invasions of Kurgan pastoralists from the Eurasian steppes contributed to the collapse of large settlements. Others point to local developments such as ecological changes as the causes for the Late Neolithic crisis.

The Origins and Spread of Farming in Europe

The various explanations for the appearance of the first farming societies in Europe, whether through indigenous populations who locally domesticated some plants and animals, or whether through the diffusion of information, products, or people, have been the subject of intense debate. Even a catastrophic flood in the Black Sea area has been proposed as an impetus for dispersion of farmers (Ryan and Pitman 1998). Zvelebil (1995:107) reminds us that the Neolithic transition not only transformed material cultures but also "raises the question of European cultural identity and of the genetic and linguistic roots of most present-day Europeans." We need to examine the transition to farming in regionally specific contexts and various scenarios have been proposed for these events (Ammerman and Biagi 2003, Whittle and Cummings 2007).

Geneticists have joined the debate with studies of the genetic patterns of modern European populations as they relate to the origin of Neolithic ones (Sokal et al. 1991, Barbujanim et al. 1995, Semino et al. 1996, Richards et al. 1996, Richards 2003a, b, Haak et al. 2005). The use of ancient DNA to discover an influx of new populations with the appearance of farming has produced a variety of results. All of the studies agree however that farming was introduced by genetically distinct people who moved into Europe during the Early Neolithic (Bramanti et al. 2009).

Traditionally, diffusion was credited with the transition from hunting and gathering to the utilization of domestic animals and plants (Childe 1957). But the assumption that the earliest farmers from the Balkans and the Aegean area spread all over Europe now looks simplistic, and the migrationist or demic expansion explanation has been frequently criticized since the 1970s. But some studies support this scenario, e.g., in southern France (Guilaine and Manen 2007). In recent years old and new migrationist models have been invoked (Ammerman and Cavalli-Sforza 1984, Renfrew 1987, van Andel and Runnels 1995). According to Renfrew (1987) the spread of farming from Anatolia coincided with the diffusion of Indo-European languages over all of Europe. Some geneticists argue that the modern genetic makeup of European populations support this hypothesis (Sokal et al. 1991, Cavalli-Sforza et al. 1994). Other models currently emphasize the role of indigenous hunters and gatherers in the transition (Dennell 1983, Zvelebil and Rowley-Conwy 1984, Barker 1985, 2006, Donahue 1992, Budja 1993, Greenfield 1993, Chapman 1994, Whittle 1996a, Robb and Miracle 2007). But I am in agreement with Bogucki (1996:242) who states, “there was no single mode by which Europe made the shift from foraging to farming.” The transition needs to be analyzed within specific geographic regions. Processes which may have occurred in central Europe, for example, may not explain developments in Scandinavia. In some areas, such as the Iron Gates area of Romania and Serbia, the Atlantic coast, and the Circum-Baltic region, there were dense concentrations of foragers who participated in the Neolithic transition.

The origin of farming is also part of the Mesolithic problem, one cannot discuss the one without referring to the other. In Greece, Bulgaria and other regions of southeastern Europe, Mesolithic sites are rare. Is this prehistoric reality or an artifact of incomplete research? Where Mesolithic data is scarce or absent, hypotheses of Early Neolithic migrations, diffusions, and interactions, can only be just those, untested hypotheses.

The information needed for domestication, and the species themselves, could have diffused from Anatolia to southeast Europe by trade (Runnels and van Andel 1988, Hodder 1990). Or farmers from the Near East could have migrated into Europe (van Andel and Runnels 1995). Benecke (2006:182) uses osteological and osteometric analyses to show that animal husbandry was introduced to Greece by immigrant farmers. Greece is not geographically isolated from Anatolia; there are no insurmountable physical barriers. For the Neolithic people in Anatolia, Greece did not symbolize a new continent. The separation of Europe from Asia is a product of a mere 2500 years of recent history. Or, foraging populations in Greece may have received some domesticated plants through exchange, the very act of which may have conferred ritual or prestige significance. We would not expect foragers to abandon immediately their reliance on hunting and gathering to start cultivating wheat and barley. Data from Franchthi Cave in the northeast Peloponnese, Greece indicate that by 7000 BC the local population had domesticated sheep and goat as well as emmer wheat and barley (Hansen and Renfrew 1978). Previously they had relied on wild foods. As Thorpe (1996:24) has pointed out, “From the demographic perspective it is simply not feasible that the inhabitants of Franchthi Cave could have been a self-sustaining community.” They were part of a wider settlement system. There are not many Mesolithic sites in Greece, thus it is difficult to hypothesize about their role in transition to farming (Demoule and Perlès 1993, Perlès 2001). The mountainous topography of Greece is not ideal for cereal cultivation since the land for it is not abundant. However, the thinly scattered Early Neolithic populations did not need much farmland, and would have found all they wanted, mountains or not. In the absence of strong evidence to the contrary, I would argue that the earliest farming populations originated in Anatolia. This is supported by the analysis of Ghiasta et al. (2003) of a new database of radiocarbon dates which indicated the expansion of new populations from Anatolia. Radiocarbon dates from Sesklo, 6455 BC (7611 ± 93 BP, P-1679), Argissa 6390 BC (7500 ± 90 BP, GrN-4145), and the numerous dates from Achilleion, indicate that by the mid-seventh millennium BC, farming communities were established in Thessaly (Coleman 1992). There is evidence for the colonization of Mediterranean islands such as Crete and Corsica by farmers (men and women) with water transport (Cherry 1990, Broodbank and Strasser 1991). These colonizers probably came from western Anatolia. According to Broodbank and Strasser (1991:234) "the evidence from Crete indicates exogamous introduction of farming and farmers through a purposive, planned and comparatively long-range colonization." There was no permanent settlement on these islands before the Neolithic, although there is evidence for the temporary presence of humans engaged in hunting and/or gathering. It should be noted that Early Neolithic sites on Crete are very rare (Watrous 2001:162).

From Crete and/or Greece farming diffused, by means still uncertain, to the eastern and western zones of Mediterranean Europe. It is noteworthy that after farming got established in the Aegean area it moved fast in various directions. Along the Adriatic coast, after about 7000–6500 BC, Early Neolithic populations were making Cardial Impressed Wares, that is, pottery stamped and incised with the edge of the shell of the mollusc species *Cardium edele*. Gudnja cave in south Dalmatia, Croatia, has ceramics with late Impressed Ware ornamentation and a radiocarbon date of 7171 ± 70 BP; 6055 BC (GrN-10315) (Chapman 1988). The western Mediterranean zone, i.e., central and northern Italy, Sardinia, Corsica, and Mediterranean France and Spain, have yielded evidence of domestic animals, especially goats, and pottery dating between 6000 and 5500 BC (Leighton 1999) (Table 7.2). Some suggest that local foragers adopted some aspects of the Neolithic such as sheep and goats. Biagi (2003:148–149) however has argued that demic diffusion accounts for the appearance of farming societies in northeastern Italy. Guilaine and Manen (2007:46) point out that "In southern France, the earliest Neolithic manifestations are due to small groups of 'settlers' of Italic origin." They brought the Neolithic package, farming, domesticated animals, and pottery to southern France. However, the study by Ghiasta et al. (2003:60) of the new database of radiocarbon dates produced contradictory results. "There would appear to be strong evidence here for the early indigenous adoption of Neolithic attributes by Mesolithic populations in France at least in its southern half " (Ghiasta et al. 2003:60). In the interior of the Iberian Peninsula, Neolithization process occurred later than in coastal areas (Ribe, Cruells, and Molist 1997). In the Basque country, local foragers adopted farming only in the fifth millennium BC (Zilhão 2000).

Rowley-Conwy (1995:346) points out four problems with claims and counterclaims about the earliest farmers in the Mediterranean and Atlantic regions of Europe: (1) the burrowing of animals into stratified sites (2) the desire of archaeologists to find early examples of such an important

Table 7.2 Simplified chronological sequence for the Mediterranean area

BC	Italy (Southern)	Italy (Northern)	France (Southern)	France (Northern)	Iberia	BC
2500–						–2500
3000–		Remedello	Ferriéres	Seine-Oise-Marne	Bell Beaker Millaran	–3000
3500–	Diana	Lagozza				–3500
4000–						–4000
			Chasseén	Chasseén		
4500–	Serra d'Ato			Cerny		–4500
	Trichrome	Square Mouth Pottery			Almerian	
5000–						–5000
				Linear Pottery		
					Impressed Ware	
5500–						–5500
			Cardial			
		Impressed Ware				
6000–	Impressed Ware					–6000

development (3) the difficulty of distinguishing wild from domestic species in the same stratigraphic layers, especially since wild pigs and cattle were native to Europe, and (4) palynological claims for early cultivation which are often not supported by other data. Along the Mediterranean and Atlantic coasts much of the early evidence for farming comes from caves and rockshelters. In Italy, the cave of Arene Candide in Liguria has an early radiocarbon date around 5800 BC for the presence of domesticated animals (Biagi, Maggi, and Nisbet 1989). The cave of Caldeirão in Portugal has a date of 4380 ± 80 bc; 5348–5231 BC (OxA-1035) for the beginning of farming in that area (Zilhão 1993). Geddes (1985) claimed that Mesolithic layers in the French caves of Chateauneuf-les-Martigues, Gazel, Jean Cross, Arques, and Dourgne yielded the bones of domesticated sheep, but Zilhão (1993) has shown that animal disturbance has introduced such bones into the Mesolithic strata from later occupations. Thus it is doubtful that these represent Mesolithic communities with domesticated sheep. Investigations at Chateauneuf-les-Martigues did not recover any domesticated sheep in the Mesolithic layers (Courtin, Evin, and Thommeret 1985). Rowley-Conwy (1995), after critically evaluating the evidence, concludes that the Cardial Neolithic in the western Mediterranean began around 4850 bc (5600–5700 BC), a date applicable to the earliest Neolithic in southern France and eastern Spain. Judging by radiocarbon dates, farming was present in southern Italy around 6000 BC, northern Italy 5800 BC, southern France 5600 BC, and southern Spain 5500–5400 BC (Zilhão 2001). However, domesticated plants and animals are often found together with Cardial pottery in eastern Spain around 5600 BC (McClure et al. 2006). There is no strong evidence for an autonomous origin of farming in the western Mediterranean. In general it seems that the transition to farming was by diffusion of products or information and/or actual colonization. Zilhão (1993) sees a discontinuity in the archaeological record between the Portuguese Mesolithic and Neolithic and suggests a maritime pioneer colonization. He compares the spread of Cardial pottery groups to those of the Linear Pottery culture in central Europe (Zilhão 1993:49).

Another route of movement of farming was from Greece into transitional zones between Mediterranean and temperate Europe, such as Macedonia, and from there into the temperate zone of southeastern Europe. As the farmers spread from Thessaly in Greece to Macedonia and other areas they needed to adapt to some climatic and ecological changes. “Whereas much of Thessaly, central Greece and the Peloponnese are subject to the Mediterranean climate, Macedonia (except for the coastal plain) also comes under the influence of a continental climate . . . with colder winter temperatures and, in some years, more summer rainfall, often extremely localized and destructive of crops and soils” (Wielkie and Savina 1997:206).

From Thrace to Slovenia and from Hungary’s Middle Tisza region to Moldova, various regional names are applied to Neolithic archaeological remains of these farmers: Karanovo I/II in Bulgaria, Starčevo in Serbia, Criş in Romania, and Körös in Hungary (Table 7.3, Fig. 7.3). We will refer to all of these groupings as southeastern European Neolithic. Dennell (1983) has suggested that the transition to farming in this area was an indigenous process. However, evidence for the hunters and gatherers is poor except in the Dinaric Mountains and along the Adriatic coast, outside the zone of initial Neolithic expansion, and in the exceptional environment of the Iron Gates on the Middle Danube, also a peripheral area for the southeastern European Neolithic. The principal domesticated plants and animals were not native to the region. I consider it unlikely that local foragers here domesticated plants and animals independently. A gradual decrease in the age of “first farming” radiocarbon dates as we move from south to north at least suggests a northward expansion by farming populations. There is no region in western, central, or northern Europe where farming appears earlier than it did in the south. What caused farmers to expand into southeastern Europe and later to central Europe? Some 1200 years, 60 human generations, separate the earliest farming societies in Greece from those in central Europe, a period comparable to that between the rule of Charlemagne (742–814) in Western Europe and the present. The expansion of the Neolithic was very gradual. There were no major migrations over long distances. Probably small groups or even individual families moved along rivers and

Table 7.3 Simplified chronological sequence for southeastern Europe

BC	Greece (Thessaly)	Bulgaria (Thrace)	Serbia	Romania (Southern)	Hungary (Eastern)	BC
3000–					Vučedol-Zók	–3000
		Ezero		Coţofeni		
3500–			Baden		Baden	–3500
				Pit-Grave		
			Bodrogkeresztúr	Cernavoda I		
4000–		Karanovo VI		Sălcuţa I		–4000
	Rakhmani				Bodrogkeresztúr	
4500–	Dimini	Karanovo V	Vinča C	Gumelniţa	Tiszapolgár	–4500
5000–	Tsangli	Karanovo IV		Boian, Hamangia	Szakálhát, Tisza	–5000
5500–			Vinča A	Dudeşti	Linear Pottery	–5500
6000–	Sesklo I-III		Starčevo	Criş	Körös	–6000
		Karanovo I				
6500–	Proto-Sesklo					–6500

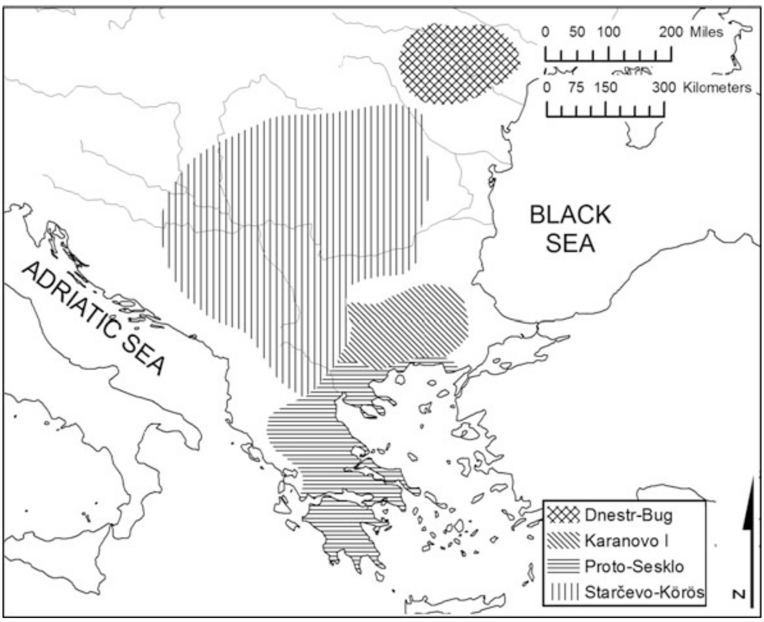


Fig. 7.3 The distribution of Early Neolithic cultures in southeast Europe

major streams. Various factors could have induced such movements, especially over short distances. There does not seem to have been any great attachment of these early farmers to specific places or territories.

Around 6000 BC, the earliest farmers of the Dnestr-Bug culture were present in Moldova and the western Ukraine (Merpert 1994) (Table 7.4). This area borders that of the southeastern European Neolithic and it is possible that local foragers adopted farming as is suggested by evidence from the Soroki 1 and 2 sites (Markevich 1974). In the steppes of Ukraine and European Russia, the beginnings of cattle and goat/sheep herding occur around 5000 BC (Shnirelman 1992, Anthony and Brown 2000).

Table 7.4 Simplified chronological sequence for Belarus, Russia, and Ukraine

BC	Ukraine	Russia (Southern)	Russia (Northern)	Belarus	BC
2500–					–2500
			Corded Ware	Corded Ware	
3000–	Pit-Grave	Pit-Grave			–3000
3500–	Tripolye C				–3500
4000–	Sredny Stog	Sredny Stog			–4000
	Tripolye B		Comb-and-Pit Orn.		
4500–				Narva, Neman (Nemunas)	–4500
	Tripolye A	Denpr-Donets			
5000–	Dnepr-Donets				–5000
5500–					–5500
6000–	Bug-Dnestr				–6000

The cereal species in the steppe Neolithic were exactly those of the Criş culture, so the source of these cereals is southeastern Europe.

The Problem of a Prepottery Neolithic in Europe

It is the opinion of some archaeologists (Theocharis 1958, Milojčić 1960) that the earliest farmers in Greece did not possess pottery, and thus the term aceramic or prepottery Neolithic has been applied to them. Bennet and Galaty (1997:82) date the aceramic Neolithic on the Greek mainland at 6800–6500 BC and on Crete at 7000–6500 BC. Similar phases are used occasionally for southeastern or central Europe. However, the areas so far excavated at such prepottery sites as Argissa, Soufli Magoula, Sesklo, and the lowest layer at Knossos have been very small. At Knossos the prepottery occupation is dated around 7000 BC. It should be noted that pottery was present in Anatolian Neolithic settlements around 6800 BC. The absence of pottery from some sites may be due to sampling errors. Clay figurines, even potsherds occur at some of these sites, suggesting that their occupants could produce fired clay objects or that at least they were available in the area; 288 sherds have in fact been found at the Early Neolithic Argissa site (Nandris 1970, quotes Rodden's Ph D thesis). Demoule and Perlès (1993) suggest that it is possible that these sherds were intrusive; they conclude that only new excavations can clarify this problem. As previously mentioned there is prepottery occupation on Crete (Evans 1994). Thus it is possible that the prepottery Neolithic lasted some 200 or 300 years in the Aegean area. However, recent work by Reingruber (2008) has cast doubt on the existence of a prepottery Neolithic in Europe.

The notion of a southeastern European prepottery Neolithic is based on the occurrence of such a phase in the Near East and on the unilineal evolutionist assumption that such a phase is universal. The earliest Neolithic at Jericho, 8500 BC, in the Near East, lacks pottery, encouraging some archaeologists to look for such settlements dating one or two millennia later in Europe. The importance of the Neolithic, however, lies in social, economic, cultural, and ideological changes rather than in the presence or absence of pottery. The paucity or absence of pottery at some sites, or some areas within a site, more probably reflects differences in function. Pottery can occur among hunters and gatherers, and is not exclusively associated with the Neolithic. Likewise not all farming communities need to possess pottery. Vessels made of wood, leather, bark, bone, or stone can be used for storage, drinking, serving, and cooking. Such vessels indicate levels of complexity of material culture similar to those indicated by the presence of pottery.

The Transition to Farming in Central Europe

Central Europe may well be the region where farming most likely spread by colonization. Recently Detlef Gronenborn (2007) discussed and evaluated various possible scenarios for the appearance of the earliest Linear Pottery material in central Europe. Except for parts of Hungary and Romania where the Linear Pottery Culture (archaeologists sometimes refer to it by the German abbreviation LBK) was preceded by the Körös culture, its sites represent the earliest farmers in the region (Table 7.5). Their earliest manifestation is around 5700–5600 BC. Whittle (1996a, 2007) has challenged the migration scenario, suggesting that this culture represents a continuation of indigenous foraging ways of life in Hungary. Kertész (1996, Kertész et al. 1994) work tends to support the hypothesis of Whittle (1996a) who has recorded almost 100 sites dating to the Mesolithic on the northern Hungarian Plain, especially in the Jászság area near the confluence of the Tarna and Zagyva rivers. Likewise Tillmann (1993) and Kind (1998) have suggested an indigenous adaptation of farming by local Mesolithic groups in Germany. Gronenborn (1999:181) has pointed out that “There is no evidence for a transitional phase, instead farming settlements appeared quite abruptly.” He (2007:77) emphasizes that a general scenario of a regional origin of LBK is favored by most central European archaeologists. Furthermore, he cites Haak et al. (2005) and points out that “recent ancient mtDNA evidence certainly does not contradict the hypothesis of an emergence of the LBK within a local population in the Transdanubia and/or south-west Slovakia, and the expansion from these territories towards the west and north-east” (Gronenborn 2007:77). There were no complex late Mesolithic forager societies in central Europe. The domesticated animals and plants were introduced from southeastern Europe. Furthermore, early Linear Pottery communities exhibit little variation in pottery or house form. If indigenous foragers adopted agriculture in central Europe, we would expect greater variability in material culture over this large area (Bogucki 1996). To be fair, Robb and Miracle (2007:113) argue that “LBK farming was adopted rapidly and uniformly by a minority of Mesolithic foragers in very specific environments.” Thirty or forty years ago hunters and gatherers were generally ignored when considering the transition

Table 7.5 Simplified chronological sequence for central Europe

BC	Netherlands	Switzerland (eastern)	Austria (eastern)	Czech Republic	Poland (southern)	BC
2000–						–2000
					Bell Beaker	
2500–		Bell Beaker		Bell Beaker		–2500
	Bell Beaker		Bell Beaker			
	Corded Ware	Corded Ware		Corded Ware	Corded Ware	
3000–						–3000
		Horgen			Globular Amphora	
3500–			Baden	Baden	Baden	–3500
			Bajč-Retz			
4000–	Funnel Beaker			Funnel Beaker	Funnel Beaker	–4000
		Pfyn				
		Cortaillod				
4500–		Egolzwil				–4500
			Lengyel	Lengyel	Lengyel	
			Stroke Ornamented	Stroke Ornamented	Stroke Ornamented	
5000–						–5000
	Linear Pottery	Linear Pottery				
5500–			Linear Pottery	Linear Pottery	Linear Pottery	–5500

to farming, now some archaeologists have gone overboard in emphasizing their importance in every corner of Europe. Judging by ethnographic data, foragers were not very successful in dealing with incoming farmers. Lüning (1994:542) has commented about results of contacts between farmers and hunters and gatherers: "In a historical situation like this the relations between the two sides frequently pursue a hostile course, ending with the expulsion of the hunters and gatherers." However, the archaeological past is not constrained by the small sample represented by the ethnographic record of the past 500 years. The Mesolithic-Neolithic transition ought to be tested case by case with archaeological data, and not prejudged. I do not reject the possibility that some foragers in central Europe adopted farming; they had to make various decisions and choices concerning their ways of life when farmers appeared in nearby territories. For example, the La Hoguette populations in southwest Germany, Luxembourg, the Netherlands, and northern France may represent foragers who had adopted ceramics and domesticated animals (Jeunesse 1987, Lüning, Kloos and Albert 1989).

The earliest farmers in central Europe belong to the Linear Pottery culture. Linear Pottery material is widely distributed, from the Paris Basin in the west to the Dnestr River in Ukraine in the east (Fig. 7.4). The southern boundary is the Drava (Drau) River in the Hungarian and Croatian border area and it is found as far north as the mouth of the Odra (Oder) River in Poland (Kulczycka-Leciejewiczowa 1979). The earliest Linear Pottery ceramics occur in western and northern Hungary, Slovakia, the Czech Republic, and eastern Austria (Lüning 1994).

The Linear Pottery culture was probably derived from the late Starčevo-Körös tradition, and the indigenous foragers (Bánffy and Oross 2010). The earliest Linear Pottery ceramics, dating to 5550

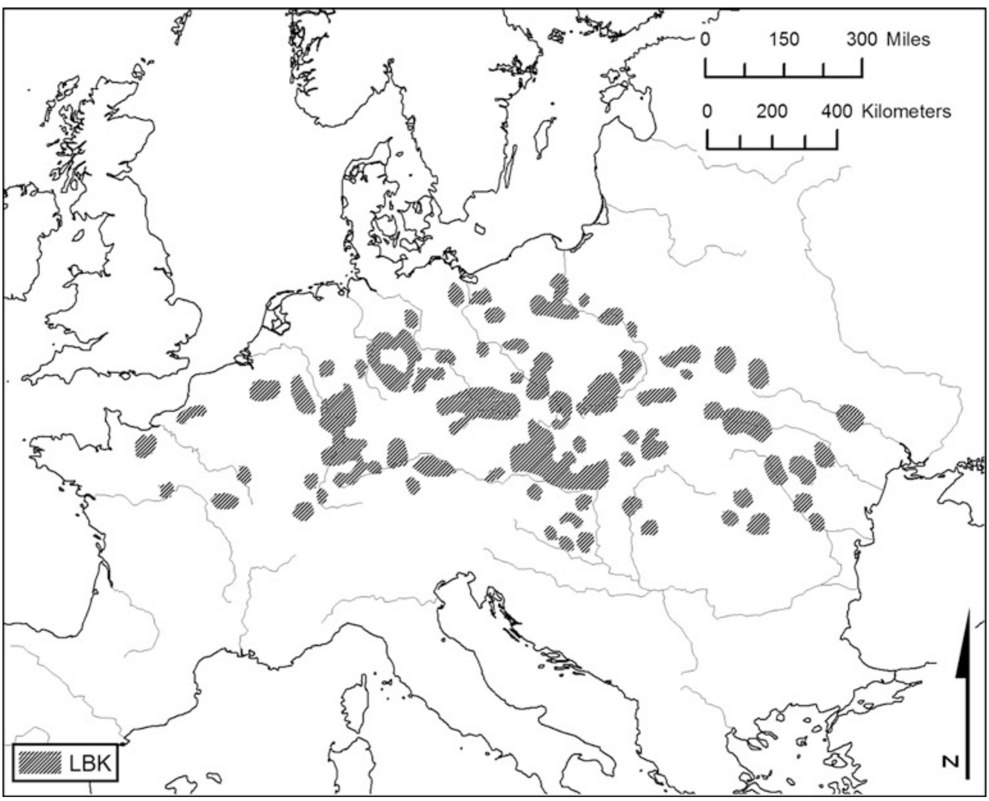


Fig. 7.4 Distribution of Linear Pottery sites in Europe

BC, show some similarities in form and ornamentation to those of the Starčevo-Körös culture (Kalicz 1995). Stadler's (2005) field work at Brunn am Gebirge, Lower Austria, revealed in one area of the site pottery similar to Late Starčevo types or formative LBK in Hungary. The Early Neolithic occupation at the site is dated to 5550–5200 BC. The *Dunántúl Vonaldiszes Kerámia* (DVK) is a Linear Pottery tradition in Transdanubia that is probably ancestral to the central European Linear Pottery culture (Kalicz and Makkay 1977, Kertész 1996). It is assumed that these people moved out from southwestern Hungary and later developed the ceramic types that we associate with Linear Pottery populations. Eszter Bánffy (2008:161) speculates that this population movement was motivated by a search for salt sources. There are no salt sources in central and western parts of the Carpathian Basin. Not much can be said about Mesolithic populations in Lower Austria, as there is little information on the subject (Stadler 2005). It took some 200 years, until 5500 BC, for Linear Pottery people to reach the Rhine Valley in Germany (Lenneis et al. 1996). Several strontium isotope studies on human skeletal remains from populations in southwest Germany indicate a high incidence of migration or mobility by these people (Price et al. 2001, Price and Bentley 2005, Bentley et al. 2002, 2003). There are different forms of movement, including migration of people into a new area, or women moving into their husbands' communities. Penny Bickle and Daniela Hofmann (2007) have thoughtfully evaluated the strontium isotope studies and observe that "Clearly isotope studies are no quick fixes for our 'big questions', but they have proven crucial to raising questions of social organization and mobility with renewed force and have opened up new avenues of thinking" (Bickle and Hofmann 2007:1038).

Ancient DNA analyses have yet to coalesce into agreement about the relative genetic contributions of Linear Pottery and Mesolithic peoples to modern European populations (Ammerman et al. 2006, Barbujani and Bertorelle 2001, Chikhi et al. 2002, Haak et al. 2005, Richards 2003a, b). The current models of demic *versus* cultural diffusion using DNA studies are still the subject of debate, and estimations of relative genetic contributions of either LBK or hunter foragers vary considerably. In large part, this variation is due to several complex factors and subtle issues affecting the results and interpretations. Obvious factors include small sample sizes, conflicting DNA data, difficulties in extraction and amplification of DNA sequences, and modern contamination. It has been pointed out that tracing genetic lines using a single marker such as a Y-based haplotype can lead to misrepresentation of the significance of results due to ascertainment bias (Currat and Excoffier 2005). Subtler factors include the skewing of the data depending on whether Y-chromosome or mitochondrial DNA sequences have been analyzed. This may result in significant differences in estimating genetic contributions (Haak et al. 2005). Further complicating the issue is the realization that some distinctive patterns may indeed be real and related to differences in the movements of males and females into Europe that depend on complex social factors not yet understood (Burger et al. 2006). Finally, some studies suggest that genetic bottlenecks in the past acted to mask genetic contributions in breeding populations (Excoffier and Schneider 1999).

Linear Pottery is one of the most intensively investigated cultures of the European Neolithic (see Whittle 2009); there have been thousands of publications on the subject since the last two decades of the nineteenth century. Numerous recent studies indicate how dynamic research is into the Linear Pottery culture remains (Pavlů 2000, Lukes and Zvelebil 2004, Whittle 2003, Hofmann and Bickle 2009).

Childe (1929) used the term Danubian to describe the entire sequence of Neolithic cultures in central Europe and the Linear Pottery culture was designated Danubian Ia. Its most characteristic attributes are (1) the ornamentation style of its finely made ceramics, which consists of the straight or curved incised lines which give the culture its name; (2) a particular type of polished adze-axe stone tool; and (3) settlement patterns consisting of communities made up of longhouses (Fig. 7.5).

The occupation of central Europe by farmers occurred during the Atlantic climatic period (7200–3800 BC), when the dominant vegetation was mixed broadleaf forest, except in areas of low precipitation, where open woodland prevailed. Most Mesolithic sites are found in areas of sandy soil,

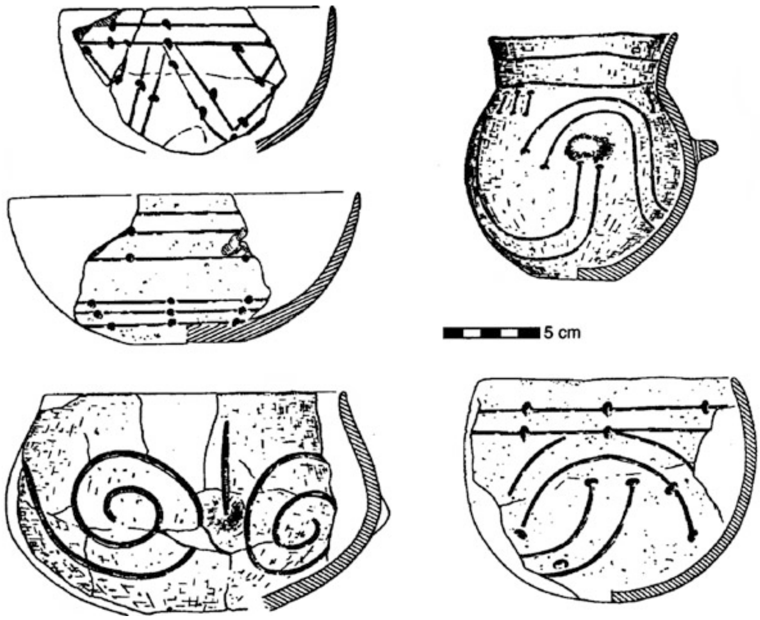


Fig. 7.5 Linear Pottery ceramics from southeastern Poland (after Kamieńska and Kulczycka-Leciejewiczowa 1970, Kulczycka-Leciejewiczowa 1970, Milisauskas 1986)

but it would be presumptuous to assume that they completely avoided loess lands. The appearance of the Linear Pottery culture did not mean the end of the foraging way of life. Linear Pottery distribution has an island-like character, and likely the hunting and gathering way of life continued in areas unoccupied by farmers. Since Mesolithic sites were located on sandy soils and Neolithic on loess, the situation favored cooperation, not competition, between different communities. Small population increases, internal conflicts in settlements or households, preference for areas with the best soils, or just the search for "greener pastures" led to a segmenting or budding-off process. This created a pattern of small and similar Linear Pottery communities across the loess belt of central Europe. The families or people that moved from "mother" communities to establish new settlements must have kept contact with their relatives or former neighbors, since it would have been difficult for pioneers to survive in a new environment without help if some crisis developed such as famine.

Radiocarbon dates from wood charcoal suggest that the Linear Pottery culture expanded relatively rapidly across central Europe. Whittle (1990) questions the reliability of these dates noting that they may be derived from the cores of old trees. Early Linear Pottery features dated by the accelerator method using cereal and bone samples do not correlate well with ceramic chronology. The dates from these techniques are younger. For these reasons, Whittle doubts the rapid expansion of the Linear Pottery populations. He suggests that the Linear Pottery culture may begin after 6400 BP. However, "If the *älteste Keramik* (Earliest Ceramics, author's translation) does mark the earliest horizon, then the initial phase of pioneering settlement was rather slower and longer lived than is currently accepted" (Whittle 1990:301). His analysis casts doubts on Ammerman and Cavalli-Sforza's (1972) calculations. Their rate of expansion for the Linear Pottery culture in central Europe is 5.59 kilometers per year, but their average for Europe is only 1.08 kilometers per year. It should be noted that humans at any time, and in any place under any conditions do not move anywhere at a steady rate of 5.59 kilometers per year. What would have caused them to move so rapidly in this area? Therefore, it may well be that the expansion of farmers was slower in central Europe than archaeologists have previously suggested.

The Earliest Farmers in the Alpine Zone

In the second half of the sixth millennium BC, the earliest evidence for farmers is found in some Alpine areas. Around 5300–5000 BC, the earliest Neolithic cultures appeared in Ticino, Switzerland. The remains of two structures, 10 × 4 meters and 4 × 1.5 meters, were found at Casa Grande in Bellizona (Stöckli 1990). The earliest ceramics in this part of Switzerland are similar to those types found in northern Italy, so these farmers appear to have come from the Mediterranean area. In north-eastern Switzerland, Linear Pottery material occurs at Gachlingen and Bottmingen, very close to the French and German borders. In the rest of Switzerland, it was several hundreds of years before farming communities appeared. Here the Cortaillod culture, dated around 4500 BC, characterizes the Early Neolithic (see Chapter 8). Small timber houses differentiate it from the Danubian tradition. It is possible that Cortaillod represents local hunters and gatherers who adopted agriculture.

The Transition to Farming along the Atlantic Coast of Europe

The Neolithic transition occurred in the Atlantic coasts of north-west Iberia and the French west coast between 5500 and 4500 BC (Arias 2007, Marchand 2007). It is here that a variety of scenarios are possible for the transition to farming. As Arias (1999:445) has pointed out, "immigrant groups seem to have moved into some areas, while in other zones, acculturation processes developed as a result of the presence of small foreign populations nearby, and in yet other regions, change was mainly an indigenous process."

In northern France and Germany, the Linear Pottery populations lived close to coastal hunters and gatherers, while Cardial peoples in the Mediterranean basin exchanged products and information with foragers in Portugal and Spain. In France, Linear Pottery material is found within 50 kilometers of the coast (Scarre 1992). Atlantic coastal Mesolithic peoples lived in environments rich in marine and other resources. Some of them may have lived in semi-permanent settlements. Therefore it is not that domesticated animals and plants necessarily provided them with more food.

The transformation from Mesolithic to Neolithic was gradual in the Lower Rhine Basin. Kooijmans (1993) uses the term semi-agrarian to describe populations dependent on hunting, fowling, fishing, foraging, and animal husbandry and perhaps domesticated cereals in the delta sites of the Netherlands.

By 5000 BC, most areas of Europe were occupied by farmers. Hunting and gathering societies persisted in the eastern Baltic area, in Scandinavia, in parts of the North European Plain, and in the British Isles. It is interesting that the farming frontier in the north, toward Scandinavia and the East Baltic area, did not shift for hundreds and in some cases thousands of years. This boundary may be related to ecological factors such as the fertility of soils. The higher population densities of hunters and gatherers in Scandinavia and the East Baltic area may also have inhibited the expansion of farmers. We can assume that along this frontier there was exchange of various products and information, but at the same time conflict may have developed. The numerous finds of Neolithic adzes/axes as shown by Midgley (1992) in forager territories of the North European Plain may not always have been the commodities of peaceful exchange, but the weapons of raiding parties of farmers against Mesolithic populations. On the other hand these finds may also represent loot taken by Mesolithic raiders after successful strikes into Linear Pottery territory.

Relationship of Farmers to Hunters and Gatherers

One of the more interesting problems of the Early Neolithic is the relationship of farmers to hunters and gatherers. Since actual archaeological evidence for any type of interaction is rare, most of these comments must be considered tentative. Price (1987) has suggested that Neolithic and Mesolithic groups were contemporaneous in the Netherlands for some time. Kozłowski and Kozłowski (1977), and Kaufmann (1979) have noted the absence of Mesolithic sites on the loess soils of central Europe. Likewise Rulf (1983) and Gramsch (1973) have noted different soil and terrain preferences by Early Neolithic and Mesolithic peoples. Kertész (1996) has also noticed the different soil preferences in the Carpathian Basin, where Mesolithic populations appear to have preferred the sandier soils of the Danube-Tisza interfluves, which were not occupied by Neolithic groups. In southwest Germany, Mesolithic groups seem rapidly to disappear from the archaeological record. Jochim (1998:222) proposes several scenarios for the fate of the Mesolithic groups, "absorption into agricultural communities, adoption of fully agricultural economies through contact, or ultimately hostile displacement." Pinhansi's and Pluciennik's (2004:S74) analysis of the craniometric data of Mesolithic and Neolithic samples suggests that "the remarkable homogeneity among some Early Neolithic specimens from south-eastern Europe and those from Çatal Höyük implies little biological interaction among many of these initial farming groups and local hunter-gatherers." This suggests that intermarriage between farmers and hunter-gatherers was rarely practiced in southeastern Europe.

Molecular analysis is adding a new dimension to our understanding of the social interactions of hunter gatherers and farmers during the Early Neolithic. DNA studies however are complicated, the results variable and difficult to interpret (Burger et al. 2006, Currat and Excoffier 2005). The confusion arises from limited samples, inconsistent results, targeting not just different kinds of DNA but different regions and comparing data across wide geographic regions and time spans. Some studies suggest that Mesolithic women contributed to the mtDNA composition of modern European descendants (Haak et al. 2005, Knapp et al. 2008). Other studies however suggest that Mesolithic contribution was small or has been masked by repeated subsequent population replacements. When combined with strontium isotope studies it becomes clear that admixture was a factor in blurring genetic patterning (Bentley and Knipper 2005).

A major obstacle to the analysis of relations between farmers and foragers is the inability of archaeologists to date more precisely many Mesolithic sites. Most archaeological material recovered from Mesolithic sites consists of flint artifacts that are impossible to date precisely by techniques currently available. The problem is well illustrated in southeastern Poland, where there are many Mesolithic sites in the post-Pleistocene period (after the ninth millennium BC). Typologies of flint artifacts yield only very general chronologies. Sites with flint artifacts but without ceramics are always classified as Mesolithic. However, it is possible that such sites were hunting camps or the sites of other activities by farmers, where no pottery was made or used. Non-ceramic sites are located both in the uplands and lowlands. Access to streams and rivers was important for both hunters and farmers, for they both utilized water for drinking, fishing, and transportation. Farmers needed to water their livestock every day as well.

The scarcity of evidence has not prevented archaeologists from proposing various scenarios for such interactions. Perhaps hunters and gatherers supplied game in exchange for grain. This might explain the scarcity of projectile points at some Linear Pottery sites. Middle and Late Neolithic sites have more projectile points; the number of hunters and gatherers had by then presumably declined. Alternatively, the increase in projectile point frequencies may indicate an increase in warfare or the appearance of new hunting methods. Or it may be due simply to more stationary ways of life, in which more activities were performed in the same settlement.

Gregg (1988) suggests foragers exchanged harvest time labor for farmers' meat, cereals, etc. Direct signs of interactions between groups were seen at Vaihingen in Germany where strontium isotope analysis revealed the different origins of people buried in the settlement and those buried in the enclosing ditch (Bentley et al. 2003). Conflict between farmers and foragers is suggested by the fortified settlement at Darion, Belgium, put up, possibly, to defend a Linear Pottery community from attacks by indigenous peoples (Cahen 1985). But we also can suggest that Darion was fortified to protect against other Linear Pottery communities. In a recent review of LBK archaeological sites in central Europe Golitko and Keeley (2007) concluded that there is a good deal of evidence for violent interactions between farmers and foragers. Barker (2006) observes that most ethnographic and historic evidence indicates tense relations between groups using different subsistence strategies. Usually this leads to the disappearance of the hunter-gatherer groups. Barker's conclusions are in opposition to more recent views such as Whittle's (1996a, 2007) on the early Neolithic Europe.

Subsistence Strategies

There was a mixed grain and livestock farming tradition in most regions of Europe from the beginning of the Neolithic, not just a dependence on domesticated plants, as in some other areas of the world. Early Neolithic populations exploited different food resources: cultivated plants and domesticated animals, wild game, fish, and plant foods. We should be cautious with the claims of various archaeologists concerning the relative roles of plants and animals at different Early Neolithic sites. Such differences can be explained by ecological or cultural factors, although they may be the result of the differential preservation of bone and plant material, chronological factors, different archaeological excavation techniques, or sampling error.

Early Neolithic economies in Greece, Bulgaria, Macedonia, and adjacent areas of southeastern Europe were based on domesticated animals and plants supplemented by wild animals and plant foods. Fishing is indicated at some sites by fish bones, shells, and bone fishhooks. However, when dealing with Early Neolithic subsistence practices in southeastern Europe or other regions, we must consider the potential productivity of such different activities as agriculture, gardening, animal husbandry, hunting, fishing, and gathering. The productivity of these different resources varied between Neolithic societies, and probably fluctuated from year to year. The potential of different food resources was largely determined by both the techniques through which they were exploited and environmental variability. During the Early Neolithic, at least, farming was done using hoes and digging sticks; no evidence for plows has yet been found. Such horticulture could not have been as productive as plow agriculture because the size of cultivated fields was limited by the capabilities of unaided human labor.

Collecting wild plants and hunting played important roles in Early Neolithic subsistence strategies. The appearance of farming settlements does not imply neglect of non-domesticated foods. The simple techniques of Early Neolithic farming probably yielded good and bad harvests. In lean years hunting and gathering would have made a great difference, and it is also possible that local hunters and gatherers brought meat in for trade. Farming was just one subsystem in more inclusive mixed subsistence strategies.

Early farming was unpredictable and poor crop yields were probably common. Harlan (1995:112) has noted that after farming became established "the threat of famine was ever at hand and starvation became an integral part of agricultural history." Judging from the historical record of the late Middle Ages and early modern times, short-term climatic fluctuations had an effect on economy and society (Pfister 1985). Cold and rainy springs and summers were followed by crop failure. Hüster-Plogmann et al. (1999) assume that a similar relation existed between climate and economy during the Neolithic. In time of poor harvests, wild plants and animals were exploited more intensively (Schibler et al. 1997). There was more intense gathering of plants, seeds, and nuts such as hazelnuts, turnip seeds, and goosefoot, which are rich in fat and carbohydrates. Hüster-Plogmann et al. (1999) show how climatic fluctuations are associated with wild animal frequencies at sites in the Zürich Lake region, southwest Germany, and Bavaria from 4500 to 2700 BC. In the Zürich Lake region, sites such as Kleiner Hafner, Mozartstrasse, Seefeld, Pressehaus, and Feldmeilen were excavated during the 1970s and 1980s. They are well dated by dendrochronology and the radiocarbon method. There were periods of amelioration and deterioration over a span of 1800 years. Hüster-Plogmann et al. (1999:191) observe that "when examining the atmospheric 14C concentrations for the period between 4450 and 2700 BC (there) are phases with high 14C-values, depicting 'cold phases' for each millennium. These are regularly succeeded by 'warm phases' with low 14C-values. When the relative proportions of game animals from the Lake Zürich shoreline settlements are placed on the graph, they follow the curve quite well." The high proportions of wild animals are associated with cold phases. However, there were gradual improvements in farming techniques, including the appearance of simple plows, throughout the Neolithic; these helped cope with crises due to climatic fluctuations. Thus farmers were less dependent on wild resources in the Alpine zone in later periods.

Judging from the bone remains recovered at Argissa (Greece), Nea Nikomedeia (Greece), and Anza I (Macedonia), sheep and/or goats dominated domestic herds during the southeastern European Early Neolithic. Perhaps these animals played a role in rituals, as is suggested by the clay figurines found at these sites. However, cattle supplied the largest amount of meat. The particular emphasis on sheep/goats that is apparent in Greece and adjacent areas is appropriate to Mediterranean environments. As at many other Neolithic settlements, more than half of the domestic animals at Nea Nikomedeia were killed as immature individuals. This suggests that young animals were slaughtered for meat. The killing of young males especially would have been an efficient method of culling a herd, since only a few males would be required to maintain herd size. It would have been inefficient to keep many young males during the winter when fodder was limited (Bökönyi 1972, Payne 1973, Gregg 1988, Greenfield 2005). Some of the wild animals that are represented by one or two bones at a site might be accounted for by natural death.

The roles played by different animals in Neolithic subsistence strategies are not easy to establish, because there are various ways of interpreting the archaeological data. One problem is whether archaeologists use the actual count of the bones of a given species or attempt to estimate the minimum number of individual animals (MNI). Also, the identification of specific species from bone remains is not simple. For example, it is not easy to differentiate domestic pig or cattle from wild varieties, though size differences are assumed to be indicators. It is also frequently impossible to differentiate goats from sheep, hence my designation "sheep/goats."

Estimating MNIs is difficult because typically we are not aware of the type of bone refuse represented in deposits at a site. The estimates assume that entire animals are indicated. When that is the case estimating MNIs is appropriate. But in many cases, such as pigs' remains in some of the Bronocice phases in Poland, only limited parts of animals are represented suggesting that those animals were not present at the site but only meat units. In those instances calculating MNIs is inappropriate. The use of the minimum number of individuals in estimating the importance of different animal species can alter our views about Neolithic subsistence. For example, Soudský and Pavlů state that 80% of the animals present at Bylany, the Czech Republic, were cattle, based on the number of cattle bones found (Soudský and Pavlů 1972:323). But MNI counts reduce the proportion of cattle to 25%. However, the weight of edible meat from cattle makes up 60% of the total weight of edible meat represented at the site when using the minimum number of individuals. Furthermore, in terms of the different amounts of calories per kilogram available from different kinds of meat, cattle supplied 80% of the food energy derived from meat. Thus we have come full circle back to Soudský's and Pavlů's original figure. It should be noted that Peške's (1986) analysis of bone counts at Bylany puts cattle at 75%. These different approaches to analyzing animal remains can be used in various ways to support one's favorite hypothesis.

The plants cultivated by the Early Neolithic farmers of southeastern Europe differed in yield, vitamin content, resistance to disease, and climate and soil needs, and therefore in their usage. The variability in plant cultigens thus reflects the ecological variability, which the early farmers faced or created, and their very mixed subsistence strategy. The failure of one type of crop in a mixed strategy is not necessarily associated with failure of other crops; this diversity gives farmers a sort of ecological insurance.

Early Neolithic populations in southeastern Europe cultivated emmer wheat, einkorn wheat, club wheat, barley, millet, lentils, and legumes (Renfrew 1979, Bogaard 2004). The small size of seeds recovered from Azmak, Bulgaria, suggests that lentils may have been wild (Renfrew 1969:154). The remains of bread wheat were also found at Azmak, but it is unclear if it was cultivated separately from emmer wheat. Hopf's (1975) analysis of plant remains from the Azmak mound shows that in some occupation layers bread wheat predominated. Around 6000 BC bread wheat was already being cultivated at Knossos, Crete.

Emmer wheat was the most extensively cultivated plant in southeastern Europe. Throughout the Neolithic and later periods, different varieties of wheat, particularly emmer, were cultivated in the temperate zones of Europe. Wheat grows best on well-drained clay soils. It needs comparatively high winter temperatures and annual rainfalls of about 50.8–76.2 centimeters (Renfrew 1973:65). Although new varieties of wheat came into use throughout European prehistory the older types persisted. Variations among wheat species in their tolerance of cold weather, resistance to diseases, yield, and usage ensured that a variety of types would be cultivated in different areas in temperate Europe. For example, the greater quantities of bread wheat encountered in the Bronze and Iron Ages, does not signal the elimination of other types such as spelt wheat. Although bread wheat is more prolific and more easily harvested and threshed than the spelt wheat, the latter species has greater winter hardiness and resistance to smut and rust fungi. In areas where the probability of frost damage to sown wheat is high, spelt wheat would have been the better choice.

Barley is a hardier cereal than wheat, and it can be cultivated on poorer soils. Furthermore, barley exhausts the soil less than wheat. Barley prefers loam soils, but it also tolerates alkaline conditions. It can be grown on soils derived from chalk or limestone.

A variety of wild plants that have been recovered from Early Neolithic sites in southeastern Europe were utilized as food, medicine, and for technological purposes such as basket-making. At Chevdar, Bulgaria, blackberry, grape, flax, and Cornelian cherry were found (Dennell 1972, 1974). Dennell (1974) thinks that flax grew in wheat fields as a segetal plant. It is a multipurpose plant and can be used for making fibers and extracting oil. In addition, apples were found at the Obre I site (Renfrew 1973:203–204).

Analyses at Early Neolithic sites in Bulgaria show very clearly how different archaeological contexts can produce different frequencies of plant remains (Dennell 1972). Cereal remains occur in different frequencies on house floors as distinct from pits, ovens, or middens. At Chevdar, emmer wheat frequencies in oven features varied from 7.2 to 94.3%, whereas those from house floors ranged from 18.8 to 33.9%. It is evident that some of the differences suggested for Early Neolithic subsistence strategies can be explained by sampling errors committed during site excavations.

The Early Neolithic Cardial peoples of Dalmatia, Italy, Provence, Spain, and the Mediterranean islands possessed domesticated cattle, sheep, goats, einkorn, emmer, bread wheat, and, especially, barley. At Cova de l'Or cave in Spain, einkorn wheat accounted for 0.89%, emmer wheat 13.4%, bread wheat 20.2%, and six-row barley 65.44% of the plant assemblage (Hopf 1971). A subsistence strategy based on barley and sheep/goats is particularly suited to seasonally hot, dry Mediterranean environments.

Cattle, sheep, goats, pigs, and dogs were the domesticated animals kept by Early Neolithic populations in Croatia, Serbia, and Romania. At this time cattle started to play a more important role in the economy, as is shown by the increase in cattle bones in relation to sheep/goat at Starčevo sites. A great variety of wild animals were hunted, but most were hoofed animals such as pigs and deer. Though percentages are low at some sites because of the presence of small mammals like hare, the weight of meat contributed by hoofed mammals to Early Neolithic diets was much greater than bone percentages suggest. Most of these were forest animals such as red deer.

Central Europe: The Linear Pottery

Linear Pottery subsistence strategies can be viewed at three levels: household, interhousehold, and intervillage. Clusters of Linear Pottery sites in a small region probably represent cooperating communities. If we consider the issue of cooperation based on the need to breed livestock across herds then cooperation was a necessity. The Linear Pottery people drew their subsistence from agriculture, livestock, gardening, hunting, fishing, and gathering. A wide range of domesticated and wild animals was exploited (Müller 1964, Nobis 1984, Glass 1991). Fishing (carp and sturgeon) and fowling (wild goose and duck) were practiced (Müller 1964), but hunting probably played a greater role than has been emphasized by archaeologists. Wild animals make up 10% or less of the faunal assemblages at various eastern German sites. However, the faunal assemblages are more variable in southern Germany and northern France (Uerpmann and Uerpmann 1997, Arbogast 2001, Hachem 2001, Stephan 2005), for example, wild animals comprise 5–20% in the Aisne valley of northern France (Hachem 1995). These latter estimates probably come closer to reality. It should be pointed out that some areas were richer in terms of wild life than others. For example, the Iron Gates and the lowlands of Poland have excellent evidence for bird and fish exploitation (Bogucki 1979, Gumiński 2005).

Linear Pottery people did at least some of their hunting to protect cultivated fields from wild animals, although it is unclear what methods and weapons were used. Very few projectile points have been found in the Linear Pottery sites of Slovakia, the Czech Republic, and Poland. This paucity may indicate that traps, rather than arrows or darts, were used for hunting animals. On the western flank of the Linear Pottery area, more projectile points are found, which may indicate the use of bows and arrows. Greater numbers of projectile points do not necessarily indicate the increased use of wild animals.

The Linear Pottery people raised domesticated cattle, pigs, sheep, goats, and dogs. Dung studies supported by environmental studies concerning local vegetation profiles have shown that domestic animals could have grazed in the forests, feeding especially on leaves (Akeret and Rentzel 2001, Valamoti 2007, Kreuz 2008). The leaves of deciduous trees could have been collected as winter fodder. In most regions cattle was the most important domestic animal. Strontium isotope studies in southwest Germany indicate that cattle “could either be kept on the loess close to the settlements year-round, led to seasonal pastures in non-loess regions, or even introduced from outside” (Knipper 2009:153). Aurochs, red deer, pigs, and horses accounted for most of the meat contributed by wild animals. The castration of bulls was already being practiced (Müller 1964). They may have been used as draft animals, but neither ard (primitive plow) marks in fields, nor wheels have yet been found at central European Early Neolithic sites. Males can be disruptive in a herd of animals, and one way to eliminate the problem is to slaughter them young or castrate them. As Early Neolithic populations expanded from southeastern Europe, the importance of pigs relative to sheep/goats increased in the economy. Deciduous forests are ideal for pig breeding because the environment can provide food for large numbers of pigs that are prolific breeders. One sow may produce several offspring per litter.

Among contemporary tribal societies, pig breeding is very important in Melanesia. Pigs are important in Melanesia not merely as a food source, but as the currency of social relations; pork is consumed on ceremonial occasions, and debts can be paid off with the meat or the animals. However, as their numbers increase, pigs create social problems, such as wandering into a neighbor’s garden and eating the neighbor’s crops (Rappaport 1967). I assume that pigs may likewise have caused some disruption in the Linear Pottery culture villages. On the other hand pigs benefit many of these communities for a variety of social reasons (Nelson 1998). For example, societies must contend with organic waste, an issue that can be solved by allowing pigs to roam, as they are avid consumers of garbage.

Thirty or forty years ago, many archaeologists assumed that the Linear Pottery people practiced slash-and-burn (swidden) horticulture and thus were forced to shift their hamlets and villages periodically because of soil exhaustion (Childe 1929, Soudský 1962, 1966, Tabaczyński 1970, Wailes 1970).

In recent years, settlement pattern studies, plant remain analyses, soil experiments, and estimates on cultivated field sizes have tended to support hypotheses of fixed-plot horticulture (Wiślański 1969, Modderman 1971, Kruk 1973, Milisauskas 1977, Groenman-van Waateringe 1978, Bakels 1978, Willerding 1980, Sherratt 1981, Dennell 1983, Barker 1985, Czerniak 1994). Jarman (1976), Lüning and Meuers-Balke (1980), Rowley-Conwy (1981), Howell (1983), and Gregg (1988) cite data, which show that the yields of cultivated cereals, such as wheat, did not decline greatly in temperate Europe in prehistoric or historic times. Experiments conducted between 1940 and 1974 on the alluvial terraces of the Rhine, without the use of fertilizers, resulted in declines of only 15% for winter wheat and 8% for spring barley.

Cultivated fields were located within 1 kilometer of settlements and there is evidence for vegetation burning around Linear Pottery sites (Kreuz 1990). Wasylikowa (1982) noted the presence of charcoal in a core during a pollen analysis at Pleszów, southeastern Poland, and also charred plant fragments, which suggest that fields were burnt. This finding probably reflects the clearing of primary forest near settlements for cultivation. Afterwards, secondary growth flora, such as wild apple, wild pear, and hawthorn, appeared around settlements (Schweingruber 1973). As the first farmers in central Europe, the Linear Pottery people had to carve their fields out of the forests by burning off natural vegetation. This, however, does not mean that they practiced slash-and-burn farming (Milisauskas 1986). The Linear Pottery peoples exploited forest resources for construction, tool making, firewood, food, and animal fodder (Kreuz 1990) (Fig. 7.6).

Digging sticks were probably used for working the cultivated fields. Crops were harvested with flint sickles inserted into wooden handles. We can estimate the amount of land needed for farming. Population estimates for Linear Pottery settlements vary from “several” to over 200, depending on the

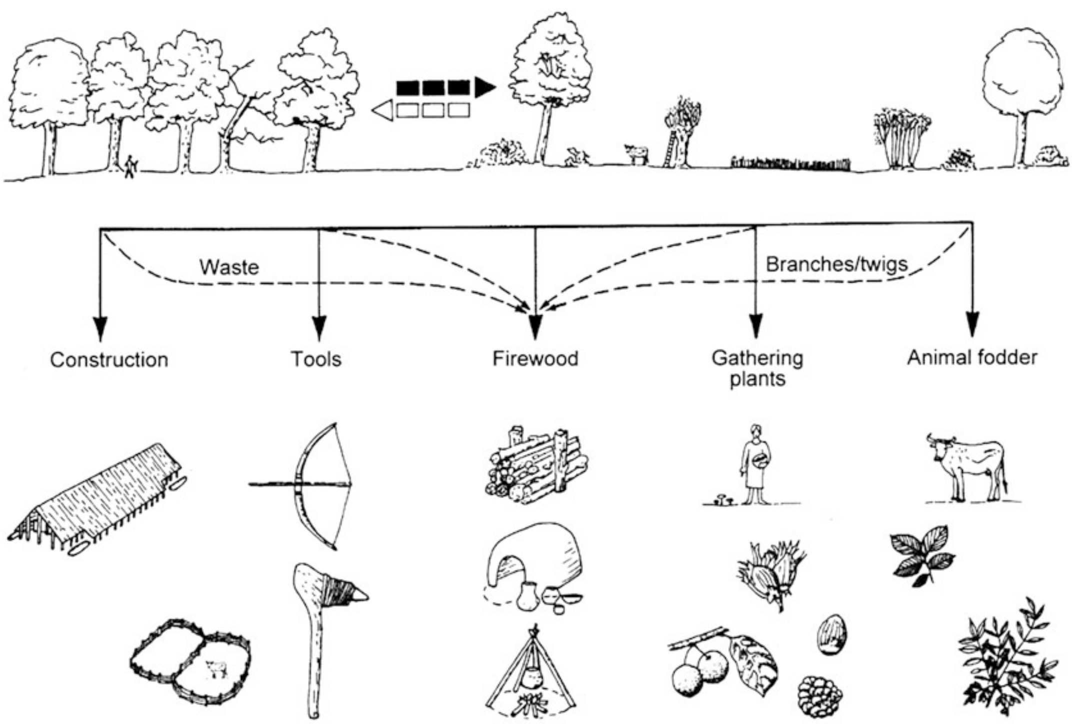


Fig. 7.6 Utilization of forest resources during the Linear Pottery culture times (after Kreuz 1990, with modifications)

assumptions and methods used. We can ask what area a small hamlet or a large village would need per year for emmer wheat, the cereal most extensively cultivated. If a family consumed the produce of 2 hectares of arable land per year (0.40 ha of land per person per year) (Gregg 1988), the amount of land needed by a settlement for 1 year would have ranged from 2 hectares (1 family) to 80 hectares (40 families or 200 people). Some of the grain would have been set aside for seed and probably for feeding animals if they were to survive during the winter. However, Linear Pottery people did not depend only on wheat for food; meat from domesticated and wild animals and food from other plants were also eaten. For most sites, there was enough land for cultivation within 1 kilometer of a settlement. We do not imply that Linear Pottery communities subsisted only on cereals, but we do point out that they used very little of the land potentially available for farming. In the Bronocice region, southeastern Poland, only 8.6% of land located within a 1-kilometer radius of hamlets and villages was utilized.

Cereals made up the bulk of the plant foods cultivated by the Linear Pottery people: emmer wheat, einkorn wheat, spelt wheat, club wheat, barley, and millet. But cereals do not supply vitamin C, calcium, amino acids, or other necessary nutrients (Neustupný and Dvořák 1983). Thus, garden plants, lentils, and field peas were cultivated and wild plants collected. As previously mentioned, emmer wheat was the crop most often cultivated; it has been recovered from over 80% of the sites, which have yielded carbonized plant remains. To rely heavily on emmer for subsistence would have been risky, since a bad harvest could have threatened the existence of an entire community. Gregg's (1988) simulation study suggests that if wheat made up 60% of the diet, famines could be expected 5% of the time. "Famine frequency increases to 32% if wheat provides 65% of the diet," (Gregg 1988:139–140). But if the wheat harvest was bad, communities could fall back on other domesticated and wild plants. Groenman-van Waateringe (1979) has suggested that wheat was probably planted in the spring for harvesting in mid to late August. However, Bogaard (2004:114) has recently noted that "the Neolithic archaeobotanical samples generally reflect long-established cereal plots that were autumn-sown and cultivated using intensive methods, resulting in relatively high levels of soil disturbance and productivity." The harvest would have required intensive work over a short period of time.

It is unclear whether opium and goosefoot were cultivated or occurred as crop weeds. The opium poppy is a drug plant, which originated in the western Mediterranean Basin and was perhaps used in rituals. Goosefoot is commonly found in emmer fields, but it may have been cultivated separately, as is suggested by the 7000 seeds found at Lamersdorf in the Rhineland (Knörzer 1971). Remains of fruit trees have been found at Linear Pottery sites (Castelletti 1988). Langweiler 8 in the Rhineland yielded the charcoal remains of wild fruit trees, such as apple, pear, and hawthorn. Wild fruits could have been used for making beverages, food, and dried for usage during the lean winter months (Renfrew 1973).

Milk and Cheese Production

It is important when analyzing Neolithic subsistence strategies to consider when the earliest milking of cows, sheep, and goats and the production of cheese occurred in Europe. Milk can be consumed sour, fermented, or processed into a variety of products such as cheese, which is a significant addition to the food supply, since it can be preserved for many months. Dairy products such as cheese and yoghurt mitigate the problem of lactose intolerance, as little lactose remains in such processed milk products (Clutton-Brock 1981). However, lactose intolerance does not mean that people did not consume milk. There are people who are lactose intolerant but still drink milk and accept the physical discomfort that results.

There is increasing molecular data showing that dairying was practiced during the early Neolithic (Copley et al. 2003, Craig et al. 2003, 2005). In the past scholars attempted to infer the possible use of animals for milk products by studying their age and sex distributions. Bogucki (1982) argued for Early

Neolithic central European dairying, citing the kill-off patterns of Linear Pottery cattle. Many cows were older than 48 months, suggesting they were not used exclusively for meat. The large percentage of cows (71%) in the adult cattle population at Künzig-Unternberg in Lower Bavaria may indicate their use for milk production (Benecke 1994). The kill-off pattern of the late Funnel Beaker cattle at Bronocice in southeastern Poland suggests that they were not kept primarily for meat. The mortality pattern based on dental criteria indicates that approximately 60% of the cattle survived beyond 42 months of age. Vessels with sieves found at Bronocice may have been used for dairying. Baskets could also have been used for cheese making, as they were during the Late Bronze Age and/or Early Iron Age in Greece. In Homer's *Odyssey*, the Cyclops used baskets for this purpose. Baskets have been preserved at some Alpine Neolithic sites, but we can only speculate on their uses. Certain artifacts may reflect milk usage. Clay strainers are found at some sites, but they are not numerous. They may indicate the milking of the cows and making of cheese. In Swiss Neolithic sites, wooden pots and tools have been preserved that may have been used in milk processing. Some collected plants such as goose grass (*Galium palustre*) could have been used for curdling milk (Tschumi 1949). Other lines of evidence such as pathological signs found on bones may indicate penning for a number of reasons including milking livestock (Mainland 2007).

Animal fats have been extracted from ceramic pots revealing evidence for dairying during the Early and Middle Neolithic in various parts of Europe (Copley et al. 2003, Craig et al. 2005, Mukherjee et al. 2005, Rowley-Conwy 2005). Isotope residue analysis of pottery sherds from two Early Neolithic sites, Schela Cladovei in Romania and Ecsegfalva 23 in Hungary, showed milk fats on a small number of sherds from each site, indicating the presence of dairying, as early as 5900–5500 BC (Craig et al. 2005). Bartosiewicz (2007) also notes that milking was practiced at the Körös site of Ecsegfalva 23 though not identified by species. He suggests that sheep was the most likely species; however, cattle were present along with caprines and could just as easily have been milked.

Sheep and goats may have been used for milk and cheese making, although they produce less milk than cows. A Neolithic cow may have produced 500–600 liters of milk per year (Todorova 1978). It is known that a few goats in a flock of sheep have a calming effect, and help maintain stability within the sheep flock (Ijzereef 1981). On the other hand, goats can do damage to the surrounding vegetation if not carefully managed. However, we have only indirect evidence for the milking of goats. At Künzig-Unternberg, 86% of adult goats were females (Benecke 1994) and Rowley-Conwy (1993) suggests that sheep/goat kill pattern at Arene Candide cave in Liguria, Italy, indicates that middle and later Neolithic peoples used them for milk and meat.

Usually sheep (ewes and rams) are sexually mature at 1 year of age. Ewes start producing milk between 1 and 2 years of age if they are with lambs. In the small sample of sheep from Bronocice that were classified by sex, most were females, which may suggest their use for milk. At the present time most scenarios about the use of domestic animals for milk products must remain speculative. However, the use of these animals for milk was more important than meat consumption, and the latter may have only been done during special feasts or celebrations. Marciniak (2005) makes similar observations in his study of LBK settlements in Poland.

Exchange

Early Neolithic trade needs to be viewed in its proper sociopolitical context. The exchange of raw materials and finished artifacts occurred in all regions of Europe. As Sherratt (1997:103) has pointed out "Even in the Neolithic there were inherent limitations on self-sufficiency." Flint sources occur in restricted areas, thus exchange systems allowed communities to obtain this nonlocally available material. Networks of exchange probably involved hundreds of small independent but interconnected communities, and trade between such societies is not a simple matter. Sahlins (1972:302) has pointed out that "trade between primitive communities or tribes is a most delicate, potentially a most explosive, undertaking." In small-scale societies of the recent past exchange among relatives usually is carried out by generalized or balanced reciprocity; but with non-kin, the prevailing mode may be negative reciprocity: shortchanging, chicanery, robbery with violence. However, trade motivates the extension of social relationships, friendships, and peaceful ties between communities or individuals. To avoid conflict, "The most tactful strategy is economic good measure, a generous return relative to what has been received of which there can be no complaints" (Sahlins 1972:303).

Most of our evidence for Early Neolithic exchange comes from nonperishables such as stone, flint, shells, obsidian, and ceramics. Trade in foodstuffs rarely leaves evidence in the archaeological record and can be inferred only from distributions of artifacts. Trade in perishable goods likely occurred over short distances; involving only neighboring communities or individuals. Trade in certain nonperishables may have involved long-distance as well as local trading arrangements. In long-distance trading, goods probably moved through many intermediaries. The value of traded items depended on weight, place of origin, distance from a community, rarity in the neighborhood of a community, and the statuses of the individuals involved. Values were not fixed or absolute, but varied considerably over the ranges of their distributions.

Intercommunity trade in the Early Neolithic is indicated by the presence of nonlocal pottery, flint, stone, obsidian, and *Spondylus* shells at sites in southeastern and central Europe. Not all these products were necessarily exchanged over the entire continent. For example, high-quality honey-flint and jasper blades were traded in Greece (Perlès 1992:128). From the Greek Island of Melos, obsidian was traded over long distances of up to 450 kilometers. Obsidian was used for tools and traded from sources on the islands of Lipari, Palmarola, Pantelleria, and Sardinia in the central Mediterranean during the Neolithic, 6000–3000 BC (Tykot and Ammerman 1997, Tykot 2004). In southern France, Cardial culture vessels were exchanged among communities (Barnett 1990). We do not know what these vessels contained.

We do have interesting data for central European Early Neolithic trade. The presence at many sites of nonlocal raw materials or finished products without evidence of local manufacture indicates that exchange systems linked Linear Pottery and non-Linear Pottery communities. Rivers were likely important trade routes, since land travel was difficult.

Biró (1998) has analyzed collections from Linear Pottery sites in Hungary and found that most of the lithics from this period come from within the Carpathian Basin. In the 131 sites examined Hungarian radiolarite accounts for 35% of the total assemblage, obsidian accounts for 20% and the remaining 15% is composed of various radiolarites and flints imported from outside the Basin.

The lack of access to desired raw materials would have been an obvious reason for trade. Not all Linear Pottery villages and hamlets were self-sufficient in the raw materials and goods needed for domestic purposes. Some materials, such as bone, stone, and wood were available locally, but flint sources were only available to few communities (Reid 1977).

Linear Pottery villages and hamlets probably lacked political centralization, and such integration as was necessary within and between communities may have been accomplished through rituals and ceremonies. Some nonlocal products were likely obtained for these purposes. Nonlocal goods may also have expressed, indeed may have justified, differences in social status. Some goods may have been obtained from other villages that specialized in their production and were thus involved in extensive trade. We should also look at trade not only as a means of acquiring material products, but as means of social communication. Exchange may extend social ties and reduce conflicts among communities (Wilmsen 1972).

Spondylus shells have been found at some Linear Pottery sites. These items are rare and usually occur in the burials of possibly higher-status individuals. The habitats of shellfish of the genus *Spondylus* include the coastal waters of the Black and Mediterranean seas. To obtain the shells, Linear

Pottery communities would have traded with those of the Vinča A culture, and others of southeastern Europe. Oxygen isotope analyses carried out on *Spondylus* shells from the Balkans indicate that they came from the Aegean Sea (Shackleton and Renfrew 1970).

To explain the *Spondylus* trade during the Balkan Neolithic, N. Shackleton and C. Renfrew (1970) have proposed a "prestige-chain exchange" model, with four characteristics:

- The exchange of goods takes place between high-status individuals on a basis of balanced reciprocity.
- The prestige goods are passed on in subsequent exchanges.
- The goods are not utilized in daily activities.
- The goods are usually found in burials or in other contexts through accidental breakage or loss.

They compare the exchange in *Spondylus* shells to the *kula* trade of the Trobriand Islanders. In the *kula* trade some of the exchanged goods had a social and ideological significance far transcending their utilitarian value.

It should be noted that the *kula* goods were not buried with the dead. Plate LXV in the book *Argonauts of the Western Pacific* shows that all the valuables, including personal possessions, will be removed from the corpse immediately before the interment (Malinowski 1922/1961). It is evident that it would be difficult for archaeologists to demonstrate from the burial data in the Trobriand Islands this type of exchange system. However, in the *kula*-ring type of exchange model, not only prestige goods were being passed on between individuals, but also many subsistence goods were exchanged at the same time. But this type of exchange is difficult to demonstrate for the Linear Pottery people. They occupied good land and populations were small; there would have been little need to exchange foodstuffs. This does not imply that some foodstuffs were not exchanged, for sometimes the idea of giving a gift was more important than the value of the gift or exchange networks may have served as a basis of communication. The goods we know were traded, such as *Spondylus* shells, probably served to reinforce status differences within communities.

The available evidence shows that, in addition to *Spondylus* shells, radiolarite, obsidian, stone, flint, and pottery were exchanged. The distribution of these materials is not uniform throughout central Europe. Slovakian and Hungarian obsidian is found mostly in northeast Hungary, Slovakia, eastern Moravia, southeastern Poland, and adjacent areas of Ukraine and Romania. Radiolarite from the Bakony Mountains in Hungary was traded within the Carpathian Basin. It is not clear what products Linear Pottery communities traded for their obsidian. Cores found at Linear Pottery sites indicate that obsidian was traded in lumps and used for making tools such as blades, flakes, and sickle blades. We should not imagine huge quantities of goods traveling across the Carpathians. At Olszanica in Poland, a total of 204 (0.5% of the total of chipped stone artifacts recovered) obsidian pieces were recovered in an excavated area of 15,158.75 square meters. Obsidian tools could have been utilized for special needs or ceremonial occasions, such as first harvests or bull castration, since obsidian blades are sharper than those of flint. The obsidian source nearest to Olszanica is the region from Prešov in Slovakia to the Tokay area in Hungary.

It is interesting that many more burins were found at Olszanica than at Linear Pottery sites in Western Europe. Newell (1970) found only 27 burins at Elsloo, Sittard, and Stein in the Netherlands. At Hienheim, Bavaria, the nine burins comprised 2% of the flint tool assemblage (de Grooth 1977), but at Olszanica, 224 burins made of locally obtainable flint comprised 9.2% of the total flint tool assemblage ($n = 2433$) (Milisauskas 1986). This may indicate differences in trading activities between eastern and western Linear Pottery sites. The Olszanica burins may have been used to make bone, antler, or other products for exchange with communities in Slovakia and Hungary. There are outcrops of Jurassic flint 1 km from Olszanica; the material may have been exchanged for obsidian procured by Slovakian and Hungarian Linear Pottery communities.

Studies of Jurassic flint artifacts indicate that this material from Olszanica was exported to other Early Neolithic settlements in Poland, the Czech Republic, and Slovakia (Kacznowska and Kozłowski 1976, Lech 1989). The Silesian sites of Niemcza and Strachów which are located 220–215 km away from Olszanica had approximately 85% of the flint from Olszanica. Lech (1989:113) suggests that at Bylany, the Czech Republic, 300 km from Olszanica, the import of Jurassic flint was an economic necessity during some phases, for example, subperiods IIb and IIc. Jurassic flint comprised 58% and 59% of the flint total during those two phases. It was possible to measure the amount of Jurassic flint exported from Olszanica by estimating blade to core ratios. About 16 flint blades were produced per core at Olszanica, of which we estimate that four (25%) were exported. Exotic ceramics, "chocolate" flint, stone, and obsidian were imported to Olszanica in exchange.

Polished stone tools of nonlocal material such as amphibolites occur in Linear Pottery settlements in central Europe. Archaeologists have speculated about the possible sources of amphibolite axes and adzes (Schwarz-Mackensen and Schneider 1983). One source of amphibolite is the Wrocław area in Silesia. Poland, approximately 200 km (124 miles) west of Olszanica; another is some 320 km away at Jistebko, Jizero Mountains, Bohemia. Previously, Milisauskas (1986) has speculated that the source for the actinolite schist axes and adzes from Olszanica was in the Wrocław area. Jistebko amphibolite was already mined during the Early Neolithic (Prostředník et al. 2005, Christensen et al. 2006) and it was traded up to 600 km from its source (Christensen et al. 2006). Studies of the amphobolitic schist axes and adzes from German Linear Pottery sites indicate that the source of this raw material was the Jistebko mine (Christensen et al. 2006). Probably the same applies to the Olszanica stone tools.

The distribution of exotic items in Linear Pottery settlements and cemeteries indicates that not all families or individuals participated equally in long-distance trade. Obsidian at Olszanica clusters around only some longhouses; other, contemporary, longhouses have very little of the material. Probably the obsidian exchange occurred between more prominent families or individuals.

Differences in ceramic styles suggest that there were other regional exchange zones in central Europe. The Želiezovce zone of pottery ornamentation in the eastern area of the Linear Pottery culture generally corresponds with the distribution of obsidian from Slovakia and Hungary.

Settlement Organization – Household, Individual, Settlement, and Regional System

Much of our information on the structure of European Neolithic societies and adaptations to the environment has been derived from settlement studies conducted on (1) individual structures (2) individual settlements, and (3) settlements in a region. Here we consider the internal arrangements of structures, their relations within settlements, and the distribution of settlements in a region. Functional relations between sites within settlement systems are analyzed. For individual structures or settlements, we consider the activities carried out in them and their function in larger units.

Neolithic houses have been studied since the beginnings of archaeology in the nineteenth century. Good data are available on houses from southeastern, central, and eastern Europe showing the distinctive styles of architecture associated with specific regions. Evidence is scantier in England, Ireland, and Scandinavia. However, the northwestern European countries have impressive megalithic monuments, henges, and other ceremonial structures. Studies of houses have reflected the various theoretical approaches that have dominated archaeology at different times. Hodder (1990) devoted an entire book to the concept of the Neolithic house as *domus* in contrasts to *agrios*, the wilds. While we admire his erudition, it is difficult to demonstrate these conceptual oppositions with the archaeological evidence.

Traditionally archaeologists excavated structures with hearths, pots, flint tools, figurines, and other artifacts and then observed, for example, that in one part of the house, an oven and pots suggested cooking activities. Analysis consisted of description, then functional interpretation of the data. Within the last two decades archaeologists have begun to present narratives, biographies, and life histories of prehistoric houses (Bailey 1996). Whittle (1996b:15–16) observes that “Houses are beginning to take their place alongside monuments such as megaliths and enclosures in a wider archaeology of the Neolithic which emphasizes values, beliefs, and senses of identity, place and time.” Thomas (1996) speculates that Linear Pottery houses were places in which meetings, feasting, the laying out of the dead, the exchange of gifts, and marriage took place. There is little direct archaeological evidence for most of these activities. Ethnographic analogy allows us to infer them. By way of contrast Tringham (1991:124) uses a feminist interpretation to suggest gender-specific behavior around a house at Opovo, Serbia. She tells a story about two Neolithic women, an exogamous wife, the narrator and a daughter, watching as the house is destroyed, “It’s burning nicely now. What a crummy house they built. Nothing but kindling for its bones. I’m surprised the loft didn’t fall down on our heads.” Can we enter the mind of the Vinča women of 4400 BC? Tringham attempts to displace traditional explanations and provide a gendered story of a Neolithic house. She looks at Opovo from the perspective of an archaeologist and of the house’s occupants. Tringham and Stevanović (1990, Stevanović 1997) have argued, based on methods by fire inspectors, that the evidence indicates that Vinča houses were deliberately destroyed by burning and then pulling them down.

It is assumed that the household, i.e., the kin-based domestic unit, functioned as the main social and economic decision maker in Neolithic societies. Flannery (1976) and Winter (1976), studying Mesoamerican prehistoric villages, suggest that the co-occurrence of houses and features comprise household clusters. The concept has been adapted to European Neolithic data (Grygiel 1986, Bogucki 1988, Chapman 1989).

The earliest Neolithic settlements in Europe are found in northeastern Greece and adjacent parts of Bulgaria and Macedonia. These are tells, or mounds, made up of the debris of long occupations. Mud-walled houses eventually collapsed and were replaced by new structures. The accumulation of such debris, as well as general refuse, resulted in tell sites. Except for some Middle Neolithic examples in Serbia and Hungary, tells are absent elsewhere in Europe. Non-tells are called extended, flat, open, or dispersed settlements. Sherratt (1983) notes tells’ high degree of locational stability; areas were occupied continuously. Probably the extremely rich alluvial soils of the region made this possible. Other reasons for tell formation are restricted settlement area, defense, ownership of land, and attachment to specific places. Examples of major tells are Argissa, Sesklo, and Sitagroi in Greece, Azmak and Karanovo in Bulgaria. Chapman (1990:52) has stressed that life on tells was different from that on flat sites. There is “very little unbuilt space for outdoor ritual, dancing, group meetings, pyrotechnology, horticulture, or animal keeping.” Communal activities would have had to take place within houses or off the tell.

Tells stood out in the landscape. They were 2, 4, or more meters above ground level. It should be noted that the earliest tell settlements did not stand out much by their height in the landscape; it took time for their debris to form a mound. Why did Early Neolithic peoples in Thessaly build houses for generations in the same spot, why did they not relocate horizontally to different areas? It has been suggested that building in the same spot reflects symbolic continuity of the house and long ancestry of families (Kotsakis 1999). Perhaps long-established households enjoyed higher prestige within the community (Halstead 1999). Perlès’ (1999) study of Early Neolithic tells in eastern Thessaly indicates that they were located 2–3 kilometers apart. Clearly people from neighboring communities had close personal interaction.

Some archaeologists have suggested that the earliest Neolithic settlements in Thessaly were not sedentary but occupied seasonally (van Andel et al. 1990, Whittle 1996a). Their arguments are based on three observations: location of some sites on active flood plains, the thinness of some occupation levels, and the insubstantial nature of some houses. Halstead (1999) made strong arguments against seasonal occupation of the Early Neolithic sites in Thessaly. For example, he noted “As for sites on floodplains, it has not yet been demonstrated whether flooding took place annually or at much longer intervals . . . and, by the same logic, future archaeologists would be entitled to conclude that many modern European cities were only occupied seasonally" (Halstead 1999:77). The early occupation layers may be thin on account of insubstantial nature of early houses such as post-frame huts or pithouses (Halstead 1999). Furthermore, Halstead (1999:77) notes that "The insubstantial nature of some Greek Neolithic houses is no more proof of seasonal occupation than is the presence of big houses in central Europe proof of sedentism." Fixed fields around the settlement also kept it from moving. Most likely the Early Neolithic settlements were occupied year-round.

Early Neolithic settlements in Greece and adjacent parts of Bulgaria and Macedonia were located by rivers or lakes. This provided easy access to water and made it possible to exploit rich alluvial soils. Wielkie and Savina (1997:201) observe that Early Neolithic settlements in Thessaly and Macedonia were located "both on the flood-plain and on the adjoining hills and terraces." Nea Nikomedeia in northern Greece was located near a shallow lake, or possibly the Aegean Sea, which may have, at the time, intruded that far inland, although the evidence for this is unclear (Rodden 1962). However, Bintliff's (1976) reinterpretation makes Nea Nikomedeia an island site surrounded by well-drained lacustrine silts. Anza I in Macedonia was situated on the low terrace of a small river, when a moderately Mediterranean climate prevailed in the region (Gimbutas 1974a). Analysis of charcoal remains show that the local vegetation consisted of junipers, oaks, and elms.

These settlements contained small, rectangular or square houses, the traces of which often have been obliterated by the activities of later prehistoric cultures, as at some Serbian Starčevo sites. Since some sites lack house forms, large pits are sometimes questionably identified as pithouses. Such may have existed in the Neolithic in Europe, but too often archaeologists have classified any large pit, especially one containing a hearth, as a pithouse. McPherron found areas with scattered pieces of fired mud and chaff, probably from Starčevo houses, at Divostin, Grivac, and Banaj near Kragujevac in Serbia. He suggests that burned or abandoned houses were destroyed by the weather, if they were not covered by soil wash (McPherron and Srejović 1971:9).

In settlements such as Nea Nikomedeia, a variety of economic, social, and ritual activities were carried out, some of which were localized in particular areas of the site. These show up archaeologically by their concentrations of the artifacts appropriate to certain activities. Wood working is indicated by axes, adzes, and chisels of stone, hunting and fighting by flint projectile points. The harvesting of cereals was done by sickles with wooden or bone handles, into which flint blades or flakes were inserted. Such sickle blades can be distinguished by the sheen or gloss that they acquire through use. Flint scrapers were utilized for working hides or skins. Various flint blades and flakes could have been used for the cutting, scraping, incising, or sawing of the different raw materials used in making a variety of tools. Fishing is indicated by bone fishhooks. Bone needles were utilized for sewing clothing. Pottery was used for food storage, drinking, serving, cooking, and ritual. People wore ornaments of stone, bone, and shell, possibly including labrets, or lip plugs; stone objects that may have been such jewelry have been found on several Greek sites. There is also evidence for musical instruments; bone flutes were found at Anza I (Gimbutas 1974a). Perhaps they were herders' pipes. We may suspect that a number of activities such as obligations of hospitality were conducted in houses, however, they are not directly observable in the archaeological record.

Clay stamps have been found at Early Neolithic settlements in Greece and southeastern Europe. In the Near East, similar artifacts were used to impress signs into the clay plugs, used to seal pottery vessels and other containers, probably as signs of ownership. In the small-scale societies of the European Early Neolithic, such stamps may have been used to indicate the ownership by corporate kin (or other) groups of certain goods, not necessarily private ownership. Or, clay stamps could have been used for body decoration.

We can take a closer look at three settlements, Nea Nikomedeia in Greece, Obre I in Bosnia-Herzegovina, and Karanovo I in Bulgaria. Nea Nikomedeia (6250–6050 BC) occupied an area of

2.4 ha. The excavated area, 1690 square meters, revealed 24 recognizable houses (Souvatzi 2008). The houses were square or rectangular, a form that recurred throughout Europe during the Neolithic. Only in the Mediterranean region and in western Europe are round houses to be found (Piggott 1972). Early Neolithic houses varied in size at Nea Nikomedeia, from 20 to 161 square meters, suggesting variation in household composition (Youni 1996). House interiors were not just living spaces, for hearths and storage basins are also found. Souvatzi (2008:74) suggests that "assuming that all buildings were contemporaneous at any one phase and that the settlement density of the exposed part is representative of the whole site, estimates of the community size suggest a population of 500–700 individuals and a number of buildings between 50 and 100 in each of the first two phases." It is unlikely that all buildings were simultaneously occupied.

The Karanovo I settlement near Nova Zagora in Bulgaria is one of the more extensively excavated Early Neolithic sites in southeastern Europe (Mikov 1959, Hiller 1990). The diameter of this tell varies from 180 to 250 meters at base. It is possible that the Early Neolithic settlement contained between 15 and 30 single-room houses at any one time. The reconstructed model at the National Archaeological Museum in Sofia has 18 houses (Tringham 1971:72) (Fig. 7.7). Assuming that single families occupied these small square houses, 6 × 7 meters, the village population probably consisted of 75–150 people depending on how many persons are assigned to one family.

The houses were constructed by erecting a framework of upright wooden posts on to which thick walls of clay or mud were daubed. Floors were covered with wooden planks. The houses were situated close to one another and were arranged in parallel rows. Inside, there were hearths, grinding stones, pots, and flint, stone, and bone artifacts (Fig. 7.8). Again, individual families probably did their own cooking.

Nikolov (1989) describes a well-preserved house, dated 5810–5750 BC, from Sofia-Slatina, Bulgaria. Roughly 12.4 × 9.4 meters, it was built of wooden posts, covered with wattle and daub, with walls 2.2 meters high and a gabled roof. There was a large room at the front and a small narrow room in the rear. The floor was clay-lined. The large room had a hearth, two wooden structures that may have been beds, a clay oven, a grinding stone, and ash pits. The small room may have been a shrine, since it contained a rectangular clay object which was classified as a house model.

Obre I is located on a terrace of the Bosna River, the rich alluvial soils of which are well suited to the cultivation of cereal and other crops. The approximate area of the site is 12,500–17,500 square meters (250 × 50–70 meters) or 1.25–1.75 hectares (Gimbutas 1970). This Starčevo settlement consisted of rectangular houses that appear to have been arranged in rows. The houses were built by erecting a wooden framework and then daubing it with clay. Inside the houses were round ovens and hearths. One house differed from the others in that it was larger and built on a stone foundation. If it was contemporary with other houses, it may indicate functional or social differences within the settlement, a place for communal rituals, or the residence of a person of higher social status.

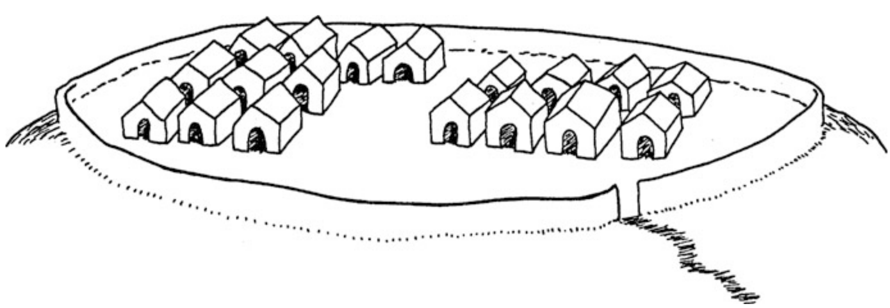


Fig. 7.7 Karanovo I settlement as reconstructed in the National Archaeological Museum, Sofia (after Tringham 1971, with modifications)

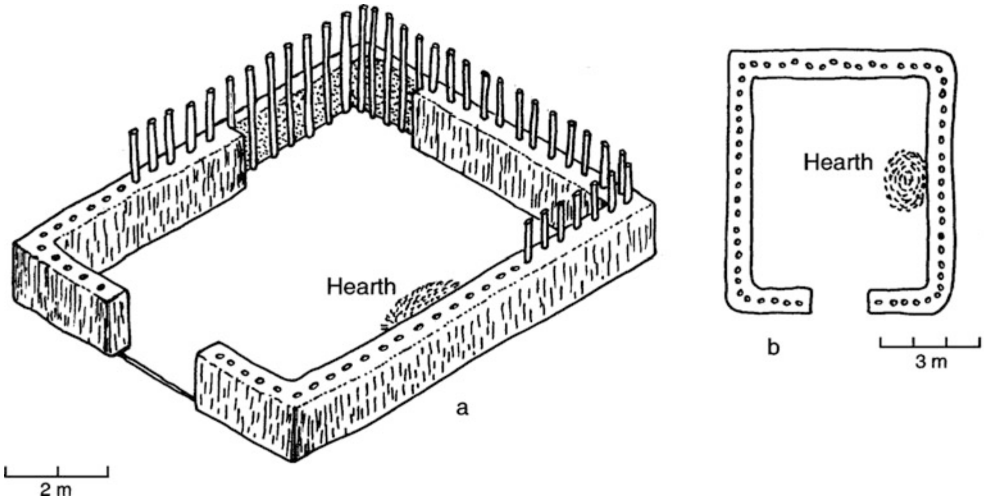


Fig. 7.8 Karanovo I house (after Tringham 1971, with modifications)

Most Körös culture settlements were located on the floodplains of the rivers of Hungary (Horváth 1989). Their size varied from 150–400 × 20–30 meters to 300–400 × 30–40 meters. Five to ten single-room rectangular structures made up the smaller settlements while larger sites may have had 20, 30, or even over 50 houses. There are no Early Neolithic tells in Hungary.

Early Neolithic settlement systems in central Europe can be reconstructed on the basis of data from Linear Pottery sites. These settlements are not distributed evenly or continuously throughout the continent, but are mainly limited to loess lands or other regions of good soils (Childe 1958). In Germany 48% to 97% of Linear Pottery sites are located on loess soils, in Austria 78% are so located (Lenneis 2001), and 51% of sites in Bohemia are similarly situated (Rulf 1982); in the Rhineland almost all sites are located on loess (Dohrn-Ihmig 1979). Loess soils themselves exhibit varying degrees of fertility. Usually Linear Pottery communities selected well-drained soils. Their sites are frequently located near or on the low-lying terraces of rivers or major streams, and usually less than 500 meters from a stream or a river (Lüning 1982). Sites located further from sources of water, such as Erkelenz-Kückhoven in the Rhineland and Asparn in Austria, yielded the remains of wood-lined wells (Weiner 1993, 1998, Lenneis 1995). At Erkelenz-Kückhoven, the earliest well, some 14 meters deep, was dug in 5089 BC, and oak planks, 3 × 3 meters, having tongue-and-groove joints, were used to line it. The second well was dug in 5057 BC. In the abandoned wells, a maplewood spade and pick, a rope made of lime bast, and a bark bag or pail were recovered. Along rivers or major streams, Linear Pottery hamlets and villages occur in multisite clusters. The sites are 1.5–3.0 kilometers apart and extend over areas of 2–3 kilometers. Agnieszka Czekaj-Zastawny (2008) classifies Linear Pottery sites in the Upper Vistula basin into domestic sites and camps. The domestic sites had longhouses, 52 out of 111. It is unclear why some sites such as Olszanica and Bylany (Pavlů 2000) were occupied for generations, some 300–400 years, while others are limited to one or two generations or maybe only for one season (Fig. 7.9). At Olszanica, houses of the different phases were built roughly in the same spot. Perhaps the nearby source of Jurassic flint was a valuable resource for continuous exploitation. In the area surrounding Olszanica, there were small Linear Pottery sites. Probably Olszanica was their "mother" settlement. At Bylany, phases 1–8 houses were concentrated in the eastern part of the site, phases 9–17 in the western part, and phases 18–25 in the center (Pavlů 2000:239). Settlements in a small region may represent a socially and economically interacting unit. There were contacts between people and probably intermarriage occurred among communities situated close to each other. It is not

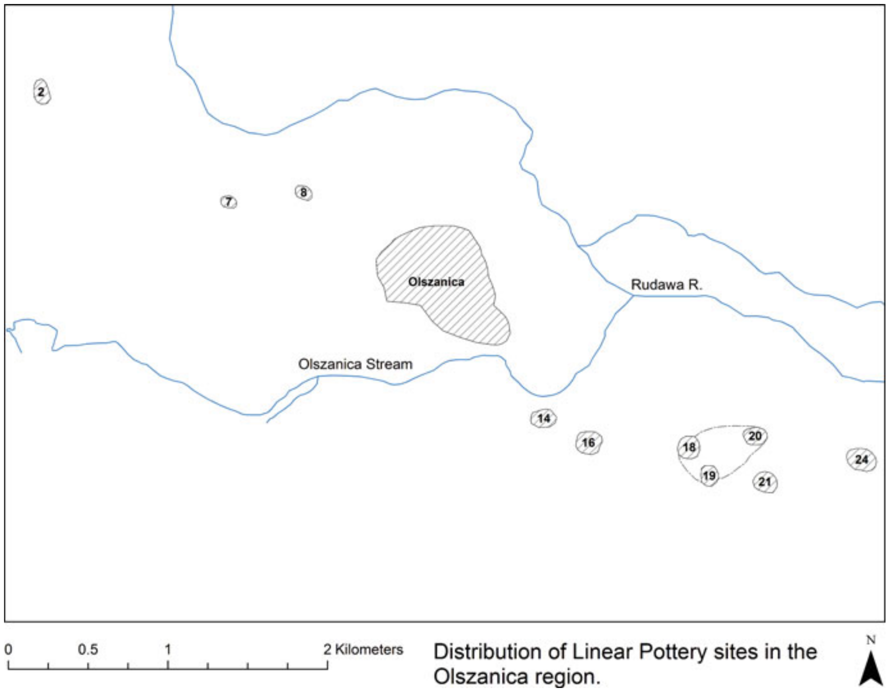


Fig. 7.9 Map of Olszanica region

easy to define the size of a regional unit for Linear Pottery culture, especially during the early phase, since groups 100-200 kilometers distant from each other shared similar material culture.

Sites vary in size, and the differences may be functional (Kruk 1973, Lüning 1998), or may reflect differences in occupational phases. Sites having numerous phases may be 10, 20, or even 30 hectares in area. Bylany I, Czech Republic, and Olszanica, Poland, both occupy 30 hectares.

Settlement density seems low if expressed as sites per square kilometer; however, the density appears greater if we consider it in terms of distances along the rivers or streams. Kruk (1973) has listed 72 Linear Pottery sites in an area of 2300 square kilometres northeast of Cracow, Poland. The number of sites may, in fact, be greater, since he was unable to survey the entire area. The average density of sites is 1 per 32 square kilometers. However, along the Dłubnia River, the linear density is 20 per 25 kilometers or 1 per 1.25 kilometers.

We do not know how many sites were occupied at any one time; thus estimates of regional populations are little more than educated guesses. Assuming all 72 sites were simultaneously occupied and that each held 50–100 people, the regional population may have been 3600 or 7000 people. However, it is doubtful that the first assumption is valid, and, therefore, the population of the region was probably less.

The density of Linear Pottery sites in central Europe varied through time. For example, the initial Linear Pottery settlement of the Middle Neckar area (7200 square kilometers), Germany, was carried out by a very small population, whose settlement density was only one community per 1028.5 square kilometer (Sielmann 1972). By the second phase, there was one settlement per 116.1 square kilometers and one per 59.0 square kilometers during the third phase. This example demonstrates a "filling in" process by Early Neolithic farmers in that area.

Linear Pottery settlements consisted of longhouses and other features such as pits, and varied from 0.5 to 7 hectares (1.2–16.8 acres) in area. There were many settlements with only three or four houses and some have only one. At Langweiler 8 in the Rhineland, the phase VII settlement consisted of 11 longhouses which were on the average 74 meters apart and occupied an area of 7 hectares (Lüning 1994:549). At Bylany, the settlement size ranged from 1–2 hectares at any one period (Pavlů et al. 1986). If the 141 houses at Bylany are divided by the 25 occupational phases, then there were approximately six houses per phase. At Vaihingen in western Germany, the settlement was divided by a fence, suggesting a division of households into separate social units or wards (Krause 1999). Perhaps the families living in individual wards were related. The smaller Linear Pottery settlements did not have enough people for major communal projects, such as digging ditches, around some settlements. Regional population must have been involved in such activities.

Linear Pottery longhouses range from 7 to 45 meters in length and from 5 to 7.5 meters in width. The average area enclosed by a longhouse at Bylany was 76 square meters (Pavlů 2000:216). The extreme length of longhouses has been overemphasized by archaeologists, at Bylany, for example, where the longest structure was 42.5 meters and at Olszanica where it was 41.5 meters (Pavlů et al. 1986, Modderman 1986, Milisauskas 1986). Average longhouse length at Bylany and Olszanica was 17 meters. In southern Bavaria the measurements ranged from 6.6 to 46.5 meters, the average was 22 meters for 80 longhouses (Pechtl 2009:188). At Šturovo in Slovakia, the average length was 23 meters and width 7.0–7.5 meters (Pavúk 1994). The Šturovo houses had more living space, since they were wider by 1 meter than those at Bylany and Olszanica.

The ground plans of Linear Pottery houses have been preserved, since their wooden posts were originally inserted into postholes some 1.0–1.5 meters in depth. Now, the remains of postholes reach 20–40 centimeters below the surface, 1 meter of soil thickness has been removed by 7000 or more years of erosion and later occupation. Unfortunately, no house floors have been preserved to show the layout of features and artifacts inside longhouses. Recently Rück (2004) suggested that Linear Pottery houses were built on slopes and not on even ground surface. He argues that these houses were constructed like pile-dwellings. "Within one house the ground level could vary about 1.00–1.50 m . . . This resulted in a space under the house of 1.00–1.50 m which could be used for storing sheep/goats or pigs or wood" (Rück 2004:319). Most Linear Pottery houses were not built on slopes, thus Rück's hypothesis is not very convincing.

The frames of the rectangular houses were built of five rows of wooden posts, two exterior and three interior (Fig. 7.10). The interior postmolds are usually larger than the exterior ones. In the

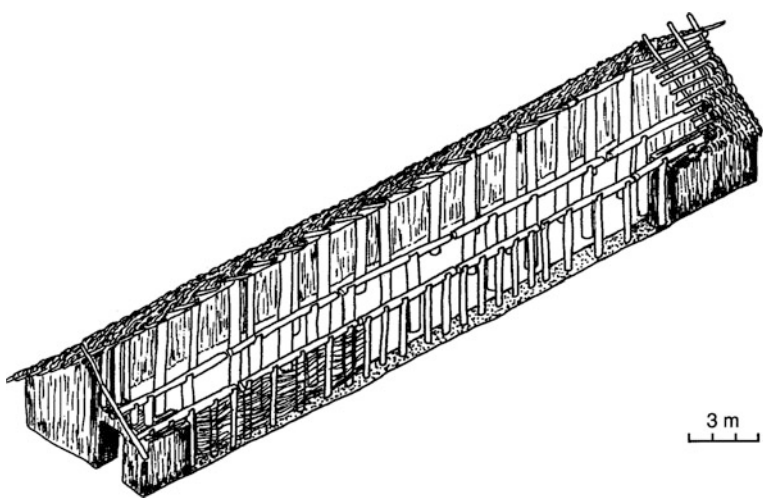


Fig. 7.10 Reconstructed Linear Pottery longhouse at Bylany (after Tringham 1971, with modifications)

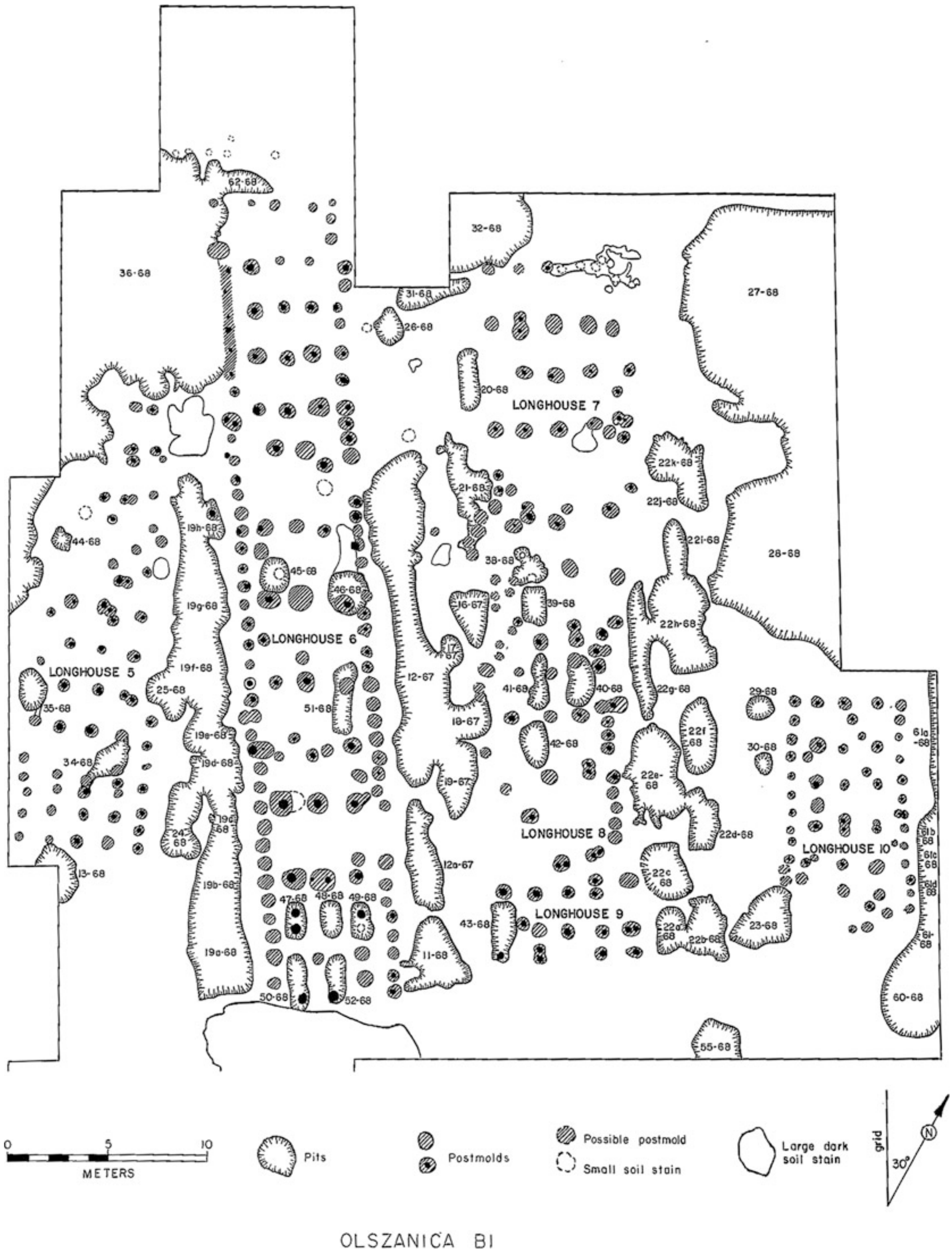


Fig. 7.11 Linear Pottery longhouses at Olszanica (after Milisauskas 1986)

earlier phases, posts belonging to the two exterior walls were sometimes inserted into wall slots or trenches, rather than postholes. The earth from pits along the side of longhouses was used for daubing the walls. Houses were usually built of deciduous trees, oak at Bylany and Olszanica; elm, ash, or oak at Langweiler 2. At Bylany, usually 10–11-year-old oak trees were used (Soudský and Pavlů 1972). These houses could have lasted 25 years. That the roofs of these houses were gabled, the better to shed rain and snow, is suggested by clay house models from Middle Neolithic sites in central Europe (Rück 2007). Sangmeister (1951) has postulated that the gabled roofs of Linear Pottery houses had a 45-degree inclination; thus if walls were 2 meters high, the entire house would have been 4–5 meters high. The extremely long longhouses, 35–40 meters in length, show structural differences from more ordinary houses: larger postmolds and postmold pits. They may have been functionally different from others, serving for communal or ritual activities, for if their size depended only on the size of the family inhabiting them, we would expect to find no structural differences. Also, around such longhouses certain kinds of artifacts such as polished stone tools occur in greater quantities. An example of such an extremely long house is longhouse No. 6 at Olszanica (Milisauskas 1986) (Fig. 7.11). Pavlů (2000:254) speculates that the very large houses were used as club houses or occupied by a Big Man. The Big Man would only appear when the settlement became bigger at one time period. Pechtl (2009:193) suggests that "the construction of an extremely long house apparently generated social prestige for the members of the household, and especially the household head."

There is evidence of functional differences inside longhouses. The central part was used as a living and working area, the northwest part for sleeping and storage. Probably the southeast part had a loft for grain or other goods, but it is unclear what purpose was served by the space below.

A number of differences can be seen between Early Neolithic sites in central Europe and those in southeastern Europe. The total area occupied by a Linear Pottery settlement at one time was greater than that at a contemporary Balkan community. The houses were usually larger, and the spacing between them was greater. At Karanovo I as many as 30 small houses closely clustered together comprised the community. A Linear Pottery settlement consisted of staggered rows of houses. We do not know what the greater variations in the size of individual houses indicate in terms of socioeconomic organization. It may simply reflect demographic fluctuations, although the overall population of Early Neolithic settlements in central Europe was probably not greater than in southeastern Europe. A settlement in Bulgaria had smaller houses than a Linear Pottery one, but it had more of them.

In the Balkans and central Europe, the ground plans of houses exhibit redundancy. The closer location of houses to each other in southeastern European tells may indicate that households had less independence; there was more conformity. Chapman (1989) has suggested that this redundancy in the Balkans reflects the presence of village leadership controlling land tenure, house construction, and ritual and social activities. There must have been little privacy in large or small houses, since they consisted of one room. Family members were in close contact when sleeping, eating, and doing various other activities. It should be noted that privacy appears to be a rarity in the human condition. The isolated lifestyles that many people enjoy today are, as far as western Europe is concerned, a by-product of the Industrial Revolution.

Economic Specialization by Early Neolithic Settlements and Individuals

The location of some Early Neolithic settlements near specific resources, such as flint or obsidian, allowed them to practice some degree of economic specialization. Olszanica is located close to a source of Jurassic flint in southeastern Poland and its inhabitants exported the material to communities in Poland, Slovakia, and the Czech Republic (Lech 1989). Lech's (1981) analysis indicates that flint mining took place at Olszanica. Perlès (1992) suggests that there was a workshop for beads made of cockle-shell (*Carastoderma glauca*) at Franchthi Cave, Greece, during the Early Neolithic. The first farmers at Knossos obtained obsidian from the island of Melos, some 100 kilometers away (Broodbank 1999). Perlès analysis indicates that nonlocal materials were acquired by the movements of specialists.

Zimmermann (1995) suggests that Langweiler 8 was a center of lithic production and a distribution center for imported flint in the Aldenhovener Plateau, Rhineland. This was the largest site in the region and was continuously occupied for some 400 years (Stehli 1989).

Was there specialization by individuals in such craft production during the Early Neolithic? Perlès and Vitelli (1999:96) suggest that craft specialization by full-time or part-time craftsmen is associated with the emergence of hierarchically organized societies. They define specialization in the Greek Neolithic very generally, "that is when some people practise skills that others do not, and the products are transferred from the producer to non-dependents," (Perlès and Vitelli 1999:96). There is some evidence for specialization in the "procurement at the sources and the production methods for exotic raw material". The evidence strongly points to specialist itinerant knappers who supplied finished products to settlements throughout Greece (Perlès 1999:97, in the paper jointly authored by Perlès and Vitelli, there are separate discussions). Thus she concludes that "the characteristics of the procurement, production and distribution of obsidian and honey flint blades . . . easily meet the requirements of individual or community specialization," (Perlès 1999:100). Ceramic production does not seem to have required the specialization of individuals or communities during the Greek Early Neolithic.

Enclosures

There are a variety of enclosures during the Neolithic and Copper Age in Europe (Burgess et al. 1988, Kaufmann 1990, Midgley et al. 1993, Andersen 1997, Darvill and Thomas 2001, Varndell and Topping 2002, Parkinson and Duffy 2007) (Fig. 7.12). Andersen (1997) has done an excellent analysis and overview of these. There are rondels (*Kreisgraben*) in central Europe, causewayed enclosures and henges in England, and various enclosures in northern and western Europe. It is evident that these features show great chronological and formal variability. Europe's ditched enclosures do not represent a single pan-continental tradition. Those in central Europe are separated from those in Britain by 1000 years and hundreds of kilometers. Not surprisingly many interpretations have been proposed for their function, although no one explanation can account for their existence. Archaeologists have always been impressed with the human effort these enclosures represent and we have numerous calculations of the time it took for Neolithic people to build them. Assuming one person could excavate 1 cubic meter of dirt per day (10 hours), the Funnel Beaker Sarup I enclosure in Denmark would have required some 100,000 man hours or 10,000 days, while the Linear Pottery enclosure at Köln-Lindenthal in Germany would have needed 30,000 man hours or 3000 days (Höckmann 1975, Andersen 1988). It should be remembered, however, that public architecture in any culture is no mere application of technology to material. Social and symbolic factors, presently obscure to us, would have affected the rhythm of such work. Archaeologists should beware then the mechanical application of often arbitrary numbers. It is evident that a socially or politically defined group was involved in such construction. Some enclosures are classified as fortifications and they are discussed in the section on warfare (Chapter 8). In the past too many enclosures were considered fortifications; now, too many are thought to be ritual or sacred places.

The use of aerial photography has greatly increased the number of known enclosures in Europe. Petrasch (1990) mentions some 3000 sites identified by aerial photography in Bavaria alone. The earliest enclosures, Soufli Magoula and Servia, occur in the seventh millennium BC in Greece (Höckmann 1975, 1990). It should be pointed out that enclosures, ditches, and other kinds of boundaries were

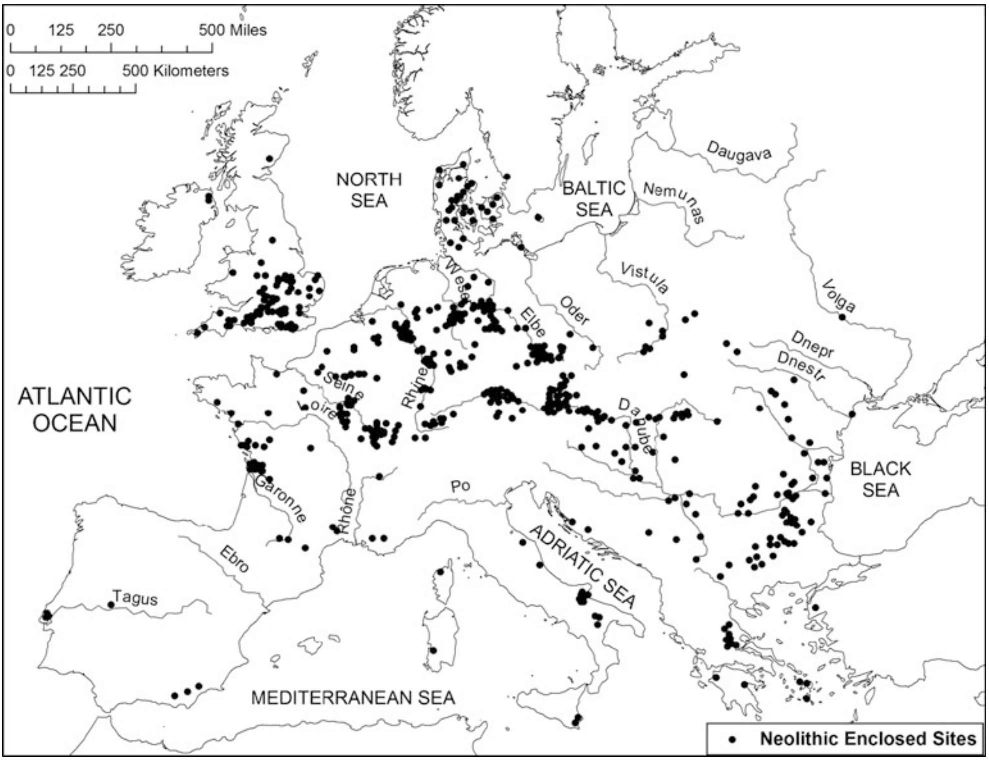


Fig. 7.12 Distribution of Neolithic enclosed sites (after Andersen 1997, with modifications)

present in Greece throughout the Neolithic (Souvatzi 2008). In central Europe, the Linear Pottery sites, Eilsleben and Köln-Lindenthal in Germany, were enclosed by ditches (Kaufmann 1990). At Eilsleben, three ditch systems were excavated; the earliest enclosing some 4 hectares is dated around 5500 BC. This ditch is flat-bottomed, 3.5 meters wide and 0.7–0.8 meter deep. Since the collapse of the so-called socialist states in central and eastern Europe, there are many more aerial surveys. These surveys, such as the one initiated by Günter Wetzel in Brandenburg, the former East Germany, increased greatly the number of sites including enclosures.

Rondels have a limited geographic distribution and chronological span. Neolithic people constructed them in central Europe over a period of only some 200–300 years. They are found in Austria, the Czech Republic, Slovakia, Germany, and Hungary and are characterized by multiple concentric ditches with usually four entrances (Trnka 1991, Midgley 2004). These rondels are associated with the Stroke Ornamented Pottery and Lengyel cultures and are dated between 4800 and 4500 BC. Within the last 20 years, numerous rondels have been discovered from the air. Examples of rondels are Bučany and Svodin in Slovakia, Goseck in eastern Germany, Bylany, Tešetice-Kijovice and Vochov in the Czech Republic, and Kamegg and Friebritz in Austria (Fig. 7.13). The very interesting rondel Polgár-Csőszhalom in Hungary has five concentric ditches, approximately 180 meters across and encloses a settlement tell. It is typically interpreted as a "sacred precinct" (Raczky et al. 1996). The enclosed tell itself is surrounded by a large, horizontal settlement covering about 24 hectares and containing numerous longhouses and burials (Raczky et al. 1994). At Goseck in eastern Germany, the completely excavated rondel had a mound, a ditch, and two wooden palisades (Becker et al. 2005). The palisades had three openings or gates. Bertemes and Northe (2006) and Biehl (2007a) consider Goseck as a ceremonial enclosure.

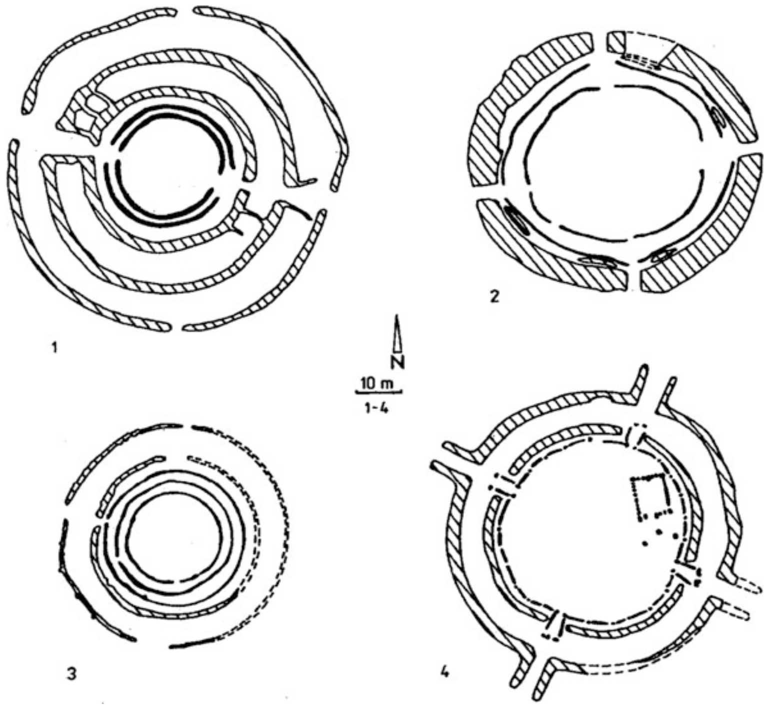


Fig. 7.13 Circular ditched enclosures in central Europe. *1*. Osterhafen-Schmiedorf, Lower Bavaria; *2*. Těšetice-Kyjovice, Moravia; *3*. Vochov, Bohemia; *4*. Bučany, Slovakia (after Petrasch 1990, with modifications)

Since rondels have usually yielded no evidence for buildings or other structures, they are often interpreted as ritual or sociopolitical centers (Petrasch 1990). Midgley et al. (1993) argue that the Bylany rondel enclosed a ceremonial area. However, Pavúk (1991) has suggested that the rondels in Slovakia were fortified settlements. A number of archaeologists have stressed the multifunctional aspects of such sites (Kovárnik et al. 2006, Whittle 1996b). Kovárnik et al. (2006:3) made these observations about rondels in Moravia "... we are now confident that they were multi-purpose socio-cultic buildings used as the meeting place for several related units where the people discussed various issues, be they administrative, economic, exchange, judicial or other. The rondels were also adapted in such a way as to allow the people to observe the movements of celestial bodies and they served as a sort of 'calendar'; the fortifications (deep ditches, palisades) were also used as defense against attackers in case of danger." Andersen (1997:309) suggests that northwestern European enclosures had no defensive functions and speculates that they were used for a number of special activities. Whittle (1996b:366) likewise has suggested that ditched enclosures may have served as gathering places for feasting and "in these arenas people celebrated domesticity, fertility, hospitality and generosity, and a shared sense of origins and belonging." A study by Pásztor et al. (2008) indicates that a solar cult played an important role in the design of the rondels.

Excavations at two small Tiszapolgár settlements in eastern Hungary, Vésztő-Bikeri and Körösladány-Bikeri, revealed a triple-ditch system involving a "U-" shaped outer ditch, a narrow middle ditch, and an inner ditch with palisade. These ditches enclose settlements with houses, a well, and kilns (Parkinson et al. 2004, Yerkes et al. 2007).

In England, causewayed enclosures appeared around 3500 BC and were not constructed after 3000 BC (Whittle 1999:72). The causewayed enclosures "consist of circuits of interrupted ditch, with internal banks, generally low and informal" (Whittle 1999:70). The number of circuits ranges from one to four; the famous Windmill Hill had three circuits. Some ditches have yielded evidence of palisades, as at Orsett, Essex, or Haddenham, Cambridgeshire (Whittle 1999:70).

British henges are circular or oval enclosures that have ditches on the inside and circular banks on the outside. They are associated with the Late Neolithic, 3000/2900–2500/2200 BC (Whittle 1999). Their diameters vary from 350 to 500 meters. Most have one or two entrances. Some are associated with stone or timber circles, e.g., a standing stone circle inside the ditch at Avebury.

The question remains as to why people built these structures. Some archaeologists stress the symbolic aspects of the enclosures (Tilley 1996, Whittle 1996a, Bradley 1998, Bailey 2000). It is evident that enclosures, ditches, and embankments, stood out in the landscape. What was their meaning to the Neolithic people? Perhaps some of them were sacred symbols reflecting a variety of beliefs. Humans put a lot of effort and labor in constructing the enclosures. They were important and significant structures; they probably had multiple functions: habitation, gathering places for feasting, symbols of territoriality, penning of animals, rituals, and ceremonies.

Population

Population levels varied in different regions of Europe during the Early Neolithic. The Linear Pottery culture, at its maximum expansion, extended some 2000 kilometers, east to west. Lüning (1998) estimates this subcontinental region held 50,118–121,715 contemporary settlements, and gives it a population ranging from 1 to 2.5 million. These estimates are based on data from the Aldenhovener Plateau where Lüning calculated on the average 3.4 houses per site. He assigned six persons per family in a single house, thus on the average a site had a population of approximately 20 people.

What was the population of Europe's 10,360,000 square kilometers around 5000 BC? The British Isles and the Circum-Baltic regions were still inhabited by foragers, with population densities a good deal lower than those of farmers. "The total population of Finland in the Comb Ceramic Period is thus estimated at 2500–11,000 which equals a population density of approximately 1 person per 25–100 km^2" (Taavitsainen, Simola and Gronlund 1998:235, they cite Nunez 1991 for these figures). If we had at least one person per 1 square kilometer in areas occupied by farmers, then the population of Europe ranged from 2 to 5 million people. Zimmermann (1996) estimates two to three persons per 1 square kilometer in central Europe.

Warfare

Many archaeologists have deemphasized the role of warfare in the earliest Neolithic societies; the period is generally believed to have been peaceful (Whittle 1996a). Mercer (1999) has discussed some of the reasons for this bias. First the influence of Marxist and post-Marxist thinking on earlier prehistoric social development excluded conflict from prestate societies. Warfare was associated with class-stratified societies. Second, the horrible wars of twentieth-century Europe have brought so much pain and suffering that many archaeologists have preferred to the avoid this topic. Furthermore, as Vandkilde (2003) has noted, some distinguished European archaeologists were political leftists and pacifists, who preferred not to emphasize conflict in the remote past. But warfare did play a major role in the European past. The wars of the Greek city-states and of ancient Rome come readily to mind.

Keeley and Quick (2004:110) define warfare as "armed conflict between any social and political units." This excludes many forms of violence such as domestic, homicide, or beatings within the community. Archaeologists and cultural anthropologists, such as Turney-High (1949), Otterbein (1970, 2004), Vencl (1984), Keeley (1996), Carman and Harding (1999), Thorpe (2003, 2006), Schulting and Wysocki (2005), Schulting (2006), Christensen (2004), Guilaine and Zammit (2005), and Beyneix (2007), have shown that warfare was common among the prestate societies. Keeley pointed out that intellectual opinion fluctuated between a Hobbesian and Rousseausian outlook on warfare during the last few hundred years. Thomas Hobbes (1588–1679) did not say that warfare was common in societies, whether primitive, civilized, or anywhere in between. He was concerned with the social and military chaos that engulfed most of Europe in his day; he wrote his great work, *Leviathan,* in Paris while on the run from the English Civil War of the 1640s. What he said was that in societies without the coercive power of government, the threat of violent chaos is ever present. Hobbes was more interested in the law-and-order problem within societies than in intercommunity or interpolity warfare. Jean-Jacques Rousseau (1712–1778) championed peacefulness, the so-called noble savage.

Is there evidence for warfare during the Early Neolithic and if so, what evidence? What type of archaeological data would indicate intercommunity conflict? How can a weapon be distinguished from a plain tool? What were some of the causes for warfare during the Early Neolithic? Clearly there is no single cause for conflict; people can fight over resources, symbols, ethnicity, beliefs, they can seek revenge, raid for mates or trophies, or follow some irrational motive or leader. The overall density of population in Europe was low, thus demographic factors probably played a small role in warfare. Not all resources were evenly distributed over the continent; only some regions had good sources of flint, for example. Control over specific resources or the protection of territory might have led to some conflicts. Raiding for domestic animals, especially cattle would have been tempting. Ritual reasons might have involved communities in so-called ceremonial conflicts. But whatever the reasons for conflict, it is very difficult to demonstrate warfare with archaeological data.

J. Chapman (1999) considers the evidence for warfare in the southeastern European Neolithic. The main sources of data are artifacts, skeletal material, settlements, and representational or artistic data. To any archaeologist who still treats archaeological data seriously, the Early Balkan Neolithic seems to be, *à la* Gimbutas (1991), quite peaceful. There are no obviously specialized tools for warfare such as flint daggers. Most artifacts, such as arrowheads and antler axes, could have served a variety of functions. Arrowheads could have been used for hunting, peaceful competitive events, or warfare. Arrowheads are in fact rare on Early Balkan Neolithic sites; not a single one was found among numerous flint artifacts at Obre I. Skeletal material recovered from various settlements does not show evidence of violence. The thousands of clay figurines do not show individuals with weapons. Some might note that since the majority of figurines are female, this is not surprising. Most archaeologists consider warfare to be a male activity, but both sexes have casualties. It would not have been surprising that the defense of fortified sites involved both males and females. Almost the only evidence for warfare is the enclosure ditches at Anza, Kazanluk, Gornea, Ostrovul Banulai, and Delchevo I (Höckmann 1990, Lazarovici 1990). None of these has been completely excavated, thus it is unclear if they enclose entire settlements. Perhaps the Early Balkan Neolithic was not as peaceful as suggested by Gimbutas, but data for warfare are meager.

In the past, the Early Neolithic farmers in central Europe were usually presented as peaceful folk (Gimbutas 1991). Gimbutas considered the Early Neolithic as a peaceful utopia. Now this picture is changing; it seems intercommunity conflict was present especially late in the Linear Pottery culture period (Kaufmann 1997, Spatz 1998, Petrasch 1999, Golitko and Keeley 2007). Petrasch points out that out of 515 Linear Pottery skeletons examined by physical anthropologists, 19.6% met violent death. If we take the entire sample ($n = 1631$) of Linear Pottery human remains, including those not examined for cause of death, the figure decreases to 6.2%. Bach's (1978) analysis of human bones from Linear Pottery cemeteries in east Germany indicates that only 2.2% were victims of violence. We would not expect many victims of warfare to be buried in cemeteries as suggested by massacres at Talheim and Schletz. At Talheim in Germany, a mass grave was found in a pit 1.5×3.0 meters and 1.5 meters deep containing at least 34 persons (9 men, 7 women, and 16 children); most were killed by axe blows to the head (Wahl and König 1987, Price et al. 2006). The diagnostic Linear Pottery shoe-last adze was used, at least occasionally, to kill people. Three individuals, two male and one adult, were probably killed by arrowheads. The shoulders and arms of the victims do not exhibit traces of injuries, suggesting that not much resistance was offered against attackers. One of the deceased, a man 50–60 years old, had participated in previous fights; his skull shows evidence of an earlier healed injury. Such injuries resulted from hand-to-hand fighting. The Talheim episode was not related to finding mates, since adult males and females were killed. It appears that a settlement was raided, the cause being unclear, and the people were massacred (Wahl and König 1987, Vencl 1999). Another late Linear Pottery settlement with evidence of brutal conflict is Schletz in Austria (Windl 1996, Wild et al. 2004). A double oval ditch, 4 meters wide, 2 meters deep, and 330 meters in diameter, surrounded this settlement. There were the remains of over 100 individuals at the bottom of the outer ditch; some only represented by skulls or pieces of skulls. Most were killed by blows of adzes or some heavier weapon on the head (Fig. 7.14). Some bones show tooth marks of wolves, dogs, and foxes, indicating that the dead lay for some time on the surface before they were dumped in the ditch. Young females are underrepresented among the dead, suggesting, perhaps, this may have been a raid for mates (Teschler-Nicola et al. 1996). In the 1990s archaeologists speculated that there was some evidence for warfare at Herxheim, Germany, where several human skulls had been made into bowls (Häusser 1998:69, Spatz 1998). Recently the Herxheim data has been reconsidered and ritual practices are now favored (Orschiedt and Haidle 2007). However, Golitko and Keeley (2007:338) note that "even if ritual practice were involved, many researchers seem to view it as an exclusive alternative explanation to warfare: the implication is that the victims of the violent rituals were come via peaceful means." It is possible that captives from raids were utilized in such rituals. At Menneville in northern France, the remains of juveniles were dumped in a ditch surrounding the settlement (Faruggia et al.

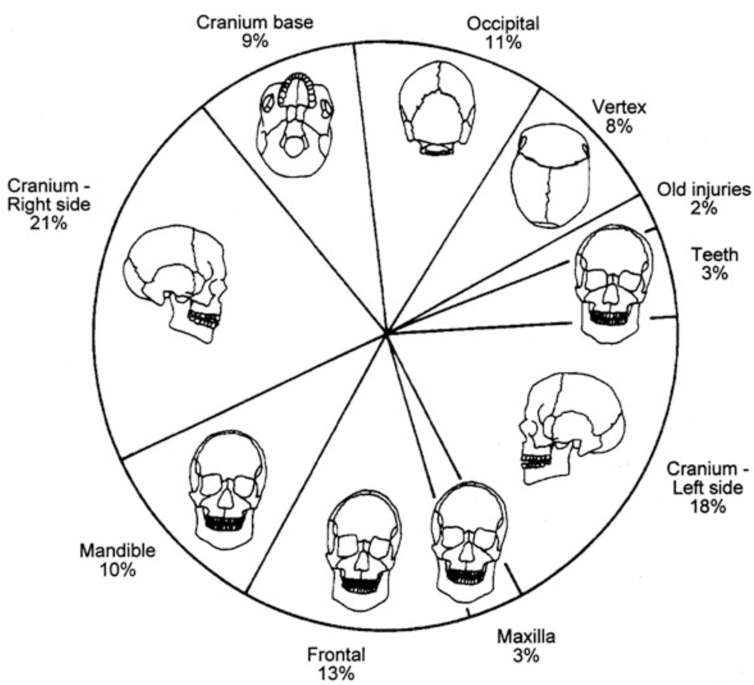


Fig. 7.14 Distribution of cranial wounds inflicted by axes/adzes at Schletz (after Teschler-Nicola et al. 1996, with modifications)

1996). Other Linear Pottery sites such as Vaihingen in Germany have yielded ditches and skeletons in them (Krause 1999). Gronenborn (1999:189) observed that late Linear Pottery "war parties set out to eradicate whole villages and annihilate most of their inhabitants." It is doubtful that events at Talheim, Schletz, and other sites in western Germany and Austria are applicable to what was happening everywhere else.

The Linear Pottery data from southeastern Poland suggest a more peaceful society. Over 42,000 flint artifacts were found in the excavated units at Olszanica in Poland, however, only three or four were projectile points (Milisauskas 1986). Relations between Linear Pottery people and foragers on the North European Plain may not always have been peaceful. The occurrence of shoe-last adzes in areas outside the Linear Pottery territory, e.g., northern Germany, may reflect the range of the Linear Pottery raiders and not peaceful trade. Or, if Linear Pottery shoe-last adzes were widely valued items, maybe the hunters and gatherers were doing the raiding, and stealing the goods.

Linear Pottery ditched enclosures at some sites suggest intercommunity conflict. In central Europe, there are 84 Linear Pottery sites with evidence of enclosures (Golitko and Keeley 2007:337). Andersen (1997) provides an overview and critique of the varied interpretations of such enclosures. Some Linear Pottery enclosures were constructed of wood and earth, and most occur in the western region of the culture (Kaufmann 1977). In the Rhineland region of Germany, each concentration of Linear Pottery sites contained a fortified settlement (Schwellnus 1983). Two fortification types are present: (1) enclosures of entire settlements (Cahen 1984) and (2) fortifications located near settlements (Lüning 1988). The presence of fortifications and enclosures show that Early Neolithic peoples could organize households and communities for major communal tasks. It should be noted that Lichardus et al. (1985) consider such facilities to be cattle corrals. According to Coudart (1991) they could have been used for ritual purposes to reaffirm supralocal solidarity. As Keeley and Cahen (1989:170) have pointed out, "Most kraals, such as those of the East African pastoralists are simple barriers – mud walls, stockades, *chevaux de frise* of thorns, etc, – meant as much to restrain stock from straying at night as to deter predators."

Keeley and Cahen (1989) analyzed three Linear Pottery sites: Darion, Longchamps, and Oleye in northeast Belgium. The Darion site enclosed a 1.6-hectare area. There were four longhouses inside the area and a large empty expanse. Lüning (1998) estimates approximately 20 longhouses at Darion and suggests that erosion destroyed the evidence of postmolds in large parts of the site. A V-sectioned ditch, measuring 1.5–2.5 meters deep enclosed the settlement. An internal palisade, 400 meters long, supported the ditch, which contained three gaps that served as gates. According to Keeley and Cahen (1989), the ditch, palisade, and gates imply that, at times, Darion fought with its neighbors. It should be noted that Lüning (1998) questions the contemporaneity of the longhouses and the ditch. What prompted the Linear Pottery people to construct these fortifications? Keeley and Cahen speculate that they protected farmers from raids by foragers, but one can raise a question, why not from other farmers?

Mercer (1999:154) states that there is "evidence for organized warfare in the Early Neolithic in Britain." He considers some of the ditched enclosures such as Crickley Hill to have had a defensive function. The Crickley Hill ditch and a palisade enclosed a 1-hectare area. Mercer also cites the presence of bows made of yew and leaf-shaped arrowheads suggesting Neolithic peoples were skilled archers. Schulting and Wysocki (2005) analyzed 350 Neolithic crania, mainly from southern Britain, and 31 had evidence for trauma. They conclude that "Some of these examples remain uncertain indicators of interpersonal violence – either because of doubts over their identification as peri-mortem fractures, or because some might reflect accidents – and so we suggest figures of about 2% perimortem trauma (i.e., themselves lethal, or part of a suite of lethal injuries), and 4–5 healed trauma" (Schulting and Wysocki 2005:132).

Decorations or artistic motifs on megalithic monuments may constitute evidence for conflict. The most common motifs are crooks and hafted axes (Giot 1994:572). One of the possible functions of hafted axes might have been as weapons.

The archaeological data of the early Neolithic do not indicate intensive warfare among various groups, but it would be a mistake to dismiss any evidence as unreliable, unclear, or unconvincing. Like many other aspects of human life, the past does not need to be Hobbesian or Rousseausian, there is always the gray area.

Social Status: Mortuary Evidence

Data recovered from cemeteries suggest that, in some parts of Europe, status differences did exist in Early Neolithic communities. Using such data can lead to contradictory interpretations. Whittle (1996a) suggests that the rich burial (no. 43) at Varna, Bulgaria (4560–4450 BC) reflects the deceased person's religious or symbolic importance (Higham et al. 2007). It is difficult to demonstrate such importance from this data alone. This exceptionally rich grave contained 990 gold objects, weighing altogether 1.5 kilograms. Cross-cultural data from societies of the recent past suggest that the burial more probably reflects the higher status and/or wealth of this man in Neolithic society.

Some archaeologists interpret differences in mortuary data in terms of status differences (Binford 1972, Saxe 1971). It is assumed that poor grave assemblages correspond to a lower status. Artifacts found in burials may reflect the social roles and statuses of the individuals with whom they are buried (Saxe 1971). We might predict that men, women, and different age groups will be associated with different activities, during certain periods of the day or season. House building, fighting, hunting, and cutting trees for clearing farmland were probably men's activities; thus it is to be expected that male burials would contain artifacts appropriate to such tasks. Nonlocal raw materials and their products might express wealth and status differences. Their presence in burials may indicate that certain males or females had a higher status than others, caused by or resulting from their participation in interregional exchange.

In southeastern Europe people were buried within settlements and no special areas were set aside as cemeteries. At Nea Nikomedeia in Greece, the dead were buried in pits outside houses, with few or no grave goods. At Anza I in Macedonia, 28 skeletons were found in the settlement (Gimbutas 1974a).

We have much more information about Early Neolithic burials in central Europe. Linear Pottery burials are found both in settlements and specialized cemeteries, the latter reflecting, perhaps, the importance of communal identities. We have good data from the cemeteries at Sondershausen (Kahlke 1954), Elsloo (Modderman 1970), Rixheim (Gallay and Schweitzer 1971), Nitra (Pavúk 1972), and Sengkofen (Osterhaus and Pleyer 1973). It should be pointed out that cemeteries are rare in comparison to settlements. Numerous settlements were found in the Aldenhoven plateau, but only one cemetery, Niedermerz. Jeunesse (1997) and Nieszerný (1995) have carried out extensive analyses of data from Linear Pottery cemeteries. These are usually located 100–500 meters from their settlements (Fig. 7.15). The largest, such as Nitra in Slovakia, Aiterhofen, Wandersleben-Gotha, and Vaihingen in Germany, each have 70–200 burials, but such large cemeteries are rare. Most graves contain only one individual. Cremations occur, but inhumations are more prevalent. The largest known cemetery, Wandersleben-Gotha in Thuringia, yielded 175 inhumations and 132 cremations (Nieszerný 1995), while at Niedermerz in the Rhineland only 6 out of 102 burials were cremations. It is not clear why some individuals were cremated. Gronenborn (1999) speculates that inhumation was reserved for

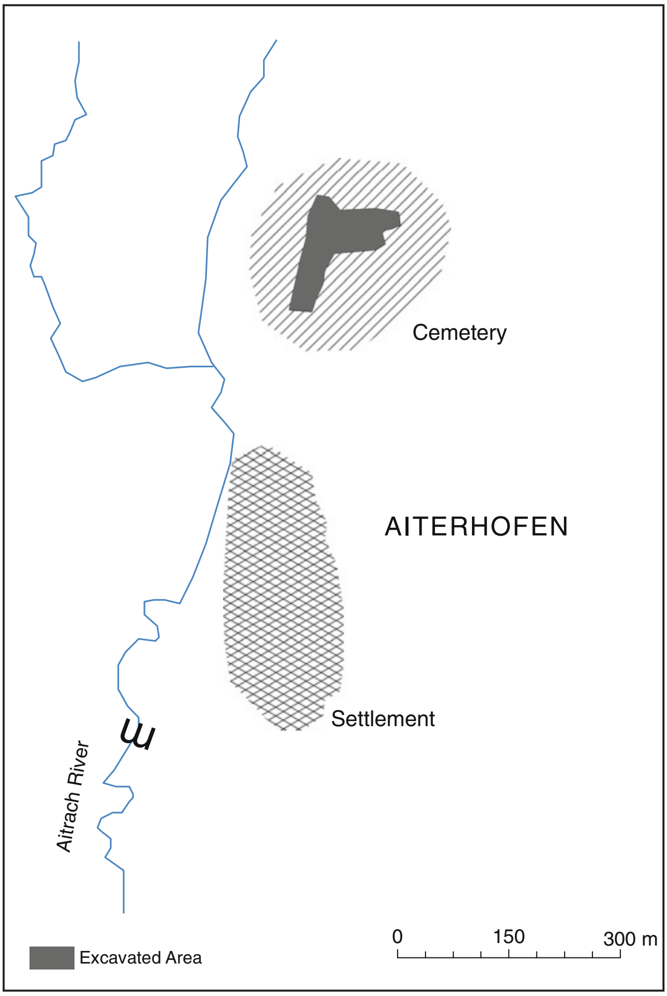


Fig. 7.15 Linear Pottery settlement and cemetery at Aiterhofen in eastern Bavaria (after Osterhaus 1975)

individuals of certain social statuses. Nieszerný's (1995) analysis of Linear Pottery population densities suggests only 20% of community members were buried in cemeteries; he speculates that these were important families. Many Linear Pottery burials contained grave goods; proportions range from 32% at Fellbach-Offingen to 77% at Mangolding. Goods may be pottery vessels, adzes, flint tools, antler/bone combs, red ocher, and necklaces made of shell or stone beads. Some burial goods are gender-specific. Arrowheads are usually associated with men as hunters and, possibly, warriors. Most individuals were buried in a flexed position with their heads oriented toward the east.

Nitra is a good example of a central European Early Neolithic cemetery. The artifacts associated with burials indicate that status differences were based primarily on age and gender (Table 7.6). Ten adult females out of 23 (45%) had no burial goods. Adult males seem to have received preferential treatment. Only 6 out of 27 (25%) were without burial goods. *Spondylus* shells and other artifacts made of nonlocal raw materials are strongly associated with old males (Fig. 7.16). This may indicate that such persons were more important in their communities and participated in interregional exchange. The tendency toward male gerontocracy at Nitra is further shown by the association of polished stone

Table 7.6 Proportions of each sex by age group at Nitra

	Young adult (16–30 years)		Adult (31–45 years)		Old (46 years)		Totals	
	N	%	N	%	N	%	N	%
Female	11	23	7	15	4	8	22	46
Male	5	10	16	33	5	10	26	53
Age group totals	16	33	23	48	9	18	48	99

Data are from Pavúk (1972)

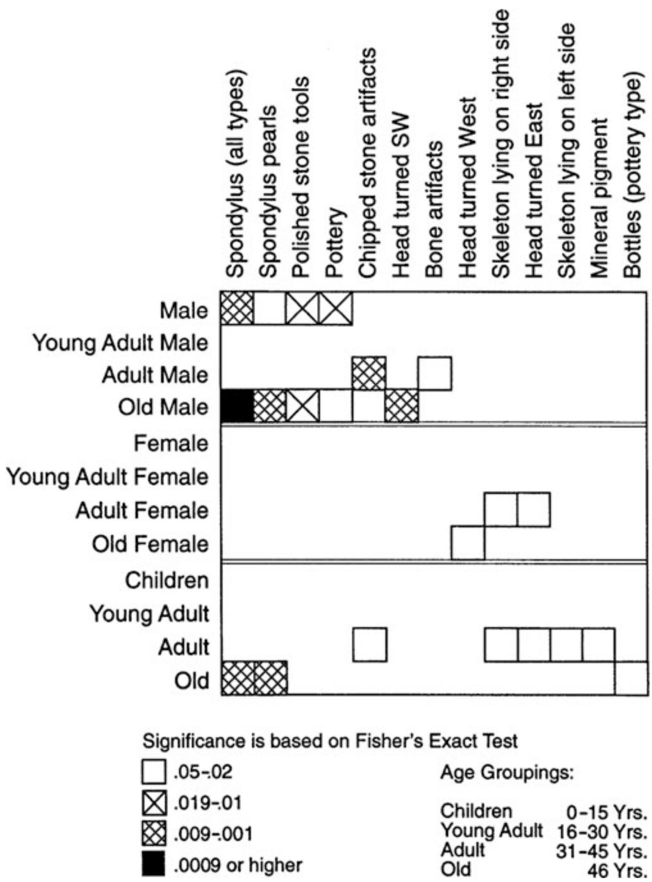


Fig. 7.16 Association of burial data with sex and age groups at the Nitra cemetery

tools and chipped stone artifacts with adult or old males. Pottery, usually assumed to be the class of artifact appropriate to female tasks, is not associated with women here. Pottery may not have reflected status or gender differences; it may have been a purely technical necessity for rituals, feasting, and other social activities. Polished stone tools were probably valued as prestige items in society and ideology. Their use as weapons cannot be excluded.

At the Sondershausen cemetery in Germany, females as well as males were buried with *Spondylus* products, assumed to be items reflecting prestige and authority. Burials with *Spondylus* had more goods than those without. Data from four Bavarian Neolithic cemeteries indicate that V-notched *Spondylus* shells and *Spondylus* bracelets were associated with men and perforated *Spondylus* shells with women. Nieszerný (1995) concludes that older men and some older women were leaders in their communities. At Flomborn cemetery in Germany, some children were buried with shoe-last adzes (Frirdich 2005).

Mortality, Longevity, Sex Ratios, and Population Composition

In regular burials at Nea Nikomedeia, 13 adults, 13 children, and 9 infants were found (Angel 1973). Thirty-one adults, 21 children, and no infants were represented by single bones or by very incomplete skeletons. Altogether, the remains of 87 humans were found. However, Angel increases the total population to 105. No infants were represented by single bones, and this apparently justifies tripling the infant sample. Adult male longevity was estimated at 31 years for 20 individuals; for adult females, 29.9 years for 23 individuals. Average male stature was 168 centimeters. He also estimated the fecundity rate at five births per woman from seven female pelvises. Neolithic mortuary data is rare elsewhere in southeastern Europe; what there is shows similar ratios of men to women, e.g., burials from Franchthi cave yielded more women (39) than men (25) (Jacobsen and Cullen 1981).

The Nitra cemetery in Slovakia provides us with information about population composition, mortality, and sex ratios in central Europe (Pavúk 1972). There are 74 skeletons; one, a child, is probably of the Late Neolithic Baden culture. Life expectancy appears to have been low for these Linear Pottery people. Out of 73 individuals, 9 reached the age of 50. Thus, if this sample is representative, one would only have had a 12% chance at birth of reaching the age of 50. Women between the ages 15 and 30 had high death rates (Table 7.6). Twenty-two skeletons were those of children aged 15 or younger. East German data shows that women were 149–164 centimeters in height (average 157 centimeters), while men were 158–176 centimeters (average 166 centimeters) (Bach 1978).

A Linear Pottery house probably held two generations of parents and children, since few people lived longer than 50 years; grandparents rarely survived to see their grandchildren (Neustupný 1983). The short life expectancy of most Early Neolithic individuals affected the size of families. The role of relatives in children's upbringing would have been important, since frequently one or both parents died at a young age (E. Zubrow pers. comm.). On the other hand, individuals surviving to an older age probably had two or three spouses in their lifetime, and thus would have had more children. Perhaps the larger longhouses reflect this phenomenon, giving their occupants a higher status.

Data from modern populations indicate that male and female births occur in approximately equal proportions. However, this parity is not always reflected in archaeological data. Various cultural practices may account for unequal sex ratios: infanticide, differential treatment of children, such as better diet for males. Infanticide victims were not likely buried in cemeteries. As a culture expanding into unused agricultural territory, Linear Pottery, perhaps, did not need to practice fertility control. They would have needed all the hands they could get.

A disproportion between sexes is evident in Linear Pottery cemeteries, and at many Neolithic sites (Häusler 1966). There are more males than females at the Bavarian cemeteries of Aiterhofen (43:36, inhumations only), Sengkofen (11:4), and Steinheim (20:7) (Nieszerný 1995).

The Nitra data shows that Linear Pottery women had less chance of reaching old age than men. Seventeen out of 21 females died between the ages of 16 and 40, whereas only 11 males out of 26 died in this age group. Data from Bavaria indicate an average age at death for adult women of 34 years and for men 40 years (Nieszerný 1995). Warfare could have accounted for many deaths among young males, while death in childbirth would have ended the lives of many young women. However, both genders probably suffered equally from warlike practices such as ambushes or sudden raids on settlements like Talheim in Germany or Schletz in Austria. Death in childbirth might, as has been in some recent societies, have been regarded as punishment for a breach of morality; such women may have been denied burial in the community cemetery and thus would be absent from our calculations. But some young men, killed in war or in hunting accidents away from home, might also be missing. The age at death of children is revealing: most died before the age of 6 years. In small-scale societies of the recent past, child mortality is greatest precisely during these years (Cook 1972). In such cultures there is frequently an underrepresentation of children in cemeteries. Examination of skeletons for diseases indicates that Linear Pottery children had health problems such as *Cribra orbitalia* and lack of vitamin C (Carli-Thiele, Teegen, and Schultz 1995, in Nieszerný 1995). *Cribra orbitalia* may reflect malnutrition or intestinal parasites and is associated with anemia.

Sociopolitical Organization

The information available on Early Neolithic settlement systems suggests they had only one administrative level. Communities were politically independent and approximately equivalent in their structure and functioning. Observed differences between settlements seem mainly to have been due to subsistence activities, such as permanent villages versus herding and hunting camps. Societies with one level of administration have been classified as "tribal" societies (Johnson 1973). For example, the Linear Pottery people in central Europe represented the "tribal" level of sociocultural development. As previously mentioned, this type of classification of prehistoric societies is controversial among archaeologists. There is some settlement integration above the level of individual communities. Individual hamlets and villages were likely politically and economically autonomous, but villages located close together may have been linked by kin relationships, by common membership in sodalities or, speculatively, by the charismatic qualities of some individual.

What is the evidence for leaders in the central European Early Neolithic? Jeunesse (1997) suggests that some late Linear Pottery burials contain individuals with inherited high status. Burials with *Spondylus* may be such (Nieszerný 1995). Gronenborn (1999) expressed similar views in his excellent synthesis about Linear Pottery culture. Furthermore, van de Velde (1990) sees social inequality in northwestern Europe, while Modderman (1988) suggests that there was an increase in inequality over time in Linear Pottery communities.

Data from cemeteries suggest that older males and some older females may have had higher statuses, may have been leaders in a village. Such achieved leadership depends on a wide range of an individual's skills and abilities. As long as he or she can impress the other members of their community with their deeds they remain at least "opinion leaders." For a variety of reasons, their followers may reject them at any time. Such leadership cannot be inherited. Some of these persons may have had political influence on neighboring communities. Such leaders can, to some extent, influence decision making, especially in the village's household production. In attempting to extend their fame to neighboring villages, they might make too many demands, pushing for increased production of agricultural or other products for gifts to non-kin. Excessive demands or attempts to exploit kinsmen may bring about their downfall.

The extremely long longhouses found at some Linear Pottery sites may have been associated with such leadership. As previously mentioned, they may have been used for communal activities or for the activities of local associations or sodalities. However, it is also possible that the most important man or woman inhabited the longest longhouse. This does not mean that there was inherited ranking of individuals in Linear Pottery society, but only that a man or a woman could achieve greater status on the basis of personal skills or personality traits.

Rituals and Beliefs

We assume that Early Neolithic peoples performed a variety of religious rituals, and magic likely played an important role in their societies. However, there is a major problem in determining what structures or artifacts were used for ritual purposes. Unusual structures containing nonutilitarian artifacts may indicate "sacred" purposes. Figurines, especially of women, are often considered to have been used in rituals. However, the only evidence for this lies in their formal characteristics and, sometimes, in the context of their discovery. Another problem confronting us in speculations about the Neolithic peoples is that their system of thought and belief was different from ours. Religion and the supernatural world played a much more important role. It is difficult for us to comprehend or imagine the supernatural world that surrounded and influenced everyday human activities and behavior during the Neolithic.

Some evidence exists for communal ritual activities in southeastern Europe. At Nea Nikomedeia, the largest structure, approximately 13 × 15 meters, was located in the center of the excavated area, and inside it were found five figurines of women (Rodden 1962). This house could have been used for communal rituals. In a small-scale society rituals would have played an important role in holding the community together. No special ceremonial structures have been identified at the Karanovo I site in Bulgaria, although anthropomorphic clay figurines found at this site could have played a role in rituals.

Human imagery especially anthropomorphic figurines played an important role in a variety of archaeological studies (Bailey 2005, Renfrew and Morley 2007). As Morley (2007:XVII) has pointed out, "Imagery has the potential to be used to create, reflect and enforce power relations, and in many societies figuration is often associated with spirituality and the practice of religious ritual. Yet clearly the functions of figuration vary greatly . . ."

Garfinkel (2003) speculates that dancing rituals were performed by Neolithic peoples. He has identified certain embossed figures which he believes represent dancers on Near Eastern Neolithic ceramics, figures which also appear in assemblages in southeastern Europe during the Neolithic. Garfinkel suggests that dancing rituals may have been crucial to early agricultural societies and these figurines served to further support group cohesion. Renfrew and Morley (2007) have suggested that representations of the body, of which figurines are the most prolific evidence, may have been an essential part of the Neolithic cognitive package. We can assume that ornamentation on figurines can be informative and tell us a narrative.

Numerous scholars have written about the beliefs and rituals of Neolithic peoples based on the fired clay and less frequently bone and stone figurines (Hawkes 1951, Gimbutas 1991). It should be noted that archaeologists have for many years conducted typological research on figurines, making observations about their variability through time and space (Höckmann 1968, Kalicz 1970, Radunčeva 1977, Todorova 1980). Lately several scholars have moved away from the ritual approach and have emphasized a more cognitive approach in the study of figurines. Some scholars claim figurines were used to order social relations. Nanoglou (2005) notes that figurines from the Early Neolithic in Greece emphasize gesture and action, while Late Neolithic figurines are in static positions with increasing detail paid to the head and torso, indicating a shift from achievement to ascription. Other scholars argue that figurines reflect representations of Neolithic bodies and by extension represent a dynamism between individual and communal agency (Bailey 2007). Biehl (1996) has emphasized that the figurines themselves serve as a context for the iconography which they bear.

There are figurines of animals, women, sexless humans, men, and various objects. Human figurines are small, usually not more than 10 centimeters in height, although two figurines more than 25 centimeters tall were recently excavated at the Cucuteni-Ariuşd site at Ciomortan (Buzea 2006). A small number of them have masks. Figurines with pubic triangles, breasts, and supposedly pregnant abdomens are classified as women (Bailey 1994, Biehl 1996) (Fig. 7.17). Those of men have penises

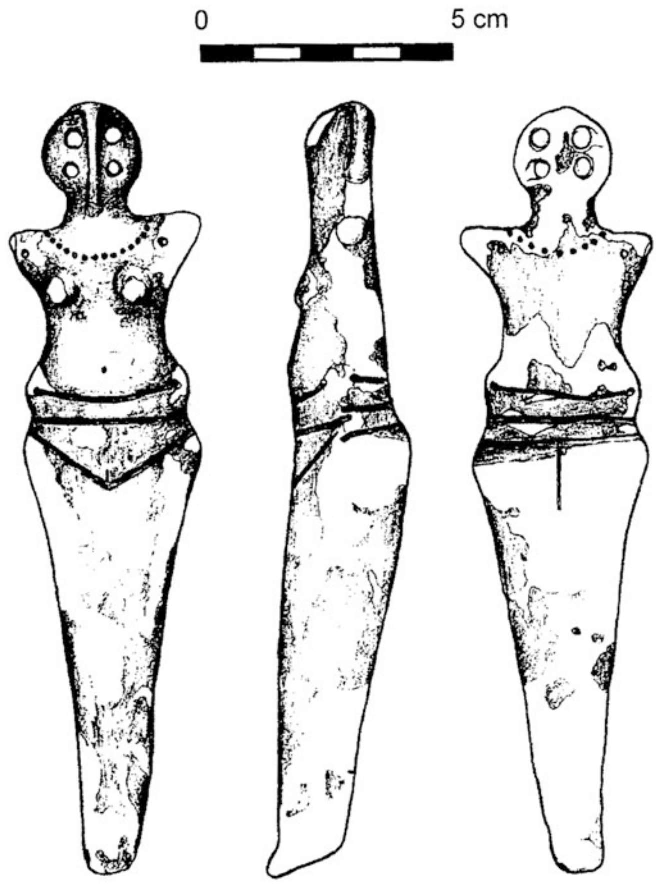


Fig. 7.17 Female figurine from Bilcze Złote (Bilche Zolotoe) Ukraine (Courtesy of Kadrow, 2010)

and/or beards (Fig. 7.18). Asexual figurines have no sexually identifiable characteristics. There are rare examples of figurines having both breasts and penises (Vajsov 1984). The commonly presented pictures of women figurines in introductory textbooks have small breasts, wide hips, and protruding buttocks, as if they had steatopygia, that is, unusually fat or large buttocks. However, such figurines are not typical. There is in fact great diversity in form and decoration among figurines. There are also figurines of cattle, ovicaprids, dogs, deer, and birds.

The "Neolithic figurine phenomenon" is found over a very large territory and lasted over 3000 years. It occurs over all of southeastern Europe and parts of eastern Europe (Ukraine), that is from the Adriatic Sea to the Black Sea. There are thousands of figurines from Cucuteni-Tripolye sites in Moldova, Romania, and Ukraine (Monah 1997). The meaning of these figurines for the Neolithic peoples probably varied through different times, regions, and contexts. Perhaps some of them reflected a certain world view and spiritual beliefs, between 6500 and 3500 BC, after which date they were no longer made. Not all Neolithic societies produced figurines; they are rare north of the Alps and Carpathians. Proportions of sexes vary at different sites, but the majority represents women. For example, in Bulgaria over 90% of them are female representations (Todorova 1978). Even when, at some sites, a third of figurines are asexual, it is difficult to explain why majorities are female. At the same time we should try to account for the paucity of figurines of men.

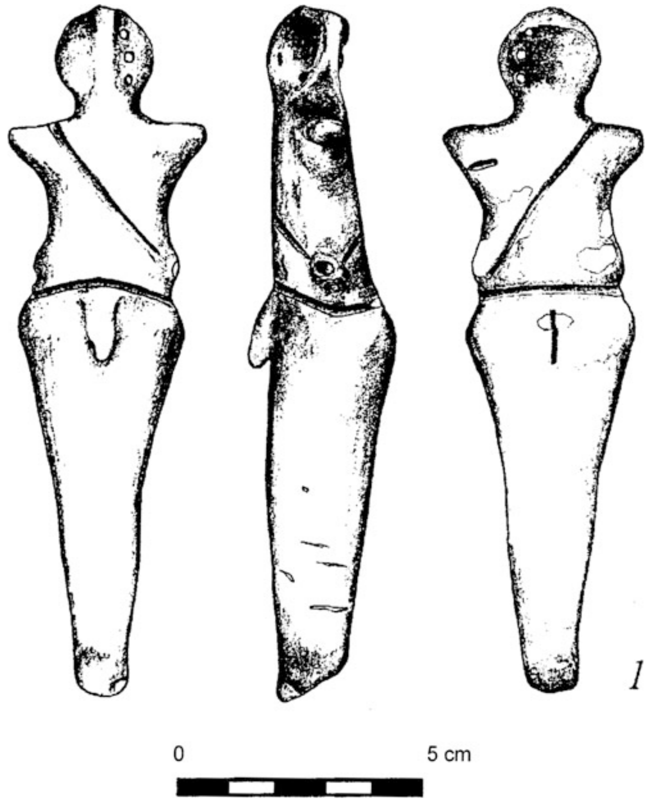


Fig. 7.18 Male figurine from Bilcze Złote (Bilche Zolotoe), Ukraine (Courtesy of Kadrow, 2010)

Many figurines were broken in the past. Gaydarska et al. (2007) have discussed the fragmentation and figurine use life. They also discuss the issue of side selection, i.e., deliberately breaking the left side or right side of the figurine. There are some correlations between Cucuteni figurine types and whether right leg or left leg is broken. Cucuteni figurines were probably not deliberately fragmented; fractures mostly follow the lines where two pieces of clay were joined to create the figurines. But if fragmentation works with Cucuteni figurines it would work only with the decorated ones (R. Whitlow pers. comm. June 15, 2009). Talalay (1987) suggests that broken figurine legs may indicate that figurines were used as contractual devices or tokens between groups.

There have been many interpretations of figurines throughout the history of archaeology, reflecting the sociocultural biases of their times. As Ucko (1996:304) has pointed out now, "we are in the era of multiple meanings." They have been considered dolls, educational aids, personal ornaments, symbols of power, representations of people or ancestral figures, goddesses, pornographic objects, or as having healing and magical powers (Bailey 1994, Whittle 1996a, Tringham and Conkey 1998). Many of these interpretations were based on historic or ethnographic analogies. Fifty years ago Peter Ucko (1962:47) pointed out that there were different reasons for their production and their use.

At Achilleion, Greece, figurines of women make up 99% out of 200, those of men 1% (Gimbutas 1991). However, at Golyamo Delchevo, Bulgaria, 32% were sexless, 67% female, and less than 1%, one figurine, male (Bailey 1994). Most figurines are found in pits, which is not a very informative context for establishing their function or usage. Pits may not have been their original contexts; they were removed from their original contexts. In Cucuteni-Tripolye sites of Ukraine, Moldova, and Romania, figurines occur in houses, hearths, and pits. At two sites, Tirpeşti and Poduri, the excavators have found clusters of figurines buried together with sherds (Marinescu-Bîlcu 1981, Monah 2003). Lesure (2007) has analyzed the current state of figurine research and noted that most research is somewhat contextual with either universalist or grand historicist overtones. That is, most explanations rely on either relating figurines to a historical tradition, such as the mother goddess, or on universal characteristics of figurines, such as their size, the presence or absence of decoration, or deliberate abstraction (Bailey 2005). We must be careful not to unknowingly read too much into our interpretations of figurines.

What is the meaning of the ornamentation on figurines? "Does decoration only function as aesthetic ornament or does it have a symbolic meaning or message?" (Biehl 1996:154). It can be an ornament and have a message. Cornelia-Magda Lazarovici (2006) considers symbols that appear on Cucuteni figurines in Romania as signs associated with mother goddess beliefs. William Flinders Petrie and Arthur Evans were two of the earliest archaeologists to excavate figurines in Egypt and in Crete, respectively. Although Petrie never held the opinion that figurines represented a mother goddess or fertility goddess, Evans believed the figurines at Knossos may have represented Ishtar (Ucko 1968:409).

Since many Neolithic figurines represent women, it has been supposed they represent goddesses. Hutton (1997) summarizes succinctly how scholars have propagated this hypothesis. To Jacquetta Hawkes (1951) Early Neolithic cultures were gynocentric, peaceful, and goddess worshippers. V.G. Childe (1958:46) stated that the figurines were used in fertility rituals and "represent the same Mother Goddess as among Oriental peasantries." Thirty-five years ago, Marija Gimbutas (1974b, 1991) resurrected and popularized Hawkes' Great Goddess hypothesis. A major authority on European archaeology in the United States, her interpretations became accepted as facts by some archaeologists (Hansen 2007). To some constituencies in the general public she herself became, symbolically, the Mother Goddess. Even after her death she remains one of the best-known and influential archaeologists. She has conducted numerous excavations and possessed reading proficiency in many European languages; her ideas simply cannot be dismissed as idiosyncratic or exotic. She made us much more aware of religion, warfare, and gender in prehistory.

In her early publications, Gimbutas associated figurines with various feminine divinities such as the Bird and the Snake Goddesses (Gimbutas 1974b, 1982). Gimbutas was fantasizing with such specific name assignments, though we can probably safely assume there were women deities and spirits who played a role in Early Neolithic religion. By the late 1980s she was proclaiming that Early and Middle Neolithic peoples were worshipping a Great Goddess (Gimbutas 1989, 1991). This appealed especially to those women in western societies who were searching for a feminist alternative to male-centered contemporary religions. According to Allen (2001:18) "Wicca, sometimes known as the Goddess movement, Goddess spirituality, or the Craft, appears to be the fastest-growing religion in America." Thus figurines even today have a symbolic meaning. Gimbutas, like J. Hawkes, idealized the Early and Middle Neolithic as a time of matrifocal cultures, dominated by peace and harmony. This so-called Old Europe was contrasted with the Late Neolithic where warlike masculine values supposedly dominated cultures. The roles and statuses of women in the Early Neolithic are not at all clear. Gimbutas assigned them high status, but it is difficult to justify hypotheses about the position of women from figurines, some of which could be divinities, others just about anything else. Ethnographic and historic data suggest that most societies honor male and female supernaturals. And, as has been pointed out by Preston (1982:326), "The presence of powerful goddesses in a religious pantheon rarely reflects anything about the role of females in that particular society." In ancient Greece, the presence of various goddesses, such as Athena, Artemis, or Demeter, did not prevent women from having a lower sociopolitical status than men. The difficulty of interpreting artistic symbolism is well illustrated by the picture of a dove, which Christians know symbolizes the Holy Spirit. How would a woman from Early Neolithic Karanovo have "interpreted" such a picture?

What do figurines of women symbolize? What were they trying to communicate to various prehistoric people? A common interpretation is that some symbolize fertility and the reproductive role of women. The mother goddess theory suggests that women achieved their higher status and power based on their ability to procreate (Talalay 2000). It may not be popular these days to stress such interpretations, but as Haaland and Haaland (1996:300) have observed, "features and function of the female body played in the formation of common human experiences." As many other scholars have, they too have suggested that early agriculture had a concern for crop fertility, thus linking it to women's fertility. There is a "metaphorical connection between mother and earth – both sources of fertility" (Haalund and Haalund 1996:299). Interpretation of figurines may vary in different contexts, thus this does not imply that most figurines were symbols of fertility. Perhaps they were produced and used by women in household rituals. As Marcus (1996) has noted about Zapotec rituals in Mexico, men's rituals did not involve figurines and were conducted outside the settlement. Perhaps this scenario is applicable to some European Neolithic societies. Bailey (1994) may be right in arguing that by 4000 BC some figurines represented actual personalities, religious or political officers. At this time some southeastern European societies were much more complex sociopolitically than they had been 2000 years earlier. Likewise Biehl's (1996:170) study of decoration on figurines suggests that "figurine production is more likely to represent an acting 'human being' than a certain god or goddess." He studied 381 clay figurines from 33 Gradeshnitsa-Krivodol culture complexes in northwestern Bulgaria, dating from 4500 to 4000 BC. However, Biehl (2007b:199) notes that "It is baffling that even today most archaeologists continue to automatically associate anthropomorphic figurines with cult and religious practices."

Lately several scholars have moved away from the ritual approach and have emphasized a cognitive approach in the study of figurines as, for example, figurines reflect representations of their bodies (Bailey 2005, Gheorghiu 2005). Bailey (2005) has suggested that the absence of features on figurines was a rhetorical ploy to enhance the significance of the figurines. He also suggested that the absence of Cucuteni-Tripolye burials reflects a relationship between items, arguing that ritual deposition of expressive pots or figurines replaced burial rituals common in other communities. Gheorghiu (2005) has taken a similar position, arguing that figurines were often direct stand-ins for humans in rituals.

In central Europe, the Linear Pottery peoples probably placed different emphases on rituals and beliefs than did their contemporaries in southeastern Europe. Figurines of women or anything else are much rarer in central and northern Europe throughout the Neolithic than in that of southeastern Europe. Figurines are rare at, or totally absent from, many Linear Pottery sites. It seems that Linear Pottery settlements located closer to the Late Starčevo sites in Hungary had more evidence for the presence of figurines (Bánffy 2003). Chris Scarre (2007:20) considers that the rare Linear Pottery figurines "form part of a unified tradition with those of southeast Europe." Jens Lüning (2005) suggests that some Linear Pottery figurines represent ancestors. Linear Pottery culture vessels decorated with human and animal faces may have played a role in rituals or had a symbolic significance. Why are clay figurines so rare in the Linear Pottery sites? Perhaps as the Linear Pottery people spread over central Europe, their beliefs and symbols changed as the memory of their ancestors' home in Hungary faded. Milisauskas (1986) excavations at the Linear Pottery site of Olszanica in southeastern Poland produced thousands of pottery sherds but no figurines. There were pots decorated with animal heads such as cattle. One can always invoke missing data in archaeological discussions and claim that Linear Pottery peoples made wooden figurines, which have not been preserved. However, wooden artifacts are occasionally preserved in wells on Linear Pottery sites and we would expect that by now some examples of wooden figurines would have been recovered. There are examples of wooden figurines from the east Baltic area, but they belong to the Forest Neolithic cultures (Fig. 7.19). Coudart (1991, 1998) has emphasized that the great uniformity of houses over a large territory, some 2000 kilometers in length, reflects more than just the homogeneity of an architectural tradition. It is unlikely that a single world-view predominated in this territory. It is possible to divide Europe into two zones based on the occurrence of figurines alone. Central and northern Europe do not seem to have been

Fig. 7.19 Forest Neolithic wooden figurine from Šventoji, Lithuania (Courtesy of Rimantienė)

as "Goddess oriented" as Gimbutas suggested for all of her Old Europe. Demoule (2001) makes a similar observation about the absence of figurines in the west Mediterranean Cardial Neolithic that suggests differences in ideology and religion. Our data on warfare may reinforce this division. Early Neolithic societies in southeastern Europe may well have been more peaceful than those of central Europe, where there may also have been greater emphasis on masculine values.

Figurines may symbolize not only ritual and belief or actual human beings, but also supply information about dress and body treatment. Some of the rare Linear Pottery culture figurines are ornamented with small pits or impressions, which may indicate that people tattooed or otherwise decorated their bodies. The presence of clothing on figurines is a rare occurrence; out of 2042 Tripolye culture figurines in Ukraine, only 27 wore some type of clothing (Pogozheva 1985). Since it is unlikely that southeast European Neolithic peoples went nude, nude figurines are some kind of transformation of everyday reality, just how and how much is almost impossible to say.

Conclusion

Between 7000 and 5000 BC, a large part of the European continent was occupied by farmers. We attempted to present the different possible scenarios for the appearance of farming in Europe. It is not possible to reconstruct these events with any certainty. It is evident that different processes operated in the transition to farming in various regions of Europe. In the Mediterranean coastal areas, and in southeastern and central Europe, farming was probably introduced by slowly migrating nonlocal populations. In other areas, a variety of processes operated, in which local foragers appear to have played an important role. There was no northward expansion of farming for approximately 1000 years after the initial expansion over central Europe.

There is evidence for human occupation in areas now covered by the Black Sea. Around 5500 BC, the rising sea level of the Mediterranean overflowed into a freshwater lake to create the Black Sea. The Neolithic peoples living along the Black Sea coast had to move inland, perhaps initiating population movements.

As farming spread Europe was changing in economy, settlement, rituals, and beliefs. The landscape of Europe likewise changed; the gradual destruction of forests over centuries was initiated.

We can observe a number of regional differences in material culture; however, explanations for these developments elude us. Why do we have different architectural styles? Why were the rectangular or trapezoidal longhouses predominant in central Europe? We assume that there were linguistic and ethnic differences. We can assume that populations having the same origin, such as the Linear Pottery, spoke the same language or dialects and shared the same ethnic background.

How people dealt with their deceased and ancestors differed regionally. In the 1980s there were only about 250 Starčevo-Körös burials known and all of them were located within settlements (Kalicz 1998). In southeastern Europe the deceased were tied to the living place and especially the individual structure. Ancestors continued to live symbolically in the same settlement, never separated from the living. In central Europe, the Linear Pottery people separated their deceased from their settlements by selecting specific places (cemeteries) for their interment. The cemetery was a separate place specifically allocated for the ancestors. Significance of gender in the treatment of the dead was reflected in the different orientations of skeletons. Gender relations are difficult to discern from archaeological data, but it seems that older men and women had more respect and possibly power.

The Early Neolithic was not a prehistoric Garden of Eden, dominated by peace and harmony as presented in numerous publications of Gimbutas. As the massacres of men, women, and children at Schletz and Talheim indicate, intercommunity conflicts were settled quite brutally. Stone and flint axes not only symbolize economic and ritual activities, but also the bashing of skulls.

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Chapter 8
Middle Neolithic/Early Copper Age, Continuity, Diversity, and Greater Complexity, 5500/5000–3500 BC

Sarunas Milisauskas and Janusz Kruk

Introduction

We have seen that there was considerable cultural homogeneity among Early Neolithic farming societies, especially in central Europe. In contrast, the Middle Neolithic/Early Copper Age is a period of increasing cultural diversity and complexity. In traditional typology, the Middle Neolithic and Chalcolithic (Copper Age) fall within this period. In Germany, Poland, England, and Scandinavia, copper artifacts, mainly ornaments, are rare at most sites, thus it is difficult to talk about the so-called Copper Age. In Bulgaria, the Copper Age begins around 4800–4700 BC and in Hungary at 4600–4500 BC.

Changes are seen in economy, society, ecology, politics, rituals, and ideology. A fascinating manifestation of human creativity during this period was the construction of megalithic monuments in western and northern Europe. Technological innovation, demographic growth, improved subsistence, warfare, and novel ideologies and beliefs are all implicated in these changes. These suggested sources of change are interrelated, and no single cause drove for the greater diversity and complexity of this period. At the same time, individuals were making conscious or unconscious choices, but our ability to reconstruct their roles is minimal.

Farming societies now (4000 BC) appear in the British Isles and Scandinavia. An expansion of farming settlements occurred in the alpine foreland. In central Europe and the Low Countries, a greater number of farmers moved into non-loess areas. The Linear Pottery farmers were for a long time limited to the southern Netherlands and "groups of hunter-gatherers who made little or no use of agricultural products continued to live" in other regions (Fokkens 1998:90). Extensive mining of flint, copper, and salt occurred in some regions. Sherratt (1981) suggests that a "Secondary Products Revolution" occurred toward the end of this period. This "Revolution" is associated with the exploitation of domesticated animals for dairy products, wool, and traction. The term "revolution" is not very appropriate for these developments, since they did not occur at the same time (Vandkilde 2007:62). Chapman (1982), Vosteen (1996), Lüning (2000), and others have questioned Sherratt's interpretations of data relating to these developments. It is not easy to determine when, for example, the first use of sheep for wool, wheeled vehicles, or other innovations appeared in Europe. It is evident that the earliest milking of cows, sheep, and goats occurred in the sixth millennium BC. The first appearance of wool-bearing sheep and wheeled vehicles occurred around 3500–3300 BC, during the Late Neolithic/Late Copper Age. There are numerous disagreements about the meaning of data or "facts." For example, what does a wooden object from the Egolzwil 4 site in Switzerland represent (Wyss

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1983)? Is it the earliest yoke in Europe dated around 3900–3700 BC? According to Sherratt (1996) it is not a yoke, but Vosteen (1996) does not exclude the possibility that it is a yoke. Another issue is the relative importance of local ("nativist") or non-local ("diffused") inspirations for the various Middle Neolithic innovations. Before 1960 diffusion was almost always and unthinkingly invoked, then indigenous causes were equally uncritically invoked. Özdoğan (1997:1) has discussed the absurdity of an autochthonous or Eurocentric development model "which rejected the presence of any intrusive elements in the prehistory of Europe up to 1980s." Since 1990, the pendulum of intellectual fashion has somewhat swung back, with Sherratt (1997) challenging "nativist" claims. He notes that "The basic issue is thus one of gradualist versus 'punctuated' change, as the biologists term it" (Sherratt 1996:159). Perhaps here the biological analogy is inappropriate (R. Whitlow, pers. comm. October 5, 2008). While the neolithization of Europe could be described in punctuated or gradualist terms, the tempo of the change is a separate issue. New technologies can quickly enter and become dominant within a society, while a migration could crawl across the landscape. Sherratt emphasizes inter- regional links, especially between Europe and the Near East. Near Eastern influences are seen in "The appearance of the traction-complex and woolen textiles at approximately the same time as arsenical alloying of copper and use of the two-piece mould" (Sherratt 1996:156). However, the Neolithic Europeans were not just passively accepting outside ideas; they were creative people adapting and changing objects to their own needs.

Chronology and Cultural Sequence

The Middle Neolithic/Early Copper Age began around 5200–5100 BC in southeastern Europe. Karanovo IV, Boian, and Vinča-Tordos are some characteristic cultures in this region. In local classification, these are Eneolithic cultures. In Mediterranean Europe, the Serra d'Alta culture in southern Italy, Almerian culture in Spain, Cerny, and Chasséen in France characterize the Middle Neolithic. It should be noted that these dates do not coincide with the beginning of this period in all regions, for example, the Early Neolithic ends around 5800 BC in Greece.

The Tripolye or Cucuteni-Tripolye culture defines the Middle Neolithic/Early Copper Age in parts of Ukraine, Moldova, and Romania, though its late phases are considered Late Neolithic in this book (Mantu 1998) (Fig. 8.1). For the sake of simplicity, the Russian term *Tripolye* (*Tripilye* in Ukrainian) will be used throughout this text.

The major Middle Neolithic archaeological manifestations in central Europe are Funnel Beaker (TRB), Lengyel, Tisza, Stroke Ornamented, Rössen, Tiszapolgár, and Michelsberg. The Funnel Beaker culture, named for the shape of a particular ceramic type distinctive to it (Fig. 8.2), occurred in northern and central Germany, the Netherlands, Denmark, southern and central Sweden, southeastern Norway, lower Austria, the Czech Republic, Slovakia, Poland, and areas of the Ukraine adjacent to Poland (Fig. 8.3). The earliest culture material dates to circa 4300–4200 BC. In Scandinavia it is the earliest Neolithic or farming culture. The Michelsberg culture, considered by some archaeologists as just an extension of the Funnel Beaker culture, occurred in Switzerland, southern Germany, northern France, and Belgium. The Lengyel culture, named for its type site in western Hungary, is found in lower Austria, the Czech Republic, Slovakia, Poland, and Hungary. The Tisza culture covered the Great Hungarian Plain from the Tisza River east to the foothills of Transylvania 5000–4500 BC and was succeeded across this region by the Tiszapolgár culture circa 4500–4000 BC. In Hungary, Tisza is considered the Late Neolithic while the Tiszapolgár is referred as the earliest period of the Early Copper Age. It should be pointed out that this is a very simplified picture of the archaeological cultures in different regions during all the periods. For example, one chronological and cultural chart for western and eastern Slovakia can illustrate how complex the picture can be (Table 8.1).

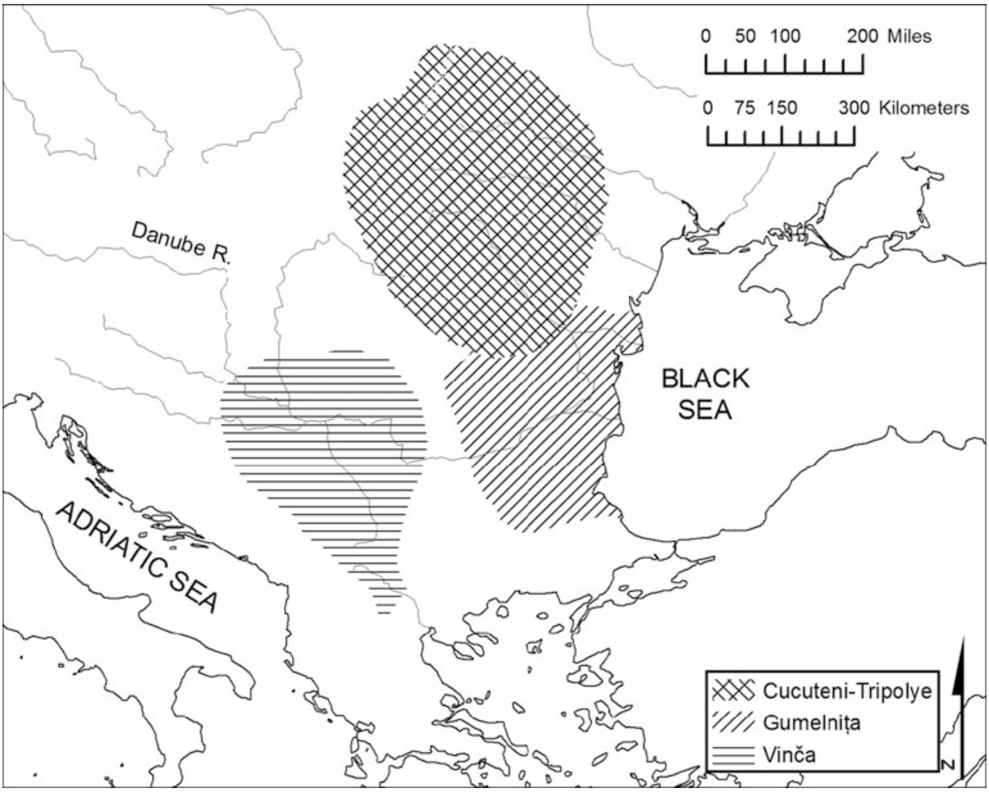

Fig. 8.1 Distribution of Middle and Late Neolithic cultures in southeast Europe

Transition to Farming in the British Isles

The transition to farming in the British Isles occurred much later than in the west Mediterranean region or central Europe (Table 8.2). Woodman (2000) and Thomas (2003) speculate that this may have taken place in a number of different ways. The Neolithic way of life was present in the British Isles around 4000 BC (O'Connell and Molloy 2001, Brown 2007), although Darvill (1996:78) dates the beginning of the Early Neolithic around 4400 BC. Were there farmers in the British Isles before that date? There is slender palynological evidence for earlier cereal cultivation. Edwards and McIntosh (1998) and Innes et al. (2003) cite evidence that cereal-type pollen grain were present during the late Mesolithic. However, Alex Brown (2007:1051) suggests that radiocarbon dating evidence "argues against dates for crop cultivation as early as c. 5000 cal BC suggested by the cereal-type pollen evidence. It is considered more probable that these pollen grains are derived from wild grains rather than cultigens." There are no pre-4000 BC sites yielding domesticated animal bones or plant remains in the British Isles, and the available evidence does not suggest a long and gradual transition to farming; the process seems to have happened quickly (Rowley-Conwy 1995, 2004, Thorpe 1996). Brown's (2007) analysis of radiocarbon dates on carbonized cereals from Britain and Ireland places the onset of cereal cultivation no earlier than 3950 BC. Brown (2007:1050) concludes that "The present dating evidence suggests a transitional period of perhaps some 150–200 years between 4000/3950 and 3800 cal BC before a Neolithic lifestyle became a more established feature of the British and Irish

Fig. 8.2 Funnel Beaker vessels from Bronocice, Poland

landscapes." The farmers on the French coast could see the cliffs of Dover on a clear day; and a small-scale population movement could have occurred from the continent to England to begin the process. Thomas (2007:430–431) suggests "that Mesolithic groups in Britain may have been aware (in general terms) both of the existence and the potential of Neolithic ways of life centuries before 4000 cal BC." He (2007:431–432) argues that indigenous Mesolithic groups had a role in the formation of the British Neolithic and "Many people, not all, continued to have a mobile way of life, but herding cattle rather than hunting deer and aurochs" (Ray and Thomas 2003). Ghiasta's et al. (2003:60) study of a new database of radiocarbon dates points "toward indigenous adoption rather than colonization," for Britain. Thus the evidence currently available does not allow us to choose between alternative hypotheses of Neolithization.

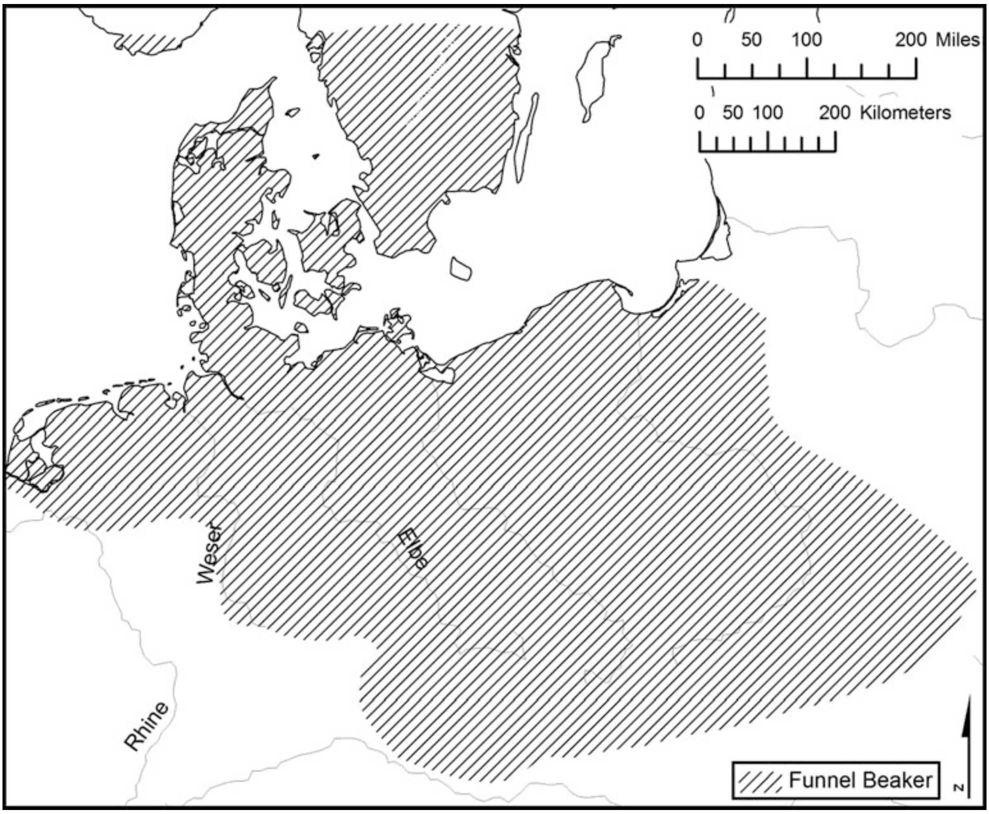

Fig. 8.3 Distribution of Funnel Beaker sites (After Jażdżewski 1936; Bakker, Vogel, and Wiślański 1969, with modifications)

The Transition to Farming in Scandinavia and the North European Plain

In Scandinavia and the North European Plain, indigenous hunter-gatherer populations seem to have played an important role in the appearance of farming (Kowalczyk 1969, Zvelebil 1986, Price 1987, 1996, Bogucki 1988, 2008, Rimantienė 1992a, 1996, 1999, Antanaitis 2000, Hartz et al. 2007). Late Mesolithic cultures, such as Ertebølle/Ellerbek in Denmark, Scania in southern Sweden, and Schleswig-Holstein and Mecklenburg-Vorpommern in northern Germany, are considered to represent complex hunter and gatherer societies whose diverse economies depended on the exploitation of marine and terrestrial resources. They interacted with farmers of the North European Plain (Fig. 8.4). Their cemeteries containing dozens of burials might indicate a group's possession of its territory. According to Persson (1999), the earliest evidence for farming in southern Scandinavia dates between 4100 and 3800 BC.

In the past a decline in elm pollen was frequently cited as evidence for the earliest agriculture in Scandinavia (Jensen 1994). Supposedly the first farmers were harvesting elm leaves as fodder to feed domestic animals. However, the elm decline is not limited to Scandinavia; it has also been noted in central Europe after agriculture had been practiced for over 1000 years. The elm decline is probably related to climatic change or something akin to the Dutch elm disease. Rackham (1980) points out that a Neolithic decline would have required at least a half million people; there is no evidence for so large a population in Scandinavia at that time.

Table 8.1 Neolithic cultural sequence in Slovakia[a]

		Western Slovakia			Eastern Slovakia	
2200 BC		Bošaca group	Kostolac group	Kosihy-Čaka group	Nyriség-Zatin group	Eastern Slovakian Mound group
				Classic Baden		
		Boleráz Group			(Barca)	
				Polgár group	Lažňany	
		Bajč-Retz			Bodrogkeresztúr II	
		Ludanice			Bodrogkeresztúr I	
		Brodzany-Nitra			Tiszapolgár	
	Lengyel group	Pečeňady				
		Svodin			Tiszapolgár-Csöszhalom-Oborin	
		Nitriansky-Hrádok				Herpály ?
					Potiská	
5000 BC		Lužianky				
		Želiezovce phase of the linear pottery culture				Bükk
		Late linear pottery		Barca III		Late linear pottery
5600–5500 BC		Early linear pottery		Barca III		Early linear pottery

[a]After Pavúk and Ŝiška 1971, with modifications

Table 8.2 Simplified chronological sequence for Northern Europe

BC	British Isles	Germany (Northern)	Poland (Northern)	Scandinavia	East Baltic	BC
2000–						–2000
2500–	Grooved Ware					–2500
		Corded Ware	Corded Ware	Corded Ware (Single Grave)	Corded Ware	
3000–	Peterborough					–3000
		Globular Amphora	Globular Amphora			
3500–	Windmill Hill Lyles Hill					–3500
4000–		Funnel beaker	Funnel beaker	Funnel beaker		–4000
					Comb-and-Pit Orn.	
4500–					Narva, Nemunas (Neman)	–4500
			Lengyel			
5000–		Rössen	Stroke Ornamented			–5000
		Linear pottery	Linear pottery			
5500–						–5500

Most archaeologists agree that foragers played a significant role in the transition to farming in Scandinavia, but they disagree on how long the process took. There was exchange of information and products between central European farming groups and Scandinavian foragers after 4600 BC. Only 100 kilometers (62 miles) separated the two. Shoe-last adzes, antler axes, and other artifacts

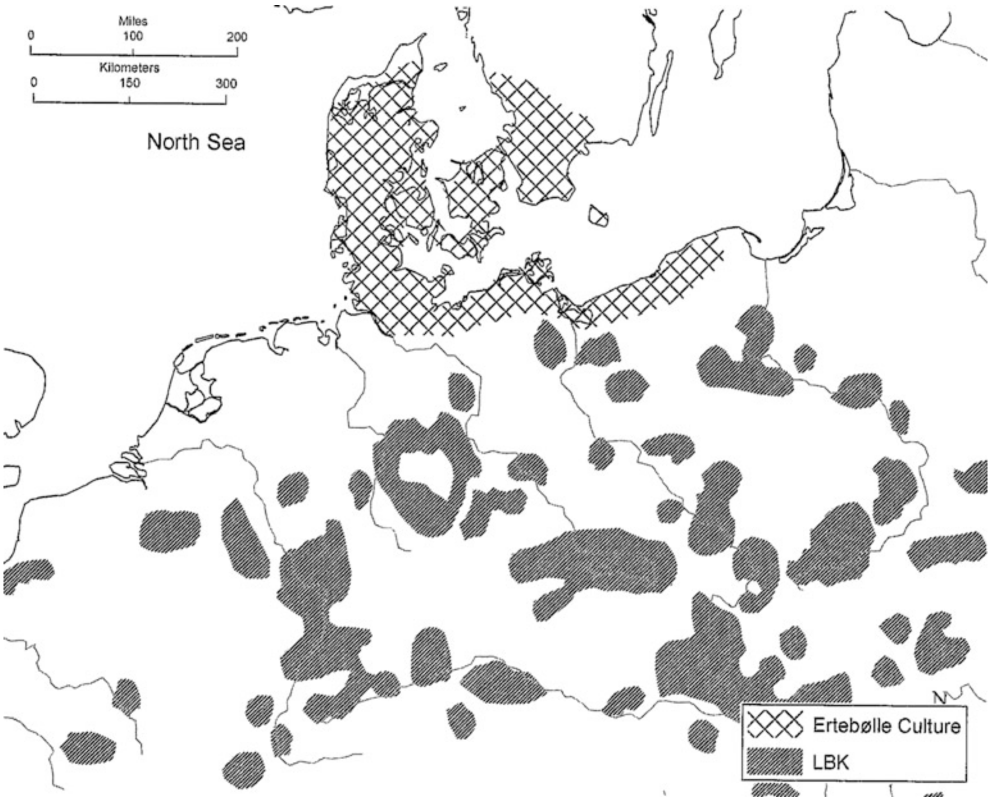

Fig. 8.4 Distribution of Ertebølle and Linear Pottery cultures (After Hartz et al. 2007, with modifications)

associated with farming cultures are found in Ertebølle/Ellerbek territories (Fischer 1982). It is unclear what the foragers exchanged in return, perhaps animal pelts and amber. It is only after 600–700 years of this relationship that the appearance of Funnel Beaker ceramics signifies the earliest Neolithic in Scandinavia (Price 1996). Jennbert (1985), Madsen (1982, 1987), and Price (1996) favor a long-term scenario for the appearance of agriculture. Thus, Price (1996:357) notes that domesticants appear around 3800 BC, but agriculture becomes the primary subsistence strategy only a millennium later. In southern Scandinavia this shift is reflected by one in ceremonial behavior, with the appearance of large earthen long barrows and bog sacrifices. Evidence for settlement is poor, though flint mines have long been known. Zvelebil (1996) and Rowley-Conwy (1998) favor a short-term scenario requiring a few centuries or less. They propose a three-stage transition to farming: availability, substitution, and consolidation (Zvelebil and Rowley-Conwy 1984, 1986). During the availability, or the first stage, foragers and farmers exchanged materials and information but the former did not adopt farming. Domesticants comprise less than 5% of faunal samples. In the substitution stage, farming replaces hunting and gathering, and domesticants comprise less than 50% of faunal samples. Dependence on farming for most of the diet occurs only during the consolidation stage.

Larsson (2007) summarizes the latest ideas and studies on the Mesolithic-Neolithic transition in Scandinavia. He discusses Klassen's (2004) and Fischer's (2002) studies; the former argues that the Neolithic was introduced as a single package while the latter favors a more gradual and piecemeal introduction of farming.

Rowley-Conwy (1998) points out that skeletal isotope data indicates a change in diet at the beginning of the Neolithic, from marine to terrestrial. Neolithic settlements commonly have inland locations, as distinct from the Mesolithic coastal sites. There is evidence for Neolithic structures at Ornehus and Limensgard. Out of 40 plow marks noted by Thrane (1982) for the Danish Neolithic, 14 belong to the Early Neolithic. The suggestion by Thomas (1996a), based on bones in shell middens that late Mesolithic peoples in Scandinavia had domesticated the pig is likely erroneous (Rowley-Conwy 1998). Domestic animals played no role in late Mesolithic Scandinavian economies, and not all shell middens are Mesolithic; some have been dated to the Neolithic period. Jensen (1994:87) points out that "The appearance of causewayed enclosures and megaliths at the end of the Early Neolithic implies a preceding phase of established agriculture on which basis these developments could take place." Furthermore, the use of wild plants and animals in their subsistence strategies need not imply that Early Neolithic peoples did not depend on farming for their livelihood.

A recent article by Cappers and Raemakers (2008) makes a persuasive argument that late Mesolithic and Neolithic Swifterbrant hunters and gatherers in the region of Antwerp and Hamburg were practicing small-scale agriculture in the wetlands 4400–4300 BC. There is evidence for the local cultivation of naked barley and other plants. Archaeologists had previously dismissed any possibility of this type of agriculture and assumed that cultivated cereals had been brought in either from highland sites or traded into the area.

Forest Neolithic

The Neolithic is distinguished from the Mesolithic in the forest zone of eastern Europe by the appearance of pottery during the sixth and fifth millennia BC (Rimantienė 1984, 2005, Oshibkina 1996, Timofeev 1998, Zhilin 2000, Dolukhanov and Shukurov 2004, Dolukhanov et al. 2005, Girininkas 2007). Thus the East Baltic Neolithic or "sub-Neolithic" (Werbart 1998) represents a continuation of the Mesolithic economies of hunting, gathering, and fishing. There are numerous regional cultures, such as Narva and Upper Volga, without farming, but with ceramics. Subneolithic societies in the Polish Lowlands, 3650/3600–1950/1800 BC, adopted some aspects from the Neolithic of the Balkan origin and they differ from the East Baltic Neolithic groups (Józwiak 2003).

Dolukhanov et al. (2005) discuss the spread of pottery making in eastern Europe based on radiocarbon dates. This process diffused from the southeast and not from the earliest Neolithic culture in central Europe, the Linear Pottery. The Yelshanian culture, located between the Lower Volga and the Ural River, has pottery radiocarbon dated to 8000–7000 BC. It took some 1600 years for the pottery making to spread to the boreal forest zone of Russia. By 5300–4900 BC pottery-using groups were present in northern Russia. The Neolithic, as defined by V. Gordon Childe (1958), on the presence of farming, came much later to the forest zone, e.g., around 3000–2800 BC in the east Baltic area. Sheep, goats, pigs, and cattle appear in some regions and this phenomenon is associated with the appearance of the Corded Ware culture in Estonia (Kriiska 2000). Evidence for farming in Lithuania at this time is poor (Brazaitis 2005). Thus for approximately 2500 years, the agricultural zone did not advance into the east Baltic and adjacent regions and different aspects of the "Neolithic Package" were adopted at different times. Clearly it was an indigenous adoption of farming and it was a gradual process.

We can examine Narva as one example of a Forest Neolithic culture. Sites of this culture are found in northern Belarus, Estonia, Latvia, Lithuania, and northwestern Russia. Ninety years ago Leon Kozłowski (1924:70–82) recognized Narva-like material and classified it as a "Baltic culture." Narva pottery consists of vessels with pointed bottoms and elongated dishes, the latter possibly used as lamps. It should be pointed out that only one type of pottery, i.e., pots with pointed bottoms, is found in all Forest Neolithic cultures. Farming Neolithic cultures had a much greater variety of vessels (Brazaitis 2005).

The Narva people hunted, gathered, and fished (Kriiska 2000; Zagorska 2000; Rimantienė 2005). Those living near the Baltic Sea extensively exploited sea resources, especially seals. Four species of seals were hunted: gray seal (*Halichoerus grupus)*, harbor seal (*Phoca vitulina*), ringed seal (*Phoca hispida*), and harp seal (*Pagophylus groenlandicus*) (Daugnora 2000, Stora 2002). An adult gray seal produces around 200 kilograms of meat, a harp seal 115–180 kilograms, and a ringed seal 90–125 kilograms. Seals also supplied people with blubber, blood, skin, and bone (Zagorska 2000). Seal's skin could have been used for clothing, footwear, and tents. No doubt seals played an important role in rituals and beliefs. Seal remains are also found at some inland sites (Zagorska 2000). It is not clear whether groups living in non-coastal regions came seasonally to coastal areas for seal hunting or received seal meat as a result of trade with coastal peoples. "The most advantageous times for catching seals were early spring (February and March) and late autumn-winter" (Zagorska 2000:279). Hunting equipment so far recovered consists of harpoons. Ethnographic evidence suggests they also clubbed seals. The importance of seals is reflected in art and ornaments. A fired clay seal head has been found in Gotland, Sweden. In Latvia and Lithuania, people were buried with seal-tooth pendants.

The Narva people had semi-permanent, possibly permanent settlements. Several rectangular structures comprised such settlement as shown at Zvidze in Latvia (Loze 1988). Numerous wooden domestic objects have been preserved at sites such as Šventoji in Lithuania and Zvidze in Latvia. Fishing equipment such as nets, pine bark floats, weirs, oars, and remnants of dugout canoes have been recovered from these sites.

Amber was collected in the coastal areas and played an important role in trade. A variety of artifacts were made: pendants, buttons, and anthropomorphic and zoomorphic figurines (Bliujienė 2007). It is interesting to note that flat, full-length human figurines and heads were produced. Bliujienė (2007:528–529) has noted that "Buttons were one of the most popular amber artefacts worn by people of the Late Narva, Rzucewo and Cedmar Cultures, as well as by Comb-and-Pit Pottery communities of the northeastern European forest zone. In the Middle and Late Neolithic, buttons were produced on a mass scale by the Eastern Baltic centres and by the workshops in the lowlands of the Vistula River."

Narva ideology was different from that of neighboring farmers. Artifacts such as elk's head staves may have been used in ritual activities or to symbolize an individual's power, status, or personality. Rimantienė (1996) considers the staves with carved elk heads from Šventoji as indicators of the worship of some deity (Fig. 8.5). It is interesting that the carved heads are of female elks. As with Neolithic figurines in southeast Europe, the female sex seems to play a prominent role in the northeastern archaeological record.

Why did people in the forest zone not practice farming earlier? They must have been aware of farming cultures in northern Poland and Ukraine, as is shown by their interaction with Funnel Beaker and Globular Amphora populations. A few Funnel Beaker sherds and small amounts of the bones of domesticated animals are found at Zvidze (Loze 1988). Stray finds of Funnel Beaker flint axes occur in Lithuania. Numerous Forest Neolithic sites in Lithuania have a few Globular Amphora pottery shards (Brazaitis 2005). However, such finds do not reflect any major changes in the subsistence strategies of Forest Neolithic groups. It seems that the highly productive economy based on fishing, hunting, and gathering did not make farming such an attractive proposition. Their beliefs and customs may well also have been barriers to change. Only with the appearance of the Corded Ware culture are greater economic changes initiated in the east Baltic region, though this does not imply that all local populations adopted farming.

Rimantienė (1999), like Zvelebil and Rowley-Conwy (1986), proposes a three-phase transition to farming in the East Baltic region, based on extensive excavations at Šventoji sites in Lithuania. First, there are rare finds of hemp, millet, and emmer; the bones of cattle and sheep/goat comprise only 2% of the faunal sample at Šventoji 23 around 2800 BC. She assumes this represents exchange of products and information between the Narva and the Globular Amphora peoples in northern Poland. Perhaps these early domesticates were prestige items or were used as ritual foods. Second, an actual

Fig. 8.5 Elk head figurine from Šventoji, Lithuania (Courtesy of R. Rimantienė)

settlement of the Globular Amphora culture is found at the Šventoji 6 site (2750 BC). Evidence for cultivation takes the form of shovels, hoes, hand ards, and threshing implements. The third phase is represented by the Bay Coast (Rzucewo, Haffküsten) culture (2700 BC), a local variant of the Late Neolithic Corded Ware culture. Farming now forms a significant part of the economy. During this long transition there was no diminishing of local wild resources or any major climatic changes. Thus, this transition needs to be explained by social factors. Rimantienė and Česnys (1990) suggest exchanges of marriage partners between Globular Amphora farmers and Narva hunters/gatherers. Thus farming in the East Baltic region was established some 4000 years later than in Greece.

The Neolithic transition did not necessarily give a better diet or better health to the former hunters and gatherers. The analysis by Butrimas and Jankauskas (1998:221) of human skeletal remains from Neolithic cemeteries in Lithuania indicate higher levels of stress, disease, and malnutrition than in contemporary hunter and gatherer populations.

Beginnings of Metallurgy – The Beginnings of the Copper Age in Southeastern Europe

In the late sixth, fifth, and fourth millennia BC, the first extensive use of copper, gold, and silver artifacts occurred in Europe (Chernykh 1992, Ottaway 2001, Roberts 2008). We find copper artifacts in the Mediterranean area and in western, southeastern, eastern, and central Europe. This does not mean that copper deposits in all those regions were exploited. Copper ores occur in several mountainous regions of Europe, but only some were exploited during the Copper Age (Fig. 8.6, Table 8.3). The utilization of copper considerably expanded mining technology, but copper was not the only mineral, nor the first, to be mined in Europe. The large-scale mining of flint also occurred during the Middle Neolithic. There is no evidence for gold mining at this time; that mineral was obtained from deposits in streams and surface collections.

The advantages of copper artifacts over those of stone are readily apparent. The metals can be cast into shapes not possible for stone, wood, or bone. However, Ben Roberts (2008:365) has pointed out that the earliest copper objects were not necessarily superior to wood, bone, and flint artifacts for

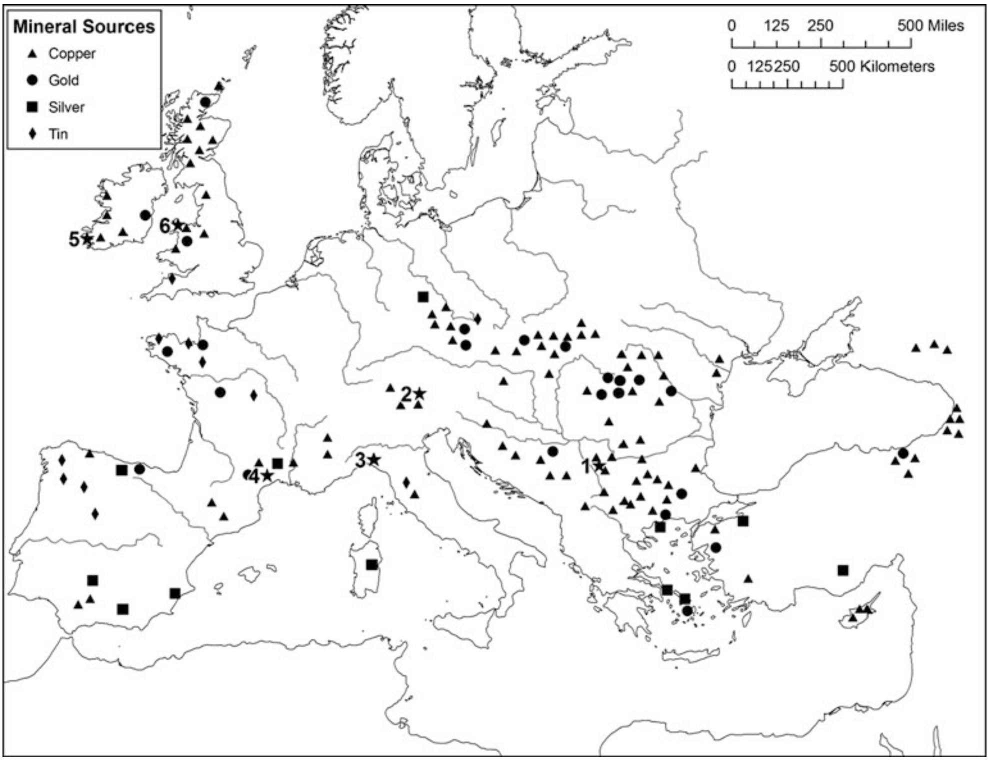

Fig. 8.6 Earliest evidence for copper technology in Europe (After Lazarovici and Lazarovici 2007, with modifications)

Table 8.3 Sites with the earliest evidence for copper technology in Europe, mapped in Fig. 8.6 (After Ottaway and Roberts 2008: table 4.1 with modifications)

No.	Site	Radiocarbon dates
1	Rudna Glava, Serbia	c. 4980–4670 cal. BC
2	Brixlegg, Austria	c. 3960–3650 cal. BC
3	Monte Loreto, Italy	c. 3500 cal. BC
4	La Capitelle du Broum, France	c. 3100–2700 cal. BC
5	Ross Island, Ireland	c. 2400–1800 cal. BC
6	Great Orne, England	c. 1800–1000 cal. BC

performing daily activities. But a major difference in production of metal objects involved "...the application of heat to create liquid from a solid that could then be poured into a mould to form a new object when cooled does not have real parallels in pre-metallurgical societies" (Roberts 2007:21). The metal objects can be remelted to produce different forms. Likewise, there is no inherent size limit on the artifacts produced. The artisan's skill and wants determine this. On the other hand, there are some limitations to the use of some metals. Copper, for one, is softer than stone for utilitarian artifacts. Also these materials are rarer than stone, wood, and bone and the skills needed to work them are more difficult to acquire. Since copper artifacts are frequently associated with higher-status individuals, the lower-status people had to content themselves with tools and jewelry of the same stone, wood, and bone that had satisfied their ancestors.

A variety of actions and choices by people are associated with the metallurgy: "... the selection of an ore or ore source, the ore extraction, processing and distribution; the smelting, melting and alloying; the casting, manipulation and design of objects; the potential object uses; the circulation of the objects; the extent of object recycling/re-melting; and the nature of object deposition" (Roberts 2008:356). Different persons with a variety of skills were needed to conduct a successful copper mining operation. Now we have persons with specific skills such as smelters, mold makers, object designers, etc., that did not exist in the premetallurgical societies.

In the Near East as early as 6500 BC, copper was fashioned into artifacts by the technique of hammering the cold metal. Small numbers of copper artifacts such as beads, awls, and fish hooks were produced in southeastern Europe by this cold hammering technique around 6000 BC. For example, cold-hammered copper objects were made during the Karanovo period in Bulgaria (Pernicka 1990), and also at Obre I in the Starčevo times (Gimbutas 1973:166). The Tripolyean A site of Solochene, Ukraine, yielded copper pins, beads, and fishhooks produced by cold hammering and annealing, that is, by heating the metal and then hammering it into shape (Greeves 1975).

In the European Copper Age actual metallurgy was practiced, that is, the smelting of copper ores and the casting of the molten metal. Some of the earliest centers of European metallurgy were in the Balkan and Carpathian Mountains. Copper smelting slag, dated to the early 5th millennium, was found at Selevac, Serbia (Glumac and Todd 1991). By 4500–4000 BC copper smelting slag was also recovered at Brixlegg, Austria (Höppner et al. 2005). In eastern Switzerland, copper was produced locally by 3900 BC (Schibler et al. 2004a:389). In the steppe regions of eastern Europe, the Pit-Grave (Yamnaya) people exploited copper ores between 3500 and 2500 BC (Chernykh 1992).

Copper mining and smelting was widespread in southeastern Europe by 5000–4500 BC. Maggi and Pearce (2005) claim that the earliest copper mines in western Europe occur in Liguria, northern Italy, mid-fourth millennium. Copper was exploited at major mines such as Ai Bunar in Thrace, Bulgaria, and Rudna Glava in eastern Serbia (Jovanović 1982, Chernykh 1992). Now we find not only pendants and beads, but also copper axes, chisels, and spearheads (Fig. 8.7). Copper ores differ in their chemical composition and thus it is sometimes possible to determine the origin of copper artifacts. Some copper artifacts at the Vinča sites came from the Rudna Glava mine.

At Ai Bunar in Bulgaria, copper ore was being mined as early as 5100 BC. Surprisingly, no slag or smelting furnaces were discovered in the area around the mine. People living in the surrounding settlements obtained copper objects or copper ores from various sources; the chemical composition of many metal artifacts fails to correspond to that of the Ai Bunar ores (Chernykh 1978). Likewise, at Rudna Glava no settlement was discovered around the mine or any smelting slag. Smelting presumably was not done near the mine but in more distant settlements, which raises an interesting question. Why lug quantities of rock 10 or 20 kilometers instead of doing the work on the spot and carrying off only the artifacts? It seems that metallurgy was not so utilitarian or rational as we might think.

How was the earliest knowledge of metal working diffused over Europe? We assume that there were not many independent discoveries of metallurgy. Vandkilde (2007:47) has observed that "Metallurgy cannot spread as a diffusion of ideas from mouth to mouth." The metal working processes had to be taught by a specialist to another person. People with metal working knowledge must have moved around. The question arises of how this knowledge was passed down from person to person. One possibility is that the smiths moved into new territories, thus gradually spreading their knowledge all over Europe. Another possibility is that some people learned metallurgy under the smith's direction as apprentices, who then moved to new territories or returned to their own communities with the skills to produce metal objects. Both scenarios presuppose that a demand for copper preceded the actual moves of smiths and apprentices.

The appearance of metal objects in Europe is associated with socioeconomic changes in Neolithic societies. Archaeologists have emphasized metal artifacts as symbols of elites, being prestigious and tradable (Vandkilde 2007). Childe (1930) speculated extensively about the role and importance of smiths in the metal-using societies. Such European smiths were probably part-time specialists. However, metal artifacts reflect not only the work of individual specialists: metallurgy requires many collective activities such as ore extraction, processing, and transport (Roberts 2008:365).

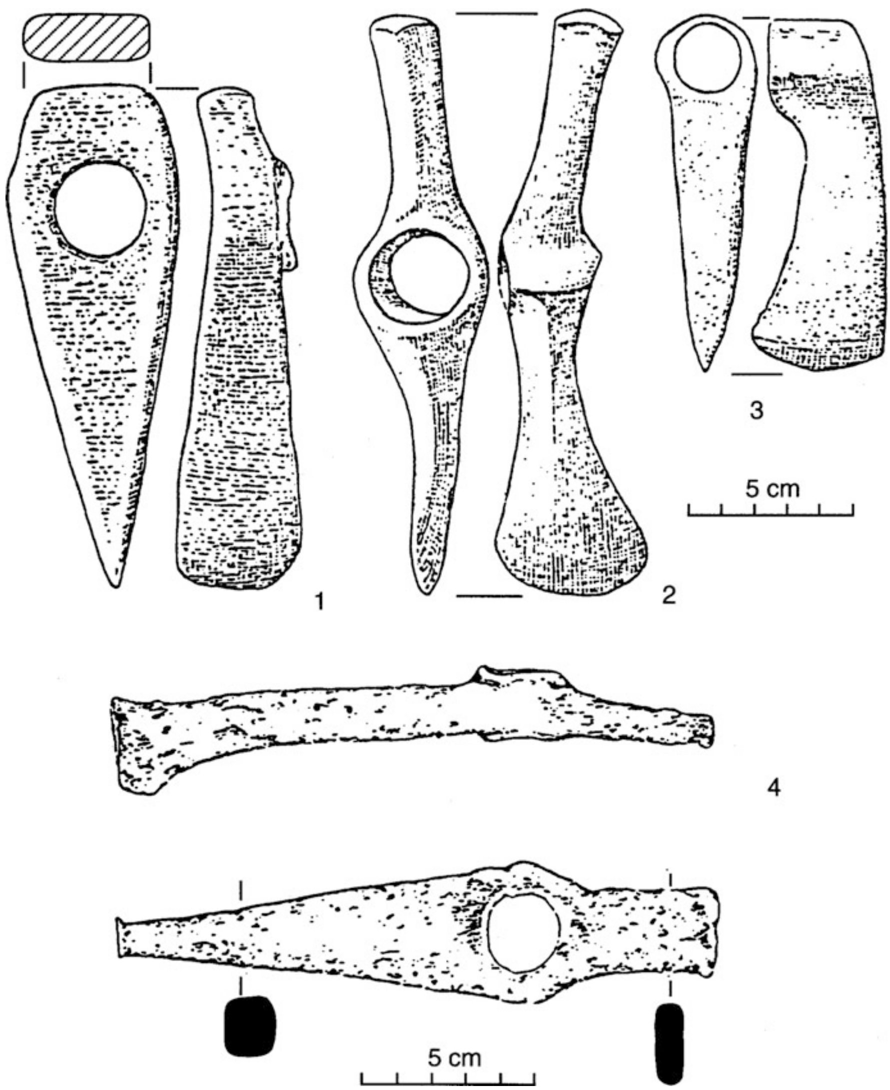

Fig. 8.7 Copper axes found in Middle Neolithic sites in Poland, imported from the Carpathians (After Tunia and Parczewski 1977, Cofta-Broniewska and Kośko 1982)

Riding and Domestication of Horses

The domestication of horses had major effects on Neolithic societies, for they could be used for transport, work, ritual, warfare, and food, including mare's milk. Hypotheses for later Neolithic incursions of horse-riding pastoralists into central and southeastern Europe draw credibility from the presence of domesticated horses in the Eurasian steppes (Ukraine, Russia, Kazakhstan), where most scholars assume they were domesticated. Marsha Levine (1999, 2004) has extensively discussed the various issues related to horse domestication. Horses, domesticated or wild, were important in Neolithic subsistence and ritual on the Eurasian steppes by 5000 BC (Anthony and Brown 2000). Recently, David Anthony (2007:200) suggests that "The earliest evidence for possible horse domestication in the Pontic-Caspian steppes appeared after 4800 BC." At that time, societies with domesticated cattle and sheep/goats were present on the steppes. Bökönyi (1974) and Bibikova (1975) postulated that horses were domesticated in the Ukraine during the Middle Neolithic. Gheorghiu's (1993) ceramic analyses suggest that horses had already been domesticated in the fifth millennium BC. Marsha Levine (2004:115–116) pointed out that direct evidence, such as textual and artistic evidence, for horse domestication is dated to the end of the third millennium BC. The remains of horses from the Dereivka site near Kiev in Ukraine (4300–3900 BC), have received extensive attention from archaeologists and archaeozoologists (Bibikova 1969, Telegin 1986, Levine 1990, 1999, Anthony and Brown 1991, 2000). Mortality patterns suggest to Levine (1990) that these horses were hunted for their meat. Anthony and Brown's (1991) analysis of the wear made by a bit on the lower second premolars of a 7- or 8-year-old stallion suggests the Dereivka horses were riding beasts. But a radiocarbon date on a stallion's premolar and a skull fragment of 700–200 BC indicates an Iron Age Scythian intrusion into the Neolithic occupation (Anthony and Brown 2000). It should be noted that Häusler (1992) already in 1992 did not consider the Dereivka stallion belonging to the Eneolithic. When did people start riding horses? Anthony and Brown (2000:76) state, "...that horses were domesticated and ridden at least by 3500–3000 BC in the Eurasian steppes." Recently, Anthony (2007:221) argued that horseback riding began in the Pontic-Caspian steppes before 3700 BC. The Outram et al. (2009) study of the horse remains of the Botai culture in Kazakhstan suggests that they used horses for traction, meat, and milk around 3500 BC. Dental wear patterns indicate the use of bits on Botai horses. Analyses of ceramic vessels have shown the presence of fatty acid residues that are possibly from mare's milk. Benecke (2004) suggests that domesticated horses are present in central Europe around 3000 BC. Anthony and Brown (2003:66) speculate that the widespread adoption of riding occurred around 3000–2500 BC in Europe, and it is associated with Baden, Corded Ware, and Bell Beaker cultures. However, the frequencies of horse remains are low in central and western Europe prior to the Bronze Age. Although it is difficult to distinguish wild from domesticated horses in faunal assemblages, bones found in the late Funnel Beaker-Baden occupations at Bronocice around 2900–2700 BC do represent domesticated horses (Milisauskas et al. 2006). It should be pointed out that the Corded Ware peoples appear around that time in southeastern Poland. In Switzerland, horses were introduced by the Corded Ware peoples around 2700 BC (Schibler et al. 2004a). In Greece, the first domesticated horses appeared during the Middle Helladic period, 2100–1700 BC, and on Crete in approximately 1800 BC.

Evidence for horseback riding is indirect. Perforated antler tines are considered by some archaeologists to be bridle-bits (Lichardus 1980), but Sherratt (1996:164) cautions that "The use of particular types of antler cheek-pieces for bridle-bits in the second millennium BC (when the chariot was in use, so they may not have been needed for riding) has encouraged the interpretation of perforated antler-tines of all sorts as possible harness equipment." The riding of horses revolutionized warfare. Riders could cover long distances over a relatively short time and live off the countryside by plundering farmers, making raiding a viable strategy. Gimbutas's (1991) scenarios of invasions of central and southeastern Europe from the Eurasian steppes assume horse-riding warriors. Anthony (2007) argues that the ability of the steppe populations to ride horses may be related to the spread of Indo-European languages. Not until the horse-collar and shafts were invented in Han China do we see horses used for heavy work. In the Middle Ages the invention spread to the west (Sherratt 2006).

Ards and Plows

The first use of simple ards, or plows, perhaps ox-drawn, may have occurred not long after 4000 BC. There are ard or plow marks, frequently under mounds, as well as figurines that may represent oxen. Ard marks have been found in Denmark (Thrane 1982, 1989), the British Isles (Fowler 1983), the Czech Republic (Pleinerová 1981), the Netherlands, Switzerland (Zindel and DeJuns 1980, Drenth and Lanting 1997), Germany, and Poland (Jankowska 1980, Gringmuth-Dalmer 1983, Tegtmeier 1993, Burchard 1998). Thrane (1989) notes that there are 39 Neolithic sites in Denmark with ard marks, six of them dating to the Early Neolithic. In northern Europe, ard marks appear around 3500 BC (Hoika 1994; Meuers-Balke and Weninger 1994). In Denmark, these occur under Funnel Beaker passage graves, dated to around 3400 BC (Thrane 1982). Midgley (1992) speculates that such simple plows were extensively used even at this early date. Ard marks are likely to be preserved only under mounds. For many years plow marks from Sarnowo, Poland (4459–4343 BC) were considered the earliest evidence for plowing (Dąbrowski 1971), but recent reanalysis has shown them to be traces of burnt construction (Niesiołowska-Śreniowska 1999:19). Most plow marks are dated after 3500 BC, and thus it is not surprising that the Sarnowo data seemed anomalous. However, not all are convinced by Niesiołowska-Śreniowska's conclusions. "It is not clear to us, however, how these criss-cross marks with v-shaped cross-section could be traces of a dwelling" (Drenth and Lanting 1997:64). Jan Albert Bakker (pers. comm. Aug., 2001) also dissents, suggesting that the radiocarbon date is deviant on account of small particles he sieved out from the sand sample. Perhaps it was mixed with material of the Brześć Kujawski phase of the Lengyel culture or the dated charcoal was from old trees.

There are conflicting interpretations of ard marks. Thrane (1989) assumes that they were associated with agriculture, but points out that "This does not mean that plowing was not associated with a series of ritual and magic beliefs and rites" (Thrane 1989:116). Rowley-Conwy (1987) and Sherratt (1996) have suggested that, at first, plowing was associated with ritual behavior or religious practices. Rowley-Conwy (1987), citing Thrane's (1982) study, notes that Neolithic burial mounds cover ard marks in Denmark. From this, he concludes that "This seems an impossibly large number to put down to the chance location of a mound on a cultivated field" (Rowley-Conwy 1987:265). Jensen (1994:102) rebuts, "One might as well maintain that for practical reasons an open cultivated area constitutes a perfect locus for monument construction, not to mention the rather over-looked – but equally important – symbolic and ideological aspect embedded in this particular type of location." Furthermore, S. Andersen's (1993) analysis of pollen results from buried soils indicates cereal cultivation prior to the mound erection. A. Gramsch (1995:85) notes that Funnel Beaker mounds were often erected in areas of abandoned settlements.

While granting that rituals may have been associated with plowing, we also point out the practical benefits of ard/plow use. The handle of a Funnel Beaker vessel depicting a pair of yoked oxen, from Kręźnica Jara, near Lublin, Poland, indicates their use as draft animals (Gajewski 1949). Furthermore, morphological changes have been noted on cattle skeletons in Germany and Romania which indicate they were used for pulling heavy loads by 5000 BC (Ghetie and Mateesco 1973; Döhle 1994). Individual ownership of oxen for working small plots might have been impractical and, therefore, they may have been communally owned. The greater permanence of settlements is suggested as well. If oxen were owned by individual families, such ownership might have been associated with higher socioeconomic status. Few families could have been able to keep oxen just for pulling ards and/or carts. Some archaeologists argue that plowing motivated a shift to patriarchal society, since men became more important in the economy while women, working with digging sticks, were the most important Early Neolithic food producers and had more political power. A shift to plowing and especially pastoralism supposedly promoted men, and eventually led to their preeminence in political and economic life (Gimbutas 1991).

Subsistence Systems

Middle Neolithic/Early Copper Age communities in most regions continued to practice mixed farming, the cultivation of cereals, and the keeping of domesticated animals. They continued to infill territories previously empty or occupied by foragers. Indigenous foragers in Scandinavia area adopted the farming way of life. In the steppes of Ukraine and Russia, communities depended heavily on the herding of domestic animals. There are no significant differences in exploited plants and animals between the Middle and Early Neolithic in most areas. Rössen and Lengyel cultures in central Europe cultivated the same plants as in earlier times, although the importance of barley seems to have increased, perhaps because of its tolerance for poor soils or those exhausted by long exploitation. The Late Vinča culture also extensively exploited domesticated and wild plants (Borojević 2006).

The cultivation of barley along with other cereals would have increased the reliability of crop yields. We should not overlook the possibility that the increasing use of barley was related to beer making and ceremonies; barley was a ritually significant food during the Bronze Age in the Mediterranean area. Barley was ritually important in Greek rituals, e.g., the sprinkling of barley on people, altars, and feeding it to sacrificial animals such as oxen (Lambert 1993, Collins 2003, Dillery 2005).

Childe (1957) and others have observed an increase in the hunting of wild animals in some regions. The increase of hunting is noted for Vinča sites, and "may be the product of efforts to protect fields and gardens from wild herbivores, or it may be the product of a greater familiarity with the movements and habits of local animals" (Kaiser and Voytek 1983:334). But Early Neolithic farmers were probably already familiar with the movements of wild animals. Other archaeologists have emphasized a decrease in hunting; therefore we should be cautious about drawing such conclusions. Different methods of faunal analysis or sampling can create illusory differences in subsistence strategies. But there are some increases in percentages of wild animals in Hungary, where over 50% of the faunal remains at some Lengyel sites are those of wild animals. Perhaps this indicates a decreasing use of domesticated animals for meat and the increased utilization of by-products such as cheese and milk. Hunting was not only for obtaining meat and hides, but wild bone was perhaps "preferable for tool use, being denser and stronger" (Russell 1990:548).

It is possible that such increases in wild-animal hunting signal changes in social dynamics and relationships involving access to hunting lands. These had been controlled by hunters and gatherers for a long time, and farmers either traded for wild resources or hunted within the limits of their farmlands. While remaining controversial, mtDNA and Y-haplotype studies increasingly suggest that the genetic contribution of Linear Pottery populations, when measurable, make up between 10 and 25% of modern European gene pools (Barbujani and Bertorelle 2001, Richards 2003, Currat and Excoffier 2005, Haak et al. 2005, Burger et al. 2006), suggesting that some forager populations increased in size, becoming farmers at some point. However, not all hunters and gatherers became farmers and these groups retained hunting rights and control over certain territories. A sudden increase in wild animals in the Middle Neolithic may signal the disappearance of foragers in an area and new access to wild resources by farmers.

At some Swiss Cortaillod sites, 60% of faunal samples are made up of wild animals. This was the first Neolithic culture in the Alpine zone and was contemporary with the Middle Neolithic cultures of central Europe. Ecological variation may account for these differences. The use of wild animals might be expected to vary between steppe and steppe-forest environments in the same general region, or at different altitudes in a mountainous region. Also, year-to-year fluctuations in crop yields would have made the varying exploitation of wild animals an advantageous strategy. A few bad cereal yields may have encouraged more reliance, for a limited period, on wild animals. It is likely too, that Cortaillod, and perhaps other cultures, represent former hunters and gatherers, now "converted" to farming. This scenario is more probable than one invoking a movement of farmers from other regions. By the end of the Middle Neolithic, the territory available for hunters and gatherers in temperate Europe had shrunk considerably.

New techniques for land exploitation are associated with the expansion of farming societies. The use of the ox-drawn ard, or simple plow, may have begun at this time. Plows turn the earth to a greater depth than do digging sticks, thereby making possible greater crop yields. This innovation probably facilitated the expansion of farming from the zones of easily worked soils, like loess, cultivated during the Early Neolithic. With ards or plows forest soils could be worked, and large tracts of woodlands were in fact cleared during the Middle Neolithic, an essential precondition for the postulated Late Neolithic movements of pastoralists into central and western Europe.

The expansion of farming led to more restrictions on choices for agricultural land. Linear Pottery peoples could be particular about what land they cultivated, as large tracts of easily worked land were available. This usually was no longer the case in the Middle Neolithic, for the areas most easily farmed had long been occupied and new environments had to be exploited by expanding populations.

In our consideration of Middle Neolithic subsistence practices, we primarily examine the relevant data from the Tripolye, Lengyel, Funnel Beaker, and Michelsberg cultures. We have considerable information about some of the subsistence activities of the Tripolye peoples. We know that emmer, bread and club wheats were important cereals, and that barley and millet were also cultivated. From Tsalkin's (1970) excellent synthesis, we know that cattle were the most important domesticated animals, with pigs and sheep/goats being next in importance. A variety of wild animals were hunted. The occurrence of projectile points in the Tripolye sites indicates that bows and arrows were used for hunting and perhaps for fighting.

It has been suggested that the roles played by various domesticated and wild animals changed through time. For example, the shrinkage of forested areas may have decreased the use of pig (Wiślański 1969).

To test these assumptions we used the Kendall's rank correlation test on data from the 23 Tripolye sites, chronologically separated into three phases. To ensure that sample size would not affect the results, we set up four groupings based on the frequencies of various animals at different sites. The increase in the number of horses through time can be considered significant (Table 8.4). It is possible that horses were domesticated at this time, which bears on the question of postulated pastoralist incursions into central and western Europe during the Late Neolithic. But some results reflect only sample sizes and not any changes in subsistence strategies. The increase in pig remains correlates positively with that of sample size, while the effect on sheep/goat frequencies is just the opposite. Thus, the sample sizes of different species influence the results. The site of Usatovo, near the Black Sea, was not included in the preceding analysis because it is a very late Tripolye site. Frequencies of various species recovered at Usatovo reflect the site's situation in a steppe zone: roughly 45% of the 992 animals found at Usatovo were sheep/goat, and 3% were wild ass, an ungulate associated with steppe and parkland environments.

The subsistence strategies of the Lengyel peoples of central Europe were similar to those of Early Neolithic cultures, though the percentage of wild animals at some Hungarian sites is very high. At Pécsvárad-Aranyhegy and Zengővárkony they comprise 57 and 46%, respectively, of the faunal

Table 8.4 Approximate significance according to Kendall's S for 23 Tripolyean sites

	Cattle	Sheep-goat	Pig	Horse	Red deer	Roe deer	Wild pig	Chronology	Sample size
Cattle									
Sheep-goat									
Pig									
Horse									
Red deer									
Roe deer									
Wild pig					0.0001				
Chronology				0.04					
Sample Size			0.05		0.02	0.05			

assemblage. Perhaps a run of poor harvests or decreasing soil fertility forced communities to rely more heavily on hunting. Contemporary sites, such as Kraków-Pleszów in Poland, yielded very few wild animals. Haskel Greenfield (1986, 1991) has shown a distinct correlation between environment and animal utilization in the Balkans. Sheep/goats dominate in lower, drier areas, while cattle and pigs dominate in moist or forested regions.

Changes in subsistence are well illustrated by the Funnel Beaker culture, whose techniques of land exploitation were more complex than those of their predecessors in central Europe. The occurrence of ard, or plow, marks under Funnel Beaker burial mounds as well as figurines that may represent oxen, suggests that the ard was utilized in central Europe.

Cereal imprints on potsherds from Denmark show that Funnel Beaker peoples cultivated emmer, einkorn, club wheat, and barley. From Lietfeld in Germany, the remains of einkorn wheat (63.3%), emmer wheat (33.5%), barley (2.4%), and flax (0.8%) were recovered. Polish data emphasizes the importance of emmer wheat. A pit at Radziejów Kujawski (3540–3320 BC) yielded over 157,000 plant remains, of which 40% were analyzed, showing that 99.5% is emmer wheat, 0.4% is einkorn wheat, and 0.05% is bread wheat (Klichowska 1970). However, these ratios may simply reflect the use of the pit for drying emmer wheat.

There are general patterns among Funnel Beaker faunal assemblages. Two of the most commonly observed patterns are that sites in Scandinavia tend to have higher frequencies of wild mammals to domesticated species, and that pigs are the second most frequent domesticated animals after cattle (Midgley 1992, Steffens 2007, Pipes et al. 2009). Sites further south and west have smaller frequencies of wild mammals and a corresponding increase in domestic animals. Pipes et al. (2009) examined faunal evidence recovered from three phases of Funnel Beaker occupation at Bronocice. Changes in the relative abundance of cattle, sheep, and pig over time, as well as changes in the age at death composition of the herds were revealed. Specifically, sheep rearing intensified, the size of the herd increased, and the majority of the animals were slaughtered as adults. Environmental data indicated the environment had transformed from being forest to open grassland (Milisauskas et al. 2004). When considered with this shift, the data suggest animal husbandry practices were fluid in response to the development of wool production.

We estimated the total meat contribution of each species represented at Bronocice, southeastern Poland, by multiplying the Minimum Number of Individuals (MNI) by the meat yield per individual as estimated by Müller (1964) and Flannery (1969), who assume the weight of each animal species is similar regardless of sex, age, or seasonal fluctuations. The meat available per person per year was not low for the Funnel Beaker community here. If the population of the Bronocice I occupation was 120 people (24 persons per hectare) then, minimally, 33 kilograms of domesticated animal meat was available per person per year. This figure includes 30 kilograms of beef, 1.15 kilograms of lamb/mutton, 1.7 kilograms of pork, and 0.13 kilograms of dog meat. Adding wild animals, we obtain 38.6 kilograms of meat per person per year. The amount of meat in a European diet in the 1960s ranged from 27 to 82 kilograms. In 1975, meat consumption in Spain came to 147 grams per person per day. In Bulgaria, the meat consumption estimates for this period are low, 40 grams per person per day (Todorova 1978). Thus the Funnel Beaker people consumed at least the same amount as some modern European populations.

Alpine Region

Jacomet and Schibler (1985) made similar estimates for a Pfyn culture (4000–3800 BC) population of 30–50 persons at Zürichsee in Switzerland. During one year, 6 cattle, 1 sheep/goat, and 4 pigs were slaughtered, and 2 deer and 1 wild pig killed (Fig. 8.8). An estimated 400–900 grams of

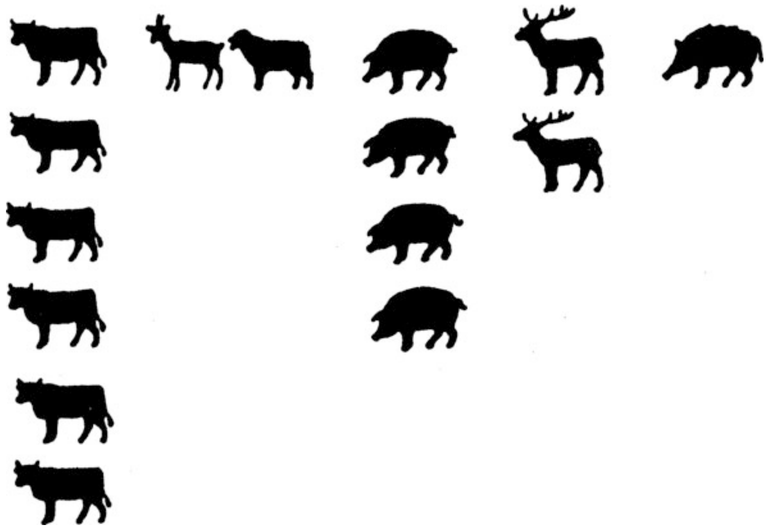

Fig. 8.8 Domesticated and wild animals killed during one year at a Pfyn culture settlement in Zürichsee, Switzerland (After Jacomet and Schibler 1985, with modifications)

meat were available per person per week, or 20.8–46.8 kilogram per year. Recently, Renate Ebersbach (2003) compared the meat consumption by four Neolithic communities on Lake Zürich with historical German and Swiss communities (Fig. 8.9). The amount of meat eaten at the four Neolithic settlements range from 4 kilograms per person per year to 27 kilograms per person per year (Ebersbach 2003:76). She notes that "In southern Germany in 1749 AD an average inhabitant ate not more than 13 kilograms of meat per year, and this value can still be observed for an average German around 1900 AD" (Ebersbach 2003:76). For the Neolithic communities of Lake Zürich cereals were the most important element of the subsistence strategy. "Milk and meat did not provide more than quarter to a third of the calorie requirements, usually much less" (Ebersbach 2003:78). It seems that the gathering of wild products was not a significant factor in people's diets. "Gathering may have been important for vitamins, for spices and herbs, and to broaden the array of dishes..." (Ebersbach 2003:78).

The settlement system of the Michelsberg culture suggests a complex subsistence strategy. Sites are found along rivers, on lakes, and at different altitudes on local elevations. The Michelsberg people may have moved seasonally with their herds between their settlements. Higham (1968:95) speculates that the Michelsberg sites in Switzerland occurring at different elevations indicate the presence of transhumant herding. That is, animals were kept in the lower villages during the winter and driven to pastures at higher elevations in the summer. The upland sites could represent the summer camps of the herders. We assume pastures were present in the later Neolithic in the Alpine zone, for they were not part of the landscape during the Early Neolithic. Pastures are the effects of human, not natural, activities and transhumance could only have been possible in later periods. The Late Neolithic people practiced transhumance in the Black Forest Mountains, south-west Germany (Kienlin and Valde-Nowak 2002/2004). Kienlin and Valde-Nowak (2002/2004) suggest that the uplands were used for summer pasturing and leaf-foddering.

A variety of domesticated and wild plants have been recovered from Michelsberg sites. Ehrenstein, a Michelsberg site in Germany, yielded emmer wheat, einkorn wheat, bread wheat, spelt wheat, six-row barley, beech mast, hazelnuts, crab apples, raspberry, dewberry, strawberry, wild plums, and Cornelian cherry (J. Renfrew 1973, Zürn 1968). Here we have some of the earliest evidence for the collection of beech mast. Acorns, hazelnuts, and beech mast were probably intensively collected in

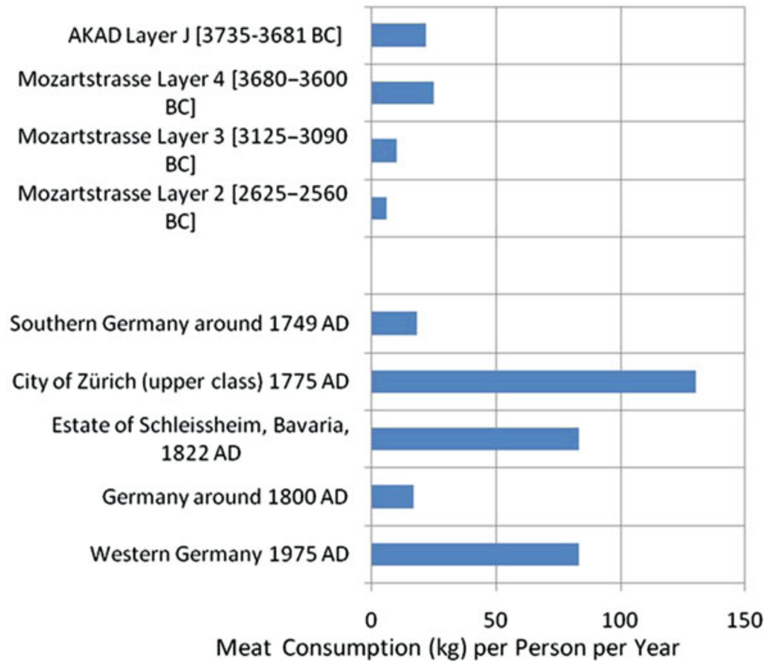

Fig. 8.9 Meat consumption per person per year (After Ebersbach 2003)

the late summer and early fall, providing rich sources of fats, proteins, and carbohydrates that could have been stored as winter food supplies.

A very interesting field system (3700–3200 BC) has been recovered at Ceide in Ireland. As described by Waddell (1998:36), "Long parallel stone walls, some up to 2 kilometer in length and 150–200 meter apart form long rectangles which are divided by cross walls unto large rectangular fields up to 7 hectares in area. The field system preserved beneath blanket bog up to 4 meter in depth has been traced by probing over an area of over 1000 hectares. The surviving walls are surprisingly low usually 50–70 centimeter high, rarely exceeding 80 centimeter." Perhaps the large fields were used for domesticated animals while the smaller ones were for cultivation of wheat and barley. The building of walls may likewise represent a social statement reflecting control of land. There were other structures such as megalithic tombs in the Ceide area, indicating communal labor and ritual.

Even if some parts of the alpine zone were occupied relatively early, we have included it in the Middle Neolithic/Early Copper Age chapter since in most parts of Switzerland farming appeared much later, approximately 4500 BC. The remains of wood, plants, berries, and fruits used and eaten by early farmers have been remarkably well preserved in the early Neolithic sites of the alpine region. Remarkable evidence is thus available for a subsistence strategy based on agriculture, livestock, gardening, plant gathering, fishing, and, particularly important, hunting. At some Swiss Cortaillod sites, 60% of the faunal sample is made up of wild animals. This was the first Neolithic culture in most areas of the alpine zone and was contemporary with the Middle Neolithic cultures of central Europe. The animals most frequently hunted were red deer, roe deer, aurochs, and wild pigs. The hunters chose their prey such as red deer selectively, apparently concentrating on young males as at the Burgäschisee-Süd site (Jarman 1972), realizing, perhaps, that females were important for maintaining stable herd sizes. The excellent preservation also gives a clearer picture of the use and maintenance of some of the domesticated animals in the economy. Sheep, for example, were not used for wool, since most recovered fabrics were made from flax. Roughly 40–60% of the livestock was slaughtered for meat at an early age.

At the village entrance of the Cortaillod site of Egolzwil 4, Switzerland, there was one building containing layers of vegetable matter and masses of the pupae of the common housefly. This suggests that cattle were stalled there over the winter months, the flies laying their eggs in their dung. The stacks of leaves and twigs of mistletoe suggest that plants were collected near the village for winter fodder, though hay was found.

We know that the Cortaillod people had domesticated einkorn wheat, emmer wheat, club wheat, bread wheat, barley, millet, peas, flax, and poppy, while wild raspberries, strawberries, bilberries, blackberries, and elderberries, hazelnuts, acorns, crab apples, wild pears, and wild plums or sloe, and other nuts, fruits, and mushrooms were also exploited. It has been suggested that apples were domesticated, but Villaret-von Rochow (1969) observed that the mere presence of quantities of apples does not demonstrate that fruit was cultivated. Some of the apples had been dried: 100 grams of the dried fruit contain more vitamins than a similar quantity of the fresh fruit (Guyan 1954, Wiślański 1969). A fruit, upon drying, retains its vitamins and loses only the weight of its water.

Salt Production

The human body requires salt (sodium chloride) and this requirement can be met by eating foods containing adequate amounts or by adding salt. It is assumed that the Paleolithic and Mesolithic wild-meat diet supplied sufficient amounts of salt, but the heavy Neolithic use of cereals with a low salt content during the Neolithic made it necessary to add salt to food. Salt may also have been used for food preservation.

Several Romanian archaeologists have conducted research on the earliest salt exploitation in Europe (Ursulescu 1977, Monah 1990, Monah et al. 2007). Dumitroaia et al. (2001/2002) stated that the earliest evidence for salt exploitation in Europe comes from the Criş culture occupation at the Lunca-Poiana Slatinei site in eastern Romania. They dated this occurrence to 6000–5000 BC and noted that “There are earlier dates for any salt exploitation site yet explored in Europe (Dumitroaia et al. 2001/2002:10–11).

Salt production in central Europe seems to date to the Middle Neolithic/Early Copper Age (H. Burchard 1965, Jodłowski 1988, Bukowski 1988, D. Müller 1988, Chapman and Monah 2007). Evidence for salt production by evaporation of saline water consists of salt-making vessels, the chemical analyses of vessels for salt content, features such as ditches which may have been used to obtain brine, and concentrations of archaeological sites around salt sources.

There is some evidence for salt production during the Middle Neolithic around Cracow in south-eastern Poland. At Barycz near Wieliczka, Jodłowski (1976) found late Lengyel salt pans. Salt production vessels had a salt content of 1.25%, while for ordinary household pots the figure is 0.55%. Specialists seem to have been involved in salt production at Barycz. They made conical salt briquettes weighing approximately 0.5–1.0 kilogram, which were utilized in exchange. A village of 100 people, 30 cattle, and 150 sheep would require 450–1062 kilograms of salt per year for consumption (Chapman and Gaydarska 2003).

Some sites in the Saale valley in east Germany have yielded evidence for salt production. At Langer Berg (Dölauer Heide), 40 briquette-type shards were found with Bernburg ceramics (D. Müller 1988). These vessels were used in salt-making. There is also evidence for salt exploitation in the Alpine zone (Weller 1999).

Tracks and Roads

The use of carts suggests the presence of roads. As previously mentioned, a cart track was found under a Funnel Beaker megalithic tomb at Flintbek, near Kiel in Germany in 1989 (Zich 1993) which can be dated typologically to around 3630/3500 BC. A number of scholars have attempted to reconstruct Neolithic roadways (Bakker 1991). Bakker (1976:66–67) notes that "the difference between the prehistoric major routes in the North European Plain and those of the early Middle Ages was very slight." Also, the existence of trackways in bog areas may be connected with the appearance of carts around 3500 BC.

Wooden trackways, 4-meter wide and made of oak, pine, alder and ash, and dated to the third millennium BC have been found in bogs in northern Germany (Hayen 1985). Trees from an estimated 40 hectares of forest were needed to construct 1 kilometer of trackway. The trackway at Dümmer, dated to the mid-third millennium BC, is 2.5 kilometers long and used 15,000 planks from 2500 trees, mostly alder, for its construction. Not all trackways were suitable for wheeled transport, as has been shown by Coles (1975). The track built of split alder trunks at Abbot's Way in England is over 1200 meters long, but only 1–1.5 meters wide, with an irregular surface. Such constructions indicate that members of Neolithic communities could be mobilized from time to time for communal activities.

Flint Mining

Middle Neolithic contexts have yielded actual evidence for the underground mining for flint and chert from numerous regions in Europe (Weisgerber et al. 1980, Lech 1981, Bácskay 1984, Villalba et al. 1986, Desloges 1990, Bostyn and Lanchon 1992, Shepherd 1994, Holgate 1995). There are 49 flint and chert mining sites in France (Weisgerber et al. 1980:474–508) and over 20 in Britain (Holgate 1995). Flint was mined at Grimes Graves in Britain, Rijckholt St.-Geertruid (already exploited in the Early Neolithic) in the Netherlands, Spiennes in Belgium, Kleinkems in Germany, Mauer in Austria, Le Grand Pressigny in France, Can Tintorer in Catalonia, Spain, and Krzemionki Opatowskie in Poland. Such mining fed the demands of agricultural, ritual, and possibly military activities. Flint axes may have been used as tools and weapons. The basic technique was to dig a shaft down to a selected flint, then follow it with horizontal galleries. At the famed British mine of Grimes Graves, located in Norfolk, some 366 shafts were found in an area of 14 hectares (Shepherd 1994). "The whole range of working consisted of shallow pits 2 by 1 meter and 3–4 meter deep, intermediate pits 6 meter deep and the deep pits with galleries which are just over 12 meter deep" (Shepherd 1994:622). Antler picks were widely used as mining tools.

Another major mine was at Krzemionki Opotowskie, Poland, initially exploited by Funnel Beaker communities. However, "underground shafts with galleries and stall are probably later . . . and can only be associated with the later TRB (Funnel Beaker) and Globular Amphorae cultures" (Lech 1991:561). According to Lech (1991:560), "Intensification of the farming economy, notably of extensive cereal cultivation demanding forest clearance, brought about an upsurge in demand for stone axe blades." It has been estimated that it took no longer than 10 min to produce a semifinished piece for the making of an axe (Balcer 1975).

At Mayen in the Eifel region of Germany, basalt was quarried for production of querns, which were used for the grinding of cereals.

Exchange

The evidence for trade is shown by the presence of artifacts made of nonlocal raw materials at the Middle Neolithic sites. We know that copper, gold, stone, flint, obsidian, shells, and pottery were exchanged among the Middle Neolithic communities. For example, in Italy exchange networks involved obsidian, finely made pottery, and polished axes. Nearly half of the gold recovered at Varna in Bulgaria may have originated from the Caucasus (Hartmann 1978). However, we cannot exclude northern Greece as a possible source. Certain traded items were probably only involved with higher-status individuals, since we are postulating the existence of ranked societies in some regions. For example, copper artifacts are not numerous outside the source areas, and perhaps they were exchanged mainly among the local elites. There is also evidence for trade in *Spondylus* shells in the Early and Middle Neolithic. *Spondylus* shells were present in southeastern and central European sites, including Vinča, Hamangia, Lengyel, Cucuteni-Tripolye, and the Linear Pottery sites. At Varna, *Spondylus* shells were found in graves alongside copper and gold artifacts, suggesting they were of some importance; indeed one *Spondylus* shell was repaired with copper. *Spondylus* shells were acquired from the Aegean Sea and the Black Sea and the distance they were traded lends credence to their importance. According to Todorova (2003:274), "The Hamangia culture owed its florescence to its trade in *Spondylus*."

Pétrequin (1993) examined exchange in stone in the Alpine foreland during the Middle and Late Neolithic (3700–2400 BC). Four types of stone were exchanged: black rock from the southern Vosges, flint from the Paris Basin, crystalline rock from the ancient Rhône glacier in Switzerland, and green rock from the inner Alps, especially around Mount Viso in Italy. These rocks circulated up to 100–200 kilometers from their points of origin. Pétrequin (1993:45) noted that "as early as 3000 BC, 70-kilogram blocks of granite were being backpacked across the Juras."

Some aspects of the organization of intercommunity exchange can be illustrated by the distribution of Funnel Beaker flint artifacts. The flint tools of this culture, such as scrapers, blades, sickle blades, burins, and axes were made from nonlocal as well as local raw materials. Some of this flint was obtained by mining at such sites as Krzemionki Opatowskie and Świeciechów in Poland. We find that there was much more intensive exchange in flint between various communities during the Middle Neolithic than in the Early Neolithic. Thus in central Europe, Jurassic flint from the Cracow area in Poland, flint from the Rügen area in Germany, flint from Volhynia in Ukraine, banded flint from the Krzemionki area in Poland, Świeciechów flint from the Annopol area in Poland, and "chocolate" flint from the Radom area in Poland were exchanged between the Funnel Beaker settlements. These varieties of flint are found hundreds of kilometers away from their sources. Settlements located near the flint sources, such as Ćmielów, Poland, have much higher frequencies of flint debitage in their lithic assemblages than those farther away. The Polish archaeologist Balcer (1975) refers to such settlements as "production settlements." However, those sites located farther away from the flint sources tend to have more finished tools than those close to the sources.

A good example of an exchange system between Funnel Beaker communities is available from southeastern Poland. It is evident that each community obtained the greatest amount of flint from the nearest source. However, the availability of good local flint did not eliminate interest in nonlocal or "exotic" flint. Furthermore, there are differences in the usage of imported versus local raw material at some sites. For example, the source of the Volhynian flint was approximately 30 kilometers (18.5 miles) from the Gródek Nadbużny site, but 61% of the axes found there were made of the Świeciechów and banded flint, whose source was roughly 150 and 170 kilometers away.

In the Carpathian Mountains, south of the Funnel Beaker culture area, the beginnings of copper metallurgy occur during the Middle Neolithic period. The small quantities of copper artifacts that turn up in Funnel Beaker sites indicate that some sort of exchange network linked them to the Carpathian region.

Settlement Organization

Our discussion of Middle Neolithic/Early Copper Age settlement organization is based on data from the Cerny, Chassey, Funnel Beaker, Lengyel, Michelsberg, Rössen, Aichbühl, Vinča, and Cucuteni-Tripolye cultures. The settlement patterns of some Middle Neolithic cultures are more complex than those of the Early Neolithic. Sites vary in size and location with respect to soils, elevation, topography, and other environmental factors. There are not necessarily higher densities of sites in all regions of Europe. In the Lower Rhine area, site densities fluctuated over time: 133 Linear Pottery sites (5500 BC), merely 8 Grossgartach sites (5000 BC), 40 Rössen/Bischheim sites (4700 BC), and 40 Michelsberg sites (4400 BC) (Lüning 2000:37). But some Middle Neolithic settlements appear to have had denser populations than those of the Early Neolithic, as is suggested by the amount of material recovered from their features. Pits in Linear Pottery settlements yield relatively little material, but those in Lengyel, Cucuteni-Tripolye, or other Middle Neolithic sites are frequently packed with ceramics, flint artifacts, bones, stone, etc.

Caves, where available, were utilized for habitation and non-domestic activities. According to Malone (1985:135), Middle and later Neolithic caves in Italy were mainly used for burials and rituals. "In some examples the sites (caves with hot volcanic springs, volcanic fumerole etc.) were used as shrines for offerings, sacrifices, burials and possibly feasts and initiation ceremonies," (Malone 1985:135).

In Britain, Ireland, and Scandinavia evidence for domestic architecture is poor, and there is much disagreement among archaeologists. Thomas (1996b:12) notes that "Much of the British evidence may represent structures which were both flimsy and temporary," while Darvill (1996:79) argues "that they are more numerous and widespread than commonly believed." He cites the 37 known buildings of the Early and Middle Neolithic in England and Wales. Of course, this is not too impressive, admittedly, when compared with the numerous structures in Germany or the Czech Republic. However, continental cultures adjacent to Britain, such as Chassey and Michelsberg, likewise have poor evidence for houses around 4000 BC. In England and Wales, structures are found within enclosures at Hembury, Devon, and Etton in Cambridgeshire and at unenclosed sites (Darvill 1996:83).

The Cerny, Lengyel, and Rössen cultures continued the Linear Pottery tradition of large houses, altogether the building of longhouses lasted for some 1500 years. Lengyel and Rőssen longhouses have trapezoidal floor plans, in contrast to the rectangular or slightly trapezoidal Linear Pottery plans, though whether this is anything more than stylistic variation is presently not known. However, so widespread a stylistic variation is a matter of significance, even if nothing else were involved. At Inden I, a Rössen settlement in the Rhineland, a 3.5-hectare area was uncovered containing the remains of 30 houses. They varied from 12 to 52 meters in length and from 6.2 to 9 meters in width, at the wider end of the house (Fig. 8.10). The area enclosed by individual houses ranged from 61 to 295 square meters. There were four houses built in a 2.5-hectare area during the first occupation phase and a fence encircled the settlement. Lüning (1994) estimates that six to eight houses existed at any one time during the later occupations. Lengyel longhouses, such as those at Osłonki in the Kujavia region of Poland, required at least 2.5 kilograms of wood per person per day for house construction and other domestic needs such as firewood (Grygiel and Bogucki 1997). Most Lengyel sites are located in areas of fertile soil. Unlike those of the preceding Linear Pottery culture, they are more frequently located at higher elevations, although the settlement layouts of these are similar.

Some Middle Neolithic settlements in central Europe, such as Aichbühl on Federsee Lake (4200 BC), are not associated with major archaeological cultures, but with local styles. This yielded only unpainted Neolithic ceramics common to southern Germany. R. Schmidt (1930) uncovered 25 rectangular houses arranged in an irregular row along the shore of the lake, built of wooden posts, and divided into two rooms, containing hearths and clay ovens. There were about 20 habitations, 5 × 8 meters, one central building, approximately 20 × 20 meters, and storage facilities. In Serbia,

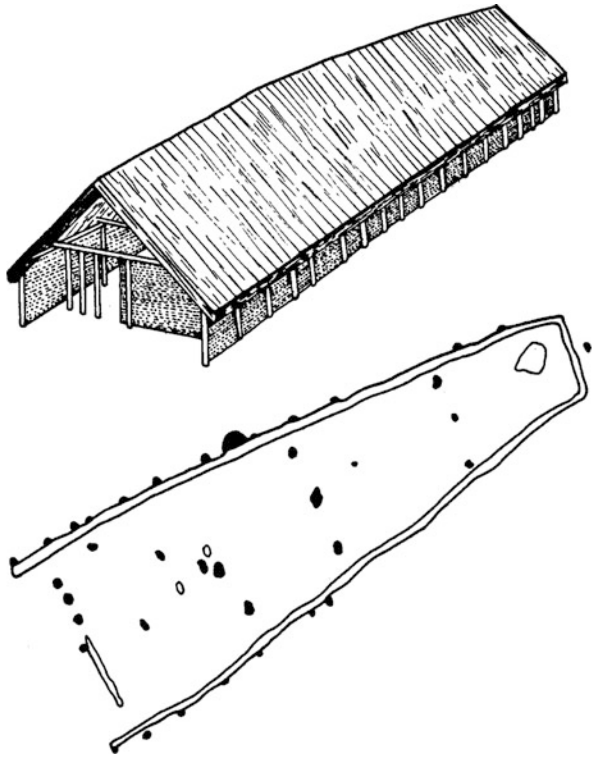

Fig. 8.10 Rössen longhouse at Inden I, length – 20 meter (After Kuper 1979)

Macedonia, Bosnia-Herzegovina, and west Transylvania, most Vinča settlements range between 1 and 10 hectare in area (Kaiser and Voytek 1983:332). There are flat and tell settlements. For example, Selevac is a flat settlement and Gomolava is a tell. At Opovo, Serbia, Tringham and Krstić (1990c) excavated superimposed house floors indicating the presence of two-story structures.

Settlements in Hungary are typically located along rivers, with tells covering from one to four hectares and flat settlements covering larger areas, up to 24 hectare in extreme cases. Flat settlements are more common in the northern Tisza Valley, while tells and tell-like mounds are more frequent in the south. Tells are often incorporated into larger flat settlements (Kalicz and Raczky 1987: 16–17, Sherratt 1983:33–36), a phenomenon also noted for the Greek Late Neolithic (Kotsakis 1999). Comparable developments are seen in the Morava, Sava, and Danube valleys in Serbia during this period. Spatial organization on many of these large sites, such as the Vinča sites of Selevac (Tringham and Krstić 1990a), Divostin (McPherron and Srejović 1971, 1988), Gomolava (Brukner 1988), and the Tisza site of Hódmezővásárhely-Gorrzsa (Horváth 1987) is patterned, with evidence for the planned layout of houses and open spaces implying some form of central political organization. These large nucleated settlements were composed of large rectangular, multiroom wattle and daub structures that likely held more than one domestic family. Most Neolithic houses within a given site were roughly the same size and shape, although some buildings may have had two floors (Horváth 1987, 1989, Tringham and Krstić 1990a). Typically, each room has an oven or hearth, and one room would be reserved for storage and possibly ritual activity. Clay-covered ox skulls are widespread indicators of religious or ethnic belief (Kalicz and Raczky 1987:22, Petrović 1990:102, Tringham and Krstić 1990a). Hódmegővásárehely-Gorsza in the Tisza-Maros triangle, (4900–4400 BC) is a fairly typical Tisza settlement (Horváth 1987). It has six occupations in the Neolithic sequence, the final one dating to the Tisza to Tiszapolgár transition. The village was surrounded by a wattle and daub fence, and in the latest occupation had a 2.5–3-meter deep ditch. House 2 is representative, measuring about 13 × 20 meters with six rooms and plastered floors. One room was reserved for grain storage and religious practices based on storage pots and an altar. Each of the remaining rooms had a domed oven and some contained looms.

In the eastern Carpathian Basin, Tiszapolgár settlements (4500–4000 BC, Early Copper Age) appear smaller and more dispersed across the landscape when compared to the settlements of the Late Neolithic. Tell-based settlements are largely abandoned and most settlements were composed of small, single-room dwellings without an interior hearth or oven, without floor plastering, without obvious internal storage containers, and without any defined internal ritual location.

Cucuteni-Tripolye settlement organization has been extensively investigated over the years by Moldovan, Romanian, Russian, and Ukrainian archaeologists, especially those Tripolye sites between the South Bug and Dnepr rivers, and Cucuteni sites near the eastern foothills of the Carpathian mountains, dating circa 4700–3500 BC. Mantu (1998) dates the Cucuteni sites in Romania from 4600 to 3500 BC. The amount of information is impressive, but there are controversies about their organization, size, and construction (Zbenovich 1996). There are over 1800 Cucuteni-Tripolye sites in Romania and 500 in Moldova (Monah 1992, Popovici 2000, Lazarovici and Lazarovici 2007:439).

Geomagnetic and aerial surveys since the 1960s have uncovered sites of various sizes, including so-called "gigantic" or large settlements (Zinkovski 1973, Shmagli 1980, Markevich 1981, Kruts 1989, Videjko 1995, Zbenovich 1996). Aerial surveying is relatively new to Romania; until 2006 only one Cucuteni site had been surveyed (Lazarovici and Lazarovici 2007). The number of sites increases significantly through time, a phenomenon alternatively attributed to population growth and economic stability (Ellis 1984), attempts to attract specialized artisans (Monah 2003a), and intensification of production in a limited space (Manzura 2005). Early Tripolye settlements consisted of rectangular houses, 3–5 meters in width, and 7–10 meters in length, usually divided into two rooms. Middle-phase houses are larger, 50–150 square meters, and divided into three or five rooms (Zbenovich 1996). Clay models of houses recovered from Popudnia and elsewhere make it possible to describe Tripolye houses in some detail. Interiors of houses were usually divided into two or four rooms (Fig. 8.11). Ovens, clay benches, cruciform platforms, grinding stones, and a few large pottery vessels are shown inside these house models, and dome-shaped ovens up to 60 centimeters in diameter were located against the walls. On the floor of each room there is usually a low, four-lobed (cruciform) clay platform, the functions of which are unclear. Russian and Ukrainian archaeologists suggest they were used for rituals. The houses had thick floors of burnt clay, and the clay models show they had gabled roofs. However, some Ukrainian archaeologists believe the burnt clay floors to be merely the remains of collapsed house walls. Some house models have short legs, suggesting to some scholars that the actual houses were built on stilts, which seems unlikely for the forest-steppe environments of the Ukraine.

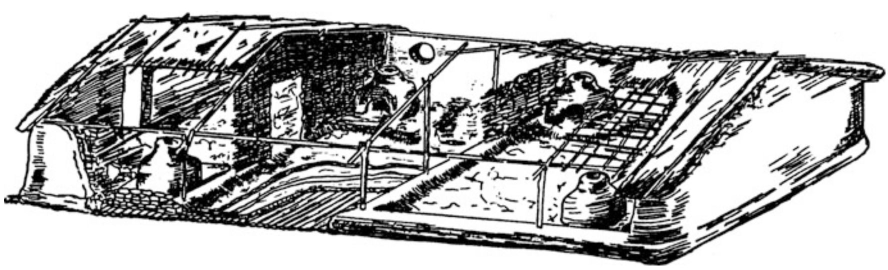

Fig. 8.11 A reconstructed Tripolye house at Kolomiishchina, Ukraine (After Passek 1949)

In the 1970s, some archaeologists suggested that Tripolye houses had two stories (Zinkovski 1973, Markevich 1981, Chernysh 1982, Kruts 1989). Zbenovich (1996:208) summarized their views: a house "had one or two stories with loft connected by ladders and an earthen floor possibly covered by a layer of wet clay, "the 'platform' is the collapsed floor of the second story or loft, baked by the burning of the building. Another collapsed platform separated the second story from the loft and was supposedly supported by thick adobe house walls." Domestic and manufacturing activities are suggested for the ground floor, with the second story serving as living quarters. The clay models, however, show no evidence of second stories (Kolesnikov 1993). Recently, a two-story house was excavated at the Cucuteni site of Poduri (Monah 2003b). There is evidence of fire at Tripolye settlements and some archaeologists believe that communities deliberately destroyed their houses and settlements by fire. However, it is difficult to prove that numerous houses were burnt at one time.

While some Cucuteni houses were subterranean or semi-subterranean, surface structures were the most common. Houses range in size from less than 20 square meters to over 100 square meters (Lazarovici and Lazarovici 2007). House floors were constructed by placing a clay floor over a foundation of wooden beams, though in some cases a clay or gravel layer was used in place of wood (Buzea 2006, Lazarovici and Lazarovici 2007). The clay floors discovered by archaeologists are usually fired and, based on his excavations at Hăbăşeşti, Dumitrescu (1967) has suggested they may have been deliberately burnt during construction. Walls were supported by large beams built through the clay floors into the wooden foundation. Some houses at Truşeşti had circular windows supported by clay frames and evidence for grooved wall decorations was found at Scanteia (Petrescu-Dimboviţa et al. 1999:189, Lazarovici and Lazarovici 2007:445). Houses often had annexes added to them; Marînescu-Bilcu and Bolomey (2000:36) described one such annex at Dwelling 12 at Drăguşeni as a porch.

A small Tripolye settlement of the middle phases of that culture covered an area of 2–3 hecatare, and may have contained 20–40 square or rectangular mud-walled houses at any one time. The houses were arranged in circles, semicircles, or in staggered rows. Kolomiishchina provides a good example of the general layout of a small Cucuteni-Tripolye settlement, measuring 170 meters along north-south axis and 160 meters on the east-west, for an estimated area of 2.7 hectares (Fig. 8.12). Passek (1949) uncovered an area of 1.3 hectare, approximately one-half of the settlement, containing 39 complete or partly preserved houses. The lengths of 28 houses range from 4 to 22.6 meters. Not all structures were necessarily inhabited, as some of the smallest ones may have been used for storage; one such house contained 20 pots but no ovens. The houses at Kolomiishchina were arranged in a circle, in the middle of which were two structures, one 22.6 meters long and another 14.5 meters long, which may have been occupied by more important families or may have been used for ritual or communal activities. There is some evidence of the repair and the enlargement of Tripolye houses, perhaps to accommodate increases in family size. Wells were found at Hăbăşeşti and Truşeşti, while outdoor kilns were found at a number of Cucuteni sites (Lazarovici and Lazarovici 2007, Ellis 1984).

The excavated houses contained painted and unpainted pottery, grinding stones, clay figurines, and bone, antler, flint, and stone artifacts. The painted vessels include some of the most beautifully ornamented ceramics of the European Neolithic (Fig. 8.13). The clay figurines usually represent women and only rarely men. Figurines of animals, especially cattle, were also found. A few of these hollow clay figurines were packed with wheat, suggesting their use in harvest or crop-protection rituals. The figurines and cruciform platforms inside the houses suggest that individual families performed some rituals. Figurines undergo stylistic changes through time. Those of the early phase were frequently decorated with closely incised lines, those of later phases are undecorated; women's bodies were represented in somewhat different dimensions.

Medium and large Cucuteni-Tripolye sites of the middle and later phases, after 4000 BC, had hundreds of houses. For example, over 200 houses were found at Vladimirovkva, Ukraine, arranged in five concentric circles. Petreni in Moldova occupied 30 hectare and had 498 houses arranged in

Fig. 8.12 A reconstructed Tripolye culture settlement at Kolomiishchina, Ukraine

Fig. 8.13 Tripolye ceramics from Bilcze Złote (Bilche Zolotoe), Ukraine (Courtesy of S. Kadrow 2010)

nine circles (Ellis 1984). At Majdanetskoe, over 1500 rectangular structures were arranged in 10–12 concentric ellipses. Geomagnetic and aerial surveys indicate that some of these sites occupied huge areas: Dobrovody, 250 hectare; Kosenovka, 70 hectare; Majdanetskoe, 270 hectare; and Tal'janki, 400 hectare (Videjko 1995). It is estimated that there were 1575 houses at Majdanetskoe and 2700 at Tal'janki. In Romania and Moldova, large settlements such as Petreny had 498 houses (Ellis 1984). Population estimates for these sites are correspondingly high: Majdaneckoe, over 14,000 people and Tal'janki, over 8000 persons. If reliable, such statistics would make these the largest settlements at that time in the Old World. It is possible that at any one time the number of houses was smaller than claimed by Ukrainian archaeologists. Only small areas were excavated at these large sites, e.g., only 60 houses at Majdaneckoe and 20 at Tal'janki. Thus, it may be that many houses are not contemporaneous, but belong to different phases of occupation (Lazarovici and Lazarovici 2007:442). Lazarovici and Lazarovici (2003:414) noted that not all Cucuteni houses at a site are contemporary, e.g., there were 44 houses arranged in two circles at Hăbăşeşti; the houses of the first circle are older. It should be noted that no cemeteries were found associated with the early- and middle-phase settlements of the Cucuteni-Tripolye culture. The distance between large settlements was 12–15 kilometre and there is some evidence for a regional hierarchy of sites. Near large settlements 4–7 kilometers away, there were small sites 2–9 hectares (Videiko 1994). It is difficult to explain the function of large sites, considered by some to be proto-urban centers, which may have offered protection or enticed craft specialists (Shmagli and Videjko 1993, Manzura 2005, Monah 2003a). However, these sites exhibit neither evidence of large public buildings, nor great variation in the sizes of structures. Yet, it is difficult to imagine that these communities lacked social distinctions, or structures of leadership and power. However, difficult to "imagine" is not impossible. Prehistory is vast, encompassing hundreds of thousands of years, and there is plenty of room for cultural arrangements utterly unknown to history, ethnography, or sociology. The postulated threat from steppe peoples in the eastern zone of the Tripolye culture might have produced concentrations of people at large sites for defense.

Populations even of small Cucuteni-Tripolye settlements appear to have been larger than those of Early Neolithic sites in central Europe. If one family used one oven in the houses at Kolomiishchina, then the settlement held 72 families. However, if we calculate one family for each house less than 60 square meters in area, the number of families is reduced to 47. Even this figure represents at least twice the population of any of the large Linear Pottery settlements. However, as Lillie (2008:13) points out, since larger houses "are subdivided into areas for cooking, drying grain, and the processing and storage of food, with kilns suggesting pottery production activities, the actual number of people inhabiting a house may be lower than the current population based estimates would seem to imply." Larger houses have yielded more pottery vessels than others, suggesting that they had more people or multiple-family occupations. Passek classifies houses into three groups according to their areas. Small houses had 10–15 pots, medium-sized ones 20–30 pots, and large houses had 35–50 pots.

Tripolye house construction required large quantities of wood, 25 cubic meters for putting up a 5 × 15-meter building (Kruc 1994). The 2700 buildings at Tal'janki would have needed 67,500 cubic meters of wood from 225 hectares of forest, assuming a hectare of forest yields 300 cubic meters of wood. Since about a quarter of the buildings were used for storage, the 2025 households at Tal'janki would have required 7286.25 cubic meters of wood per year. It is possible that they shifted their sites periodically on account of wood exhaustion. Salt may have also been a scare resource. Cucuteni sites near the Carpathian Mountains, particularly Poduri (Monah 2003b), were located near salt sources. However, the giant settlements like Tal'janki were not. Chapman and Gaydarska (2003) estimate that Majdanetskoe, which was smaller than Tal'janki, would have needed 70,000 kilograms of salt annually.

The Funnel Beaker settlement system in central Europe is more complex than that of their Early Neolithic predecessors in central Europe. As is the case with the Linear Pottery culture, Funnel Beaker sites are found in the areas of fertile soil in river valleys. However, for the first time, the loess-covered hills and uplands were also occupied, as evidence from Germany and southern Poland shows. Furthermore, there was greater expansion into zones of non-loess soils. The following observations on Funnel Beaker sites are based on data from surface surveys, such as those of Kruk (1973, 1980) in southern Poland, which have contributed to a clearer understanding of settlement systems. In their location and size, Funnel Beaker sites in the southeastern Polish uplands and adjacent parts of Ukraine differ from those on the plains of northern Poland, Germany, and Denmark, and more resemble Tripolye sites in Ukraine. In southeastern Poland, Funnel Beaker sites vary in size, topographical location, and the nature of their artifacts, reflecting, possibly, functional variation. Sites can be large, medium, or small. Large sites are located on high elevations and have a great variety of archaeological material on the surface. Some cover extensive areas, such as Bronocice which is over 50 hectares in size (Milisauskas and Kruk 1984). Medium-sized sites show further variation in their surface material, as some have little pottery and more stone and flint artifacts. Medium-sized sites are located both in the valleys and in the uplands. Small sites have meager quantities of artifacts on their surfaces and occur at both low and high elevations, though the latter are more common. They may have been the temporary camps of herders. Large sites usually occur several kilometers from one another, with smaller sites interspersed between them. Large sites may represent the seats of sociopolitical authority in small polities, where the ranking lineage or family may have resided. The proportions for the large, medium, and small sites are 5:9:30 (1:2:6 ratio), respectively (Kruk 1973, 1980, Milisauskas and Kruk 1984).

Funnel Beaker settlement systems exhibit similar variability on the North European Plain. Those in Jutland and northern Germany show a three-tier hierarchy of sites (Madsen 1982, Johansson 1979, 1981). In a 1600-square kilometer region of Jutland, Madsen (1982) classified sites into 3 types: exploitation, residential, and central. The exploitation sites are the smallest and are seasonal. Johansson (1979, 1981) excavated an exploitation site, Bistoft LA 11, in northern Germany; this site was used seasonally for hunting, fishing, and the pasturing of domestic animals. Residential sites are larger and permanently occupied. Central sites are very large and enclosed by ditches, and resemble British causewayed enclosures.

The absence of Funnel Beaker and Michelsberg house remains in many regions suggests that there were changes in building methods during the Middle Neolithic. Lüning (1994:550) speculates that houses changed from post-based structures to dwellings with floor joists. "The supporting posts and walls were no longer sunk into earth but placed on horizontal beams level with the surface" (Lüning 1994:550). The most economical explanation is just that houses were getting flimsier, while other kinds of sites were getting more substantial.

There is great intersite and interregional variability in Funnel Beaker house styles. In central Europe, both large and small rectangular houses were constructed of a framework of posts with mud-daubed walls, the largest not exceeding 20 meters in length. Pelisiak (2003) noted that houses range from 25 to 30 square meters in area in the Polish Lowlands. At Wallendorf, Germany, 9 or 10 houses 8–10 meters in length were uncovered. At Flögeln in northern Germany, a rectangular structure was uncovered (Zimmermann 1980) (Fig. 8.14). In Funnel Beaker sites of the southeastern zone, such as Bronocice, there are concentrations of burnt clay fragments bearing the imprints of posts. As is the case in some Tripolye sites, such concentrations may represent the remains of collapsed walls. Some Funnel Beaker structures were perhaps more complex as is suggested by an incised picture of a multistory house on a bone tube found in a burial at Złota in Poland (Bąbel 1992) (Figs. 8.15 and 8.16). In the large settlements in southeastern Poland, there are concentrations of features and artifacts such as ovens and flint material, which may be the remains of specific activity areas (Milisauskas and Kruk 1984).

Some Michelsberg settlements were located on hilltops, sometimes surrounded by ditches, crossed at intervals by causeways (Lüning 1968, Dubouloz et al. 1997). The areas enclosed by the ditches vary. For example, the enclosed area at Miel is 90 × 54 meters, that at Mayen, 360 × 220 meters,

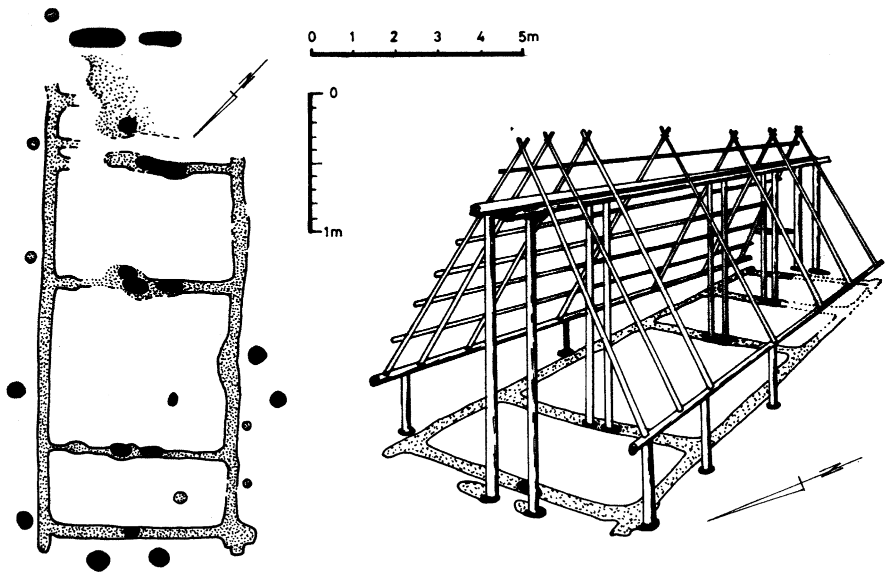

Fig. 8.14 A reconstructed Funnel Beaker culture house at Flögeln-Eckhölten, Germany (After Zimmermann 1980, with modifications)

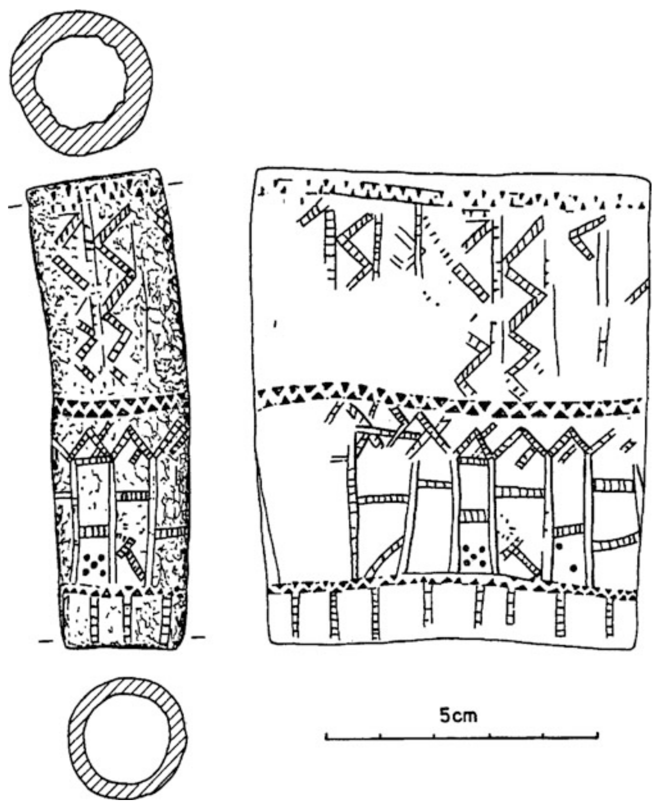

Fig. 8.15 An incised beaker of a multistory house on a bone tube found in a burial at Złota, Poland (After Bąbel 1992)

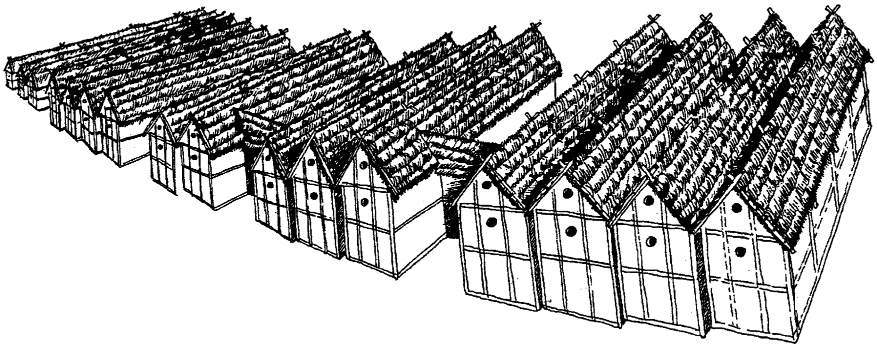

Fig. 8.16 Reconstructed Tripolye culture structures at Majdanetskoye, Ukraine (After Videjko 1995)

and that at Urmitz, 1275 × 840 meters. Urmitz was surrounded on three sides by ditches having 22 causeways, and on the fourth, by the Rhine River. Some sites had palisades in addition to the ditches. Relatively few archaeological features have been found inside these enclosures, which has given rise to numerous controversies about their functions. Since the ditches are not continuous, some archaeologists regard them as ritual places, or cattle enclosures, although one would not think that palisades would be needed to pen cattle. It would be easier to protect the cattle within encampments from a surprise cattle raid or predators.

In the Alpine zone of Europe, western Austria, northeastern France, southern Germany, northern Italy, Slovenia, and Switzerland are found the sites of the famed lake dwellers (Menotti 2004). As previously mentioned, they are contemporary with Middle Neolithic cultures in north central Europe. The earliest lake-dweller settlements in Switzerland are dated around 4300 B.C. Archaeologists once believed that, because of the situation in which these sites were found, all settlements had actually been built out over the water, on stilts. We know now that lake-dweller houses were built on dry land, on beaches, on the edges of marshland waters, and sometimes over the water (J. Coles and B. Coles 1995, Schlichtherle 1997, Magny 2004). These settlements consisted of small square or rectangular wooden houses, 6–12 meters long and 3–6 meters wide (Schibler et al. 2004a, b), ranging in size from 500 to 10,000 square meters. There were settlements "with only six to ten houses, but also villages with as many as one hundred houses," (Schibler et al. 2004a:388). The Swiss settlement of Arbon-Bleiche 3 on Lake Constance (Bodensee) had some 50 houses, located close to each other. The small size of the houses, which we assume were occupied by individual families of five or six persons, would indicate a population of 250 or 300. Dendrochronology dates make it possible to recreate the construction history of this site, which belongs to the Pfyn and Horgen cultures. "The first building work in the village began in the year 3384 B.C., when a single dwelling was raised. In the following year, only two more houses were built. More houses were constructed over the next few years, until the entire village had been completed" (Schibler et al. 2004b:395). No longhouses have been found in the Alpine zone, and it is unclear why. There was plenty of wood there, so the reasons were likely social or symbolic rather than simply technical. Linear Pottery sites do occur in Switzerland in areas adjacent to France and Germany.

Perishable materials, not usually recovered from archaeological sites, such as wood, bone, textiles, and crop remains, are exceptionally well preserved in some of the French, Swiss, and German Alpine sites (Wyss 1969) (Figs. 8.17, 8.18, and 8.19). These finds demonstrate sophisticated Neolithic technologies for woodworking, fishing, hunting, and clothing. Rising lake levels covered settlements with water or marsh after their abandonment, thus sealing them in airless environments that inhibited the action of the bacteria which cause decay.

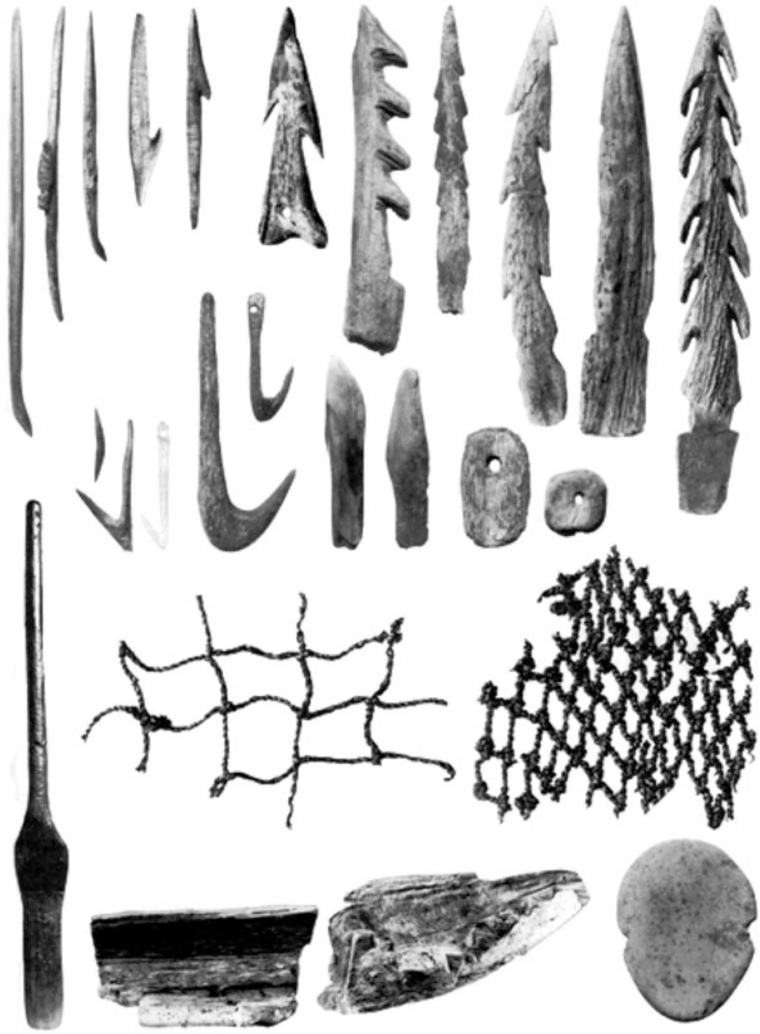

Fig. 8.17 Fishing equipment from Swiss Neolithic sites (After Wyss 1969)

Evidence of the carpentry methods of the Alpine Neolithic peoples has been preserved. Floor joint and mortise and tenon joints were present, made possible by complicated wood joints (Billamboz and Schlichtherle 1985, cited by Lüning 1994).

Megalithic Monuments

In western Europe some groups began erecting large stone structures, the famous megalithic monuments between 4600 and 4500 BC (Mohen 1990, Patton 1993, Hansen 1997). The term usually includes burial structures of stone and earth, as well as large freestanding stones (menhirs), set up in groups or individually (Daniel 1963). Megalithic monuments are found in Malta, southern Italy, France, Iberia, Ireland, Britain, Belgium, the Netherlands, Germany, Scandinavia, and northwest Poland (Fig. 8.20). In Poland, the elongated burial mounds lack stone chambers; similar mounds occur

Fig. 8.18 Wooden artifacts from Swiss Neolithic sites (After Wyss 1969)

in Brittany, England, Denmark, and northern Germany. Also around 3300 BC, the earliest megalithic tombs were constructed along the Black Sea in the Caucasus area (Hansen 1997).

They are Europe's most enduring monuments, and there must have been hundreds of thousands of megalithic tombs in Neolithic Europe. For example, around 20,000 megalithic tombs were built in the mid-fourth millennium BC Denmark (Hansen 1997:179). Approximately 50,000 megalithic monuments have survived some seven millennia of agriculture, construction, looting, and architectural "recycling." What percentage this represents of Neolithic construction is unknown, though it is worth observing that of the 5000 Danish examples noted 200 years ago by antiquarians, only 1800 still stand (Kaelas 1994:599). In 1829, there were 236 on the island of Rügen in northern Germany; by the 1960s there were only 54 (Schuldt 1972). Already around 2300–2200 BC, a dolmen in the Netherlands "was robbed of its contents and some of its boulders and cobbles" (Bakker 1992:3). It should be noted that laws were passed long ago against the destruction of megalithic monuments in some European countries, for example, in Sweden in 1666 and in the Dutch province of Drenthe in 1734–1735 (Klindt-Jensen 1975, Bakker 1992).

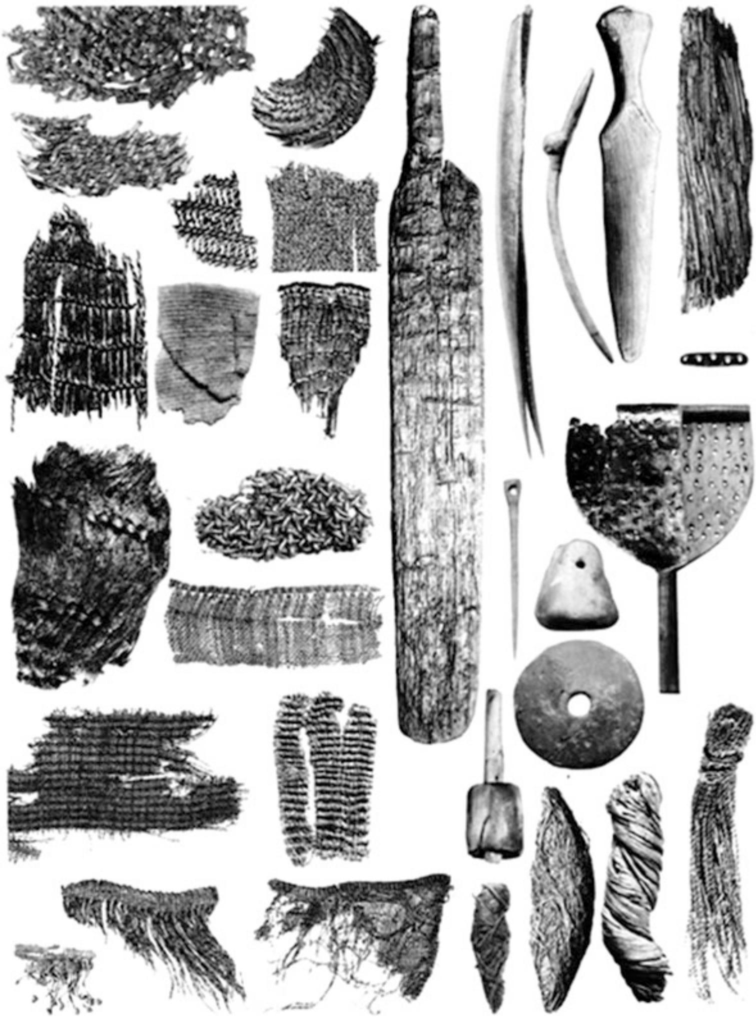

Fig. 8.19 Textiles and equipment for their production from Swiss Neolithic sites (After Wyss 1969)

Since megalithic monuments were constructed of stone, their builders likely meant them to last forever. The erection of megaliths altered the landscape physically and mentally for thousands of years (Bergh 1997). Because of their durability and visibility, they have been interpreted and reinterpreted continuously by later generations, even in the twentieth century AD (Thomas 1996a, Holtorf 1996). There are a number of studies on individual histories of megalithic monuments such as Avebury (Burl 1979, Malone 1989, Ucko et al. 1991) and Stonehenge (Chippindale 1994, Cunliffe and Renfrew 1997, Darvill 2006). Here we are only interested in archaeological interpretations, even though there is limited information concerning their symbolic meaning. Of course, they can and have been studied from the perspectives of architecture, beliefs, symbolism, status, astronomy, and economy.

Kaelas (1994:598) classifies megalithic monuments into five types: (1) chamber tombs, walled and roofed by large stones (Fig. 8.21), (2) absidial buildings, termed temples of Malta, (3) single standing stones or menhirs, (4) rows of standing stones, such as those at Carnac in Brittany (Fig. 8.22), and (5) circular arrangements of large stones such as Stonehenge in southern England. There also are rock-cut

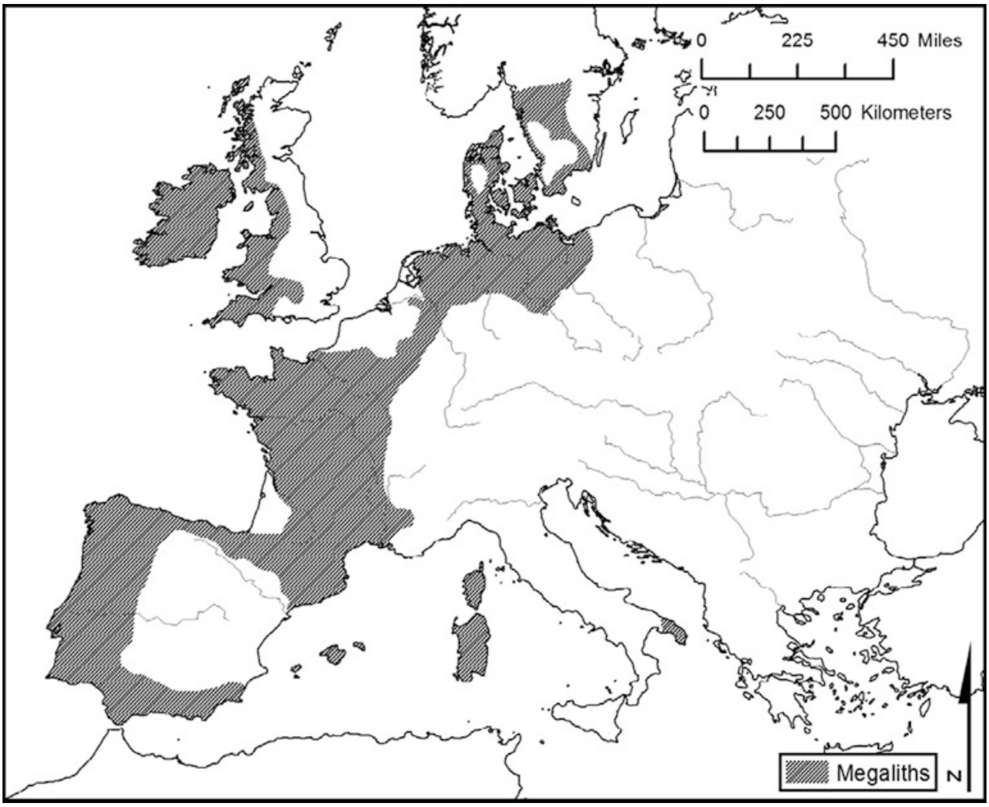

Fig. 8.20 Distribution of megalithic-chambered tombs in Europe (After Piggott 1965, with modifications)

Fig. 8.21 A rectangular megalithic chamber (14.3 × 4 meters), Roche aux Fées, Essé, Brittany. It was originally covered by a mound (Courtesy of J. Briard)

Fig. 8.22 Stone alignments at Ménec, Carnac, Brittany (Courtesy of J. Briard)

tombs (hypogea) in the western Mediterranean region and in the French Champagne. The standing stones have a more limited distribution; they are not found in Scandinavia. Chamber tombs can be either "passage-graves" with chambers quite distinct from the access-passage, or "gallery graves" (*allées couvertes*) in which there is no sharp distinction between chamber and passage (A. Chippindale and C. Chippindale 1988:15). The chamber of passage graves can be rectangular, oval, or square. Some megalithic stones have pecked or incised decorative motifs, zigzags, spirals, crooks, axes, and circles (Twohig 1981).

There were two types of early massive structures: elongated burial mounds without stone chambers and megalithic structures with chambers. Long mounds of earth with stones along the edges first appear in western France, southern Britain, and Kujavia in Poland between 4600 and 4000 BC (Sherratt 1997) (Fig. 8.23). Later, in the coastal regions of western France, western Britain, northern Germany, and Scandinavia, megalithic structures built of large stone slabs appear: British dolmens and chambered cairns, French passage graves, and Scandinavian *dysser* (Sherratt 1997). Long mounds were erected over burials of 1–3 persons and were not accessible after construction (Sherratt 1997). Megalithic chamber tombs could have been reused; people could have been interred in them at different times. There were also regional differences in the treatment of the dead. Inhumation predominated in Scotland while people were cremated in Ireland (Eogan 1997:45).

Who built structures such as Stonehenge in England, Newgrange and Knowth in Ireland, or the standing stones at Carnac in Brittany and for what purpose? What sort of message did they attempt to transmit for contemporary and future generations? Even today they serve as sources of spiritual fulfillment, as shown by the annual assemblage of some 20,000 people to celebrate the summer solstice at Stonehenge (Darvill 2006:275). Mohen (1990:17) mentions various local customs and beliefs associated with standing stones in historic times in Brittany. For example, men would rub their naked stomachs against the Kerloas menhir at Plouarzel to ensure beautiful children, while at Carnac "young girls would undress and rub their navels on the stone as they repeated their wishes" (Mohen 1990:17). It is evident that these structures were symbols of beliefs and values, the sites of rituals associated with them in the landscape for many years. Tilley (1996:157) has stated that "They served to immortalize the group constructing them." Clearly these structures are the very solid expression of myths.

Fig. 8.23 Excavation of a Funnel Beaker mound at Sarnowo, Poland (Photograph by S. Milisauskas)

Fig. 8.24 The Sarsen stones at Stonehenge (Photograph courtesy of James B. Griffin)

Megalithic monuments have been especially used as sources of data for scholars who favor cognitive archaeology (Renfrew and Zubrow 1994).

One of the most famous megalithic monuments is Stonehenge (Fig. 8.24). It is already mentioned by Geoffrey of Monmouth in the *History of the Kings of Britain* in the early twelfth century AD. He tells the remarkable story that Stonehenge was transported by ship by the wizard Merlin from an Irish mountain, where the stone circle had stood until then. In its early phase, dated around 2800 BC, it was a circular enclosure with rings of timber posts. The sarsen phase at Stonehenge is dated around 2600–2400 BC (Parker Pearson et al. 2007). Darvill (2006) speculates that around 2600 BC Stonehenge became a cult center and attracted people from distant places for its reputation as an oracle and healing place.

In the Boyne River valley, approximately 50 kilometers north of Dublin in Ireland, are three large chamber tombs, Dowth, Newgrange, and Knowth, surrounded by smaller mounds. Each tomb consists of a passage and a chamber built of large stone slabs and covered by a cairn of loose stones. Newgrange, dated around 3200 BC, covers an area of approximately 1 hectare; it is an oval mound, 103 meters in diameter and 11 meters high and was originally surrounded by a ring of upright monoliths (O'Kelly 1982). Entrance to the chamber inside the mound was by a 19-meter long passage, which was constructed of upright stones, averaging 1.5 meters in height, though there is considerable variation, with taller ones closest to the chamber. Chamber and passage were roofed with stones. The chamber is shaped like a cross, with three recesses or side chambers. The roof is a corbelled vault rising to a single capstone 6 meters above the floor. Grooves were cut into the capstones to drain rainwater before it could enter the tomb. An unusual feature at Newgrange is the roof-box, through which the sun, rising at the winter solstice, shines and illuminates the passage and chamber.

At Knowth, George Eogan (1986) excavated around 20 tombs, which are dated between 3600 and 2400 BC. The largest tomb has two passages; the western one was over 30 meters in length. A round mound delimited by a kerb of stones covers the tomb. About 400 large stones were used in building this tomb. Approximately 250 stones from all the Knowth sites are decorated with geometric and other abstract motifs. Only passage tombs have carvings in Ireland (Twohig 1998). Eogan (1997:50) suggests that large tombs, such as Knowth and Newgrange in Ireland and Gavrinis in Brittany, were dynastic tombs and were associated "with the emergence of dynastic families." Clearly this reflects the presence of ranked societies. However, many individuals were buried in small tombs in Ireland; it was a common burial structure for same-status individuals (Bergh 1997).

The Carnac region in southern Brittany has all types of megalithic monuments: long mounds, passage graves, and standing stones, dating 4500–2500 BC, though such monuments are difficult to date (L'Helgouach 1965, Burl 1985, Bailloud et al. 1995). Here we briefly discuss the standing stones. There are single standing stones, several set together, stone semicircles, and long alignments of numerous standing stones. Most menhirs are 1–12 meters high. The long alignments such as those at Kerzerho, Kermanio, and Le Ménec, consist of over a thousand stones (Burl 1993). Local stone outcrops were used for their construction. Mens (2007:30) notes that "the geomorphological studies of D. Sellier (1995) on the menhirs of Kerlescan have shown that the landscape prior to the construction of the alignments consisted of residual granite outcrops, sometimes as much as 2 meter high." At Le Ménec, 1069 standing stones are arranged in 10 or 11 rows, each over 1 kilometer in length. The arrangements are irregular; at the western end, the alignment is 100 meters wide, 85 meters in the middle, and at the eastern end 60 meters. At the western and eastern ends of Le Ménec, there were rings of standing stones. C. Scarre (1998:68) suggests that "the stone rows were perhaps built as complex processional ways leading to ritual enclosures." There are numerous single standing stones in Brittany. That these erections were significant, probably sacred to their Early Neolithic builders is self-evident. What they symbolized is at present unknown, although ancestral spirits have been suggested.

Renfrew (1973b) showed with radiocarbon dates that megalithic monuments in Atlantic Europe, especially in Brittany, are older than those in the Mediterranean area. Most recent studies stress their indigenous origin. Sherratt (1997:359) has pointed out that farmers reached the outer edges of Europe, i.e., Atlantic Europe and the North European Plain, around the time the first megalithic structures were built. While Linear Pottery communities did not put up such structures, they may indirectly have stimulated the megalithic phenomenon. By 5200 BC Linear Pottery material is found in the Paris basin (Arias 1999:423). They exchanged information and products with the hunting and gathering groups of the Atlantic coast and such contacts may have put stress on the values and beliefs of the hunters and gatherers. Control of domestic animals and plants by the farmers may have impressed the foragers. One way of dealing with these new uncertainties may have been to build stone structures to express belief in the immortality of their lifeways. The long mounds may be symbolic transformations of the longhouses associated with Linear Pottery and later cultures (Childe 1949, Hodder 1984, Sherratt 1990). In northeastern France long burial mounds containing Linear Pottery material, such as at Passy-sur-Yonne in Burgundy, indicate changes occurring in funerary practices (Duhamel et al. 1997). The elongated tombs at Balloy were superimposed on late Linear Pottery longhouses (Chambon and Mordant 1996, Mordant 1998). Interaction between Mesolithic and Linear Pottery groups does not, however, explain the origin of megalithic monuments in the western Mediterranean, e.g., in Iberia and southern France. It is unlikely that there were separate megalithic monument origins in Scandinavia, the British Isles, Brittany, and Iberia. According to Hansen (1997:179), "the building of megaliths started somewhere along the Atlantic coast of Europe between Ireland and Portugal."

Since the sixteenth, seventeenth, and eighteenth centuries, antiquarians have given various interpretations, explanations, and meanings to megalithic monuments. In folk tales, they are built by giants or the Devil (Kaelas 1994:598). The eighteenth century antiquarian, William Stukeley, considered the megaliths at Avebury to be temples of the Druids (Burl 1979). We now know that they are much older than the Druids, who are associated with the Iron Age. Oscar Montelius (1899) suggested that the idea for megaliths came from western Asia – *ex oriente lux* – and V.G. Childe (1957) also associated them with religious ideas originating from the eastern Mediterranean. In the last 30 years explanations and interpretations have multiplied (Holtorf 1996). They are territorial markers to Renfrew (1973a), they validate the status of leaders for Fleming (1973), they reflect elite ideology to Shanks and Tilley (1982), social and ideological transformations to Bender (1985), they stand as symbols of prestige and status for Bradley (1993), and they are instruments of the conversion of hunter and gatherer communities to Sherrat (1995a). As Mark Patton (1993:1) has stated "Each subsequent generation of archaeologists has made its own discoveries and comments, and offered interpretations of these impressive but enigmatic monuments." Since megalithic monuments stood for hundreds of years, they must have represented historical or mythical places for later Neolithic, Bronze Age, and Iron Age populations. However, as Renfrew (1998:5) has noted about historic monuments in the Near East, "The story which went with these monuments would have been known to their contemporaries, just as the significance of Silbury Hill or the Dorset Cursus in Wessex was in their day."

Carvings on megalithic monuments have been interpreted in numerous ways. Gimbutas (1991) and many scholars in the past interpreted some motifs as representing women or a "Mother Goddess." Twohig (1998:178–179) suggests "that the 'Mother Goddess' interpretation cannot be sustained in either the early/middle Neolithic art on the passage tombs and menhirs in Brittany." Carvings of axes are frequently found in Breton tombs and actual axes occurred inside the tombs. Supposedly axes symbolize masculinity and power. More recently, some scholars have suggested that there is a binary opposition of men and women in megalithic art and the contents of tombs (Hodder 1990).

Many megalithic structures represent impressive engineering achievements by Neolithic peoples. How did they manage to move stones weighing some 10, 20, 30, or more tons? In 1979, an experiment was conducted at Bougon near Poitiers in France to move and lift a 32-ton concrete block, equivalent to one megalithic capstone (Mohen 1980, 1990, Joussaume 1985). Over 200 persons participated in this experiment. Ropes and nets of plaited vegetable fiber were used, along with wooden levers and rollers. The number of men needed to move the block some 40 meters varied with different attempts. In one attempt 250 men were involved, but even with 200 men, 170 pulling ropes and 30 shifting wooden rollers along the block's path, it was moved. Approximately seven men per ton were needed. The size of the experimental stone pales in insignificance when compared with the 300-ton Grand Menhir Brisé, which originally stood 20 meters high. Thus, the construction of megalithic monuments required a large group of people and all sorts of materials. Bakker (1992:33) speculates that "Building a TRB tomb would have involved a long period of time, not only for preparing the site, collecting the building materials, making the necessary ropes and timber, deciding which blocks should be used, and preparing the trackways, but also for producing and storing the food, drink, and pottery needed for the sacrificial rites and for sustaining and entertaining the invited stone haulers, building experts, and the other guests in the festival accompanying the construction." Ten to fifteen individuals could build small passage tombs consisting of 4–6 stones and a roof slab in 2–4 weeks (Bergh 1997:144).

Usually, stones for the construction of megalithic monuments were locally available. For example, the source of stones for the construction of Funnel Beaker (TRB) tombs in the Netherlands was less than 350–450 meters away (Bakker 1992:36). Giot (1994:573) has noted that, in Brittany, "it was not uncommon for stones to be transported 4 kilometer." According to R. S. Thorpe and O. Williams Thorpe (1991), the source of the bluestones at Stonehenge was local glacial erratics, and not the Preseli Mountains in Wales, some 240 kilometers away. However, Green (1997), Lawson (1997), and Scourse (1997) suggest that the larger stones of Stonehenge (the sarsens) were brought from the Malborough area, 40 kilometers away. But the smaller bluestones were brought on rafts or boats by the sea and by rivers, and then overland around 2400–2200 BC from the Preseli Mountains along the Irish Sea.

Megalithic structures vary in size, construction techniques, form, and chronological position, and their distribution cuts across those of various archaeological cultures. Some of the stone tombs are composite monuments, constructed in several phases over long periods of time. Henshall (1974:140–141) notes that in Scotland, "they were first built as relatively small and simple structures, later added to, altered and embellished." Thus, different groups of people may have been involved in building and altering the same monument, complicating its interpretation, for the first builders may have been of a different culture than their successors. At Locmariaquer and Gavrinis in Britanny, for example, menhirs erected around 4500 BC were uprooted and used in the construction of later tombs. Carvings on one stone in a burial chamber at Gavrinis match those on the capstone of the *La Table des Marchand* tomb at Locmariaquer, 3 kilometers away, and date around 3500 BC (Le Roux 1985, Giot 1994). Presumably, beliefs changed and earlier menhir sites could be desecrated to build later passage graves. The same phenomenon occurred in several other places, e.g., Sion in Switzerland, where former, often engraved, menhirs were transformed into capstones.

The variability of the megalithic structures reflects differences in rituals, symbolic behavior, and ideological meaning. The use of chamber tombs for burials may be only one aspect of their significance. Social criteria for mound interment likely differed among megalithic building societies. In some areas they may be associated with high-status individuals, and, in turn, this may reflect the appearance of ranked or complex-kin-organized societies. In other areas they may have served as burial structures for entire lineages, as is the case among the present-day Merina people in Malagasy (Bloch 1968). Generally, not many artifacts were deposited with the dead in megalithic tombs. If funerary rituals were performed inside such structures, not many people could have participated in them, for lack of space. Bender (1985) hypothesizes that such restricted access reflects ritual control by a minority of elders or by a dominant lineage.

Some scholars, especially A. Thom (1967, 1971), A. Thom and A. S. Thom (1978), and Hawkins (1966) have suggested that megalithic monument builders had some knowledge of astronomy and could predict solar and lunar eclipses, and had devised a standard unit of measure, the Megalithic Yard of 0.829 meter. Some structures are classified as lunar observatories. Yet, many archaeologists remain skeptical. Patton (1993:119) expresses these objections succinctly with reference to the supposed lunar observatory centered on the Grand Menhir Brisé at Locmariaquer in Brittany: "The 'lunar observatory' hypothesis is based on the identification of several megalithic 'backsights' aligned (with the Grand Menhir Brisé as a 'universal foresight') towards the rising and setting positions of the moon at major and minor standstills. There is a problem, however, in that the area is so rich in megalithic remains that plausible 'backsights' would be found on almost any line drawn outwards from the Grand Menhir." However, as previously mentioned, the builders of Ireland's Newgrange incorporated a dramatic solar reference into their monument. Stonehenge seems to have been oriented to the rising midsummer sun.

Cups, Beakers, and Drinking

Middle Neolithic pottery types such as cups, beakers, and other vessels with handles reflect an increasing diversity of liquids consumed, especially in central and southeastern Europe. Early Neolithic vessels have no handles, thus Linear Pottery drinkers must have used their two hands to hold their bowls when drinking water or other liquids. The drinking of beer, mead, and wine in Europe goes back to the Neolithic. Sherratt (1997:374) has pointed out that "Historical Europe was undoubtedly a realm of 'drinking cultures,' just as North America at the time of its discovery by Europeans was a realm of 'smoking cultures'." Northern and central Europeans drank beer and mead, while the Mediterranean people consumed wine and mead. Mead is produced by fermenting honey, probably from wild bees (Vencl 1994:303). Neolithic beer could have been made from wheat, barley, oats, and millet. When did Europeans start drinking alcoholic beverages? Evidence from Greece indicates that viticulture was practiced by the end of the fifth millenium BC (Zohary and Hopf 1988). In the Near East, the evidence suggests wine production may go back to the sixth millennium BC (McGovern et al. 1996). Rojo-Guerra et al. (2006:253) cite Bueno et al., for the presence of "mead residues in pottery from the huts discovered below the Azután megalithic monument" in Spain. Six Iberian Bell Beaker sites have yielded evidence for beer consumption (Rojo-Guerra et al. 2006:262). Chemical analysis of residues in one beaker indicated that Bell Beaker peoples drank wheat beer (Rojo-Guerra et al. 2006:244). They speculate that "luxuriously ornamented vessels were used for drinking alcoholic beverages" by Bell Beakers (Rojo-Guerra et al. 2006:258).

We are all familiar with the negative aspects of alcohol, but there are also many positive aspects. Alcoholic beverages may be associated with economic, social, political, and ritual activities. They may be used "for gaining and consolidating personal prestige and power, for creating social relationships, for establishing the etiquette of hospitality and forming groups on the basis of solidarity and obligations" (Vencl 1994:319). Furthermore, beer, wine, and mead supplemented the diet by providing calories, vitamins, and minerals.

Warfare

The location of sites, presence of fortifications, and the occurrence of specialized weapons such as polished axes/adzes suggest that there was more warfare in the Middle Neolithic than during the Early Neolithic. During the Early Neolithic in central Europe, almost all axes/adzes were made of ground stone. Bored stone or polished flint implements were rare. Not only are there more bored Middle Neolithic axes/adzes, but a greater variety of raw materials was used to make them: flint, stone, antler, and copper. The copper axes were probably not much more efficient than those made of stone. Pure copper is a soft metal and, therefore, copper axes were more suitable for cracking skulls than woodworking. However, we should not think that only axes/adzes were used, or that they were used mainly for fighting. Their most obvious function was woodworking, and some types may have been symbols of rank or ceremonial artifacts. Axes/adzes made of exotic raw materials were extensively traded, while the miniature stone and clay axes at certain sites would have been useless for "practical" purposes. All types of axes/adzes are usually found in male burials; therefore, we may assume that men dominated the social situations in which they were used.

Recently, Parkinson and Duffy (2007) have reviewed fortifications and enclosures during the Neolithic and Bronze Age in Europe. The number of settlements surrounded by ditches increases during the Middle Neolithic, though not all were necessarily used for defense; some may have been used for the keeping of domestic animals, others for ritual and ceremonial purposes. In the discussion of the Middle Neolithic warfare, we only discuss various fortified sites. Neolithic enclosures are discussed separately (Chapter 7).

Defensive structures become more elaborate during this period in southeastern Europe. "The four classic techniques for defending a settlement in later prehistory are all present: ditches, banks, palisades and stone walls," (Chapman 1999:117). This is well exemplified by fortifications at north-eastern Bulgarian tells (Todorova 1982, Chapman 1999). The level I occupation at Ovcharovo had a triple bank, two ditches, and a palisade; the level II fortification consisted of a double bank and a palisade. Likewise, settlements surrounded by ditches are present in the western Mediterranean region (Martin de la Cruz 1997).

Numerous enclosed settlements have been found in central Europe (Lenneis 1979). Starling (1988) notes that from 20 to 41.2% of sites in the Elbe-Saale region belonging to the Late Middle Neolithic cultures had enclosures or ditches. Enclosed settlements are usually situated in new locations and show variability in form, suggesting that they served a variety of purposes such as defense, habitation, gathering places for feasting, symbols of territoriality, penning of animals, rituals, and ceremonies.

Approximately 50 fortified Lengyel sites are known in central Europe, only a few of which have been extensively excavated. Petrasch's (1990) and Trnka's (1991) analyses of Lengyel fortified sites indicate three phases of development. First, a single circular ditch was dug. Second, several ditches were subsequently constructed, and third, the ditches were topped with palisades. Some circular ditches, 50–100 meters in diameter, have entrances supposedly oriented to the cardinal points. Most fortifications, such as those at Svodin in Slovakia (Němejcová-Pavúková 1986, 1995) and Těšetice-Kyjovice in Moravia (Podborský 1988), are located within settlements (Fig. 8.15). Svodin had an area of 25 hectare and contained two fortifications belonging to different occupations. The construction of the Svodin fortifications required a large group of people. If only 10% of a population, estimated at 800, participated in the construction it would have taken 4 years. Three hundred people could have done it in a year assuming one person could excavate 1 cubic meter per day (Podborský 1979). At Svodin, 11,000 cubic meters of dirt were excavated and 4700 posts averaging 5.5 meters in height were erected.

Svodin may have been a refuge for a regional population of 3000. Assuming that the population density of the loess regions of central Europe was 20 per square kilometer (Lüning 1982), the Svodin fortification could have served an area of 150 square kilometers (Petrasch 1990). The Künzig-Unternberg fortification around Daggendorf, Germany, may have drawn on, and have been used by, a population from an area of some 100 square kilometers (Petrasch 1990).

The Lublin-Volhynian culture ditch (3700–3600 BC) at Bronocice encloses an oval area of approximately 168 × 210 meters or 2.4 hectares (Kruk and Milisauskas 1979) (Fig. 8.25). The depth, 2.20–2.94 meters, and width, 2.02–2.96 meters, varied around its circumference. The V-shaped ditch was dug in the loess subsoil and has oblique, step-like, down-sloping sides. Parallel to the ditch, and 2 meters away from it, was a 1-meter wide, shallow trench containing traces of postmolds representing the remains of a palisade (Milisauskas and Kruk 1990). Fortifications of similar construction are found in many regions of central Europe (Lüning and Stehli 1977, Podborský 1988, Petrasch 1990).

We analyzed the Lublin-Volhynian fortifications using the model of the Neolithic defensive system constructed at the Aldenhovener Platte in Germany (Kuper et al. 1974). Earth removed from the ditch was probably used to construct the embankment. The amount of earth used in the construction of the embankment roughly equals the volume removed from the V-shaped ditch, and would have provided a narrow flat surface on the top of the embankment from which the defenders could have fought their attackers.

There are Funnel Beaker enclosures and fortifications in central and northern Europe. A system of two ditches was found at Makotřasy in Bohemia (Pleslová-Štiková 1985). The ditch belonging to the early occupation enclosed an area of 5 hectares. The later ditch had a square shape, an area of 9 hectares (300 × 300 meters) and two 18-meter wide entrances. Pleslová-Štiková thinks that the square

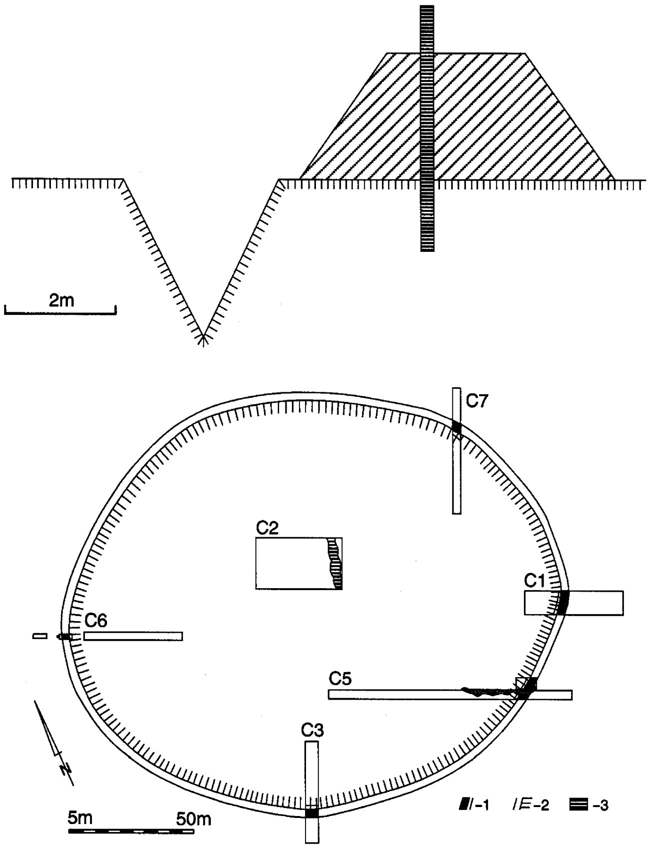

Fig. 8.25 Top-reconstructed fortification (ditch, palisade, and embankment); bottom-Lublin-Volhynian fortification at Bronocice, Poland: 1-excavated units and palisade; 2-hypothetical shape of the fortification; 3-Funnel Beaker-Baden enclosure (After Milisauskas and Kruk 1990)

enclosure had astronomical or ritual significance and was not associated with warfare. The location and presence of fortifications at Cucuteni-Tripolye sites are evidence for intercommunity conflict. Arrowheads (bow and arrow), polished shale/flint axes, spear points, and axe-hammers were used as weapons in fighting (Klochko 1994). Some settlements are located on high elevations or promontories near rivers, whereas others are on low-lying river terraces. This militaristic interpretation does not appeal to some archaeologists, who prefer to see the Tripolye people living a life of pastoral innocence and tranquillity. Such scholars interpret the ditches as enclosures to protect cattle.

Large fortified Tripolye sites, such as Tal'janki and Majdanetskoe in Ukraine, are dated to Tripolye C1, 3800–3600 BC, so are later than many of the other sites we have mentioned. They were not fortified with banks and ditches, but instead are thought to have had joined house walls that presented an external barrier, a single long wall, to the intruder broken only by radially aligned streets, like spokes of a wheel. Other than this possible barrier, there are no fortifications at these large sites of Tripolye C1. Very large Tripolyean sites are located on a narrow strip of land, 30–40 kilometers in width, along the southern edges of the forest-steppe zone (Kruc 1994). Some archaeologists speculate that the herding or pastoral populations of the Sredni Stog culture threatened these settlements in the eastern zone. Polivanov Yar, Ukraine, is located on a high promontory. On three sides are steep slopes that provide natural protection, while on the unprotected eastern side a ditch and an embankment were constructed (Passek 1949). The sites of Truşeşti, Hăbăşesti, Traian, and Cucuteni-Baiceni in Romania also had defensive ditches (Florescu 1966). At Truşeşti, the ditches were 2.5–4 meters wide and 1.5–2 meters deep. Two parallel ditches protected the site of Hăbăşesti. Their width varied from 1.5 to 5 meters and depth from 2 to 2.5 meters. At Cucuteni-Baiceni, an embankment of stones and dirt provided protection for the settlement in addition to a ditch. A ditch and a palisade surrounded the Iclod site during phase I (Lazarovici 1990). A large proportion of fortified promontory settlements appear to be datable to the Tripolye B1 period, about 4200–4000 BC, which seems to have been a period of unusually intense conflict in the eastern Carpathian piedmont. Perhaps it is not a coincidence that many Karanovo VI tell settlements were abandoned in the lower Danube Valley at the same time.

In Northern Ireland, Mallory (1993) described a Neolithic ditched enclosure at Donegore Hill. According to Mallory (1993:415), "Donegore fits broadly within the series of British neolithic interrupted (causewayed) enclosures." Two interrupted ditches and two timber palisades surrounded the Donegore Hill settlement, which enclosed 2.6 hectares. It was occupied from about 4000–3100 BC. Mallory believes that Donegore Hill served a defensive purpose.

The Problem of Writing and Record Keeping

Writing originated some 5500 years ago in the Near East (Schmant-Besserat 2007). There are conflicting opinions about the earliest appearance of writing in Europe. While the Linear Pottery culture dominated central Europe, Middle Neolithic cultures such as Vinča flourished in southeastern Europe, probably with more complex sociopolitical organizations than their neighbors to the north. Vinča peoples used copper for manufacturing tools and ornaments, and subsequently developed copper metallurgy. The most spectacular claim made on their behalf is that they used writing (Falkenstein 1965, Hood 1967, 1968).

Incised motifs such as crosses, spirals, and squares have been found on Vinča pots, which some archaeologists consider to be symbols of property ownership (Winn 1981) (Fig. 8.26). To Gimbutas (1991) they represented an early form of writing, a claim regarded skeptically until the discovery of three incised clay tablets at Tartaria in the Transylvanian region of Romania in 1961 (Vlassa 1963). Tartaria is a low mound (250 × 100 meters), the lowest levels of which contain a Vinča occupation. A Vinča pit dug into the lowest occupation yielded three clay tablets, clay and stone figurines, and a shell bracelet. The possibility exists that the pit is not Vinča, but intrudes into the Vinča level from later and higher levels. The tablets were found in trench G. Zanotti (1983:212) has suggested that they "are intrusive from the upper strata most likely connected with the Baden-Kostolac presence on the site." This would date the tablets to 3400–3000 BC. Zanotti's interpretation was criticized in very harsh terms by the Romanian archaeologists Lazarovici and Maxim-Kalmar (1991). They claim that the feature was not disturbed by the Baden-Kostolac pit, and they date the tablets to the Vinča occupation.

Two of the Tartaria tablets are rectangular, and one is round (Fig. 8.27). They are small; the round one is 6 centimeters in diameter. One of the rectangular tablets and the round one have holes drilled through them. Symbols are inscribed only on one face. One of the tablets has only pictographic symbols, in which some scholars see resemblances to Sumerian writing of the Jemdet Nasr period (3100–2900 BC). Hood (1967) had suggested they were associated with Sumerian gold prospectors. The interpretation of marks, motifs, and designs, such as these Tartaria inscriptions, which occasionally turn up on artifacts, should be done with the greatest caution. They may be symbols of some sort, such as marks of ownership or ways to transmit some information, but it is unlikely that they are writing.

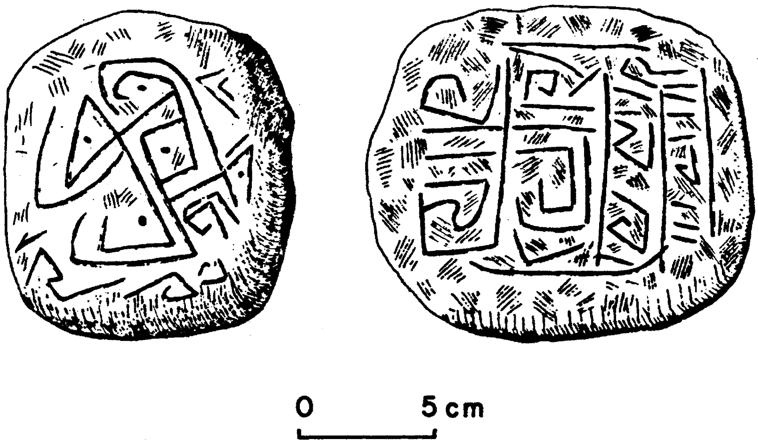

Fig. 8.26 Inscriptions on a vessel from Gradeshnitsa, a Vinča settlement in Bulgaria

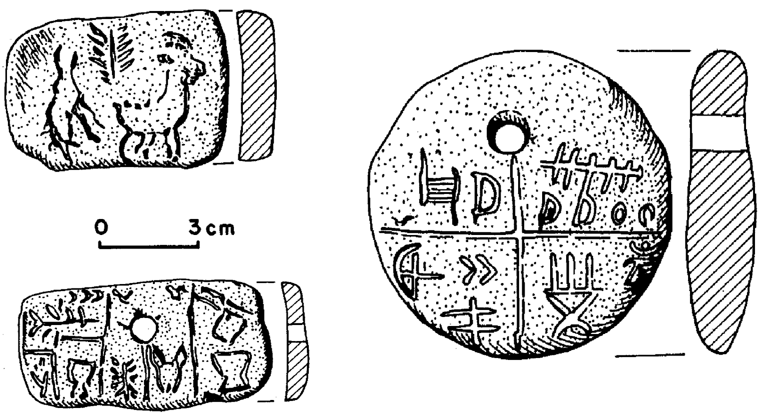

Fig. 8.27 Incised clay tablets from Tartaria

Katina Lillios (2004a, b, 2008) studied the engraved stone plaques of the Iberian Late Neolithic and Copper Age (3000–2500 BC), usually found in burials. Most of them are made of slate and “they are generally trapezoidal, roughly 10–20 centimeter in height and 10 centimeter in their maximum width” (Lillios 2002:139). “The most common motifs on Classic plaques are triangles (68%), next are the chevrons (16%), zigzags (11%) and checkerboard (10%)” (Lillios 2004:139). Since some plaques have combinations of the different motifs, the percentages total over 100%. In the past these plaques were interpreted as religious objects, heraldic artifacts, or emblems of ethnicity. Lillios (2004b:127) suggests “that the majority of the plaques – the Classic plaques – may have been records of the genealogical and lineage affiliation of an élite class of individuals in south-western Iberia.” She (2008) even suggests that they may represent a form of writing. They certainly can be memory aids and heraldry for the dead, but are not like the early writing in Egypt or the Near East.

Writing was usually developed by early state societies to facilitate record keeping to help administer their complex social, political, and economic systems. It is unlikely that the prestate societies of the European Neolithic would have invented writing independently, since they would not have needed it. The use of symbols to express ideas may go back to the Lower Paleolithic, but it is extremely difficult to demonstrate archaeologically whether a corpus of symbols constitutes a writing system, such as Linear B, the Egyptian hieroglyphics or Sumerian cuneiform. There is no evidence that institutionalized complex administrative apparatuses existed in these cultures. However, this does not mean that markings on Vinča pots have no meaning. They may represent the separate identity of a community or household (Tringham and Krstić 1990b). David Anthony (pers. comm. June 2001) noted that Near Eastern writing was for record keeping, but Chinese writing began for ritual and commemorative purposes associated with the sacred power of kings. It may be that the Chinese model could apply to southeastern Europe: writing as a sort of sacred script, like the signs on oracle bones in China.

The Origin of Complex Societies

Various archaeologically observable changes in the Middle Neolithic/Early Copper Age point to increases in social and political complexity in some regions of Europe. Some small-scale societies may have been historically transformed into societies with inherited inequality in personal status. These are perhaps best termed "ranked" societies. Others have called such societies low-level hierarchical societies, ranked societies, complex-kin-organized societies, or chiefdoms and there is wide variation in the definitions applied to these terms. Earle (1987, 1991) has described chiefdoms as politically centralized regional populations. Conversely, in global perspective, Cowgill (1997) and others (Liu and Chen 2006, Bray 2008, Thurston 2009a) have pointed out that complex societies are often decentralized, or pass through decentralized phases, both before and after episodes of centralization. Hayden (1995) uses the term "transegalitarian" to describe societies that are neither egalitarian nor politically stratified. In these societies, status and power differentiates some individuals and/or families from others. Hodder (1986), Yoffee (1993), and Pauketat (2007) have criticized the use of the term "chiefdom" when applied over times and space containing great variability in sociopolitical and subsistence organization, and have suggested the abandonment of evolutionary typologies. All typologies simplify diverse data and that is where the problem lies. It is the diversity of data that explains and justifies. Careless use of typology obliterates detail and makes explanation more difficult. Typology can also lead to some faulty interpretations. If we have a "chiefdom" type and assume that a chiefdom has properties like hierarchy, inequality, etc., then analysis turns to a sort of name game, shifting the question to "Can we call this site/artifact culture a chiefdom?" with the implicit transfer of the aforementioned properties to the artifact culture.

"Chiefdom" originally referred to very specific forms of political organization, mainly in Polynesia. Since the 1960s, the term has been expanded to the point of meaninglessness. We have only the vaguest notions of Middle Neolithic political organization, and there is certainly no reason to think they had many useful similarities to Tahiti, or to the Kwakiutl, or any other eighteenth/nineteenth century "chiefdom."

Probably archaeologists here and elsewhere in the 1970s and 1980s have "found" too many chiefdoms (Feinman and Neitzel 1984, O'Shea 1996:5). In the early 1970s, the identification of chiefdoms was justified primarily by the presence of earthen mounds and megalithic structures in Britain, Malta, and elsewhere (Renfrew 1973a). Since then there have been numerous studies (Milisauskas and Kruk 1984, Bradley 1991, Gilman 1995, Price 1995, Earle 1997) concerning the development of chiefdoms, especially during the Bronze and Iron Ages. Causes usually cited include population increase, warfare, ecological changes, trade, and internal conflict. As pointed out in Chapter 7, some French and German archaeologists argue that the type and quantity of goods in burials constitutes archaeological evidence for the higher status and power of some individuals (Nieszerny 1995, Jeunesse 1997). Sherratt (1996:163) suggests that inequality in animal ownership may have contributed to social stratification.

We have to consider heterarchy when dealing with complexity (Crumley 1995, 2008). If some distinct parties possess limited and contextually based power, for example, individuals have power in the decision to relocate, religious practitioners have power in leading ritual at harvest, but neither have power over the other outside these spheres; it throws a wrench in linking burial goods to social complexity through a single hierarchy. On the other hand it does offer an explanation for how a Neolithic group might be able to make complex decisions on a settlement scale without some of the material displays or enforcement capabilities we associate with chiefs.

The burial contents of some graves at Varna, Bulgaria indicate some type of a ranked, nonegalitarian society around 4560–4450 BC (Renfrew 1978, Chapman et al. 2006, Higham et al. 2007) The Varna cemetery was probably utilized for approximately 125 years or for four or five generations. It is estimated that 300–350 individuals were buried at Varna, at a rate of perhaps three or four individuals per year (Chapman et al. 2006:175, Higham et al. 2007:651).

At Varna 294 burials were excavated, but gold artifacts, indicating wealth, were only found in 61 graves (Ivanov 1988, Ivanov and Avramova 2000). We assume that the Neolithic peoples at Varna considered objects of gold as symbols of prestige and wealth. For example, grave numbers 4 and 43 contained gold beads, gold rings, gold arm-rings, copper axes, and other artifacts. The weight of gold in both graves was 1518 grams and 1516 grams, respectively. Approximately 6 kilograms of gold was found in all burials (Ivanov 1988). Forty-three of the Varna burials were cenotaphs (symbolic interments without skeletons), some containing numerous goods. Some of these graves contained clay masks "with gold objects placed strategically on the location of eyes, mouth, nose and ears" (Chapman et al. 2006:160). Out of 61 graves with gold artifacts, 34 were symbolic interments. It is possible that these graves represent missing or dead individuals in distant places, such persons who died in warfare or trading expeditions.

The Varna cemetery has attracted a wide range of interpretations. For example, Biehl and Marciniak (2000:204) consider this as a "process in which all available resources in a particular region and time were mobilized to define and display a community identity." Chapman et al. 2006:160–161) do not agree with the idea that "group solidarity has been emphasized in the creation of the Varna cemetery through a series of communal events (Bailey 2000:284), this principle does not begin to explain the intra-group differentiation." Chapman et al. (2006) classify the Varna burials based on their contents into three groups: lavish, rich, and poor. The lavish graves are associated with great men, the rich graves with patrons, and the poor ones with clients. "The most lavish graves at Varna were reserved for those members of the inter-regional elites whose lineage was supporting their claims to succeed the newly dead great man – in short, to assume the position of the next great man" (Chapman et al. 2006:174). Only a handful of men were buried in the so-called lavish graves with numerous objects including gold and copper. "The wealthy graves at Varna were articulated extended inhumations, including adult males, adult females and children" (Chapman et al. 2006:174). These individuals were buried with fewer artifacts than the great men. The poor graves reflect a new type of hierarchical, patron-client relationship. Some of these poor individuals were buried without any personal items. Chapman et al. (2006) consider Varna as a supra-regional mortuary where people from the surrounding area were buried.

The mortuary evidence for the appearance of ranked societies in northern Poland is based on the small number and size of the Funnel Beaker culture burial mounds. These trapezoidal mounds range from 25 to 150 meters in length (Chmielewski 1952, Jażdżewski 1970, 1981, Krzak 1994) and they usually contain one or two individuals (Fig. 8.23). Therefore, we may assume that only high-status persons were selected for interment in these mounds. Wason and Baldia (2000:142) suggest that religion inspired such monument building and "eventually helped to institutionalize leadership." Recently, Funnel Beaker mounds such as those at Slonowice, have been found in southeastern Poland (Tunia 1996, Burchard 1998) (Fig. 8.28). This mound may resemble the reconstructed Fussell's Lodge barrow

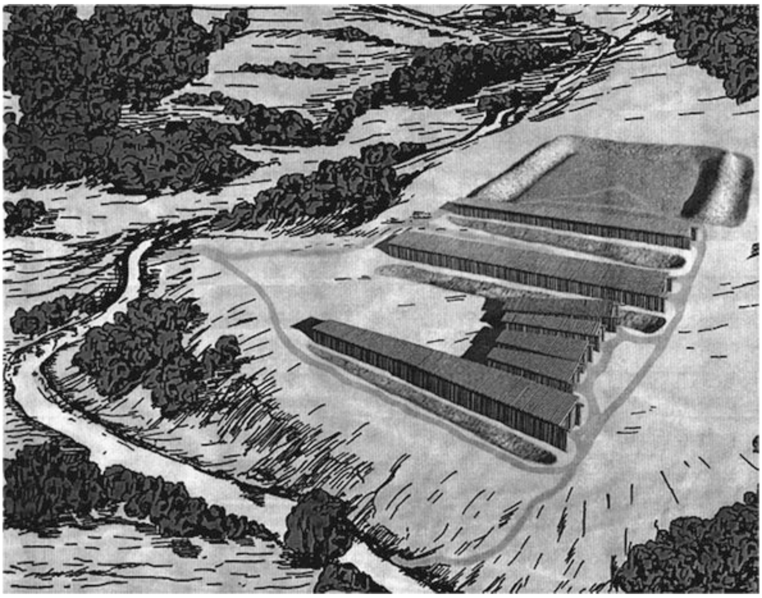

Fig. 8.28 Funnel Beaker burial mounds at Słonowice, Poland (Courtesy of K. Tunia)

in England; perhaps similar structures were constructed by Funnel Beaker people in the upper Vistula basin (Fig. 8.29).

Some archeologists have used settlement hierarchies to demonstrate the existence of ranked societies. Information theory, popular among American archaeologists in the 1970s, suggested that the number of decision-making levels is a reflection of the hierarchical structure of a society (Flannery 1972, Johnson 1973, Wright and Johnson 1975). Thus, settlement hierarchies might be used as evidence for different types of decision-making structures. It should be noted that settlement hierarchies do not always denote centralized government or authority. There are many decentralized societies where there are "central places" without "central people" in them, but there would still be some group, office, faction, or even elected entities in charge of keeping order. This may be because social or political elites live elsewhere or because there are no elites in the commonly used sense.

Milisauskas and Kruk (1984) used the settlement hierarchy documented in the Bronocice region, southeastern Poland, to demonstrate the development of low-level hierarchical societies. The Funnel Beaker settlement hierarchy has at least two levels of permanently occupied sites, which may represent a two-level decision-making organization, one at the community, and one at the regional level (Milisauskas and Kruk 1984). These ranked kin-organized societies may well have been short-lived and unstable political formations.

What caused the appearance of leaders at Bronocice? Environmental factors and subsistence behavior do not appear to have played major roles. The regional population may have increased by a factor of five over that of the Early Neolithic. There was no shortage of fertile land to motivate struggles over scarce resources. The region is ecologically homogeneous, and thus the economic integration of different ecological zones seems unlikely as a motivation for the rise of ranked societies. Hayden and Gargett (1990) have suggested that the maneuvering of self-interested individuals played an important role in the emergence of complex societies. These ambitious and enterprising individuals are called aggrandizers (Clark and Blake 1994). Competition may occur among households for wealth, status, and leadership and "winners" might achieve dominant positions in the community. It should be noted

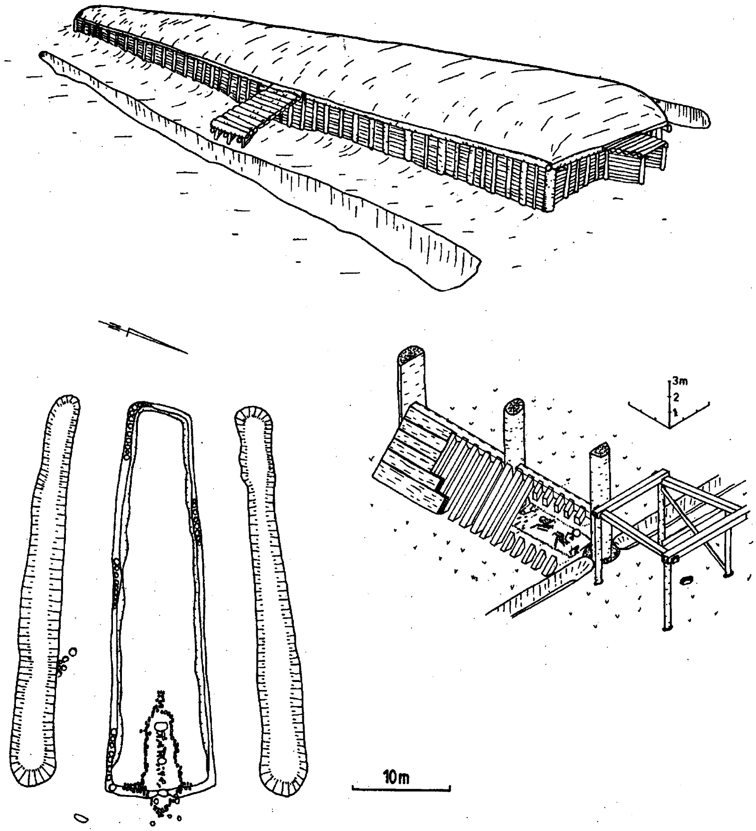

Fig. 8.29 Reconstructed Fussell's Lodge long barrow, Wiltshire, England (After Ashbee 1970, Krzak 1994, with modifications)

that such maneuverings may be found in all cultures, including foraging bands. They usually do not have tremendous historical evolutionary effects, but change can be facilitated by having aggrandizers in power. It should be pointed out that if the competition that leads to a dominant aggrandizer is partly determined by wealth and status, aggrandizers are actually dependent on the actions of a whole household. Although an individual might come to represent this group that does not mean the individual is responsible for that status, and being a successful aggrandizer might depend on the craft skills of a wife or the contacts of an avunculate or brother. Therefore, the winners in those situations would be groups of people, probably represented by one or two individuals. Pauketat (1994, 2007) uses agency theory to investigate the emergence of complex society at Cahokia in the Mississippi valley. According to Barrett (1994:5), "Agency is the means of knowledgeable action, and is not reducible simply to the actions of the individual. Through agency, subjectivities (which in certain circumstances may have been expressed as the idea of the individual or as the idea of the community) are realized in practice." Agency tries to trace how power relations might work out at an individual level, or possibly an individual group level and to determine who are the responsible actors in the exercise of power or change (Barrett 1994).

Hodges (1989) has emphasized the importance of political and religious leaders in the development of complex societies. However, it is very difficult to demonstrate the role of charismatic and ambitious individuals during the Neolithic. Perhaps the Melanesian big man can be used as a simple analogy for the Neolithic societies. It should be noted that in some societies, "Big Men" could be "Big Women" too. A Melanesian big man makes himself big by doing big things like giving feasts, recruiting at first his relatives to labor for him to produce surplus, then attracting non-relatives who are impressed with him. He then makes himself indispensible by loaning people capital or goods, usually pigs, and never asking for the loans to be repaid as long as the borrowers support him. He uses his many "clients" to create political critical mass, and then usually takes a role as "speaker" for the community to outsiders.

The recent historical record certainly suggests that charismatic, talented, and ambitious individuals, such as Kemal Atatürk of Turkey, played an important role in the formation of European states. Often archaeologists attempt to diminish the importance of individuals, especially so-called great men, in influencing human events, since archaeological evidence for their presence is usually lacking. Charismatic persons are important players in culture change. Although these charismatic individuals are not the main cause for the formation of a complex political system, they should be considered as part of the explanation. The missing element in such great men or women explanations is ideology. Why do people go along with great men or women? In case of Kemal Atatürk, it was the appeal of new forms of Turkish nationalism and his determination to preserve the state. While an analogy from the twentieth century may not be directly applicable to forms of Neolithic politics, it can be useful in demonstrating the role individuals can play in any time period. It should be noted that different nations have their own versions of events; for example, Kemal Atatürk is not a heroic figure in Greece.

Gender Differentiation

Data from Lengyel and Tiszapolgár cemeteries, such as Brześć Kujawski (Jażdżewski 1938, Gabałówna 1966), Osłonki (Grygiel and Bogucki 1997), Tiszapolgár-Basatanya (Bognar-Kutzián 1963), and Zengővárkony (Dombay 1960), allow inferences to be made about gender distinctions in Middle Neolithic societies. That male skeletons lie on their right sides and females lie on their left sides shows that gender distinctions were made (Häusler 1966, 1994). Treatment of the deceased at Tiszapolgár-Basatanya cemetery in Hungary suggests that fighting, hunting, and trading were men's activities, for men were buried with flint tools, weapons, animal bones, and copper tools (Milisauskas 1978) (Fig. 8.30). The control of exchange by men is suggested by the association of male skeletons with products made of nonlocal raw material, such as copper and obsidian. Skomal's (1980:85) analysis indicates that the phenomenon of wealth was associated with a group of males during the Tiszapolgár period at the cemetery. Pottery was probably made by women and used mainly by them in domestic activities, as is shown by the finding of pottery mostly with female remains. Burial data from the Brześć Kujawski cemetery indicate that men did the fighting, as antler axes are associated with male burials. Data from Osłonki in Kujavia, Poland suggest the importance of women in that society. The emphasis is on body ornamentation rather than on grave goods. "One exceptional female burial featured a copper diadem, made from strips of hammered copper bent around a belt of perishable material, numerous copper and shell beads, and five copper plaques" (Grygiel and Bogucki 1997:166). This may indicate that women were as important or more important in their communities and participated in interregional exchange. It may also indicate that women did none of those things but men did, and demonstrated their wealth and authority by loading trinkets on to their wives and daughters.

In the Varna cemetery, greater gender differentiation in terms of power is reflected by burial contents. Graves containing numerous artifacts are associated with men. According to Bailey (1996a:294) "Male identities were linked with public ritual and the conspicuous consumption of prestige goods in burials." However, at Durankuluk, Bulgaria, gold objects were found in seven men's and seven

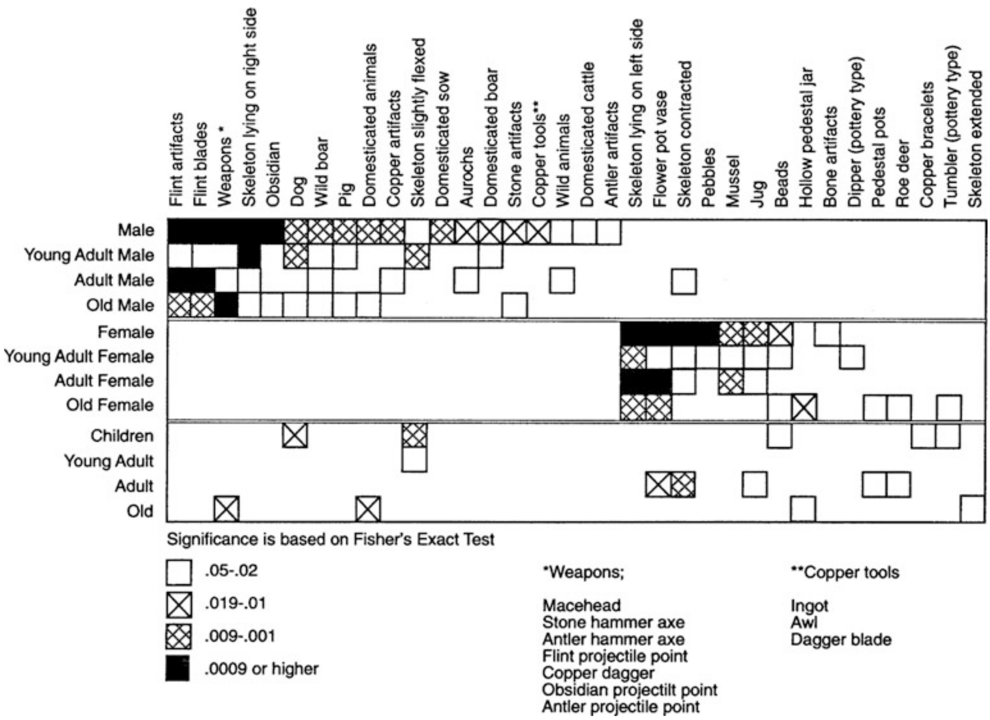

Fig. 8.30 Association of burial data with sex and age groups at the Tiszapolgár-Basatanya cemetery. Weapons include macehead, stone hammer axe, antler hammer axe, flint projectile point, copper dagger, obsidian projectile point, antler projectile point. Copper tools include ingot, awl, dagger blade. (Data are from Bognár-Kutzián 1963)

women's burials; copper artifacts occurred in more women's burials (78) than men's (54) (Avramova 1991). Thus, women could likewise be associated with prestige goods.

Mortality, Longevity, Sex Ratios, and Population Composition

The cemeteries that have been investigated by archaeologists have small populations, and therefore it is difficult to demonstrate conclusively various cultural practices, such as infanticide. Sex ratios are most unequal in Lengyel and Tiszapolgár cemeteries. Generally, the Brześć Kujawski, Zengővárkony, and Tiszapolgár-Basatanya cemeteries have yielded more males than females, and it is evident that not all females were buried in these cemeteries (Fig. 8.30).

Sex determination of children's skeletons is difficult and many archaeological reports omit this information. However, the context of a child's burial may help in determining its sex. For example, if the positions of the body or certain artifacts are associated with a particular sex in adult burials, we can hypothesize that at the same site sex differences among children are similarly indicated. As previously mentioned, at the Tiszapolgár-Basatanya I cemetery males were buried on their right sides and the females on their left. Four children's skeletons were lying on their left sides and only six on their right. If these individuals are added to the 36 adults, the sex ratio becomes 42:29, even more unbalanced in favor of males. The greater mortality rate of female children probably reflects differential treatment at birth. At the Tiszapolgár-Basatanya cemetery, the ratios of males to females are unequal in the Tiszapolgár period, but are quite similar in the Bodrogkeresztúr period (Tables 8.5 and 8.6). Even if

Table 8.5 Proportions of each sex by age group at Tiszapolgár-Basatanya I[a]

	Young adult 16–30 years		Adult 31–45 years		Old 46 years		Totals	
	N	(%)	N	(%)	N	(%)	N	(%)
Female	2	5.5	2	5.5	7	19	11	30
Male	13	36	5	14	7	19	25	69
Age group totals	15	41.5	7	19.5	14	38	36	99

[a]Data are from Bognár-Kutzián 1963

Table 8.6 Proportions of each sex by age group at Tiszapolgár-Basatanya II[a]

	Young adult 16–30 years		Adult 31–45 years		Old 46 years		Totals	
	N	(%)	N	(%)	N	(%)	N	(%)
Female	13	18	15	21	6	8	34	47
Male	12	17	13	18	13	18	38	53
Age group totals	25	35	28	39	19	26	72	100

[a]Data are from Bognár-Kutzián 1963

we assume that children's skeletons were positioned by sex, the sex ratio in the Tiszapolgár period is still quite unequal: There are more boys buried than girls (Table 8.7). Bognár-Kutzián (1963) explains the disproportion by suggesting that these people practiced female infanticide. However, as previously mentioned, the data from the Early Neolithic cemeteries in central Europe do not reflect balanced sex ratios.

The lengths of the extended skeletons in the Tiszapolgár-Basatanya cemetery were measured. The male skeletons averaged 170 centimeters in length and the females 160 centimeters. The stature of living individuals was likely several centimeters greater. Out of the 54 individuals assigned to the Tiszapolgár phase, 10 had estimated ages of 50 or more; 14 out of the 82 individuals represented by the Bodrogkeresztúr burials achieved this age. Thus, in the earlier period one had an 18.5% chance of surviving to age 50, while one's chances dropped to 17% in the later period. This indicates very little change. As in the Early Neolithic, few children died between the ages of 11 and 15. The life expectancy of Eneolithic (Copper Age) people was 32 years for men and 28 years for women in Bulgaria (Todorova 1978).

Among the Tiszapolgár people many disabled or diseased adults survived only through the help of their fellows, as is shown by evidence of disease and deformity on the skeletal material. Of course,

Table 8.7 Proportions of children by age group at Tiszapolgár-Basatanya I and II Cemetery[a]

	0–5 years		6–10 years		11–15 years	
	N	(%)	N	(%)	N	(%)
Tiszapolgár period	8	42	9	47	2	11
Bodrogkeresztúr period	3	37.5	4	50	1	12.5

[a]Data are from Bognár-Kutzián 1963

only diseases that left traces on the bones could be analyzed, and due to differential preservation not every skeleton was analyzed for evidence of pathologies (Bognár-Kutzián 1963:392–395). However, evidence for a number of diseases, pathologies, and injuries was found, including paralysis of arms, deformation of skull, plagiocephalism, osteoporosis symmetrica, neurosis of spinal cord (baastrub and arthrosis), fracture of spine, head wounds (crushed skull), brain tumor, stiff spine, scaphocephaly, and arthritis-rheumatism. Fifteen skeletons (8 females, 7 males) from the Bodrogkeresztúr period showed signs of rheumatism. Some individuals with head wounds survived their injuries. Whoever would idealize prehistoric humanity's way of life in the manner of Rousseau should consider this evidence. Not only was life short, but also various pathological miseries hounded men and women, and there was little possibility of relief. It is doubtful that shamans could cure or relieve the pain of many of these diseases. However, we should note that any sample of deceased individuals will show signs of disease and disease stress.

The Iceman or Ötzi

In 1991 the mummified body of a man, called the "Iceman" or "Ötzi," approximately 45 years of age, was exposed in a melting glacier on the Hauslabjoch in the Tyrolean Alps in the Austrian-Italian border area (Barfield 1994, Spindler 1994). Ötzi subsequently became one of the most intensively investigated prehistoric persons in archaeological history (Spindler 1996, Bortenschlager and Oeggl 2000, Fowler 2000, Rollo et al. 2002, Dickson et al. 2003, Müller et al. 2003, Murphy et al. 2003, Ruff et al. 2006, Pernter et al. 2007, Ermini et al. 2008). This rare find, dated 3300–3200 BC, has enriched our knowledge of the Neolithic/Copper Age human condition. Ötzi's entire mitochondrial (mtDNA) genome was even sequenced by Ermini et al. in 2008. The DNA study indicates that Ötzi's maternal lineage has died out or is very rare. However, we should be conscious that one individual does not equal a society's way of life.

He was of relatively short stature, 159 centimeters (5.2 feet) and weighed 61 kilograms (134 pounds) (Ruff et al. 2006). The Iceman was of sturdy build like an Olympic wrestler. His tibia suggests an active lifestyle; he was able to walk long distances over rough terrain (Ruff et al. 2006:98). There are numerous speculations and arguments about his death and his activities in the mountains. According to Oeggl et al. (2000) he was probably involved in transhumance, i.e., driving livestock to higher elevations for summer grazing. Pastures were present in the Alps during the later Neolithic. Others have suggested the Iceman's "occupation" as a shaman, hunter, and/or metal prospector. A. Vanzetti et al. (2010) argue that Ötzi represents a ceremonial burial. Based on insects and flora found on him, he came from a settlement some 20–25 kilometers to the south in the present-day Italy. Bone and dental isotope analyses suggest that he was born within 60 kilometers of the location of his death and that he migrated to a new location during his adult life (Müller et al. 2003). It appears he died in late spring or early summer, "Based on the flowering seasons of the pollen taxa" found in his colon (Oeggl 2000:103). There have been various scenarios proposed for the Iceman's death. He was shot with an arrow since a flint arrowhead was found in his left shoulder, and it is possible that he bled to death in the mountains: "the Iceman's cause of death by an arrowhead lacerating among others a great thoratic artery – the left subclavian artery – and leading to a deadly hemorrhagic shock can be now postulated with almost complete certainty, especially when considering environmental (3210 meters above sea level) and historic (5300 BP) settings into account" (Pernter et al. 2007:1786).

The Iceman had some health problems. The one preserved fingernail revealed three Beau's lines which indicates that Ötzi "had been very ill three times in the last six months of his life" (Dickson et al. 2003:72–76). Eggs of the parasitic whipworm (*Trichuris trichura*) were found in his colon; this can cause diarrhea. He also suffered from the early stages of arthritis. Parts of his body, such as his spine, right knee, ankles, and left calf, were decorated with tattoos. Spindler (1994:169) described how the tattoos were done: "the skin is punctured, scored or cut with a very sharp or pointed instrument. A colored paste is then rubbed into the wounds. The pigment most frequently used is powdered charcoal, stirred up with saliva, or tepid freshwater, which produces the familiar blue tint. As the Iceman's tattoos have decidedly blue coloring, charcoal was probably used to make them." Perhaps the unexposed tattoos on the back and legs were associated with some kind of therapeutic treatment. His teeth were extremely worn; the cause of this abrasion was a cereal diet, the chewing of dried meat, and/or the working of leather. On a positive note, his teeth were free of caries. Furthermore, he had a *diastema*, a 4-millimeter gap between the two first incisors.

Most of the Iceman's clothing, shoes, leggings, a loincloth, an upper garment, and a cap, were made of fur and leather. He also wore a plaited grass cloak. Ötzi carried a number of artifacts: a 6-foot longbow of yew, copper axe, two cylindrical containers made of birch bark, a small flint dagger, an antler point, a quiver of *Capridae* hide containing two broken arrows, and 12 unfinished arrow shafts made of wayfaring tree branches. The source of flint of the dagger was some 150 kilometers to the south, in the Lake Garda area. The Iceman wore a body belt with a pouch which contained three flint artifacts, a bone awl, and a piece of tinder fungus (*Fomes fomentarius*) for starting fire. He also carried on a leather thong two pieces of birch fungus (*Piptoporus betulinus*) (Peintner and Pöder 2000). Based on ethnographic analogy, we can speculate that the birch fungus was used for medical and/or ritual purposes.

What type of diet did the Iceman have? Based on colon content analysis, "The Iceman's last meal, consisting of cereals, vegetables and meat, was well-balanced" (Oeggl 2000:102). DNA analysis by Rollo et al. (2002:12954) of the intestinal content indicates that Ötzi's "last meal was composed of red deer (*Cervus elaphus*) meat, and possibly cereals; this meal has been preceded by another one based on ibex (*Capra ibex*), different species of dicots, and cereals." However, a study of the chemical composition of the hair, i.e., of stable carbon and nitrogen isotope values, indicates a primarily vegetarian diet with very little meat (Macko et al. 1999). Hair can reflect diet from 3 or 4 weeks, i.e., a longer period of time. The Iceman probably ate what was available at the moment; clearly he was not a vegetarian. He consumed bread made of einkorn. The einkorn was not eaten as porridge or gruel, since the small size of the bran indicates a highly processed cereal (Oeggl 2000). Währen's (1995) analyses and experiments suggest that the Neolithic people in Switzerland could produce fine flour for bread making.

Conclusion

We traced continuities and changes in Middle Neolithic/Early Copper Age societies over some 2000 years. Now farmers are found from the Bosphorus to Scandinavia. By the first half of the fourth millennium BC, East Baltic foragers had become aware of Funnel Beaker populations as some evidence is found for the exchange of materials, and presumably information, at Lithuanian and Latvian sites (Rimantienė 1992b, Loze 1988). Middle Neolithic populations continued to practice a mixed-farming economy in most regions of Europe. Many innovations occurred during this period and some of them affected gender relations. The domestication of horses and their use for riding revolutionized human mobility and warfare. Gimbutas (1991) stressed the emphasis on masculine values during the Late Neolithic. It is possible that domesticated horses and wagons pulled by oxen appealed very much to men's psyches, racing, and fighting during the late Middle Neolithic. It does not mean that women could not ride horses, but that horses symbolized men's activities much more.

Megalithic monuments reflect a variety of beliefs, rituals, and the labor of many individuals. It is doubtful that people driven to the task with a whip built megalithic structures. People believed in something that drove them to build monumental architecture. As has happened frequently throughout human history, beliefs changed during the Neolithic and this is reflected in the desecration of older monuments.

There was more competition and conflict between communities as indicated by the number of fortified settlements. Since populations were still small in Europe, it is unlikely that shortages of land played any role in initiating conflicts. Unequal relations developed between some communities. The interaction among Funnel Beaker settlements in southeastern Poland appears to have been hierarchical; the Bronocice settlement may have coordinated various activities among the Funnel Beaker communities in the region.

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Chapter 9
Late Neolithic/Late Copper Age 3500–2200 BC

Sarunas Milisauskas and Janusz Kruk

Introduction

By the beginning of the Late Neolithic/Late Copper Age, most of Europe was occupied by farmers. Only the coniferous and tundra areas of northern Europe remained inhabited by hunters and gatherers. In some areas politically complex societies already existed. However, there is a discontinuity in some aspects of the archaeological record after 3500–3000 years of farming societies in Europe; perhaps this reflects crises or major changes at the end of the "Old Neolithic" or "Old Europe." Over the years archaeologists have concentrated on origin problems: farming, political complexity, or this or that culture. The endings of things have received less attention. In southeastern Europe, for example, anthropomorphic clay figurines disappeared, large settlements were abandoned, many were destroyed by fire, and burial mounds appeared. This affected northern Bulgaria and southern Romania first, around 3800 BC. The shift in the Tripolye culture, i.e., no more big sites, big houses, female figurines, and painted pottery, seems to begin about 3500 BC and is almost complete by 3000–2800 BC. Around 3100 or 3000 BC, most large settlements disappeared in central Europe. How are we to interpret these undoubted changes seen in the archaeological record?

Two major explanations, migrations or locally initiated changes, compete to account for these developments. In Gimbutas's (1991) widely popularized narratives, warlike, male-dominated Late Neolithic cultures destroyed the peaceful, female-centered, goddess-worshipping "Old Europe" of the Early and Middle Neolithic (Shennan 1993). Gimbutas postulated invasions by the pastoralists (called the Kurgan culture by Gimbutas) from the steppes of eastern Europe. Her hypothesis has been criticized by numerous archaeologists (Häusler 1981, Anthony 1986, Whittle 1996). One problem with this explanation is that horse riding is still not well documented in central and western Europe at this time. An alternative explanation involves "economic and technological changes, including exchange networks in combination (or not) with social and settlement changes, such as decentralization of settlement, fission of households, and even growth in the power of males to control joint action of the scattered villages" (Tringham and Conkey 1998:40). Likewise, Bankoff and Winter (1990:175) see "gradual changes over a considerable period of time, rather than necessitating explanations involving unique dramatic events such as migrations or invasions."

There are certainly Late Neolithic/Late Copper Age developments requiring explanation. Some archaeologists argue that the onset of the Late Neolithic coincided with large-scale movements of pastoralist and other ethnic groups in Europe. Therefore, we must discuss such hypothesized migrations of pastoral groups into central, western, and northern Europe. Many scholars, especially Gimbutas

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(1956), have maintained that the Late Neolithic saw not only the influx of pastoralists from the steppes of southern Ukraine but also the appearance of the Indo-European-speaking peoples in various parts of Europe. However, demonstrating prehistoric migrations or even the presence of a pastoral economy, indigenous or immigrant, is not a simple matter. We suggest that the migration hypothesis should be treated with caution. Archaeologists have long speculated about Late Neolithic linguistic and ethnic identities, using the stylistic attributes of pottery and stone tools to differentiate the archaeological cultures, which supposedly coincide with such groups. Gimbutas (1991), for example, equates the Globular Amphora culture with Indo-European speaking peoples. Kilian (1955), Puzinas (1983), Merkevičius (1996), and Rimantienė (1996) associate the Bay Coast (Corded Ware) culture with prehistoric Baltic-speaking populations. How, in general and if at all, do ethnic groups and ethnic differences show up in the archaeological record? After wrestling with the problem for nearly 200 years, archaeologists are no nearer the answer to this question than they ever were. Ethnohistoric data tells us that some or all of diet, domestic architecture, community plans, burials, and yes, pottery, art styles, jewelry, weapons, etc., can be markers of ethnicity. The same data tell us that few or none of these things *need* vary ethnically.

The Late Neolithic/Late Copper Age is associated with two major technological innovations: wooly sheep that produced new materials for clothing and wheeled vehicles (Sherratt 2006, Horváth et al., 2008). Sherratt (2003) argues that these innovations originated in the Near East and spread rapidly along the Danube corridor in Europe. Horváth et al. (2008:455) speculates that these inventions "spread from 2 directions at the same time: from western and east-central Europe (Köninger et al., 2001) and Anatolia through southeast Europe (Uruk expansion: Sherratt 2003), and met somewhere in the Carpathian Basin." Kalicz (1963) and Němejcová-Pavúková (1992) emphasize also the linkage of the lower Danube with Anatolia, thus linking the phenomenon of Uruk and the Boleráz phase (3500–3300 BC) of the Baden culture.

Chronology and Cultural Sequence

Using archaeological material, it is hard to separate the Late Neolithic/Late Copper Age from the Middle Neolithic/Early Copper Age. The Late Neolithic began at different times in various regions in Europe, in central Europe, for example, around 3200 BC. The central European Bronze Age, which succeeded the Late Neolithic, began about 2200 BC. However, the Bronze Age in Greece was already under way during the transalpine European Late Neolithic. Likewise, the Neolithic/Copper Age ended at different times across Europe, around 2500 BC, for example, in southeastern Europe. In the Ukrainian and Russian steppes west of the Urals, the Early Bronze Age begins about 3500/3300 BC.

Archaeologists have defined Late Neolithic/Late Copper Age cultures mainly on the basis of pottery styles. The following are the more important of the archaeological cultures, which fall within the timespan of the Late Neolithic: the southeastern European Late Gumelniţa, Salcuţa, and the Late Tripolye culture of the Ukraine, the central European Corded Ware, Globular Amphora, Bodrogkeresztúr, Baden, late Funnel Beaker, and Bell Beaker cultures. Some scholars regard some of these cultures as Early Bronze Age, especially in southeastern and western Europe. There is considerable variation among these cultures in other archaeological manifestations such as burial practices and settlement systems, variations that are very difficult to explain. During the Late Neolithic we also find large ceramic style zones in Europe. The Corded Ware, Globular Amphora, Baden and Bell Beaker cultures may be regarded as such style zones. There is nothing particularly new about style zones in the European Neolithic. The Early Neolithic Linear Pottery culture and the Middle Neolithic Lengyel culture also can be regarded as artifact style zones. However, the Corded Ware and Bell Beaker zones were larger than anything in the earlier prehistory, except the Linear Pottery, and that was the product of first farmer pioneer immigration. Since that is not a possible explanation for the Late Neolithic, it is a new development.

The Globular Amphora, Corded Ware, and Baden cultures or ceramic style zones dominate the central and eastern European Late Neolithic. The first two have yielded scanty economic and settlement data; Hodder (1990:175) appropriately describes their archaeological record as "almost pure burial archaeology."

In discussing Late Neolithic developments, our emphasis is on the Corded Ware, Globular Amphora, and Baden cultures, since they are frequently cited as examples for a migrationist interpretation of culture change. The Corded Ware culture is also called Battle-Axe, or Kurgan, culture.

Baden culture sites occur in Hungary, northwestern Romania, Slovakia, the Czech Republic, eastern Austria, and southern Poland and they date between 3500 and 2800 BC (Horváth et al., 2008) (Fig. 9.1). The earliest phase is called Boleráz and is dated 3500–3300 BC. Sherratt (2006) noted that the first occurrence of wool-bearing sheep and wheeled vehicles coincides with the appearance of the Baden culture. He emphasized that "The Baden culture thus marks one of the major transformations in European prehistory – even if the origin of some of its critical features is to be found outside Europe, and indeed can be traced back beyond to the areas which saw the beginnings of writing and city-life," (Sherratt 2003:425). Recently, Furholt (2008) argued that Baden culture does not exist; only the early Baden ceramic style spreads over parts of central and southeastern Europe.

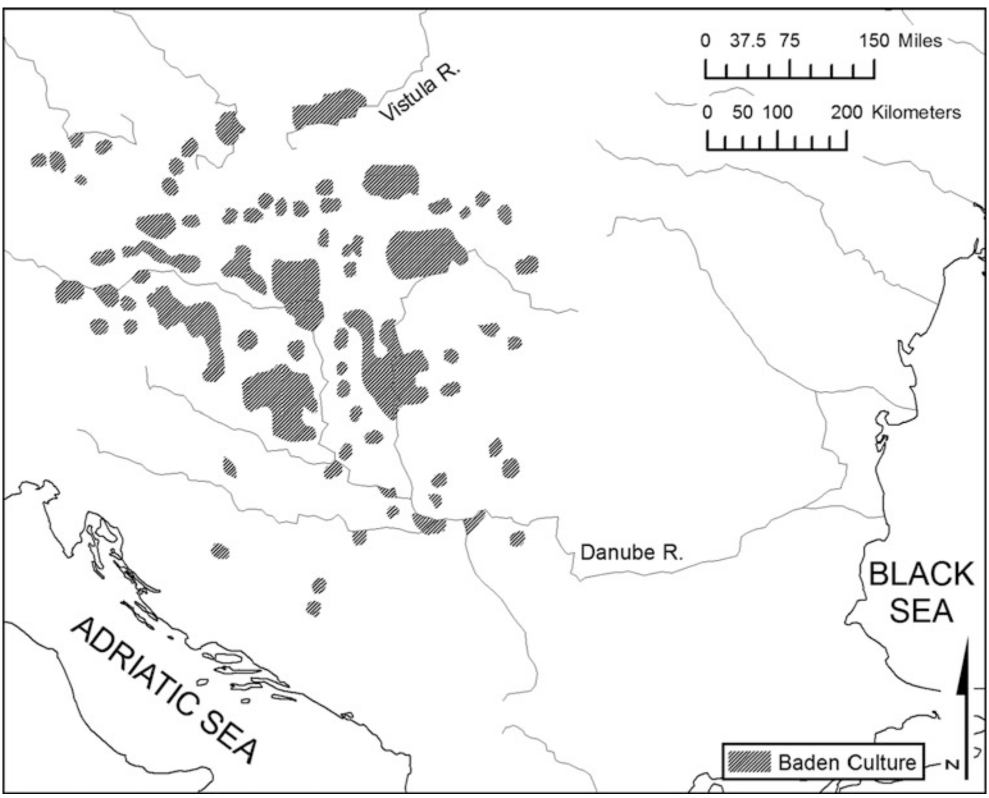

Fig. 9.1 Distribution of Baden culture sites (After Sochacki 1970)

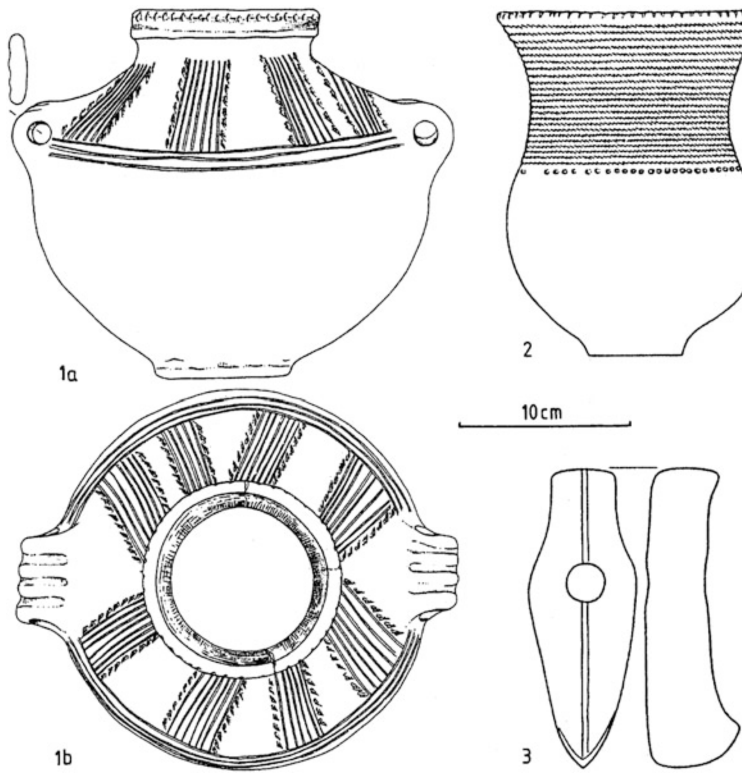

Fig. 9.2 Corded Ware artifacts: *1a*, *1b*, Type A amphora (Krbice, Czech Republic); *2*, Type A beaker (Goleniów Zdzary, Poland); and Type A axe (Lutomiersk, Poland) (After Machnik 1979, Smrž and Buchvaldek 1998)

The Corded Ware culture is one of the most widely distributed of the Late Neolithic. Its earliest, pan-European horizon (3100–3000 BC), is defined by Type A axes, Type A amphorae, and Type A beakers, found in mound burials (Fig. 9.2). This horizon's existence has been questioned over the last 20 years. Behrens (1994, 1997) argues the term should be limited to Denmark, where it was first defined by Glob (1944).

This culture extended from the Rhine to the Upper Volga River, from Finland to the Alps and the Carpathians. It includes many local cultures such as the Swiss and Saxon-Thuringian, Single Grave culture, the Swedish Boat-Axe, the Finnish, and East Baltic Bay Coast (*Rzucewo, Haffküste*) culture, and the southeastern Polish and Middle Dnepr, Fatianovo culture (Fig. 9.3). The entire complex occupied mostly the northern part of the deciduous forest zone.

Around 2900–2800 BC the earliest Corded Ware pottery and burials appeared in the Carpathian foothills (southeastern Poland), suggesting to some the intrusion of a new people into those regions (Machnik 1979). Similar developments are noted by Rimantienė (1992a, 1996) in the East Baltic area, and by Kristiansen (1989) in Denmark.

Since mounds, cord-ornamented pottery, battle axes, and red ocher in burials occur in the Pit-Grave (Yamnaya) culture of the southern Ukraine and Russian steppes and the Corded Ware culture, some archaeologists believe the latter were immigrant descendants from the former. However, this hypothesis has some problems. Corded Ware finds appeared around 2800 BC in western Europe. If we accept the migration hypothesis, we must allow that Pit-Grave culture populations moved before 2800 BC into central Europe from the steppe region of the southern Ukraine. Some Corded Ware traits are

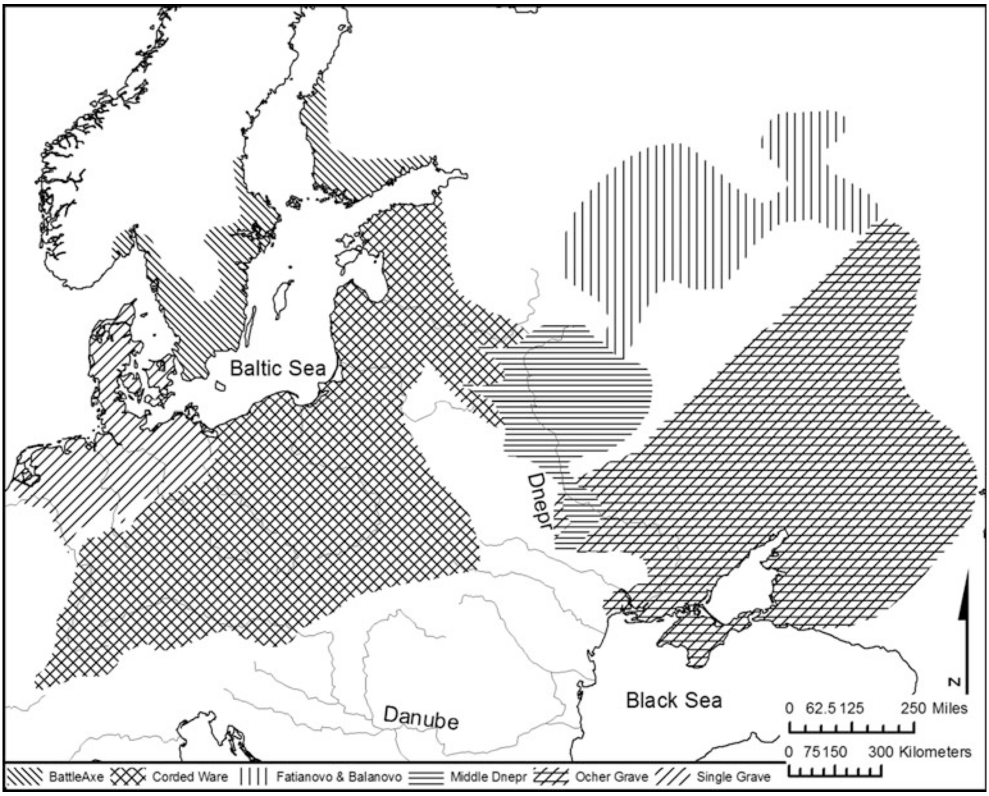

Fig. 9.3 Corded Ware groups and related cultures

found in the other Neolithic cultures of central and eastern Europe. Cord ornamented pottery is found on Funnel Beaker, Globular Amphora, Comb-and-Pit Ornamented Pottery sites, and Funnel Beaker sites often yield battle-axes. It is difficult to establish from the available archaeological evidence the route by which Pit-Grave populations could have migrated into central Europe before 2900 BC. The most likely route would have been from Romania through the Carpathian Mountains into central Europe. There are graves in Romanian Moldavia and southeastern Hungary which are similar to those occurring around the Black Sea. At Baia-Hamangia in Romania, graves containing burials adorned with red ocher have been dated around 2600 BC (Quita and Kohl 1969). This might indicate the expansion of steppe peoples from the Ukraine into southeastern and central Europe, although red ocher occurs so frequently in prehistoric ritual contexts that it is difficult to base any argument of population movement solely on its presence.

The Bodrogkeresztúr, Funnel Beaker, and other Neolithic cultures were present in central Europe before 3100 BC. If we accept Neustupný's (1969) view that, in the Czech Republic anyway, the Corded Ware culture had a subsistence strategy based on agriculture, then migration probably cannot be invoked to explain its appearance in some areas of central Europe. It is possible that different ethnic groups exploited the same region at different periods, but archaeologists cannot usually distinguish ethnic differences on the basis of their material remains alone. It would be easier to recognize such groups if they had different subsistence strategies. If Corded Ware represents a pastoral way of life, it could represent newcomers to central Europe who migrated from the east along the Carpathians. We know that in historic times pastoral groups have moved back and forth through the Carpathians and Balkan ranges.

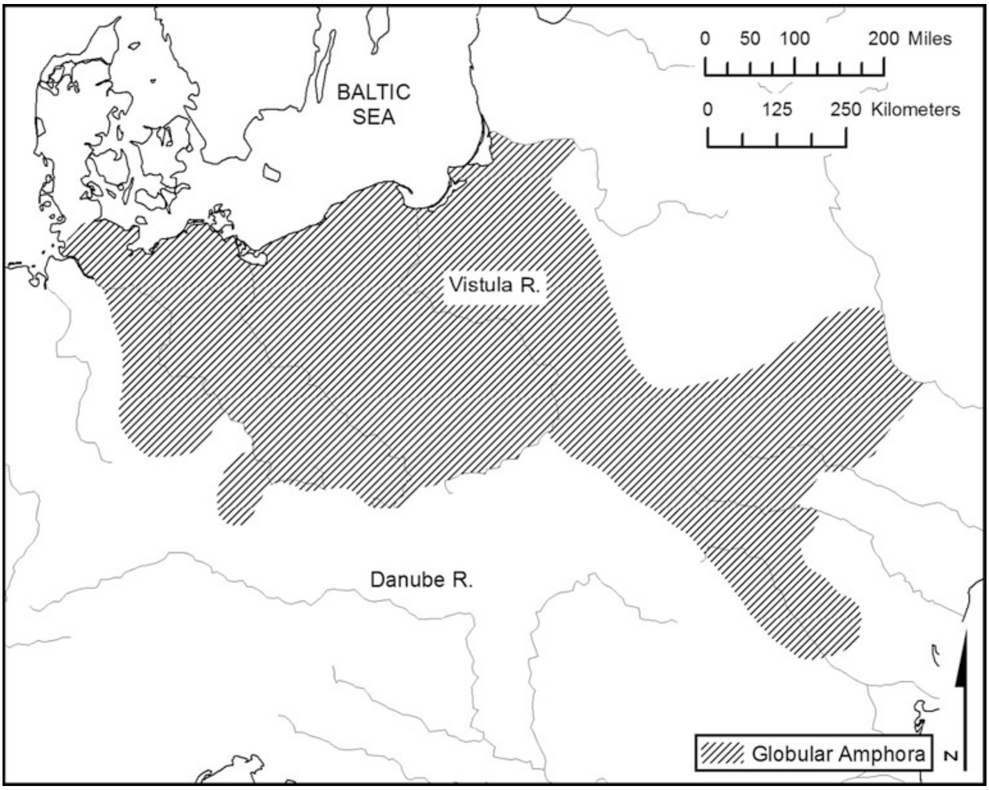

Fig. 9.4 Distribution of Globular Amphora culture sites (After Wiślański 1970)

Another question worth asking is what would have caused Pit-Grave peoples to migrate into central Europe. We know that in historic times, pressure from one set of pastoralists on another often triggered a chain reaction of migrations that eventually affected Europe. For example, in Asia, group A would press against group B, which, in turn, would press against group C, etc., which eventually would affect the groups living in Europe. But it is very difficult to demonstrate that any Late Neolithic society in Asia or Europe had such a military advantage over its neighbors that it could have forced them to migrate. Thus, even if we postulate a pastoral economy for the Corded Ware culture, it does not mean that it originated in the steppe region.

The Corded Ware, Globular Amphora (Fig. 9.4), and Baden style zones overlap in some regions. One explanation is that there were three different peoples, with different subsistence strategies occupying the same region. However, as Machnik (1970) has demonstrated, only the Corded Ware Early Phase overlaps with the Globular Amphora culture. Machnik has also noted that in areas where there are many Globular Amphora sites, there are few Corded Ware sites, and vice versa. For example, there is a great concentration of Globular Amphora sites along the Warta, Middle Vistula, and Bug rivers, while the Corded Ware culture finds are rare in those areas. In the Upper Dnestr and San drainages, there are large numbers of Corded Ware finds. In some areas, Late Corded Ware overlaps with the Comb-and-Pit Ornamented Pottery culture and the Bell Beaker phenomenon.

The Late Neolithic/Early Bronze Age Bell Beaker phenomenon is found in western, central and west Mediterranean Europe, 2900/2800–2000/1900 BC (Fig. 9.5) (Harrison 1980, Czebreszuk 2004). It appeared in central Europe around 2500/2400 BC. Nicolis (2001) and Czebreszuk and Szmyt (2003) publications contain numerous articles about the various aspects of the Bell Beaker phenomenon. As

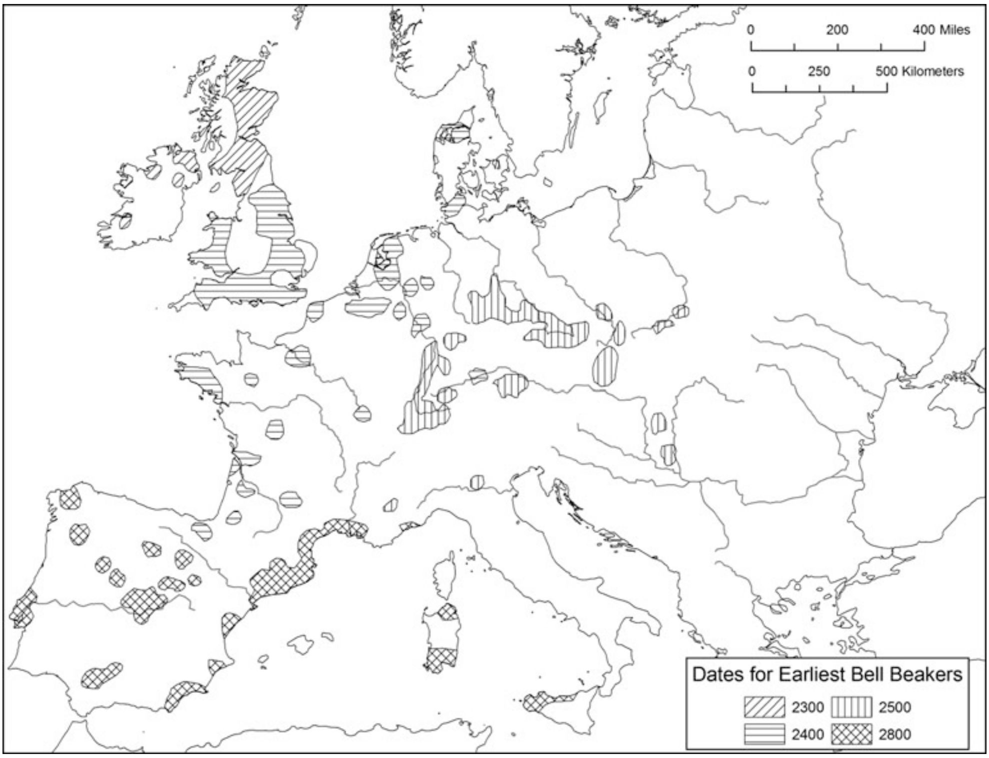

Fig. 9.5 Distribution of Bell Beaker culture sites (After Kamieńska and Kulczycka-Leciejewiczowa 1970, with modifications)

is the case with some other Late Neolithic cultures, most of our evidence for Bell Beakers comes from burials. In the past, the Iberian Peninsula was favored as its area of origin. Chronology tends to support this hypothesis, since the earliest radiocarbon dates around 2800 BC occur in Iberia, southern France, and northern Italy. Chronological data also indicates that the Bell Beaker phenomenon spread from the southwest toward the northeast. Today some archaeologists tend to prefer local origins for the Bell Beaker phenomenon. However, the Bell Beaker burials around Stonehenge in England indicate some migration. "On the basis of isotope testing of the man's teeth" from a burial at Amesbury, "archaeologists concluded that he had spent his youth in the Alpine regions, while his son, buried nearby, was a native Briton" (Czebreszuk 2004:483).

Bell Beaker male burials usually contain a bell-shaped beaker, copper dagger, wrist guard, v-perforated button, and a flint knife. They contributed to the development and spread of metallurgy in Europe. Bell Beaker peoples used simple casting methods to produce copper daggers, flat axe heads, and halberds. Archery must have played an important role in hunting, fighting, and "sports" of the Bell Beakers. Flint arrowheads, archer's wrist guards, and shaft straighteners for polishing the arrow shafts form the archery set in male burials. Furthermore, models of bows made of bone and antler have been found in central Europe.

Various hypotheses have been proposed to explain the Bell Beaker distribution. Childe (1957) argued that nomadic communities of merchants, warriors, or prospectors for metals were responsible for this manifestation. The historically known example of the Roma of Medieval Europe reminds us that it is indeed possible that nonpastoral nomadic groups, practicing some economic or technological specialization, existed in Europe during the Late Neolithic. However, since archaeologists cannot yet demonstrate ethnic variability from material culture alone, and since little is known about Bell Beaker subsistence and settlement systems, interpretations of their way of life must remain speculative. J. Shennan (1977) interprets the Bell Beaker artifact assemblages in terms of a pan-regional system of prestige competition between emerging elites, expressed visibly in the types of mugs they used in public feasts and in certain preferred weapons. The elites were local, but the system of competition was not.

The Late Neolithic cultural-historical picture is further complicated by the occurrence of the Comb-and-Pit Ornamented Pottery (North Eurasian or Proto-Ugro-Finnish) culture in Poland, Finland, the Kaliningrad district of Russia, in Lithuania, Latvia, Estonia, and northern Russia; this overlaps with Corded Ware in some areas. Sites of this culture are found near lakes, rivers, or on sand dunes, from which pottery, flint, and stone artifacts have been recovered. Many archaeologists believe that these people practiced a hunting, fishing, and gathering way of life, because no bones of domesticated animals have yet been recovered. However, some of their potsherds show imprints of domesticated grains.

The Globular Amphora culture, named for its most characteristic vessel form, is another important Late Neolithic manifestation in central Europe and parts of eastern Europe. It is found in the Elbe, Odra (Oder), Vistula, Upper Siret, Upper Prut, and Upper Dnestr basins and extends up to the Middle Dnepr basin (Fig. 9.4). Both ornamented and unornamented vessels have been found, their motifs can be stamped, cord impressed, or incised. The frequency of cord-impressions increases through time (Wiślański 1966, 1969, 1970). Since some Globular Amphora burials are of the passage grave type, the culture is sometimes considered to be connected with “megalithic cultures,” of western Europe.

Traditional assumptions about the Corded Ware and Globular Amphora cultures may be wrong. Different ceramic styles may not represent different ethnic groups at all, but may reflect some other cultural variation along some other dimension. The presence of different archaeological cultures in central and eastern Europe during the Late Neolithic is difficult to explain, and one way of making some sense out of the data is to try to correlate artifact styles with ecological niches, human adaptations, and subsistence practices. Much has been written about the pastoral ways of life of supposed Corded Ware and Globular Amphora peoples. Such hypotheses, while attractive, rest on slender bodies of archaeological evidence.

The Appearance of Wheeled Vehicles

The appearance of wheeled vehicles in Europe between 3500 and 3000 BC was a major socioeconomic development (Bakker et al., 1999, Sherratt 2006) (Fig. 9.6). Recently, three volumes devoted to wagons and animal traction were published, including numerous articles by various specialists (Köninger et al., 2002, Fansa and Burmeister 2004, Pétrequin et al., 2006). The earliest types are four-wheeled wagons, but by the end of the fourth millennium BC, two-wheelers appeared. It seems that wheeled vehicles appeared more or less simultaneously in the Near East and Europe. Some archaeologists (i.e. Childe 1951, Piggott 1983, Sherratt 1997) have argued for the diffusion of wheeled vehicles from the Near East to Europe, while others such as Häusler (1992) and Vosteen (1999b) have stressed their local development. However, Bakker et al. (1999:787) suggest “That wheeled vehicles were invented independently at about the same time in Europe and the Near East is improbable. Their complex construction, which remained in use for ages in relatively little changed form, and comparable technological solutions in both areas suggest a connection, as does the proximity in time and place.” It is possible that wheeled vehicles originated in the Near East and later diffused to Europe. Maran (2004) speculates that the invention of wagons occurred in an area north of the Black Sea. There are arguments about the function of the earliest wagons. According to Sherratt (1996:163) they

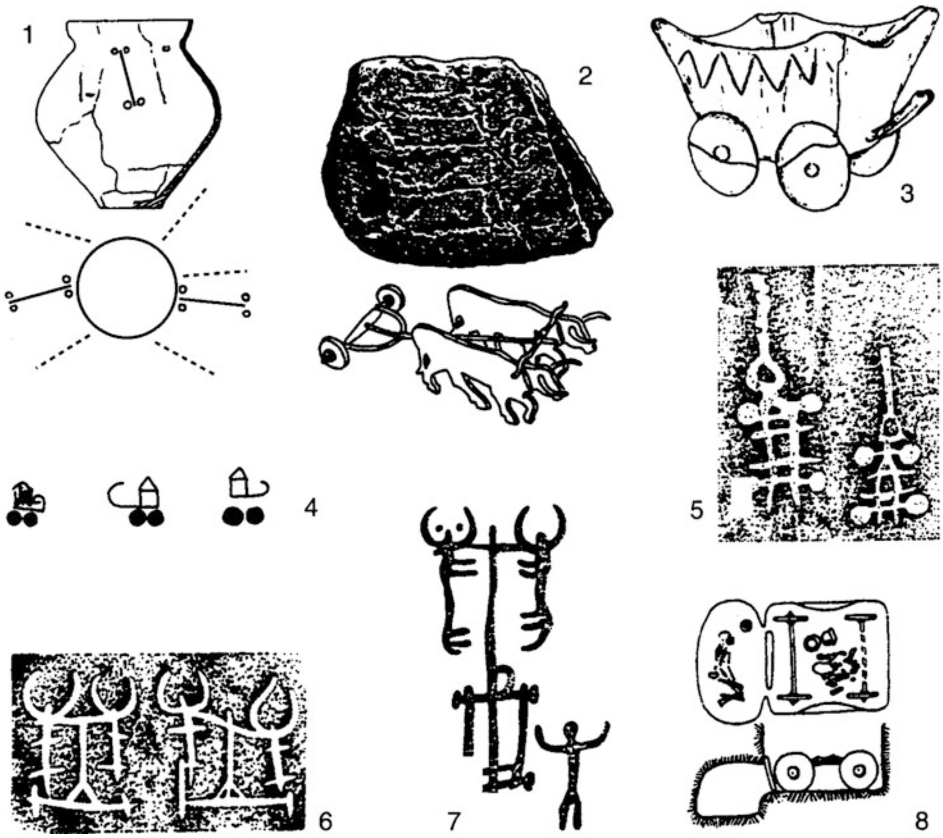

Fig. 9.6 The earliest evidence for usage of wheeled vehicles (After Kruk and Milisauskas 1999). *1* – Funnel Beaker vessel from Ostrowiec Świętokrzyski, Poland (After Uzarowiczowa 1975); *2* – sandstone tablet found in a megalithic burial mound at Züschen, Germany (After Kühn 1935), reconstruction of yoked oxen (After Evers 1988); *3* – cup in the form of wagon from a Baden culture cemetery at Budákalasz, Hungary (After Foltiny 1959); *4* – pictographs from Uruk IV, Iraq (After Piggott 1968); *5* – Bronze Age engraving from Smedtorpet, Sweden (After Evers 1988); *6* – Late Neolithic or Bronze Age engraving from Melitopol, Ukraine (After Evers 1988); *7* – Bronze Age engraving from Uchtasar, Armenia (After Evers 1988); *8* – wagon burial in a catacomb grave at Tri Brata, Eliste, Kalmyk steppes on the lower Volga, dated to the second millenium BC (After Sinicyn 1948)

were initially associated with elites. Vosteen (1999a) considers their purpose to have been ritual or religious; everyday use, if any, would have been secondary.

Most of our data on wagons come from central, eastern, and northern Europe (Piggott 1983, Höneisen 1989, Bakker 2004, Bondár 2004, Burmeister 2004, Schlichtherle 2004, Čufar et al. 2010). The earliest evidence for four-wheeled vehicles in Europe occurs at Flintbek in northern Germany and at Bronocice in southern Poland and dates to about 3500–3400 BC (Zich 1993, Milisauskas and Kruk 1982). Maran (1998) notes that the earliest cattle burials likewise appear around the same time suggesting a relationship between wagons and cattle. Wheels have been found under the burial mounds of the Pit-Grave (Yamnaya) and Catacomb-Grave cultures in the steppes around the Dnepr, Don, and Lower Volga, and are dated to the latter part of the third millennium BC (Sinicyn 1948, Häusler 1985, 1992). "Solid-wheeled wagons and carts, probably pulled by oxen, appeared in steppe wagon graves" of the Yamnaya culture by about 3100–3000 BC (Anthony 1995:561). Anthony (1995:561) points out that "Wagons provided the bulk transport for tents, food and supplies that for the first time freed herders from logistical dependence on river valleys and permitted them to move deep into the steppes with their herds for an entire season." Late Neolithic solid wood wheels have been found in the Netherlands, northern Germany, Denmark, Switzerland and other countries. Most of them are dated after 3000 BC. The Corded Ware Zürich-Pressehaus find in Switzerland, for example, is dated to 2710–2690 BC (Ruoff 1978, Ruoff and Jacomet 2002, Schlichtherle 2004).

A 20-meter long cart-track was found under a Funnel Beaker elongated mound at Flintbek, consisting of two parallel wheel-ruts and "a single shorter wheel-rut parallel to them. Each wheel-rut was 5–6 centimeter wide and the gauge of the wagons must have been 1:10–1:20 meter. The 'wavy' bottom of the longitudinal sections points to wheel impressions, and not to track marks of sledges" (Bakker et al., 1999:783).

A vessel incised with wagon motifs was found in a late Funnel Beaker pit at Bronocice (Milisauskas and Kruk 1982, Bakker et al., 1999). It is 10.5 centimeters high and is incised with designs representing four symbolic themes (Fig. 9.7). The wagon motif appears five times around the vessel. In addition, there are incisions, which may represent trees, fields, and water. The motifs probably represent the everyday activities and beliefs of a Funnel Beaker community. Günther (1990) and Pollex (1999) see a more religious symbolism in the incised motifs. One of the motifs may represent a sun symbol; supposedly the "sun wagon" was pulled by cattle. Likewise, Malecki (1995) emphasizes the

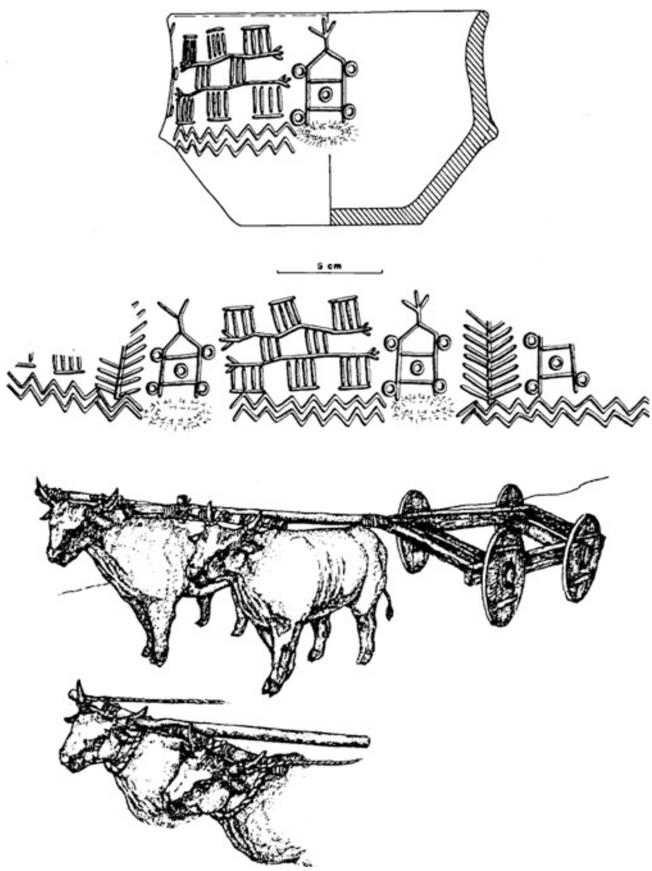

Fig. 9.7 Motifs inscribed on the Bronocice vessel (*top*) and reconstructed illustration of oxen pulling a wagon (*bottom*)

religious and astronomic function of the incised motifs. Some of the motifs on Neolithic (Copper Age) carvings on the rocks at Val Camonica in Italy are similar to those on the Bronocice vessel. A bovine long bone in the same level of the pit which yielded the vessel has been radiocarbon dated to 2775 ± 50 bc; 3400 BC (GrN-19612), some 200 years earlier than the Late Uruk pictographs of carts from the Near East.

There is more evidence for wheeled vehicles from the central European Late Neolithic/Late Copper Age. Models of clay wagons belonging to the Baden culture have been found at Budakalász and Szigetszentmárton, Hungary (Banner 1956, Kalicz 1976), and a wagon-shaped pottery vessel from Radošina, Slovakia has been dated to the Late Neolithic (Němejcová-Pavúková 1973).

Bronocice also yielded the impression of a cord on a bovine horncore dated around 2900–2700 BC (Milisauskas and Kruk 1991). The part of horncore where the cord was tied was 6.5 centimeters in diameter. This suggests that oxen were used for pulling plows and wagons, since they made up approximately 20–25% of the cattle recovered from that site. Oxen were already being castrated in the Early Neolithic and their use as Middle Neolithic draft animals should cause no surprise (Ghetie and Mateesco 1973, Döhle 1994). They can be utilized for work at three or four years of age (Higham 1968:87). Ox-carts are slow, traveling at no more than 2 kilometers per hour (Evers 1988). Bogucki (1993) argued that cattle were used for pulling logs and firewood for households since the Early Neolithic.

Wool Production

Dating the first use of sheep for wool production is not easy for Neolithic Europe. Wool-producing sheep were present in the Near East by the sixth millennium BC (Bökönyi 1976). Only specific breeds of sheep produce wool, and Early Neolithic European sheep based on skeletal evidence are assumed to have been non-wool-bearing types. Some scholars suggest that wool-bearing sheep were introduced into Europe during the Late Neolithic (Benecke 1994). However all sheep breeds have an undercoat of wool which can produce small quantities of wool. The gradual development of a wool coat at the expense of the outer hairs or kemp resulted in wool-fleeced breeds (Ryder 1983:16–17). Recent mtDNA studies reveal that European and Asian sheep breeds have complex genetic histories due to significant gene flow in ancient times (Meadows et al., 2005, Tapio et al., 2006). When archaeologists discuss wool production, they are generally looking for some large-scale textile-related enterprises. But sheep fleeces may first have been used for felting, not fiber production (Hurcombe 2008).

Wool has been identified in the Caucasus in the later fourth millennium BC (Shishlina et al., 2003). In western Europe, the earliest evidence for wool is the carbonized wool from Clairvaux-les-Lacs around 3000–2900 BC. Schibler (2004) suggests that there is an increase in sheep and goats in Corded Ware settlements in Switzerland around 2800 BC. "This result coincides with an increase of the mean size of the sheep and a higher proportion of animals that were slaughtered at an older age (Hüster-Plogman and Schibler 1997:81–3). During the same period buttons and needles made from bone and antler were found for the first time" (Schibler 2004:153). He concludes that this evidence reflects the presence of wooly sheep and the use of wool for textile production.

There is indirect evidence for wool production at Bronocice in Poland. The occurrence of numerous spindle whorls, loom weights, and spools indicate some sort of textile production. The number of such artifacts increases through time. Only 0.48 textile artifacts per pit occur during phase 1 (3800 BC). There is an increase to 1.6 artifacts per pit by phase 4 and to 3 artifacts per pit during phase 6 (2900 BC). The increase may be associated with wool production from sheep flocks.

Types of spindle whorls may indicate their use in wool production (Rast-Eicher 1997). The data from the Swiss Neolithic sites along Zürich Lake indicate that conical spindle whorls were used for flax, while flat and narrow ones were used for wool. At Bronocice, both types occur. In Late Neolithic times Bronocice's sheep may have supplied the local community's woolen needs, though the amount of wool produced per sheep was probably small, since primitive sheep usually do not grow more than a kilogram of wool (Ryder 1983:96).

Subsistence Strategies

As previously discussed, it is not easy to interpret archaeological data about the subsistence strategies of various Neolithic/Copper Age societies. This is especially true of the Late Neolithic, for we have very little data about its economy in some regions of Europe. There are some differences in the archaeological data on subsistence strategies among different sites and regions, but the causes of such variation have yet to be explained. To some extent, this variability may be associated with ecological zones. There is a geographic dimension; animal remains from Pit-Grave sites in the Ukraine and Russia may reflect adaptation to a steppe environment. Other differences are not so easy to interpret. Major changes in subsistence practices begin to occur in the Late Middle Neolithic and continue into the Late Neolithic in some regions. Intensive exploitation of uplands, where many Late Neolithic settlements are located, begins around 4000 BC in central Europe. The majority of Funnel Beaker-Baden sites in the Bronocice region were upland settlements. Large areas of forest were cleared, probably by fire, and there was a marked increase in silt deposition, probably from the resulting soil erosion. For example, by the onset of the Late Neolithic the Bronocice region had become a forest-steppe environment. These anthropogenic changes may have been caused by and may well have encouraged the more widespread herding of domestic animals. Thus, Late Neolithic subsistence behavior should be seen as a modification of earlier practice and not as innovation marking a complete break with the past. Central European societies seem now to have been more committed to the herding of domestic animals.

Data from the Pit-Grave site of Mikhailovska show that cattle and sheep/goat were the two most important animals in its steppe-adapted ecology, while the pig played an insignificant role (Tsalkin 1970). The large number of cattle and sheep/goat at Mikhailovska may indicate the practice of pastoralism. However, it is more likely that this bias represents the adaptations of a mixed farming way of life to steppe ecological zones; indeed, cattle and sheep/goat are usually the dominant animals at many sites located within the steppes. Cultivated millet, wheat, and barley impressions have been found in Pit-Grave pottery in graves in Ukraine. Pigs require shade and tend to thrive in a forested habitat. Mikhailovska also yielded numerous horse remains. As mentioned earlier, horses are also abundant on Middle and Late Tripolyean sites. The association between the ecological zone and the type of animals present is also found at Gumelniţa sites in the steppe zone of the Lower Dnestr and Southern Bug basins in the Ukraine and Moldova. The frequencies of sheep-goat are the same as, or greater than, those of cattle, while the frequencies of red deer and wild pig, which are forest animals, are relatively low. Again, it should be emphasized that the Gumelniţa culture spans the Middle and Late Neolithic. Different phases of this culture can be used to illustrate subsistence and settlement organization for the Middle and/or Late Neolithic.

It has already been noted that some Middle Neolithic domesticated plant assemblages showed an increase in the proportion of barley remains. The same is true for some Late Neolithic assemblages. As near as can be established, the cultivation of bread wheat also became more prevalent at this time.

Although it is often assumed that the transition to the Late Neolithic is marked by the appearance of pastoral peoples in some regions of Europe, this hypothesis is difficult to demonstrate with archaeological data. Krader (1959) defines pastoral societies as those which depend chiefly on herds of domesticated animals for subsistence. Many archaeologists consider nomadic pastoralism and sedentary agriculture to be two mutually exclusive subsistence strategies. But pastoralists need not be nomads: "pastoral movements can be classified on a scale from stationary to transhumant to nomadic" (Prescott 1995:165). We know that pastoralism involves livestock rearing and some degree of seasonal mobility, but we do not yet know enough about the possible range of variation in Late Neolithic subsistence practices. Certainly, ethnographically known pastoralists display a considerable range of variation in this respect; herders may inhabit villages part of the year, cultivate crops, or hire themselves out to work for members of their own or another ethnic group. They may themselves produce the fodder needed during the winter, or purchase, or otherwise extract it from the sedentary farmers with whom they come into contact (Dyson-Hudson 1972). The traditional archaeological picture of groups of pure pastoralists displacing groups of pure farmers is a naïve oversimplification. Even if the Late Neolithic practice of pastoralism could be demonstrated, it would be far from any detailed description of that subsistence strategy. One would need to know the variety and number of animals herded. This depends not only on the size of the group and the availability of pastures, but also on various social and economic needs such as land, fodder, and food, as well as rituals, ceremonies, and the prestige arising from interrelationships with local and nonlocal groups. It would be helpful to know the degree of dependence on livestock and the alternative possibilities for resource exploitation such as agriculture, hunting, fishing, or even warfare. At present, little can be said about these matters.

First, we examine the subsistence strategies of the Corded Ware and Globular Amphora peoples. We try to infer Corded Ware subsistence strategies from burial data, though this admittedly is poor. Relative species frequencies represented by bone artifacts and animal remains suggest the Corded Ware use of cattle, sheep/goats, pigs, and horses, in that order of importance. Cattle and sheep could have been pastured during the spring, summer, and fall, but would need to be stalled and fed during central European winters. Thus we suggest that only seasonal, or transhumant, movements of flocks and herds were possible. The use of pigs suggests that the Corded Ware peoples were not nomadic, but at least semi-sedentary animal herders.

Thus, the hypothesis of Corded Ware pastoralism remains undemonstrated. As yet, there is little archaeological evidence that the peoples responsible for the Corded Ware archaeological record were pastoralists in Krader's (1959) sense. To many archaeologists, the paucity of settlement and domestic architectural data for this culture suggests that they were nomads, or at least practiced transhumance. One can raise a number of questions. Was Corded Ware architecture so flimsy? Were particular occupations of small size and/or short duration?

Kadrow (1994) suggests that the early Corded Ware populations practiced pastoralism in southeastern Poland. Around 2600–2500 BC, Funnel Beaker-Baden farmers were disappearing, and thus later Corded Ware groups incorporated farming in their subsistence strategy. Pastoralists could not survive "without access to agricultural products" (Kadrow 1994:74). Brazaitis (2005) pointed out that Lithuania was heavily forested, thus it would have been possible only in limited areas to practice pastoralism.

Neustupný (1969) has argued that the Corded Ware peoples in central Europe depended on farming for subsistence. Plow marks have been found under some Corded Ware mounds; sickle blades occur in some burials, as do domesticated animal remains. Cereal imprints occur in some Corded Ware pots. It is possible that various regional Corded Ware groups differed in their subsistence adaptations. Malmer (1962), Strahm (1971), Czebreszuk (2004), and Schibler (2004) have noted that this culture is associated with agriculture in Switzerland, southwest Germany, and Sweden. Strahm (1971) has maintained that the Corded Ware subsistence strategy in Switzerland was based on agriculture, since the archaeological material of that culture occurs in villages located on the edge of lakes. Clearly, the Alpine Corded Ware peoples exploited a different ecological niche. Malmer (1962, 1969) has argued that the Swedish Corded Ware culture was also agricultural. He found 58 settlements and 244 burial mounds of the Corded Ware culture in Sweden; however, it is unclear if the settlements were permanent villages, occupied year round. It is very interesting that in Scania, southern Sweden, the heaviest concentration of Corded Ware material occurs in the same areas where most of the Scanian Funnel Beaker burials and settlements have been found. Here, at least, Corded Ware groups occupied terrain and utilized soil similar to those of their Funnel Beaker predecessors, and were likely farmers themselves. The Swedish Corded Ware communities appear to have been the descendants of local Funnel Beaker groups and not immigrants. Much of our evidence for Corded Ware plant utilization comes from cereal imprints found on pottery. Mathias and Schultze-Motel (1971) analyzed 125 pots for plant remains from eastern Germany and found imprints of barley, emmer wheat, einkorn wheat, and oats.

The Bay Coast (*Rzucewo*, *Haffküste*) local group of the Corded Ware culture occurs along the Baltic coast of northeastern Poland, the Kaliningrad (called Königsberg prior to World War II) district of Russia, and Lithuania (Fig. 9.8). These people appear to have subsisted to a great extent on maritime fishing and sea-mammal hunting. At Šventoji in Lithuania harbor seal (*Phoca vitulina*), ringed seal (*Phoca hispida*), gray seal (*Halychoerus grypus*), and harp seal (*Pagophylus groenlandicus*) were hunted (Daugnora 2000). At Rzucewo, the remains of over 100 seals were recovered, as well as those of other wild and domesticated animals (Niezabitowski 1933). This suggests that archaeologists should study the adaptations of the Corded Ware people in the different ecological zones. It is unrealistic to expect a similar adaptation in the coastal areas of the Baltic Sea and the loess uplands of southeastern Poland and the northwestern Ukraine.

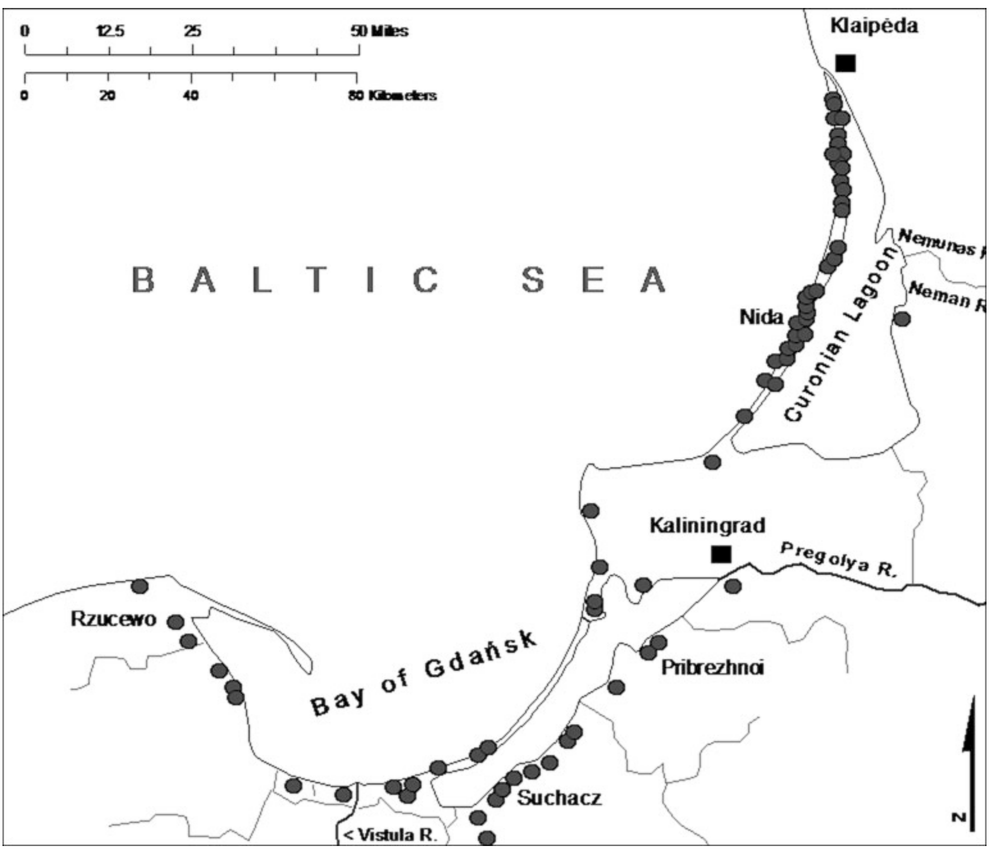

Fig. 9.8 Distribution of Bay Coast Culture sites (After Tetzlaff 1970, with modifications)

As in the case with most central European Late Neolithic cultures, there is little information available concerning subsistence practices of the Globular Amphora peoples. Some graves have yielded sickle blades, and the remains of wheat, barley, and pulses (leguminous plants) that have been found in baked clay objects. Burials often contain the remains of cattle and pig, the latter usually represented by their lower jaw bones. Occasionally, there were apparently deliberate interments of whole cattle. Sheep-goat appears to have been of less importance.

The users of Globular Amphora pottery mined banded flint at Krzemionki Opatowskie in Poland. Exploitation extended over an area 4 kilometers in length and 30–1220 meters in width (Balcer and Kowalski 1978, Borkowski et al., 1989) involving approximately 1000 mine shafts, 4–11 meters deep. Mining tools, such as antler picks and stone hammers, were found in the mine area. Numerous axe rough-outs or semi-finished pieces were traded from this site. The production facilities, and the axes and chisels produced there, indicate the skill with which this exploitation was carried out. According to Lech (1991:569), "The absence of wear traces, the careful polishing and the fact that they were frequently placed in megalithic graves indicate that they were not tools, but weapons and symbols of prestige." Banded flint axes were exchanged as far away as 600 kilometers from Krzemionki. It is noteworthy that the earlier Funnel Beaker exchange systems carried such goods no further than 180 kilometers.

Cattle and sheep/goat predominate on Baden sites, although there are many remains of wild animals at some sites. The consumption of alcoholic drinks is associated with the northward spread of the Baden culture, and numerous handled jugs and cups have been found on Baden sites (Sherratt 1997).

The animal remains from the Bell Beaker site Csepel-Háros in Hungary and Liptice II in the Czech Republic should be mentioned. The horse dominated the faunal remains at Csepel-Háros and cattle at Liptice II. One should be cautious in drawing conclusions from these two sites concerning the adaptations of all Bell Beaker peoples.

Settlement Organization

Late Neolithic/Late Copper Age settlement data comes from many sites, but it is not easy to reconstruct the settlement systems of all regions in Europe. Since some Middle Neolithic cultures such as Tripolye, Gumelniţa, and Funnel Beaker continue into the Late Neolithic, it can be assumed that there was continuity in their settlement systems. However, as previously mentioned, large settlements disappear in some regions around 3500–3000 BC. The Mediterranean region has more Late Neolithic settlement data than central or northern Europe.

Late phase Gumelniţa in southeastern Europe has yielded good settlement data, for example, at Căscioarele in Romania, 60 kilometers south of Bucharest. The settlement, which was eventually destroyed by fire, is located on a small island in Lake Catalui (Dumitrescu 1965). During its phase B occupation it consisted of 16 scattered houses, showing no discernible plan or common orientations. Houses were constructed of wooden-post frameworks with walls plastered with clay. Most had one square hearth, usually over 1 square meter in area, and yielded clay loom weights, clay spindle whorls, querns, and flint and bone tools. The smallest house was 4.5 × 4.5 meters (approximately 20 square meters) in area, while the largest was 16 × 8.8 meters (approximately 141 square meters). An individual family probably inhabited each house; the population of the settlement is estimated at over 100 people.

Corded Ware burial mounds, seasonal camps, and, much rarer, permanent settlements are known. It is possible to estimate the density of distribution of burial mounds. There is one mound per square kilometer in the Grzęda Sokalska area of southeastern Poland (Koman and Machnik 1993). By this arithmetic, over 300 mounds may have been erected in 314 square kilometers of the Bronocice area during the entire Corded Ware period (2900/2800–2400 BC). In some regions mound density was higher; there are hundreds, perhaps thousands, in the Carpathian area (Machnik 1997). Buchvaldek (1987) estimates Corded Ware population densities at 1–2 per square kilometer. Neustupný (1983) used data from the Vikletice cemetery in the Czech Republic, in use for a century, to suggest a community population of 25 at any one time. In the Bronocice region, mounds were surrounded by flat graves, thus a small necropolis held, on the average, the remains of five individuals. Assuming a life expectancy of 25 years, we estimate that 1500 individuals were buried in the 300 Corded Ware cemeteries in the region over a period of half-a-millennium. Applying the formula used by Acsádi and Nemeskéri (1970), we estimate a Corded Ware population of 125 people in the Bronocice region at any one time.

Corded Ware settlements are rare in central Europe, but they are present (Buchvaldek 1986, Turek 1995, 1997) and there is good settlement data from Swiss sites. Only two Corded Ware settlements are known in Moravia (Turek and Peška 2001:415). Behrens (1973) reports the remains of square houses near a large concentration of burial mounds at Luckar Forst near Altenburg, Saxony-Thuringia. Schlette (1969) reports the postmolds of a structure at Bottendorf, in the Arten region of eastern Germany. Remains of rectangular wooden structures have been found for the Bay Coast (Rzucewo) "group" of the Corded Ware culture at Suchacz (Ehrlich 1934, Tetzlaff 1970) in Poland, Nida (Rimantienė 1989), Daktariškė (Butrimas 1982), Žemaitiškė (Girininkas 1990), and Gluobiai (Juodagalvis 1992) in Lithuania. However, for other groups we have very poor evidence for any sorts of houses. To many European archaeologists, the absence of house structures for most Corded Ware groups suggests that these peoples were pastoral nomads who did not need to construct permanent houses. However, large cemeteries like Vikletice, in the Czech Republic, may indicate the presence of permanent settlements. Swiss Corded Ware sites have remains of houses.

Data for Globular Amphora settlement systems are also sketchy. Permanent villages are believed to have consisted of a few small square and trapezoidal houses, rare examples of which have been found. Archaeological materials found on sand dunes and sandy hills probably represent seasonal camps. As with Corded Ware, this culture is frequently considered to have been one of nomadic herders. Szmyt (1996) suggests a three-tiered Globular Amphora settlement hierarchy for the Kujavia region in Poland. There are single settlements of one to three houses, with 4–15 people. Three to five such settlements form a local group exploiting 160–310 square kilometers. Some 20 local groups form a regional grouping of 400–2000 people. If her estimates are at least approximately correct, it will be seen that Globular Amphora population densities were quite low in comparison with those of the Funnel Beaker culture.

The densities of Bell Beaker settlements vary in Europe. There are about 230 settlements in Moravia, which is one of the highest densities (Turek and Peška 2001). Most sites are small, consisting of 1–3 pits, and are located in the lowlands near watercourses.

Warfare

Evidence for warfare has a varied distribution in the different areas of Europe during the Late Neolithic/ Late Copper Age. In France, numerous fortified sites are found (Cassen and Boujot 1990); for example, in the Charentes and adjoining regions approximately 60 fortified sites are known (Giot 1994). Some, such as Champ-Durand in Vendée, have a triple row of interrupted ditches with dry-stone walls and towers to protect entrances. Large fortified settlements in the Mediterranean countries suggest an intensification of conflict among societies of the period. In Portugal, most settlements were located on hilltops and some of them were fortified (S. Jorge and V. Jorge 1997). There are impressive stone-built fortified settlements at Los Millares, Cerro de la Virgen, Zambujal, and Vila Nova de Sao

Pedro in Iberia. Monks (1997) has synthesized the evidence for warfare in Iberia from 3500 to 2200 BC, noting a significant increase after 3000 BC, during the Chalcolithic period. Bows and arrows appear to have been the main weapons, but hand-to-hand fighting also took place. Monks (1997:13) points out that fortified and non-fortified sites were situated in locations affording natural protection. Most sites have stone walls; ditches are less common. The labor invested in large sites was enormous, requiring more than 100,000 workdays. Los Millares in Almeria was "surrounded by an extensive defensive system, comprising three lines of walls, associated bastions, towers, a ditch. . .and, in a later phase, outlying forts" (Monks 1997:15). The site probably enclosed an area of 2 hectares (5 acres), and was built of limestone held together with mortar. "The outerwall, which belongs to a later phase, is over 300 meter in length, with an elaborate barbican entrance flanked by towers and bastions, and an outer ditch. Openings or arrowslits provide good visibility as well as providing protection for archers firing from within the towers" (Monks 1997:15–16). In the latest phase, approximately 12 outlying forts were constructed. Large sites such as Los Millares and Zambujal were occupied for 500 and 800 years, respectively, while smaller sites were occupied for 100–300 years. Around 2200–2000 BC most fortified sites were abandoned.

As previously mentioned, some archaeologists speculate that large parts of southeastern, central, and western Europe were conquered by people from eastern Europe. One would thus expect to find more evidence for conflict in the Late Neolithic. Most Gumelniţa sites were fortified in Bulgaria. The poor quality of settlement data in central Europe tends to limit this evidence to greater numbers of battle-axes, projectile points (arrowheads), and other artifacts assumed to be weapons. There are, however, a few fortified sites in central Europe, such as Homolka in Bohemia, belonging to the Řivnáč culture (Ehrich and Pleslova-Štiková 1968) and the Funnel Beaker-Baden occupation at Bronocice (Milisauskas and Kruk 1990).

The hypothesized pastoral economy of some Late Neolithic cultures, such as the Corded Ware, is believed to have predisposed them to warfare and the numerous battle-axes are cited in support of this notion. The battle-axe is a weapon, not a tool for chopping wood or other domestic activities. Corded Ware is also called the Battle-Axe culture, which supposedly reflects its militaristic character. Vandkilde (2006) and Westermann (2007) suggest that the corded beakers and the shafthole axes found in Corded Ware male burials denote male identity. They assume that drinking rituals were practiced by warriors. Perhaps high-ranking Corded Ware males were organized into warrior clubs (Vandkilde 2007:68). The four Corded Ware burials at Eulau in Saxony-Anhalt, Germany, indicate the presence of violence or warfare around 2500–2400 BC (Haak et al., 2008). Some 13 individuals were killed. DNA studies indicate that there was a genetic relationship between the dead persons in one grave, possibly a "family grave": an adult male (40–60 years), an adult female (35–50 years), and two boys, 4–5 and 8–9 years old. Some of the 13 individuals were killed by blows on their heads or flint arrowheads. For example, the 8–9-year-old boy had a fractured skull. Some of them tried to defend themselves from the blows of attackers as reflected by injuries on their arms and hands. "Overall, the injury patterns point to a violent event, which probably resulted in the death of all 13 individuals. The most plausible interpretation is that the graves are the result of a violent raid, with 85% of the dead being subadults and women, and the survivors returning to bury their dead" (Haak et al., 2008:18227). The strontium analysis of their teeth indicates that the women grew up in a different region, suggesting the practice of exogamous virilocal patterns of marriage.

If there was Late Neolithic pastoralism, cattle raiding is a possibility, as herd animals are mobile and relatively easy to steal. Few people are needed merely to look after a herd, but more would be necessary to protect it from an attack. Cattle raiding may have caused a warlike value system to develop, in which the military exploits of successful warriors were rewarded with higher social status, personal prestige, or at least more cows.

Settlement and demographic data suggest conflict between various populations in central Europe. In southeastern Poland, there seems to have been a Late Neolithic decrease in population, while people concentrated themselves into a smaller number of large settlements. Ecological factors seem inadequate to explain the 75% population decline in some regions of southeastern Poland. The surviving farmer-herders of the Funnel Beaker-Baden culture continued to cultivate cereals and garden crops, though there was greater emphasis on stock breeding. Large areas were available for the grazing of cattle and sheep because of the extensive deforestation that had occurred in the region. War and invasion may have been factors. If Corded Ware people were in the region by 2800 BC, they may have been a threat to the indigenous Funnel Beaker-Baden people. Bronocice was fortified during its phase 6, the frequency of flint axes there increased, and over half of the region's population concentrated itself in one settlement. Animals herded by the Corded Ware populations in areas of Funnel Beaker-Baden cultivation could have caused conflicts between them.

The Funnel Beaker-Baden occupation at Bronocice has yielded burial data for an anomalous catastrophic event, either an epidemic or a massacre. One burial pit contained 17 individuals, 12 of whom were children or infants (Kruk and Milisauskas 1982, Pipes et al., 2010) (Fig. 9.9). Also, some of the features of the phase 6 occupation yielded only skulls, which may be evidence for conflict or violence, since it is doubtful that such depositions would be associated with ancestor worship.

Evidence of conflict among the Bell Beaker groups comes from burial data. Most archaeologists assume that the rich male burials containing copper daggers, wristguards, and flint arrowheads were those of warriors (Turek 2002, Vandkilde 2006, Sarauw 2007). There are a small number of female burials, such as Tišice in the Czech Republic, with weapons (Turek 2002). Turek (2002) speculates that these were a group of women warriors. The Tišice warrior woman, 40 years old, was buried on her right side as were most men whereas women were generally buried on their left side (Fig. 9.10). Her burial was associated with the following grave goods: 5 bell beakers, 1 cup, 1 large ovoid pot, 2 gold plates – hair pieces, 2 stone wristguards, 1 copper dagger, 1 copper awl, and 1 amber bead (Fig. 9.11). There are traces of timber construction of a burial chamber. Vandkilde (2007:73) suggests that "The few instances where females are buried as males recall the modern Albanian tradition of

Fig. 9.9 Funnel Beaker-Baden multiple burial from Bronocice, Poland

Fig. 9.10 A female Bell Beaker warrior, buried at Tišice, the Czech Republic (Photograph courtesy of J. Turek)

women becoming men if males for some reason were lacking in the family." However, some archaeologists consider this period as peaceful (Skak-Nielsen 2009). Skak-Nielsen (2009:357) argues that the daggers were used for the slaughter and sacrifice of livestock, and thus a dagger would indicate the bearer's high status and wealth in livestock (Skak-Nielsen 2009:352). He concludes that "The seven or eight centuries of the Late Neolithic in southern Scandinavia and also early parts of the Copper and Bronze Ages in other parts of Europe may have been a relatively peaceful interval between more warlike eras. Nick Thorpe (2006:158) has reached similar conclusions regarding the Later Neolithic and Early Bronze Age in Britain and Ireland" (Skak-Nielsen 2009:357).

Ritual and Social Organization

Impressive megalithic monuments continued to be constructed in western and north-central Europe. In northern France, depictions of women appear on such late Neolithic monuments (Twohig 1981, L'Helgouach 1993). This calls into question Gimbutas's interpretation of Late Neolithic developments, which emphasizes predominance of masculine symbols, values, and beliefs. However, given

Fig. 9.11 Bell Beaker artifacts associated with the female warrior burial at Tišice, the Czech Republic (Courtesy of J. Turek, photograph by P. Berounsky)

the well-documented cultural variability of the Late Neolithic, we are sure that there was plenty of room for all sorts of ideologies.

In the western Mediterranean region, spectacular temple architecture and figurative art flourished between 3600 and 2500 BC on Malta (Renfrew 1973, Stoddart et al., 1993, Malone 1998). According to Malone (1998:163) the cultural complexity of Late Neolithic Malta has "no near parallels of development in the western Mediterranean." The islands of Malta cover 316 square kilometers (120 square miles) and they are located 93 kilometers (57 miles) south of Sicily. They were colonized by farmers around 5000 BC. Between 3600 and 2500 BC impressive religious buildings, such as Ggantija and Tarxien, were constructed of coralline limestone. Small, medium, and large figurines played a role in ceremonial behavior (Malone 1998). Small figurines, usually made of clay, may have served private rituals. Medium-sized ones occurring in tombs and temples may have been for public and private rituals. "Large figurines, generally of stone, were sizeable enough to be visible over some distance. It appears they were intended for public display and veneration" (Malone 1998:156). These large figurines range from 50 centimeters to 2 meters in height, and many show a corpulent image, suggesting a "repetition of an icon or image found in many religions," (Malone 1998:156). Those with large buttocks and thighs are assumed to represent women, though only a small number of figurines have specific sexual characteristics such as breasts. As Malone (1998:156) points out, many figurines are genderless and the obese Mediterranean men have equally rotund forms. Why were such temples constructed on Malta and not elsewhere? The physical isolation of islands comes to mind. Population and ecological stress may have played a role. According to Malone (1998), probably late Neolithic Malta was a densely populated and socially stratified society. It should be pointed out that Gimbutas (1991) considers Malta as an important location for Mother-Goddess worship.

Pollex's (1999) analysis of cattle burials suggests that religious beliefs were changing in central Europe between 3500 and 2200 BC. "Burials of up to 10 animals have been reported, either near or within human graves or unconnected with humans, but associated with other domestic animals" (Pollex 1999:542). Most cattle burials belong to the Globular Amphora culture, but they are also found on late Funnel Beaker, Baden, and Schönfeld sites (Gabałówna 1958, Behrens 1964, Wetzel 1979, Wiślański 1979). They may reflect cattle's importance in economy, the high status of their owners, or they may symbolize sacred animals (Gabałówna 1958, Behrens 1964, Pollex 1999).

Traditionally, the social organization of Globular Amphora and Corded Ware societies has been considered to have been patrilineal, as these cultures are believed to have been pastoralist, and ethnographic data indicates that most pastoral societies are patrilineal. But archaeological evidence for this hypothesis is weak. As indicated earlier, data about Corded Ware and Globular Amphora subsistence and settlement system are not very informative.

Most data come from mounds and cemeteries. Corded Ware peoples erected burial mounds and dug flat moundless graves. Corded Ware mounds were not constructed of stones as were the megalithic monuments, but they likewise stood out in the landscape for hundreds or thousands of years providing memory and myths for successive generations. Some flat graves probably originally had mounds, subsequently destroyed by farming or other activity, their fill scattered over the fields. Individuals were buried in pits dug into the ground. Most frequently, a grave contains a single skeleton in a contracted position (Fig. 9.12). Corded Ware females were usually buried on their left side and the males on the right side (Turek 2000). This contrasts with the Bell Beaker custom; males were buried on their left side and females on the right side. Turek (2000:7) noted that “It seems very likely that the main feature of the Corded Ware and Bell Beaker burial rites, which is the symbolic differentiation of the male and female distinction even applied to child burials” (Turek 2000:7). Pottery, stone axes, and flint artifacts are the most common burial goods. The builders of Corded Ware mounds emphasized their locations in the landscape by selecting the highest local elevations. That such sites were symbols is undoubted, but just what they symbolized – ancestors, territoriality, chiefly power, collective identity – remains unknown. Most likely, they represented a community’s claim to a landscape.

As in many other Neolithic cultures, there are more men than women buried in the Corded Ware cemeteries and mounds (Siemen 1992). Not all skeletons have been analyzed by physical

Fig. 9.12 Corded Ware burial at Bronocice, Poland

anthropologists. Many skeletons were classified as male because artifacts such as arrowheads were found buried with them. Women have no distinguishing artifacts associated with them, thus some of the disproportion between the sexes can be accounted for by the numerous unclassified skeletons, some of which belong to women.

Judging from data found at Vikletice and other cemeteries in the Czech Republic, there was a significant association of gender and age groups with specific types of burial treatments (Buchvaldek and Koutecký 1970, Neustupný 1973). Neustupný's (1973, 1983) analysis of 134 Corded Ware graves at various Bohemian sites and 120 graves from Vikletice alone showed differences between men and women in ornaments, tools, weapons, and pottery form and decoration. At the Żerniki Górne cemetery in southeastern Poland, 64 Corded Ware graves contained 77 skeletons; 27 were identified as male and 22 as female. Gender differences are strongly reflected in Corded Ware burials. Arrowheads, antler tools, and wild boar tusks are associated with men (Kempisty and Włodarczak 2000), while ornaments such as antler beads are mainly associated with women. Copper artifacts, rings, and spirals have been found in 6 burials, 4 female and 2 male. Since copper was a nonlocal material and presumably valued for that reason, these individuals represent either "richer" families or special achieved status. Women were buried on their left side, 20 out of 21. Men were buried on their right or left sides, in about equal proportions (Kempisty and Włodarczak 2000: table 14). It is unclear why there were differences in men's burial positions or why one woman was buried on her right side. Flint axes were found in men's and women's graves, but those associated with women were smaller. Probably women's axes were used for lighter jobs, such as cutting branches for firewood. Kempisty and Włodarczak (2000:147) assigned points for various artifacts found in graves (based on the value of artifacts, e.g., two points for copper artifacts or ceramics, one point for flint or bone artifacts), thus men had 38 points on the average, women 21, and children 5. As a society oriented toward the herding of animals, the Corded Ware culture seems to have put more emphasis on rituals associated with men at the time of death. The average age at death for the entire population at Żerniki Górne was 28 years. If children are excluded from this calculation, then the average age of death for adult men was 43 years and for women 36 years.

Włodarczak (2006) has analyzed Corded Ware burials in southeastern Poland. In the earliest phase deceased males were buried in mounds but did not have stone battle-axes and flint arrowheads. In later phases, some adult males were buried with battle-axes, flint arrowheads, corded beakers, bone artifacts, wild boar tusks, and grindstones; these are classified as warriors (Włodarczak 2006). Women and children were usually buried in flat cemeteries. Battle-axes were found in 21% of the male graves. Most adult male and female graves were not rich in burial goods. Males buried on their left side like most women do not have arrowheads and battle-axes. Children's burials may reflect their families' statuses. Some boys' burials have miniature objects such as battle-axes, possibly reflecting their higher status. This would imply that status was inherited.

There are some 400 Bell Beaker cemeteries containing over 1000 burials in Moravia (Turek and Peška 2001). As previously mentioned, Bell Beaker males and females were differentiated by their burial positions.

Most information on Globular Amphora social and ritual organization also comes from burials, notably stone-lined cist graves, 2.5–6.0 meters long and 1.0–2.0 meters wide, dug into the ground with mounds of stone and earth over them. Some graves lack stone construction and some were lined with wood. In eastern Germany, Funnel Beaker megalithic tombs were frequently reused for Late Neolithic burials (Schuldt 1972, Nagel 1985). Rectangular or trapezoidal passage graves are rare. The number of skeletons in graves ranges from 1 to 17; however, usually only 1, 2, or 3 skeletons are present, and only rarely are they completely articulated. Probably after a person died, his/her body was placed in a tree or on a scaffold. After the flesh had been removed, or had decayed, the bones were placed in the grave. The most common grave goods are pots, flint axes, and the remains of animals, especially pigs, suggesting that animals played some role in rituals and feasts. Pigs may have

Table 9.1 Distribution of children's age at death at Vikhvatinsti

Age groupings	Number	Percentage (%)
1–5	13	48
6–10	11	41
11–15	3	9

been important less for their nutritional value and more as symbols of wealth and prestige, as was the case in Melanesian societies of the recent past.

As previously mentioned, the occurrence of deliberate Globular Amphora and Baden cattle burials suggests the ritual importance of the species. Their owners may have been nomadic herders, but the mere presence of cattle does not prove this. If Globular Amphorae peoples practiced a pastoral economy, perhaps they had a patrilineal kinship system. Burial data reflects age and probably gender differences. Out of 122 analyzed skeletons, roughly 10% belong to children (Wiślański 1969). Only certain children were buried and, assuming a ranked society, only children with higher status at birth may have enjoyed this privilege. The small number of individuals in burial structures indeed suggests a cultural selection by privilege. Wiślański (1969) has summarized burial data from 124 Globular Amphora graves in Germany and Poland, 90 of which contained only one or two individuals; only 11 graves had five or six individuals. In the eight double burials where sex of individual was determined, one held two women, while seven contained one woman and one man each; women were usually younger than men. Women may have been put to death at the time the men died.

Data from the Late Tripolye cemetery of Vikhvatinsti, which belongs to the Late Neolithic period or perhaps even the Early Bronze Age, show no associations of a particular age or gender group with burial goods, either in regard to kind or quantity. One statistically significant association is that of undecorated pots with adult men. Archaeologists usually and too easily assume that women made pottery, artifacts that are associated with women's activities. However, the making of pots and the disposing of them are two different activities. Vikhvatinsti yielded a very large number of children's burials, roughly half of those in the cemetery (Passek 1961). If we divide the children into the three age groups, we find the fewest deaths between the ages of 11 and 15 (Table 9.1). This distribution still indicates underrepresentation of infants in terms of normal mortality, if the sample is considered representative. Out of 53 skeletons, 9 were classified as 50 years or over. Thus, at birth a person had a 17% chance to reach the age of 50. This is essentially unchanged from the Middle Neolithic. In summary, there is little information about the social and ritual organization of Late Neolithic cultures in central Europe. Mediterranean Europe has been much more informative.

Ranked Societies

We can assume that small-scale and ranked societies were present in various regions of Europe after 3500 BC. The discussion about such cultures in the Middle Neolithic is also applicable to the late Neolithic. As previously mentioned, the archaeological record from Malta and Iberia suggests the presence of ranked societies. The impressive settlements such as Los Millares were likely the centers of small-scale polities. However, archaeological data from the central European Late Neolithic does not present much stronger evidence for more complex societies.

Farmers may have been late in coming to England, but soon they were putting up funerary and other monuments that may reflect social distinctions. Bradley (1991) has examined the changes through time in the types of archaeological monuments in Wessex, and argues that they relate to sociopolitical developments. Around 3500 BC, causewayed enclosures and elongated mounds were being constructed. Causewayed enclosures "are characterized by 1–3 concentric ditches and banks enclosing areas 1.5–7.7 hectare," (Shennan 1999:880). In the elongated mounds, the number of people buried in them is too small to account for populations; there is a selection who gets buried in the long mounds. By 3000–2200 BC, the Wessex landscape is dominated by henges. "These are circular banked enclosures with a ditch typically inside the bank, varying very considerably in size (0.1–12.5 hectare) as well as in elaboration," (Shennan 1999:880). Like the causewayed enclosures, the larger henges required numerous person-hours for their construction. They may have been centers of individual polities (Bradley 1991:53).

The Origin and Dispersal of the Indo-European-Speaking Populations

Archaeologists have long speculated about the association of archaeological cultures with linguistic and ethnic groups. Since most modern European peoples speak Indo-European languages, this language family especially has attracted the attention of linguists and archaeologists alike. Beginning with Sir William Jones in 1786, scholars have noted that nearly all the languages of Europe as well as those of Iran and northern India were related, and derived from a single Proto-Indo-European language (Daniel 1968, 1976). This is shown by the many sets of similar words in the different languages, for example, Sanskrit *agni*, Latin *ignis*, Lithuanian *ugnis*, Polish *ogień* for "fire;" Sanskrit *devas*, Latin *deus*, and Lithuanian *dievas* for "god." In the scenario favored by most linguists and most archaeologists, the early Proto-Indo-Europeans spread out from their original homeland and their languages diverged into the families now existing or known from the historical record: Baltic, Celtic, Germanic, Italic, Slavic, Greek, Armenian, Anatolian, and Indo-Iranian (Fig. 9.13). "The location of the Indo-European speakers before major differentiation into the various stocks is the Indo-European homeland," (Mallory 1997:93). Where and when was Proto-Indo-European spoken?

Fig. 9.13 Distribution of the major stocks of the Indo-European languages (After Mallory 1997, with modifications)

What is the archaeological identity of the Proto-Indo-Europeans? Archaeologists, linguistics, physical anthropologists, population geneticists, and others have offered various answers to these questions. Some scholars, notoriously Gustaf Kossinna (1902), located the Indo-European homeland in northern Germany and in Scandinavia, thus providing justifications for extreme nationalism in Germany and elsewhere. Archaeologists tend to forget or ignore that one of the twentieth century masters of their discipline, V. Gordon Childe (1926), wrote *The Aryans: A Study of Indo-European Origins*, in which statements were made that reflected the racist theories of the 1920s. “At the same time the fact that the first Aryans were Nordics was not without importance. The physical qualities of that stock did enable them by the bare fact of superior strength to conquer even more advanced peoples and so to impose their language on areas from which their bodily type has almost completely vanished. This is the truth underlying the panegyrics of the Germanists: the Nordics’ superiority in physique fitted them to be the vehicles of a superior language” (Childe 1926:212). Later in his career, Childe would not have written such a statement; in fact, he disowned his linguistic interpretation used in the *Aryans* (Green 1981). It should be pointed out that “by our current standards,” many archaeologists of the nineteenth century or the 1920s “could be convicted of racism” (Renfrew 1994:156).

Renfrew’s (1987) *Archaeology and Language* rekindled interest among English-speaking archaeologists in the study of Indo-European origins. Other recent works, Gamkrelidze’s and Ivanov’s (1984) *Indoevropeiskii Yazyk i Indoevropeitsy* (*Indo-European Languages and the Indo-Europeans*), Drews’ (1988) *The Coming of Greeks,* Mallory’s (1989) *In Search of the Indo-Europeans,* Markey’s and Greppin’s (1990) *When Worlds Collide: Indo-Europeans and Pre-Indo-Europeans,* and Jones-Bley’s and Huld’s (1996) *The Indo-Europeanization of northern Europe*, have presented a wide range of competing theories on the matter.

Some linguists speculate that the initial separation of the Indo-European tongues occurred between 5000 BC and 2500 BC (Mallory 1997:100). It is assumed, perhaps too easily, that reconstructed Proto-Indo-European represents an ancient vocabulary (Anthony 1995). “For example, *kmtom (one hundred) is thought to be a good approximation of the Proto-Indo-European root that developed into the cognates šimtas (one hundred) in Lithuanian, centum (one hundred) in Latin, and satem (one hundred) in Old Persian,” (Anthony 1995:15). The reconstructed Proto-Indo-European vocabulary has a distinctly Neolithic flavor with words for domesticated plants and animals, plows, wheeled vehicles, and wool. The earliest appearance of domesticated plants and animals in Europe dates ca. 7000 BC, but wheeled vehicles and wool only appear some 3000–3500 years later. The earliest written Indo-European languages, Anatolian Hittite and Myceneaen Greek, date between 1900 and 1400 BC, too late to account for the divergence of the various language groups (Mallory 1997). Probably the Baltic, Celtic, Germanic, Italic, and Slavic proto-languages emerge between 1500 and 500 BC.

Mallory (1997) presents the four most common models for Indo-European origins. All these models can be criticized from a linguistic and/or archaeological perspective. The proponents of the “Baltic-Pontic” model date Proto-Indo-European to the Mesolithic and give it a distribution from the Baltic to the Black Sea (Kilian 1983, Häusler 1985). This is a very large area and could accommodate the ancestors of many Indo-European languages in Europe and Asia. The model implies, for example, that the Linear Pottery people spoke an Indo-European language.

The Anatolian model proposes that the spread of Indo-European languages in Europe is associated with the dispersal of the earliest farming societies from Anatolia (Renfrew 1987, Safronov 1989, Cavalli-Sforza et al., 1994). The Zvelebils (1988, 1990) and the Sherratts (1988) modified this model. But many archaeologists have observed that no Indo-European languages are documented in the earliest Mesopotamian records (Anthony 1991), although the earliest written Indo-European documents, in the Hittite and Luvian languages, do occur in Anatolia around 1900 BC. It would be a mistake to dismiss Renfrew’s hypothesis. His position was extensively evaluated by David W. Anthony et al. (1988).

If we limit our attention to the Balkans and central Europe, we might consider the region to be linguistically interactive with several related languages. We assume there was continuity in central Europe between Early Neolithic peoples and their successors, such as Lengyel and Rössen cultures. Thus, at least until 3500 BC we can assume that central European languages were derived from those of the first farmers. The Funnel Beaker culture, in its turn, had a northern or central European origin. It is the later Neolithic cultures, such as Baden and Corded Ware, that present problems for a model of linguistic continuity, as it is not clear if these later cultures had a central European origin.

Marek Zvelebil (1995) proposes a three-stage acculturation model for the appearance of Indo-European languages. Like Renfrew he assumes their spread in southeastern and central Europe was associated with the dispersal of farmers from Anatolia. In the circum-Baltic area and other regions, indigenous hunters and gatherers came into contact with agriculturalists and this led to a change in language. This was a very gradual process occurring over hundreds of years. The languages of farmers carried higher prestige and became *lingua franca* in Europe.

The Balkan/central European model dates the Proto-Indo-European breakup to around 5000 BC (Gornung 1964, Diakonoff 1985). Again, many European languages could have arisen in this territory. This model assumes that the earliest Neolithic peoples of central Europe, that is the Linear Pottery culture, spoke a Proto-Indo-European language. It is difficult to account by this model for the presence of Indo-European languages in the steppe regions of eastern Europe; there is no evidence that central European or Balkan cultures expanded into steppes during the Neolithic.

The Pontic-Caspian model is one most familiar nowdays to English-speaking scholars. It places the Indo-European homeland in the steppes north and northeast of the Caucasus Mountains between 4500 and 3000 BC (Piggott 1965, Gimbutas 1970, Mallory 1989, Anthony 1991, 2007). Mallory (1997:115) has pointed out that all four models have problems, but that this one is the "least bad." It is assumed that the linguistic territory of the Proto-Indo-European culture was no larger than 500,000–750,000 square kilometers; roughly the size of France or Spain (Mallory 1989, Anthony 1995). Anthony (1991:215) notes that the presence of wheeled vehicles in the Proto-Indo-European homeland suggests a dispersal after 3300 BC. The most likely agent of this dispersal is the Pit-Grave (Yamnaya) culture (3500/3300 BC – 2500–2300 BC) of the Pontic-Caspian steppes. The Pit-Grave culture possessed riding horses and wagons; these may have provided greater mobility. Around 2900–2700 BC there is some evidence of an intrusion by the late Pit-Grave culture into the lower Danube Valley and the Carpathian Basin (Ecsedy 1979, Sherratt 1983). Baden/Ezero and Corded Ware cultures might have served as the medium for the spread of Indo-European languages in Europe.

As previously mentioned, the terms for different parts of wheeled vehicles could not have entered the Proto-Indo-European vocabulary before 3500 BC (Anthony 1991). The term for horse is reconstructible in the Proto-Indo-European vocabulary. There is no evidence for presence of horses in Anatolia or Greece during the Early and Middle Neolithic. At least for central, eastern, and northern Europe, the archaeological data is not inconsistent with a hypothesis dating the appearance of Indo-European languages after 3500 BC. The collapse of cultures derived from the Danubian tradition occurred around 3500 BC; large settlements disappeared from many parts of Europe around that time. The Corded Ware and Baden cultures may be associated with the introduction of the Indo-European languages. In a major article, Häusler (1998) strongly reiterates his objections to the introduction of Indo-European languages into central and northern Europe from the Pontic-Caspian area. In Häusler's scenario, there was cultural and presumably linguistic continuity since the Mesolithic. One can argue that in Scandinavia and the East Baltic area (Girininkas 1996), where the local foragers adopted agriculture, cultural continuity exists, but not in central Europe. We assume that Linear Pottery farmers introduced their language or languages into central Europe. It is unlikely that farmers would adopt a language spoken by foragers, but they probably incorporated some words. However, it is possible that Mesolithic foragers in the Circum-Baltic area spoke a Proto-Indo-European language.

Conclusion

There are many uncertainties about the Late Neolithic economies, settlement, and ideologies. The available archaeological evidence can be interpreted in various ways; debates and arguments will continue. Perhaps as new interpretative approaches develop and further field work is conducted, some of these issues will become clearer.

The traditional invocation of migration to explain Late Neolithic changes in some parts of Europe is not currently popular. However, materialist invocations of internal developments, population increase, and/or agricultural intensification also seem inadequate to us. Warfare may well have been a process of culture change, and an important one. The increased availability of domesticated horses may have facilitated rapid long-distance plundering, and the wealth realized from such activities may have underwritten the costs of social and political innovations at present only dimly perceived.

It would be not surprising that people became conscious of their ethnic identity during the later Neolithic. We can see continuity of occupation of a specific place or region, and we can observe regional stylistic differences in artifacts. Such stylistic differences may reflect ethnicity (Wobst 1977).

The Indo-European problem will continue to challenge archaeologists. Even if Childe was later dissatisfied with his *Aryans* (1926), he still, at the time of his death, hoped to find the cradle of the Indo-Europeans (Green 1981).

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Chapter 10
The Bronze Age

Anthony F. Harding

Introduction

The term "Bronze Age" represents that segment of time that succeeded the New Stone Age (Neolithic) and the Copper Age (a term that is used variably across Europe to indicate the time when copper metallurgy first became widespread). Although the name implies that it was the alloying of copper with tin and other minerals that was important, in fact there are many other aspects that were equally or more significant as defining characteristics of the period. Lying as it does between the period of dominance of small-scale farming societies and the rise of major state-type societies, the Bronze Age is usually considered to represent a crucial developmental phase in European prehistory. During this phase, literacy spread throughout the Eastern Mediterranean area, where large-scale palace-based societies were present. Though it is only developments in Greece (of the various East Mediterranean civilisations) that affect us directly in this chapter, nevertheless the proximity of many European Bronze Age communities to these major socioeconomic units was arguably a major factor in the world of Bronze Age Europe in general. Opinions differ about the extent or importance of links between Greece and the "barbarian" world, but all are agreed that matters such as the movement of prestige goods and metals around the Mediterranean could not have failed to affect societies living on its northern and western shores, and arguably in their hinterlands.

The period has been the subject of intensive investigation in recent years, partly through various programmes of fieldwork and theoretical advances, but also because some parts of Europe – usually those in peripheral areas – preserve Bronze Age sites and landscapes in extraordinary detail, a fact which has tempted many archaeologists to undertake investigations into them. Yet in spite of this, the Bronze Age remains curiously underresearched by the present generation of scholars, at least in the Anglophone world, and underestimated by students and public alike. On the one hand, it is extremely well provided for in terms of monuments and artifacts – especially the latter, with tens of thousands of metal and pottery items filling the storerooms of Europe's museums; in this it is orders of magnitude more artifact-rich than the Neolithic. On the other, it lies rather too early for written histories, such as those of Herodotus in the fifth century BC, to help our understanding of its course (unlike the Iron Age). As a consequence, scholars and students alike have tended to work either in the preceding period, where the quantities of data are generally manageable and the room for creation of imaginative reconstructions of the past considerable, or the succeeding one, where models for social and economic development can be tested against relatively secure frameworks of historical process. In spite of this,

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a number of specific or general works have been produced in recent years (Kristiansen 1998; Harding 2000), with fuller details on matters discussed in this chapter, including extensive referencing; most recently Kristiansen and Larsson 2005, for an idiosyncratic view of the period.

The period lasted, in Europe, for around 2300 years, from the beginning of the Early Bronze Age in Greece at about 3000 BC down to the arrival of iron in Scandinavia around 700 BC. Within that long time span, there are numerous variations at the regional level in the length of time involved, and the precise course of events within that time span. So in Greece the transition to the Iron Age took place around 1100/1050 BC, while in Scandinavia the Bronze Age did not start until sometime after 2000 BC.

Dates are, therefore, relative, and primarily concern the sequence in any given area. What is more important is what we mean by the term "Bronze Age". As the name implies, metals were a crucial element in the definition of the period, though, as we shall see, by no means the only one. In simple terms, the Bronze Age is defined as the period when copper or copper alloys served as the primary material for the production of tools, weapons and ornaments. This is to oversimplify the situation, however. Copper metallurgy did not start with the beginning of the Bronze Age (it was in regular use in some parts of Europe by the Middle Neolithic), nor end with the beginning of the Iron Age (it continued to be used for certain high-status items). Nor was the use of "bronze" (usually signifying a copper-tin alloy, but applicable also to copper alloys involving arsenic or lead) a necessary or invariable concomitant of the start of the period: it came in during the Early Bronze Age in most areas, and was thereafter a regular, though rather variable, feature of Bronze Age metallurgy.

So metals were just one part of the complex mosaic that makes up the character of the period. Using them to define the period is more a matter of convention than anything else, going back to the early days of prehistoric research in Europe – initially to the Thomsen Three-Age scheme of Stone, Bronze and Iron, and then to the discovery and excavation of the site identified as Troy by Heinrich Schliemann, or of Knossos by Arthur Evans; or, further afield, the excavation of barrows in Britain and Denmark by nineteenth century antiquarians, of villages of round houses in Sicily by Paolo Orsi or of tombs and settlements in Almeria (south-east Spain) by the Siret brothers. In the schemes developed by these scholars, it became a convenient starting point for the developments of subsequent centuries to point to particular pottery styles and particular metal forms with which to begin the sequence. Thus Evans at Knossos, in defining the phases of the Cretan Bronze Age, separated the Neolithic layers from those he termed "Minoan", and specifically "Early Minoan" (so named after the legendary King Minos), which he saw as following in essentially unbroken succession through a series of phases and sub-phases into the period of the Knossian palace. Comparison with the sequence at Troy, and the local situation in many other parts of Europe, then led to the identification of an entire period termed the "Bronze Age".

Chronology

The relative chronology of the Bronze Age has been built up over many years, on the basis of site stratigraphies and artifact typologies (Figs. 10.1, 10.2 and 10.3). The detailed correlation of layers and types has occupied the energies of many scholars, and continues to do so in those parts of Europe where dating methods involving the physical sciences are not currently much used – usually for financial reasons, though sometimes because of a lack of suitable samples: occasionally because of residual suspicion about the usefulness or accuracy of methods such as radiocarbon dating. In this way, divisions and sub-divisions of the period are made and remade. It is important to recognise that this work, though superficially tedious and remote from the realities of Bronze Age life, nevertheless has an important role to play in setting out the framework within which the developments of the Bronze Age

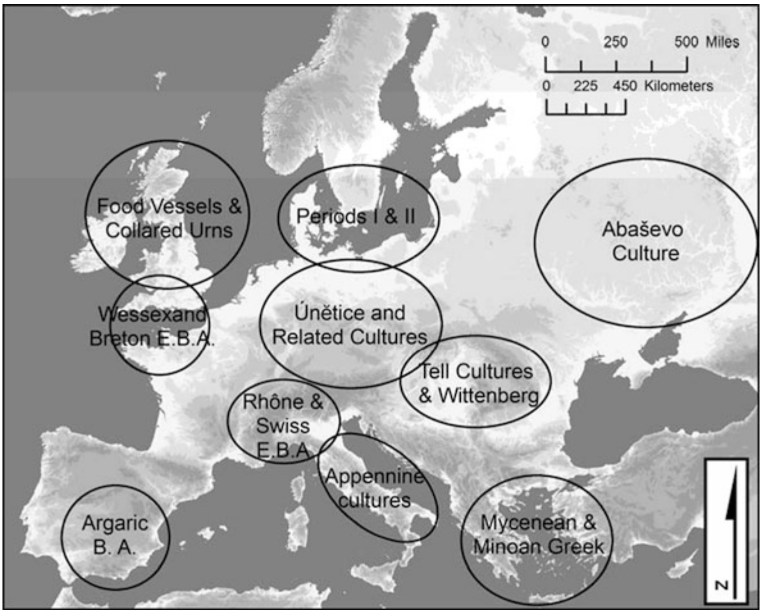

Fig. 10.1 Distribution of Bronze Age cultures around 1600 BC

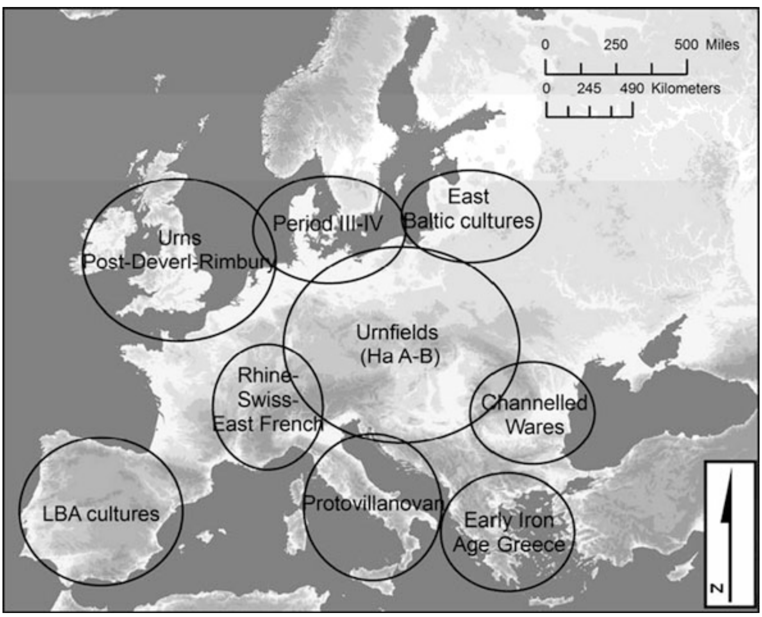

Fig. 10.2 Distribution of Bronze Age cultures around 1000 BC

occurred. Without it, attempts at more "relevant" studies, such as that of social practice, can flounder on the rocks of chronological or typological impossibility.

On this basis, it is usual in most areas of Europe to divide the Bronze Age into three parts, usually called Early, Middle and Late. Each country or area has its own way of regarding those divisions,

BC	Britain & Ireland	France	C. Europe	N. Europe	Italy	SE Europe	E. Europe
700	Llyn Fawr			Period VI			
					Iron Age II		Basarabi
800	Carp's Tongue		Ha C	Period V		Mezócsát	Chernoles
	Ewart Park/Dowris	Br. Final IIIb					
900	Blackmoor		Ha B2/3		Iron Age I		
1000		Br. Final IIIa	Ha B1				
	Wilburton/Roscommon			Period IV		Gava II	Belozerka
1100		Br. Final IIb	Ha A2		Final Bronze Age		
					Protovillanovan	Gava I	
1200	Penard/Bishopsland	Br. Final IIa	Ha A1	Period III			Noua-Sabatinovka
1300			Bz D		Peschiera		
			Lausitz	Period II	Late Bronze Age	Piliny	
1400	Taunton		Bz C				
			Tumulus BA		Terramare I		
1500	Acton Park	Bronze	Bz B				Timber Grave (Srubnaya)
		moyen			Middle Bronze Age		Trzciniec
1600	Wessex 2					Otomani I	Füzesabony
				Period I			
1700							
	Wessex 1	Bronze					
1800	Bush Barrow	ancien	Bz A2				Catacomb Grave
					Polada	Hatvan	Monteoru I
1900			Vèterov				Wietenberg I
				Late Neolithic	Early Bronze Age		
2000			Ùětice				
	Beakers		Bz A1				Pit Grave (Yamnaya)
2100						Nagyrév	Glina
		Beakers	Singen				
2200			Nitra				

Fig. 10.3 Chronological chart for the European Bronze Age

however. We consider only the central European area in detail, while referring briefly to sequences elsewhere. Matters are complicated even there by the difficulties of translating various terms (principally German) into English, as there are not enough appropriate English words to cover the shades of meaning in such terms as *spät-, jung-, jüngere-, jüngst-,* and *End-Bronzezeit* (all meaning approximately "late" or "final" Bronze Age – cf French *Bronze tardive* and *Bronze final*). In general, the three divisions are as follows:

- *Early Bronze Age* (ca. 2200–1500 cal. BC) refers to finds from cemeteries practising inhumation (except in Hungary where cremation was the norm), and a smaller number of barrow sites. The name of Únětice (a site near Prague) is the most important, as cemeteries containing material of the type found there are widespread through Poland, eastern Germany and the Czech Republic. Other important cultures include Adlerberg (near Worms), Straubing (on the Danube north of Munich), Nitra (in south-west Slovakia), Mierzanowice (in south-east Poland), and Kisapostag, Nagyrév, Hatvan and Füzesabony in Hungary. Related material appears in Switzerland, Austria and north Italy. There is a range of metal finds, characterised by flat and flanged axes, triangular daggers and halberds, pins with racket or spherical heads, massive arm-rings and other forms.
- *Middle Bronze Age* (ca. 1500–1350 cal. BC) indicates material dominated by burial under barrows, and therefore called in English the "Tumulus Bronze Age", in German *Hügelgräberbronzezeit*. Such barrows and barrow cemeteries are found widely through central Europe, from eastern France to Hungary and northern Croatia and Serbia. Again, a characteristic range of metal forms is present, in which rapiers and early swords are notable, along with socketed spearheads, palstaves, arm- and leg-guards, and many forms of personal ornaments (pins, pendants, spiral rings etc.).

- *Late Bronze Age* (ca. 1350–750 cal. BC) indicates a period marked by a major change in burial mode from the previous phases, and specifically the near-universal introduction of the cremation rite, the ashes of the deceased being placed in urns and the urns in a defined cemetery area or "Urnfield". Such cemeteries are very numerous and widely found across continental Europe, with similar phenomena also being present in peripheral areas. A wide range of metal forms was produced, including very large numbers of common tools (axes, sickles) but also many weapons (swords of various kinds, spearheads, arrowheads), sheet-bronze objects such as vessels (buckets, cups, cauldrons) or armour, ornaments of many kinds, and a huge variety of other objects and types. Much of this metalwork was deposited in groups or "hoards".

In these brief descriptions, only burial form and metal types are mentioned, but there is also extensive evidence for settlement, and for the production of other artifact forms. Particularly notable is the rise, during the Late Bronze Age, of fortified sites, either on hilltops ("hillforts") or in lowland positions, typically on lakes ("stockades").

Two chronological systems, out of the many that have been developed, deserve special mention. The first is that devised by Paul Reinecke (1911/1965) and is applied to central Europe (principally Germany and adjacent countries). In this system, the "Bronze Age" (Bronzezeit) was separated from the "Hallstatt Age" (Hallstattzeit), named after the great cemetery in Salzburg province excavated extensively in the nineteenth century, and each was assigned four phases, A-D. Later it became clear that phases C and D of the Hallstatt period actually belong in the Iron Age. The system, in basic outline, is thus as follows:

Bronze A: Early Bronze Age (Únětice and related cultures)
Bronze B-C: Middle Bronze Age (Tumulus cultures)
Bronze D, Hallstatt A-B: Late Bronze Age (Urnfield cultures)

Numerous local variations and sub-divisions of these phases will be found in the literature.

The second scheme is that devised by Oscar Montelius (1986 [1885]) for the Nordic area, in which six periods were recognised: Periods I-VI. These work out as follows:

Period I: Incipient Bronze Age in the north, with imported metalwork from central Europe
Periods II–III: Early Bronze Age
Periods IV–V: Late Bronze Age
Period VI: Transition to Iron Age (contemporary with full Iron Age further south)

It may be noted that this terminology is not consistent with that of the Reinecke scheme, since Period II equates largely with Bronze B-C, and Period III with Bronze D and the first half of Hallstatt A.

Within each local area of Europe, local schemes will be found, but almost all can be reduced to a tripartite, Early-Middle-Late, basis. In Britain, for instance, an Early Bronze Age characterised by barrow burial in the south and cist or pit burial in the north is particularly associated with a group of rich burials in central-southern England, frequently called the "Wessex Culture". The Middle Bronze Age is characterised by particular metal forms and by a prevalence of cremation burial, and the Late Bronze Age is known from abundant metal hoards and from fortified sites. In Italy, the phases are marked by the development of the "Apennine Culture" in the central part of the peninsula; as might be expected from a country with such a variety of environments, developments in the north are different, with sites located around sub-Alpine lakes having their own sequence, and stratified tell-type sites or "Terremare" in and around the Po valley (named after the rich brown earth that local farmers preferentially extract from such sites to enhance soil fertility), following a course parallel to that on the Apennines. Sicily, the Aeolian Islands and Sardinia all have their own local sequences. Other notable regions with specific cultural sequences include France, Spain, Hungary, Romania and the Russian-Ukrainian area (for details see Coles and Harding 1979).

Until the advent of radiocarbon and dendrochronological dating, the only way to derive absolute dates for the phases of the Bronze Age was through comparison with other areas where a chronology appeared to be assured, notably through Greece and ultimately therefore to Egypt. This, the technique of cross-dating, depended on a number of similarities in artifact form across wide areas of Europe, or occasionally on the finding of objects that had clearly been made in one place and moved to another. Thus there are finds of Egyptian stone vessels and other objects in Greece, and there is a great deal of Aegean pottery found not only in Egypt and the Near East, but also in Italy, Sicily, Sardinia and (in a very few instances) in Spain, Yugoslavia and Albania. The Mycenaean pottery of Italy and Sicily is perhaps the clearest example of this movement of goods, which enables archaeologists to tie the sequence in Italy closely to that in Greece (Marazzi et al. 1986). Thus the sequence in Sicily and the Aeolian (Lipari) Islands is as follows:

Castelluccio/Capo Graziano: Late Helladic I-II
Thapsos/Milazzese: Late Helladic IIIA
Pantalica I/Ausonian I: Late Helladic IIIB-C
Pantalica II/Ausonian II/: Late Helladic IIIC-Sub-Mycenaean (the attribution of comparisons is more uncertain in this instance, and depends in part on analogies with mainland sites)

Figure 10.3 provides an outline of the relative sequences in the various areas of Europe.

Since the dating of the Late Helladic is fixed in relation to Egypt, a dating framework between about 1600 and 1100 BC may be obtained for these Italian phases. Recently, however, there has been some doubt about the absolute age of the East Mediterranean phases, not least because the date of a key event (the eruption of the Thera volcano) has been put in question. Instead of falling in the decades around 1500 BC, as long believed, radiocarbon and other evidence suggests that it actually occurred in the 1620s BC (Warren and Hankey 1989:140 f.; Manning 1999). Since the eruption is firmly tied to the stylistic phase Late Minoan IA, and that in turn is synchronous with Late Helladic I, there is uncertainty about Mediterranean chronology in the middle of the second millennium BC.

This turn of events highlights the importance of methods from the physical sciences to guide us in the creation of an absolute chronology for the Bronze Age. This question has traditionally been a matter of intense debate, but is now practically solved for many areas, especially those where the survival of wood has enabled a dendrochronological sequence to be established. This applies particularly not only to Alpine countries, notably Switzerland, but also to Denmark and north Germany where oak coffins are found well preserved under barrow mounds, and to Ireland, where wood is preserved in Bronze Age settlement structures rather than burials (Becker et al. 1989a; Becker et al. 1989b; Randsborg 1991).

What this means in practice is that Swiss sites contemporary with the later stages of Bronze A, for instance the later phases of the site at Zürich-Mozartstrasse (Gross et al. 1987), can be dated to the sixteenth century BC (actually several phases, dated 1607, 1545 and 1503/4 BC in terms of felling years, while the main constructional phase is now dated by radiocarbon to the nineteenth-eighteenth centuries cal. BC: Conscience 2001); the oak coffins of Denmark (most belonging to Period II) to 1425–1350 BC, and the grave constructions in the famous barrow mounds of Helmsdorf and Leubingen to the twentieth-nineteenth centuries BC (much earlier than previously thought). This compares with a radiocarbon chronology that currently places the main phases of the Bronze Age in central Europe as follows:

Bronze A1	2200–2000/1950	Hallstatt A	1250–1050
Bronze A2	2000/1950–1600/1500	Hallstatt B1	1100–1000
Bronze B-C	1500–1350	Hallstatt B2/3	1050–750
Bronze D	1350–1200		

The dendro dates indicate that some refinement of this chronology will be needed; the latest date of ca. 1800 BC from the bier at Helmsdorf, for instance (Becker et al. 1989b), shows that the Bronze A1 period lasted at least a century longer than radiocarbon alone would imply.

Dates for other parts of Europe follow local paths; in some areas numerous C14 and dendro dates are available, in others very few. Thus an area such as north Italy has excellent material available for dating and a reasonably secure chronology, while on the other hand the British sequence still contains many uncertainties, though the general outlines are now clear (Needham 1996; Needham et al. 1997).

Life and Death

How did people live in the Bronze Age? Paradoxically, much of the answer to this question revolves around how they died, that is to say, how they treated their dead. For those of us who live in the First World, death is a sanitised affair, kept strictly separate from life. In many other societies, however, it is much more a part of daily life. For a start, life expectancy in all centuries prior to our own was very much lower than it is today, so that death in the family was something everyone must have experienced at frequent intervals. Second, dealing with the dead was not something left to the undertaker, but a matter dealt with at home by the bereaved themselves. Third, attitu des to the dead may have been very different from ours, so that beliefs in the importance of the body, as well as of the soul, may have influenced the treatment of the deceased after death. The dead may, for instance, have been treated as ancestors who were present both in spirit and in actual body in the lives of the survivors. For all these reasons, it is likely that there was no rigid separation of death from life. One way in which this manifests itself in a Bronze Age context is in the finding of "houses" for the dead that resemble those for the living. While it is unclear how such houses functioned, it is likely that they indicate a connection with death and the dead.

Death was, then, a regular part of life, but it would be wrong to suppose it was the only or the most important part. Basic subsistence and shelter were the first requirements. In later sections we shall look at social and economic life; here we are concerned with the physical constructions that protected people from the elements, and in which their basic needs of cooking, eating, sleeping and social interaction were carried on, in other words their houses and villages.

Settlement Organization

Houses and villages are variably known from different geographical and temporal segments of the Bronze Age. In some parts almost nothing is known beyond areas with pits and domestic rubbish (broken pot, animal bone). This is the case for much of the Early Bronze Age in much of western Europe. In other areas, there is extensive and regular evidence for house and village plans: in the Low Countries and southern Scandinavia through much of the period, for instance, or in central Europe in the Late Bronze Age. It is impossible to generalise about the form and sequence of such structures over the whole of the continent and the whole of the period, though within some regions there is consistent evidence that permits a degree of generalisation. We look at individual village plans in order to derive information on specific areas.

In general, villages became larger and more complex over the course of the Bronze Age. Thus Late Bronze Age sites tend to extend over greater areas and have more houses than do those of the Early Bronze Age. But this hides a large degree of variation, which may have been caused by a number of factors. It remains true at all periods, for instance, that whatever the degree of social complexity involved, there was a background of small farms, probably with a single house and single family that was responsible for much of the continuance of agriculture. Even in cases where sites became highly agglomerated, as occurred at the end of the Bronze Age, there were still individual farmsteads present in the countryside, visible archaeologically as no more than scatters of pottery and – where excavation has taken place – a few pits and postholes.

Villages of small round huts are known from the Early and Middle Bronze Age in Britain – as at Shaugh Moor on Dartmoor (Wainwright and Smith 1980), or Black Patch in Sussex (Drewett 1982) – and in south Italy and the Aeolian Islands, as at Leporano near Taranto (Lo Porto 1963) or Capo Graziano on Filicudi (Bernabò Brea and Cavalier 1966). In such cases, where the buildings are too small for more than two or three people to live and work, there has been discussion about whether a family might have used more than one house. At Black Patch, for instance, it has been suggested that the group of houses in one of the Hut Platforms might have served a single nuclear family, with separate buildings for a man, a woman and children, and a retainer. Certainly the available floor space on the Hut Platform was not sufficient to allow more than a very few people to be present, other than sitting or lying inactive. Once activities such as cooking, weaving, or even eating are taken into account, space would be extremely limited. So the buildings must have been divided according to function or group member. This conclusion probably applies also to the Italian houses, though it has not been explored in detail there.

In Britain, these round huts are often enclosed within a wall or bank, or set within an extended pattern of fields. At Shaugh Moor, for instance, the five round houses in Enclosure 15 were disposed round the perimeter, leaving a substantial space in the middle where animals might be kept (Fig. 10.4). On northern hills, there were typically no more than two or three houses within a larger enclosed space. By contrast, in Italy houses seem to occupy almost all of the designated occupation area, with little or no open space between the houses, but also no enclosing wall. At the Montagnola di Capo Graziano, however, the occupied area is defined and delimited by the terrace on which the site stands; for it to extend further, it would have had to expand onto other terraces. Something similar occurs at Milazzese on Panarea, where the Middle Bronze Age village lies on a rocky promontory extending into the sea (Fig. 10.5); there is simply no space for the settlement to expand further (Bernabò Brea and Cavalier 1968). At Milazzese, fishing would have been the obvious economic activity for the inhabitants, but at Capo Graziano (which lies some 150 meters above the sea) pastoral and agricultural activities must also have been involved, albeit on a small scale. So the inhabitants must have kept their animals on the hill outside the settlement, and gone down to the level ground below them to till such fields as were present; they could not have kept their animals inside the site.

Through much of the Bronze Age, continental Europe made use of rectangular houses in open-plan settlements, where there was no problem about space for economic activities and the stalling of animals. In the Low Countries and Denmark, for instance, extensive excavations on many sites have revealed a characteristic pattern of house building (Thrane 1985; Tesch 1992; Fokkens 1991; Arnoldussen and Fokkens 2008). The houses were post-built, the walls post-framed and the ridge roof supported on a central line or lines of posts. A rather specific change took place during the course of the Early Bronze Age, and continued into the Late Bronze Age: initially a single central row of posts supported the ridge, but by Period II this gave way to a dual-post arrangement, probably supporting purlins on which the rafters rested. Reasons suggested for this change include the stalling of animals under the eaves, and the lack of suitable timbers for single-piece rafters. It is equally possible that the change was connected with changes to the internal arrangements of the houses, reflecting different relationships within the families that lived in them. For instance, if work was redistributed so that

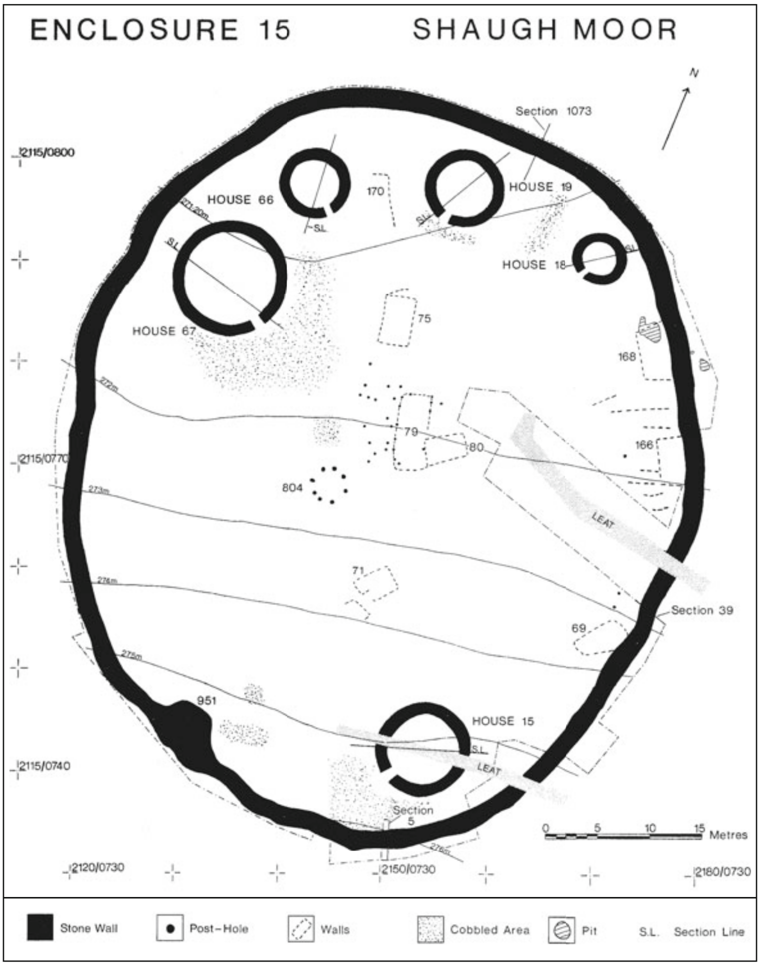

Fig. 10.4 Shaugh Moor, Dartmoor, south-west England, plan of Enclosure 15 showing open area with round houses in the northwest sector of the perimeter and at the south-east (Wainwright and Smith 1980)

different members of the group became responsible for weaving or potting, a rearrangement of the living arrangements might have become necessary.

Good examples of such post-framed houses may be seen in the Netherlands. At Zijderveld in South Holland and Dodewaard in Gelderland, for instance, Middle Bronze Age houses were constructions of some size and complexity. A long house at Zijderveld was 27 meters long and up to 5.5 meters wide, with three rows of structural roof-beams and a double wattle and daub wall (Hulst 1991); one at Dodewaard was similar but with only two rows of beams. The progress of research in recent years has greatly expanded our knowledge of house and settlement form in the Low Countries (Arnoldussen and Fokkens 2008, with many other contributions in the same volume).

Not all houses across Europe were of this type. In Alpine lake-sites, for instance, much use was made of the log cabin (*Blockbau*) technique, and houses were generally single-cell affairs (Wyss 1971). Good examples of this type of house may be seen at the Mozartstrasse site in the center of Zürich (Gross et al. 1987). In Alpine valleys, where many sites were located on glacial knolls, larger constructions were put up, divided internally into two or more rooms; here the classic site, with a long

Fig. 10.5 The promontory of Milazzese, on the southern edge of Panarea, Aeolian Islands, southern Italy, with the Middle Bronze Age village seen from the north (Photo: author)

sequence through the Bronze Age, is that of the Padnal near Savognin in the Graubünden canton of south-east Switzerland (Rageth 1986). The construction technique usually involved stone foundations with post and plank walls above, and the sequence extends from the latter part of the Early Bronze Age to the beginning of the Late Bronze Age, with identifiable internal elements including separate rooms, hearths and storage areas; in one phase a cistern was present. On tell sites in Hungary and adjacent areas, wattle-and- daub constructions were usually used, typically with a main room centered round a hearth, and a room, perhaps a porch (e.g. at Feudvar in the Vojvodina, northern Serbia (Fig. 10.6): Hänsel and Medović 1991). On such sites, there is almost invariably a problem with space. The houses are crammed together cheek by jowl, with narrow passages between them and usually no open space in the whole of the settlement – at least across the excavated area. In such circumstances, it is evident that the continuance of the community in harmony must have been hard at times, and may have depended on conformity with rules laid down by agreement, or imposed by higher authority. It is probably not surprising that some such settlements did not survive very long, to judge from the fact that they contain material only of one phase. Equally, others – particularly those on tells – continued in existence for centuries, implying the existence of a well-observed and deeply embedded set of social conventions.

While many sites were enclosed by a ditch and bank or a wall, some, especially in the later part of the period, were provided with more elaborate constructions that may be called defences. In such cases, the disposition of structures within the site is of great importance. In many fortified sites, it is evident that there was a dense pattern of houses, with little space for anything else. The classic instance of this is the stockade of Biskupin in west-central Poland that started life in the Late Bronze Age, though its visible phases date to the Early Iron Age (Rajewski 1950). Comparable house density may be seen at Senftenberg near Potsdam (Herrmann 1969); though individual houses are hard to trace, the dense pattern of post-holes across almost all the enclosed area suggests that little space was left unbuilt on. In the case of Late Bronze Age hillfort occupation, the extent and density of settlement is usually unknown. The Wittnauer Horn in northern Switzerland is usually cited as evidence for dense occupation (Bersu 1945), though in fact the indications there are ambiguous. But there are many earlier sites where it does appear that the defended area enclosed many densely packed houses – the

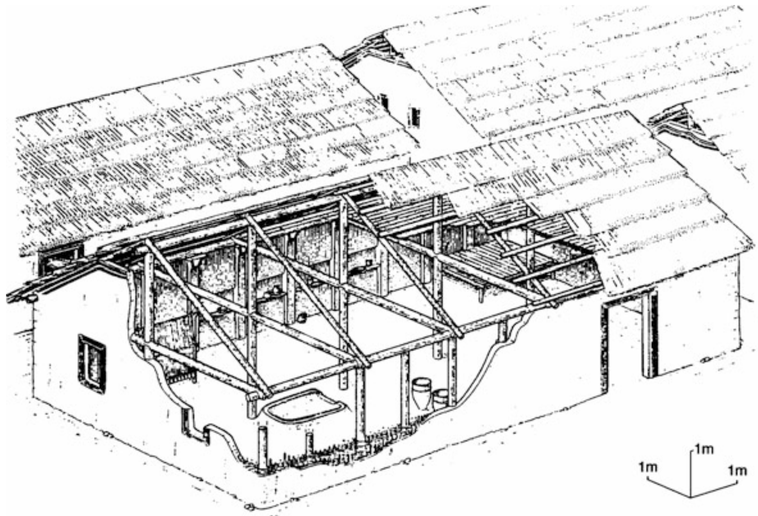

Fig. 10.6 Reconstruction of Middle Bronze Age house on the tell at Feudvar, Mošorin, Vojvodina, Serbia (Hänsel and Medović 1991)

examples of Barca in Slovakia (Kabát 1955; Hajek 1961) or Monkodonja in Istria (Teržan et al. 1998) are merely two that probably fall into this category.

In a Mediterranean context, things might be very different. Perhaps most unusual is the case of Sardinia, where the *nuraghi* served not only as fortified family farmsteads, but in the case of the largest and longest-lived, such as Barumini, Sant'Antine and the Nuraghe Losa, became home to extensive villages (Lilliu 1962).

The form of houses, and the layout of villages, depended on a series of factors that preclude the identification of common features. Technology, available raw materials, natural environment, social and economic relations, and cultural choices all influenced the ways in which people came to build houses and place them in villages. Not least among these factors were the ways in which access to the interior of houses, or to particular parts of villages, was intended to occur. It is normal that different members of a society have differential access to different buildings, and different rooms within those buildings. In a Bronze Age context, however, most houses were extremely simple in layout and access to the interior could only have been conditioned by archaeologically invisible barriers. Only in rare instances, as with the *anaktoron* or "palace" of Pantalica or the extensive ranges of rooms at Thapsos, both in Sicily, can we see access to inner rooms being restricted by arrangements of intermediate corridors and doors.

In talking of Bronze Age settlements, it is usually the case that only a part of the original site is known in excavation, typically only a few houses. This makes it difficult to make statements about the nature of the overall plan, though how people positioned their houses in relation to each other and to communal facilities is a matter of considerable importance when we come to consider social relations. I have already mentioned the small settlements of Early Bronze Age round houses in Britain that seem to have involved only a single family or small group, with space for the corralling of animals and a clear association with field banks. In looking at the plans of Urnfield period settlements, on the other hand, it is evident that some involved a degree of communal planning and cooperation.

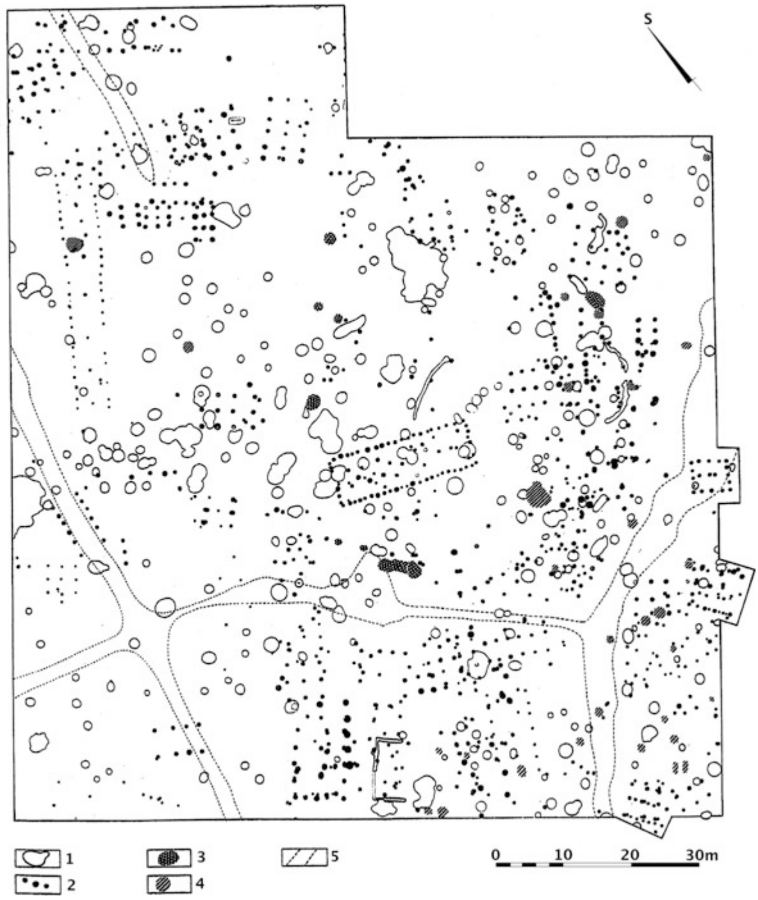

Fig. 10.7 Lovčičky, Moravia, Czech Republic: Late Bronze Age settlement (Říhovský 1982)

The plan of one of the best known, Lovčičky in Moravia, shows a series of buildings positioned round a central open area; this open area is flanked by the two largest constructions on the site (Houses E and AS) which may have served as communal halls (Říhovský 1982) (Fig. 10.7). By contrast the plan of Zedau in Brandenburg shows agglomerations of small rectangular buildings with no indication of formal planning (Horst 1985), and the village plan at Everse Akkers in North Brabant consists of a main farmhouse with a number of outbuildings (van Bodegraven 1991) (Fig. 10.8). On the other hand, where space was limited by external factors such as wet or steep ground one may find highly organised layouts even where no indication of special status for elite families is present. Thus on Swiss lake-sites houses tend to be arranged in regular rows (as at Zürich-Mozartstrasse: Gross et al. 1987), as is also the case in the stockade of Biskupin (Rajewski 1950) or the hill-sites of Cabezo de Monleón, Zaragoza (Beltran Martinez 1984), Genó, Lleida (Luis Maya et al. 1998) or the Wittnauer Horn, northern Switzerland (Bersu 1945). In other words, no one principle was responsible for the form of Bronze Age villages; they were conditioned in part by people's attitudes to space and their relations with their neighbours, but in part also by environmental factors.

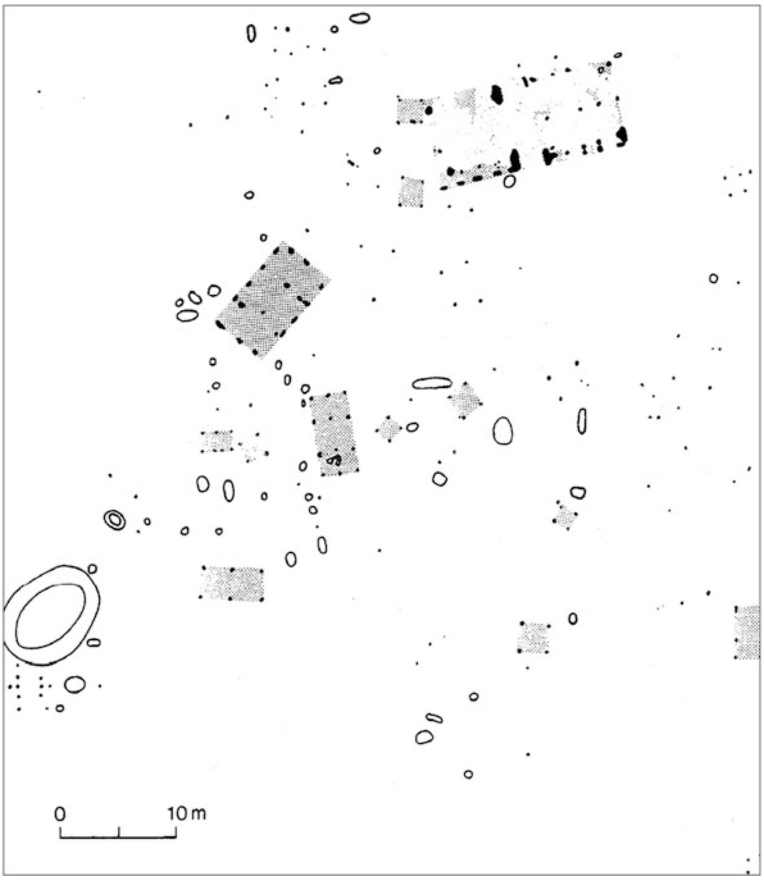

Fig. 10.8 St Oedenrode, Everse Akkers, North Brabant, the Netherlands: Late Bronze Age and Early Iron Age settlement, house cluster 4 (van Bodegraven 1991)

Mortuary Data

Death was a serious business for the living in prehistory. Not only did the dead have to be disposed of, for hygienic reasons, but the position of the dead had to be observed. Not all dead people were of equal importance, any more than all living people were. To judge by the form of their resting places, and the objects placed with them, some people were treated with a great deal more care and respect than others. But this is to impose a modern perspective on the past, in which possessions are all-important, and visibility the hallmark of status. Many people may have been regarded as important ancestors for a family or tribe, without that importance necessarily being obvious today.

The disposal of the dead revolves around a limited number of options. It may be formal or informal; involve inhumation or cremation; be made visible or invisible; and be accompanied by the deposition of material goods or not. Within each of these major options there are various possibilities, of which the erection of a monument (typically a mound) is perhaps the most obvious. In the Bronze Age, all these possibilities were explored. In the Early Bronze Age, most burial was by inhumation; in the east, the west and the north burials were marked by barrow mounds; in most of the center and the south they were placed in a defined burial area without mounds (Häusler 1977, 1994). In one area alone, the Hungarian plain, cremation was the norm. In the ensuing Middle Bronze Age, the situation was similar except that large parts of central Europe moved to erecting mounds over the dead. Cremation continued in Hungary, and started to occur in parts of the west and north. Finally, in the Late Bronze Age, cremation took over as a near-universal mode of disposal, and the disposal of the ashes of the dead in urns was a characteristic hallmark of the Urnfield period. There were, however, notable instances where certain individuals were inhumed and not burnt; though most Urnfield cemeteries predominantly used cremation, there were often instances where a few burials were inhumed, and a few cemeteries where inhumation was actually more common than cremation. These may have been local cultural choices, and do not alter the fact that cremation was everywhere the norm. Curiously, in Scandinavia the form of burial, for instance in a coffin, continued even though the actual rite was now one of cremation – an instance of cultural preference overriding what might be seen as logical procedure.

Some burials were apparently made in splendid isolation, but most were part of a larger whole, an area where several or many other burials were placed, in other words in cemeteries. Cemeteries are usually thought of as being areas for flat inhumation graves, but in fact any defined burial area counts as a cemetery, so concentrations of barrow graves or cremation pits are also cemeteries. In many of these cases, some element of patterning is visible. This is particularly true of the inhumation cemeteries of the Early Bronze Age in central Europe, where the form of the burial was strongly correlated with sex. From the Rhine to the Tisza and Vistula, there was a strong tendency for graves to be oriented north/south or north-east/south-west, less commonly east/west. At the cemetery of Výčapy-Opatovce in south-west Slovakia, for instance, males were oriented west-east and lie on their right side, females east-west and lie on their left side (Točík 1979). This means that in all cases the face actually looks towards the south. Curiously, a small number of individuals were given the "wrong" burial position according to the biological determination of sex; this may reflect aspects of the person's individuality, or status, or some other unknown factor that influenced those making the burial.

As well as patterning at the level of the grave, the grave-pits themselves were sometimes grouped, as at Singen near Konstanz, where four distinct groups of graves were found, suggesting that individual clans or families were buried in particular areas (Krause 1988). A similar situation may be present at the Urnfield cemetery of Vollmarshausen near Kassel, where distinct burial zones are claimed, and where there are some differences in the particular ways that people disposed of the dead in each zone (Bergmann 1982). This is, however, exceptional as far as we can tell at present, since most Urnfield cemeteries are simply known as series of pits or urns spread across a wide area. There are interesting variations on the theme in some regions, for instance in the north-west of continental Europe where graves might be enclosed in curiously shaped ditches or "funerary enclosures". At Telgte, near Warendorf in Westphalia, for instance, the investigated portion of the site extended over 2 hectares and included dozens of ditched enclosures, round, long and "keyhole-shaped", some with elaborate wooden constructions in the interior (Wilhelmi 1981) (Fig. 10.9). Round enclosures can frequently be found in France, as at Broussy-le-Grand near Saint-Gond in the Marne (Chertier 1976).

Barrows were patterned no less than flat graves, though in this case it is the nature of internal construction and the sequence of burial that is most striking. In particular, in the west of Europe there was a strong tradition of defining a burial area, prior to mound erection, by means of a ditch or a ring or rings of posts (Fig. 10.10). Since these rings are continuous, and often closely spaced, the clear implication is that this phase of construction and use came after the placing of the dead in the burial pit, but before the heaping up of the mound. Burial was, in other words, a drawn-out process, in which the identification of a *temenos* or restricted place was as important as the mound itself, maybe more so. The use of rings of posts or stakes (Ashbee 1960:60 ff.) recalls the well-known and long-lived tradition in the British Isles of erecting rings of stones ("stone circles") or posts ("pit circles" – probably at least as common as stone circles, though less easy to find; Gibson 1994; Clay 1998); a recent remarkable discovery in this tradition is the so-called Seahenge at Holme-next-the-Sea on the coast of Norfolk, where a circle of timber planks surrounded a central upturned tree, with felling dates

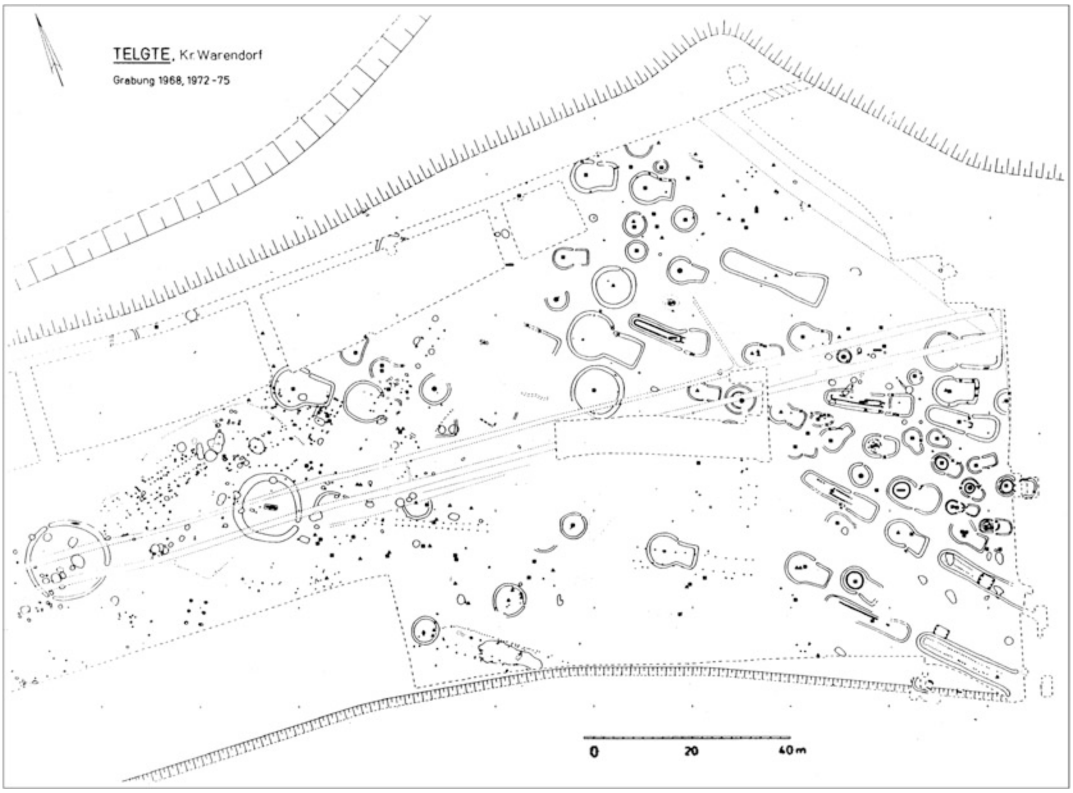

Fig. 10.9 Telgte, Warendorf, North Rhine-Westphalia, Germany. Plan of the Urnfield cemetery, showing ditch enclosure, long graves and "keyhole graves" (Wilhelmi 1981)

of 2050–2049 BC for the timbers (Brennand and Taylor 2000; Watson 2005; Fig. 10.12). A second, larger, circle lies nearby (it dates somewhat earlier than Seahenge), also made of split timbers and containing two large oak logs in the center, set within a hurdle-lined pit; the tops of the logs have a rounded scoop as if to receive another construction – perhaps a coffin or bier (Watson 2005:80). Pit circles are now widely known across Britain. Some of them were probably the precursors to burial in barrows, while others may have been intended to remain as free-standing monuments with or without burials.

Mortuary data is indispensible for providing information about the way societies were structured, and how the people who made up those societies interacted with each other; occasionally, too, we may obtain information on their occupations and crafts. As we have seen above, there are essentially three types of burial in the Bronze Age world: flat inhumations, inhumations in or under mounds and cremations. Of these, the latter is of least value for social inference, since the process of cremating the dead has frequently destroyed not only the body of the deceased (meaning that information on age and sex is not available) but also any grave-goods that may have been deposited with the burial. This is not always the case, but it affects enough of the total for information to be rather limited in extent. Inhumations, on the other hand, suffer from their own problems, particularly that of representativity. Especially with mounded burial, or with the tholos and other elaborate and richly furnished tombs of Greece, one must ask whether the persons buried in the mounds were typical of the population as a whole, or special people, marked out by highly visible burial monuments. If so, where is the rest of the population? This question cannot usually be answered. Barrows are often situated in highly visible

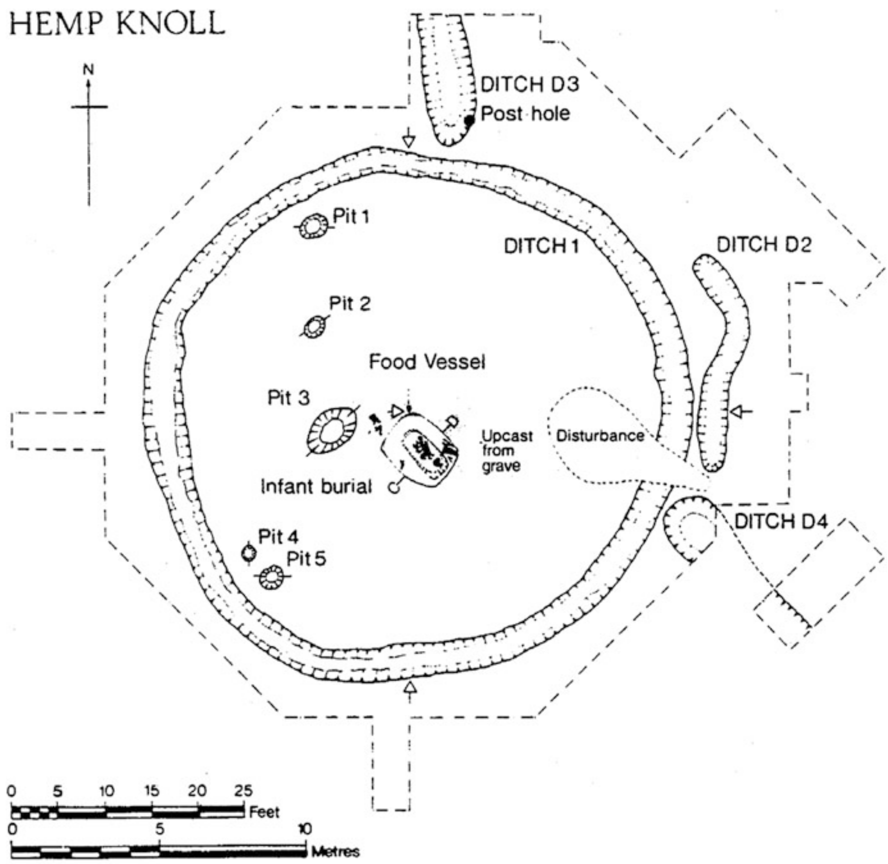

Fig. 10.10 Ring-ditch beneath Early Bronze Age burial mound at Hemp Knoll, near Avebury, Wiltshire, southern England. Note the large central grave, which was accompanied by a Beaker pot and wrist-guard, and the nearby food vessel from another grave (Robertson-Mackay 1980)

positions (on hill crests or ridges, for instance) or elaborated by particular constructional means, such as the provision of rings of posts or stakes round the burial pit, a stone kerb revetting the mound material, or multiple layers of stone, earth and turf. Within both barrows and flat graves, other features might be present, most notably coffins of hollowed-out tree trunks, or of planking. It is not evident from accompanying material that burial in a coffin was a sign of rank, though it may be one of the indicators that marked out special people, its significance now unrecoverable. Other special forms, such as the ship-settings of Scandinavia (Strömberg 1961; Müller-Wille 1968–1969), may be more immediately recognisable as relating to facets of everyday life, since ships were so common an element of rock art and may reflect the most convenient means of transport around Scandinavian shores.

In this context it is also worth noting that some graves contain items which appear to indicate the occupation or craft of their occupants. A series of graves is known, from western Europe as far east as the Volga steppe, where metallurgical equipment is found (Jockenhövel 1982); a grave from Hesselager on the Danish island of Funen contained a series of stone polishers that microscopic analysis showed were for the finishing of metalwork (Randsborg 1984) (Fig. 10.13). A grave in Volgograd province contained not only wooden sledge runners but also items suggesting that the deceased specialised in the production of arrows (Yudin and Lopatin 1989).

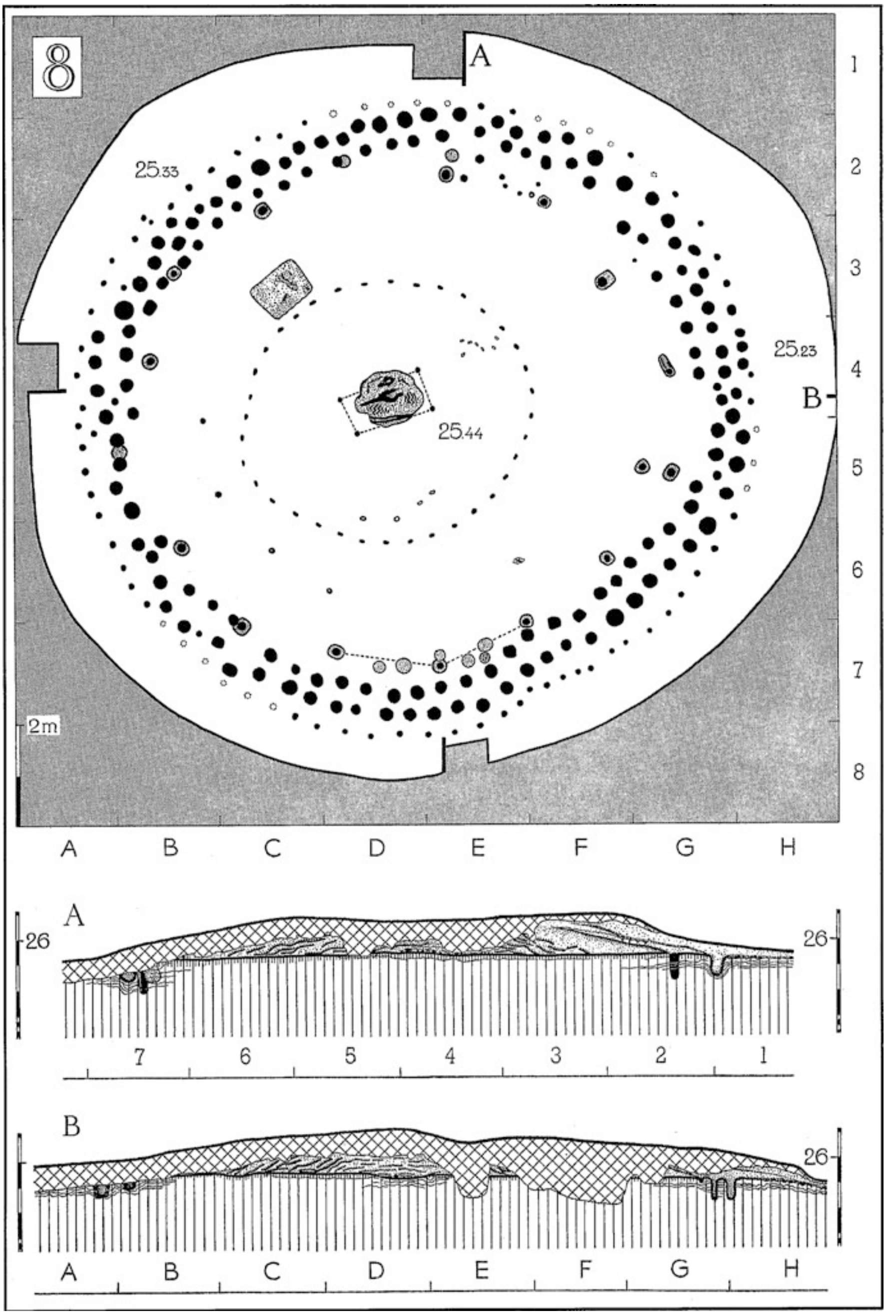

Fig. 10.11 Excavated plan of Bronze Age burial mound (no. 8) at Toterfout-Halve Mijl, North Brabant, the Netherlands, showing triple post rings, and primary (central) and secondary grave pits (Glasbergen 1954)

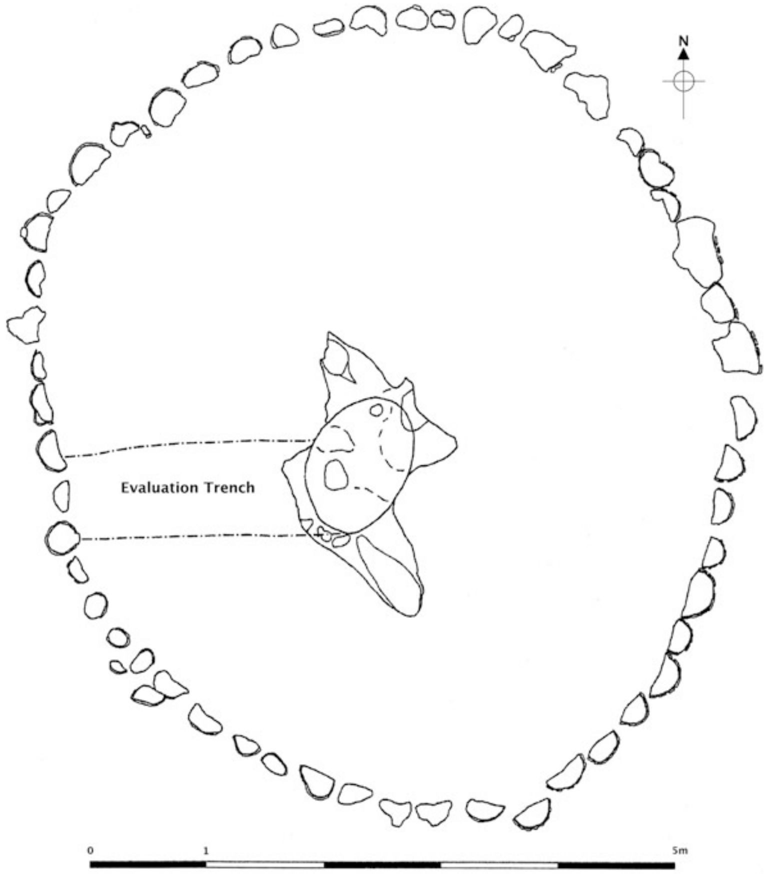

Fig. 10.12 Seahenge, Holme-next-the-Sea, Norfolk, eastern England: plan of the site showing the circle of split timbers and the central upturned oak tree (Watson 2005)

Even in flat inhumation cemeteries, one cannot always be sure that the questions of presence and absence, and survival are satisfactory answered. Robbing, for instance, has been shown to be a problem at a number of sites in Austria and Slovakia, just as it affects the tholos and chamber tombs of Mycenaean Greece (Raddatz 1978; Rittershofer 1987; Neugebauer 1991). But in spite of this, it is the inhumation cemeteries above all that provide us with information of high quality for an appreciation of social organisation in the Bronze Age. Such cemeteries appear in considerable numbers across large parts of central Europe in the Early Bronze Age, and in a number of instances there is good data on age and sex, as well as a systematic tabulation of grave-goods.

A classic analysis of the Slovakian cemetery of Branč was able to show marked distinctions between male and female, and young and old (Shennan 1975). In general, women and girls were more lavishly provided for than men and boys, and a few young women were especially well provided for. The interpretation that has been offered suggests that male status was displayed in the female members of a man's family, notably his wife, while rich young females may have been child brides. A highly detailed analysis of the cemetery of Mokrin in northern Yugoslavia has shown that there was a standard burial mode, with particular placing of the body (the knees drawn up, the head facing east), but that specific variations on this theme were introduced to mark out particular individuals (O'Shea 1996). Thus sets of beads, forming sashes or elaborate necklaces, are associated with females and may indicate hereditary social offices, while other markers such as metal ornaments were rare and

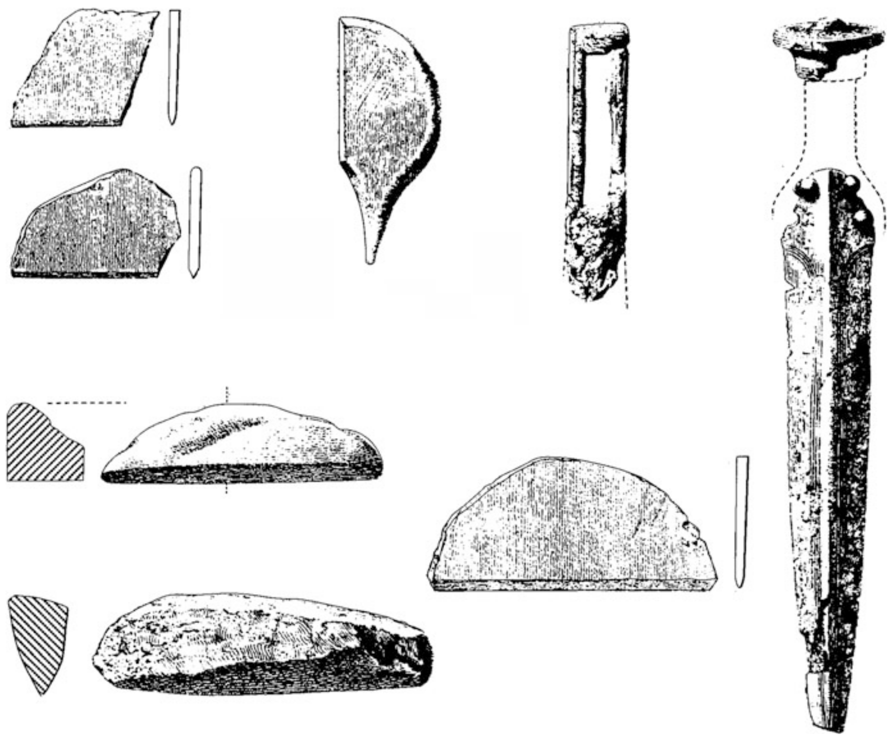

Fig. 10.13 Hesselager, south-east Funen, Denmark: grave-goods from a grave of Period III containing stone-polishing tools for metalworking (Randsborg 1984)

preferentially associated with females and may have reflected wealth derived from membership of a particular family (Fig. 10.14).

It is unfortunate that such cemeteries are not more widespread in time and space, for the potential information they provide is of a very high order. Instead, in the west and north of Europe, it is barrow burials that are the norm, bringing with them the problems outlined above. In Britain and Scandinavia, where barrows are exceptionally frequent, there are additional problems arising from the fact that nineteenth century antiquaries have often despoiled the sites, leaving no records of the precise associations of the finds. To complicate matters further, many graves had few or no grave-goods on which to base an analysis. But in spite of these difficulties, some remarks are possible. Certain graves in certain regions were evidently well provisioned by the general standards of the day. Particular attention has been paid to the graves of central southern England in the developed Early Bronze Age, or what has been termed the "Wessex Culture" (Piggott 1938, 1973; Gerloff 1975; Burgess 1980). Here bronze daggers were a relatively common accompaniment, along with ornaments of various exotic materials, including amber, faience, shale and gold, the latter uncommon but where it does appear rather flashy in appearance (Fig. 10.15). It is tempting to suppose that the person buried with a gold belt-hook, two daggers, and a macehead of fossiliferous stone, with bone zig-zag cylindrical mounts on the haft, was someone of special status, and that his burial place – Bush Barrow, within sight of Stonehenge – a place of particular importance (Fig. 10.16).

In the Nordic area too, gold is sometimes found in Early Bronze Age barrows, but swords and other weaponry are more common, as are the clothes worn by the occupants of the graves (Broholm and Hald 1935/1940). Frequently these burials are placed inside wooden coffins, but there is little or no sign that this was an indication of special status – other than that burial in a massive mound constituted special status on its own. But here, in Denmark and north-west Germany, barrows were

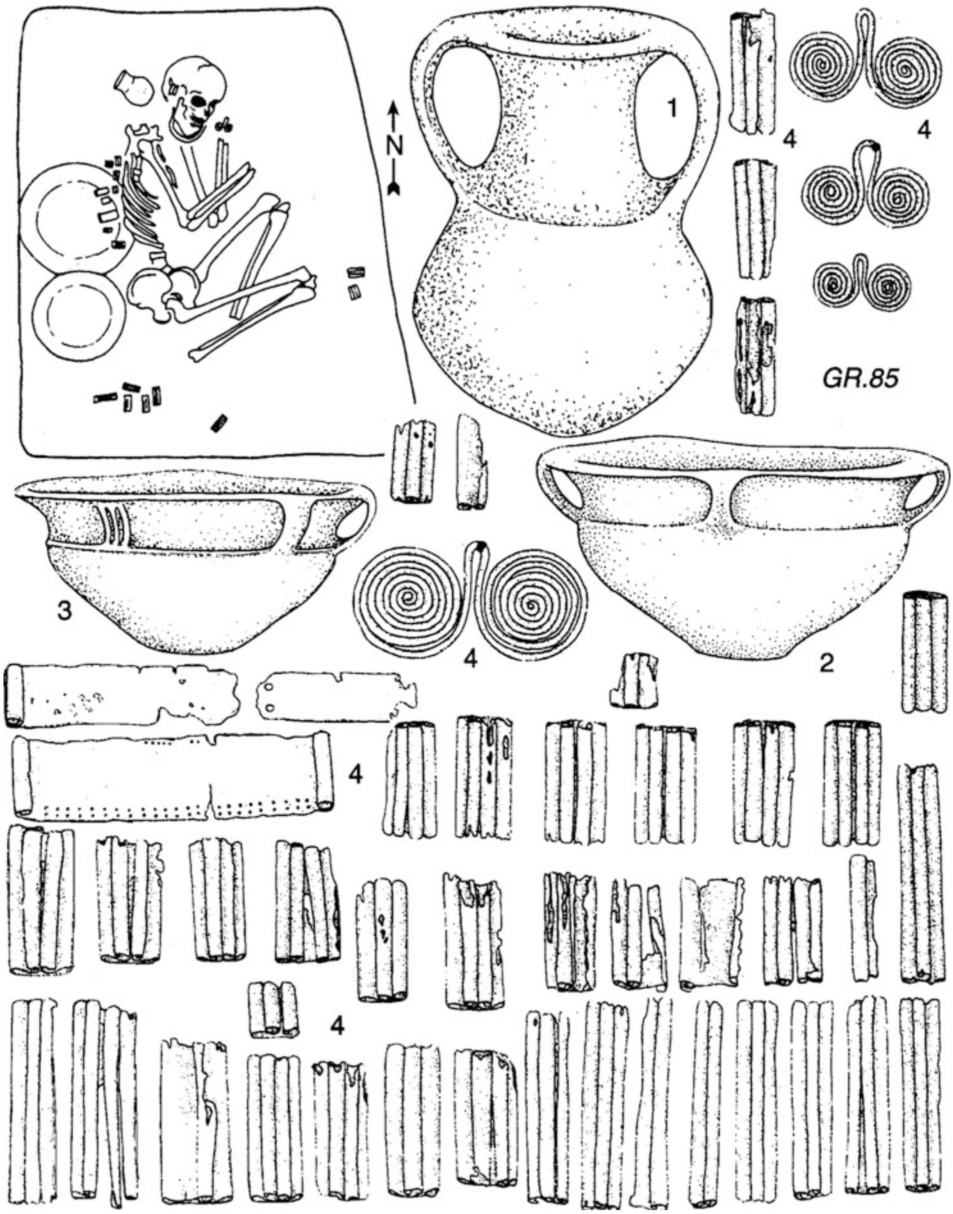

Fig. 10.14 Mokrin, Kikinda, northern Banat, Serbia: rich goods from grave 26 in the Early Bronze Age cemetery (Girić 1971)

the norm (Glob 1974). On the other hand, in more easterly parts of Germany, they were unusual. Much attention has been focused on two barrows in Sachsen-Anhalt, Helmsdorf and Leubingen, and on a set of barrows in western Poland at Łęki Małe (Fig. 10.17), where elaborate chambers were constructed under the barrow mound, and grave-goods included gold objects (Coles and Harding 1979:40 ff.). Barrows of the period in this part of Europe are not in fact as unusual as has been claimed, but these rich graves still attract special attention, as the burials of potential or actual chieftains in an otherwise largely undifferentiated society.

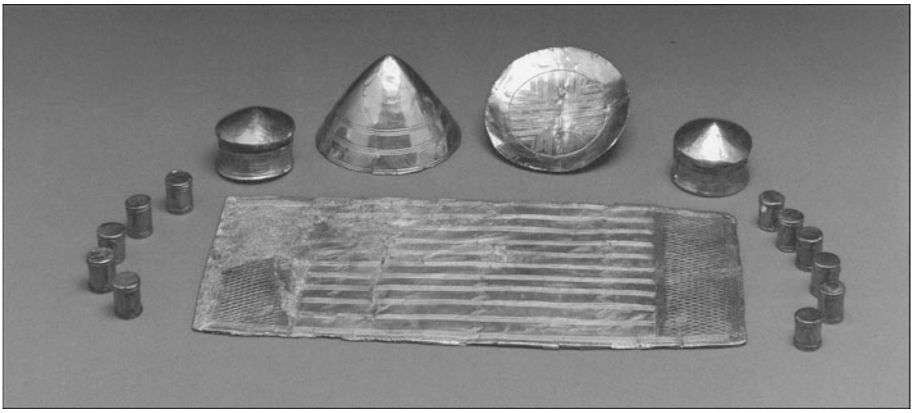

Fig. 10.15 Gold objects from the rich grave of the Wessex culture at Upton Lovell, barrow G.2(e), Wiltshire, southern England. (Clarke et al. 1985)

Fig. 10.16 Bush Barrow, near Stonehenge on Salisbury Plain, Wiltshire, southern England (Photo: Stuart Needham)

In a Middle Bronze Age context, where the standard burial mode was the barrow, little can be added. Instead of marked signs of wealth, there are indications that ornament sets were being used, and that such sets marked off the female inhabitants of particular regions (below). Some graves did contain swords or other special bronzes, suggesting that warrior elites were one part of Bronze Age society, but in general the degree of differentiation is not great (Fig. 10.18).

By the Late Bronze Age (Urnfield period), the burial rite had almost everywhere changed to that of cremation, with the consequent problems that this brings. Nevertheless, there are some cemeteries where it is possible to discern different provision of grave-goods for different categories of people. A cemetery that has been intensively studied is that at Przeczyce in Silesia (southern Poland), where a mixed burial rite was practised – mainly inhumation (unusually), but with some cremations also

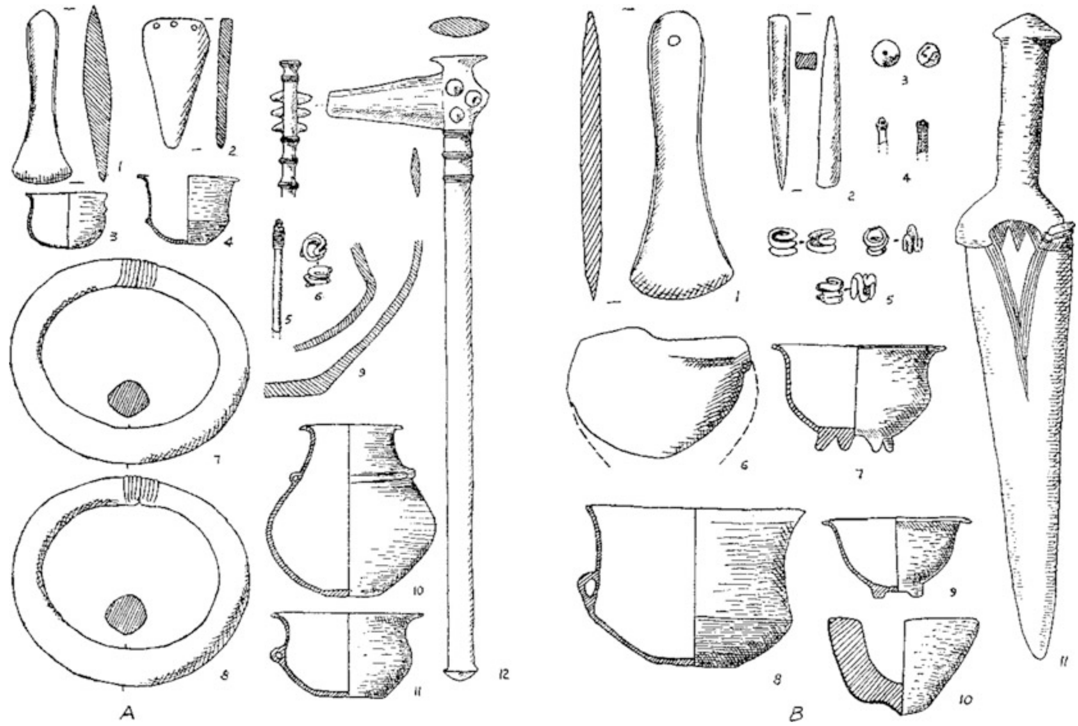

Fig. 10.17 Rich Early Bronze Age grave-goods from grave A, barrow I at Łęki Małe, Kościan, Poland. Note the metal halberd (no. 12) and the massive armrings (no. 5) (Kowiańska-Piaszykowa and Kurnatowski 1954)

(Szydłowska 1968–1962, 1972). What strikes one immediately, bearing in mind the rich metalwork of the period, is how impoverished these graves appear. They are only really rich in pots. Even where metal is present, it is usually only in the form of buttons or other small trinkets.

A very few larger items, such as a razor or a sickle, are present. Such a picture can be repeated over large parts of the Urnfield world, and strongly suggests that few people had access to items that can be construed as indicating wealth. This contrasts markedly with what is known of the repertoire of bronze objects of the period, in which elaborate weaponry, ornaments and vessels were widely produced. It also contrasts with those areas where markedly rich grave-goods were provided, or where the form and elaboration of the burial monument was especially marked, as in the case of the vaulted stone burial chamber at Seddin, or the enormous mounds at Håga near Uppsala or Lusehøj on the Danish island of Funen (Almgren 1905; Thrane 1984) (Fig. 10.19).

Burial thus varied greatly across the Bronze Age world. While the need to dispose of the dead was a common one, different people responded to the stimulus in different ways at different times and places. Frustrating though it can be for archaeologists trying to reconstruct aspects of prehistoric life and society, without this extraordinary resource they would be immensely impoverished. For all that, much remains to be discovered about Bronze Age attitudes to death, and hence to life.

Economic Life

The Bronze Age economy was, in Europe outside the Aegean area, essentially a subsistence economy. It is true that during the period industrial-scale production of metalwork began, and that exchange of raw materials and finished products assumed a considerable significance. But for most people who

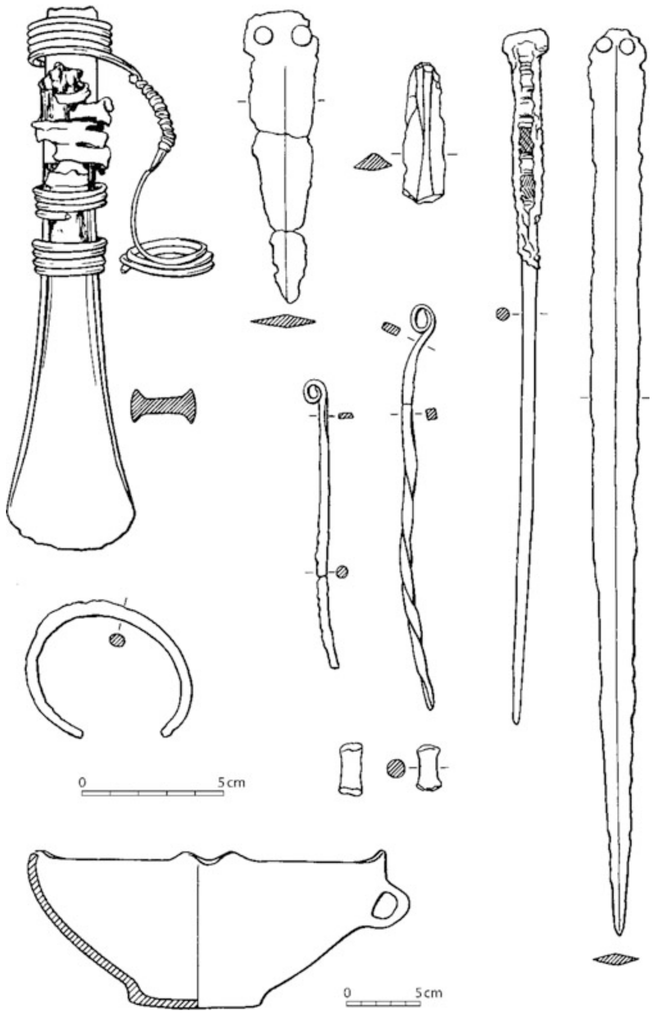

Fig. 10.18 Middle Bronze Age grave-goods from barrow 48 at Šťáhlavy, near Plzeň, Czech Republic (Čujanová-Jílková 1970)

lived in Europe, the primary concern, and the main occupation, was the tilling of the land and the tending of animals for the production of food and other primary materials. We can say this because most Bronze Age settlements are small, include abundant plant and animal remains and do not have evidence for metallurgical production on them.

In the Aegean, too, it is likely that many people were involved in food production. Archaeologically it is the palace sites that attract most attention. People who lived in palaces presumably did not till the fields themselves, but they must have relied on large numbers of people living in the surrounding countryside who did. These people tend to be invisible, because the small settlements in which they lived are not generally those that have attracted the attention of archaeologists.

That said, the evidence for production of food and shelter is not always present, and where present, is not always easy to interpret. The most abundant source of evidence is that formed by the remains of plants and animals found on settlement sites. The process by which foodstuffs may become preserved

Fig. 10.19 Kung Björns Hög (King Björn's Mound) at Håga near Uppsala, Sweden, a large and rich Late Bronze Age barrow (Photo: author)

in the archaeological record are somewhat haphazard; certainly there can be no one-to-one correlation between what was eaten and what survives. But if particular plants or animals can be shown to have been present on Bronze Age sites, then at least we know that they were available and potentially exploited. It is the relative abundance and importance of each species that remains a matter of uncertainty.

In terms of plants, it is mainly the cereal crops that are involved, though legumes such as peas, beans and lentils were also very important. Cereals – principally wheat and barley – were of course grown in fields. A field is simply an area of land used for cultivation, and it may be of almost any size. The larger the field, the greater is the need for aids to cultivation. The most basic method of cultivation is to use a hoe or mattock formed from simple sticks or branches to break up the weed mat on the ground surface (assuming that woodland had been cleared first), but this is very laborious and time-consuming. The use of a spade or shovel speeds things up somewhat, and traces of spade-digging have been found at Gwithian in Cornwall (Thomas 1970). What really makes a difference is to use a plow of some kind, with animals to provide the traction necessary. In a Bronze Age context, the only things that can be called plows are the simple pointed wooden implements more accurately known as ards (Glob 1951). A few examples have been found, from bogs in Denmark and lake-side sites in the Alpine area; a recent find from southern England was of a slightly more developed variety (*British Archaeology*, July 1997, 5). In addition, the marks made by these ards are also found on occasion, typically preserved under barrow mounds (Pätzold 1960) (Fig. 10.20). They can only have been moderately effective in breaking up the weeds, and very probably further work using mattocks and hoes would have been necessary. Implements like these must have been drawn by a pair of animals, probably oxen, and yokes are known. It is gratifying in this context to record that certain well-known panels from Swedish rock art depict plowing scenes, including one where the plowman appears to be holding a mattock.

The fields in which the crops grew are known especially well from parts of Britain (Fowler 1983), though they may perhaps be inferred from other areas. Fields are primarily defined by their edges,

Fig. 10.20 Lusehøj mound in south-west Funen: plan of the ard furrows under the excavated part of the mound (Thrane 1984)

and it is the walls or banks that formed the boundaries of fields that constitute our most prolific evidence. Especially in parts of central-southern England (Wessex), as also on the moorland areas of Dartmoor or the English-Scottish border counties, fields are highly visible either on air photographs or as surviving undulations (or even walls) in the ground. The situation on Dartmoor in Devon is particularly notable (Fleming 1988), with many surviving field walls, locally known as reaves. Large groups of fields survive there, which direct and indirect evidence demonstrates belongs to large-scale Bronze Age systems of land division; in Wessex there are also numerous examples. On Dartmoor the most distinctive individual fields are long and narrow, while in Wessex they are square or rectangular, and this raises the interesting question of exactly how and for what purpose they were used. While the Wessex fields were arguably well suited to arable agriculture, the Dartmoor strips seem much harder to envisage full of crops, or even animals. In practice, it is likely that the stone walls were merely the lower part of a more inpenetrable barrier formed by hedges and fences (in one case at Shaugh Moor the wall was found to overlie the traces of an earlier fence), and that animals were kept in the fields thus formed. The discovery of hoofprints at this same site seems to prove the point (Smith et al. 1981). The remains of fields occur, less frequently, in some other parts of Europe, notably the Netherlands, parts of Scandinavia and the Baltic countries (Fig. 10.21), and is increasingly being attested in other areas (e.g. Normandy: Marcigny and Ghesquière 2008).

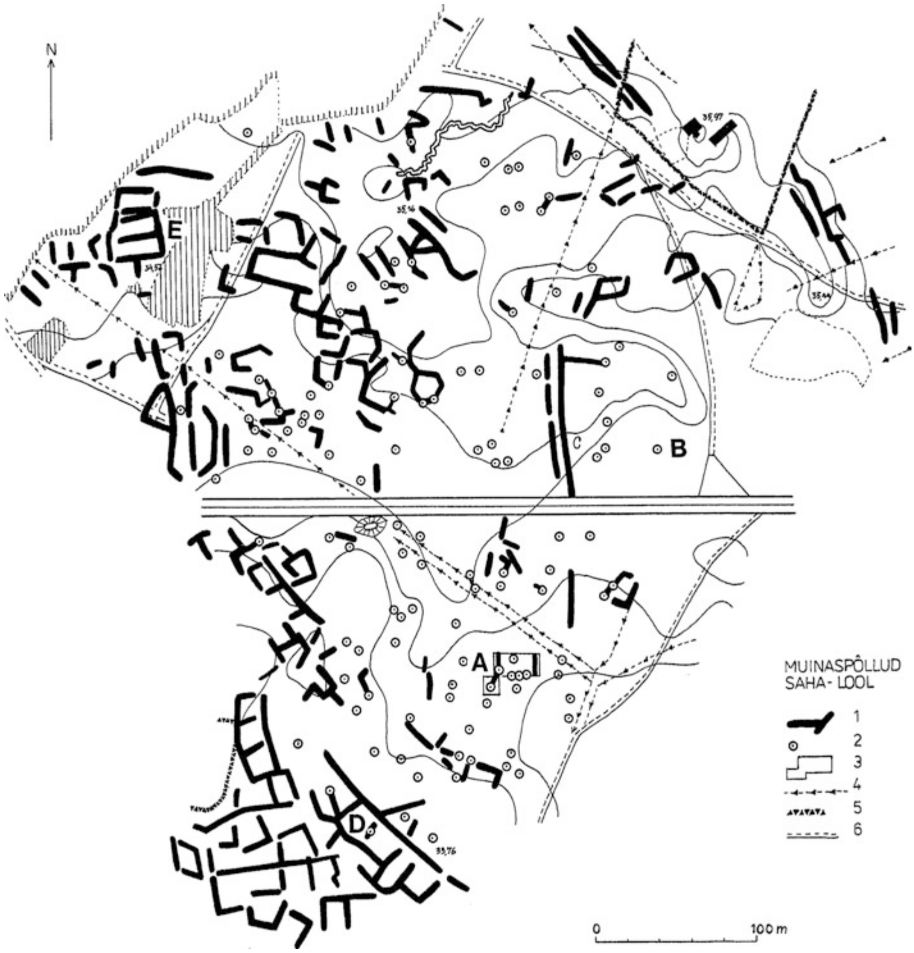

Fig. 10.21 Fossil field walls at Saha-Loo near Tallinn, Estonia, dating from the end of the Bronze Age and the Early Iron Age (Lang 1994)

The grown crop was harvested using a variety of bronze sickles, which survive in huge numbers in continental Europe, and brought in to be processed and stored. Finds of carbonised grain, the usual source of evidence on plant remains, are thought to emanate from the drying process. Storage took place in pits or above-ground structures (granaries), or in the case of a circular arrangement of pits at Twisk in North Holland, in corn-stacks (Buurman 1987).

In terms of the relative representation of plant species on Bronze Age sites, extensive information is now available (van Zeist et al. 1991) (Fig. 10.22) – though, as discussed above, one should not rely too much on plant *absence* as opposed to *presence*. What is clear is that wheat of one or more varieties, and particularly emmer (*Triticum dicoccum*), and barley were usually present (emmer and barley typically present on over 60% of analysed sites in central Europe). Other wheat varieties, and other cereals, were much less common (spelt wheat, rye, oats), though there is some evidence from Poland and elsewhere that rye was becoming common by the end of the period. Beans, peas and lentils were quite common, and again more so at the end than the beginning of the period. Millet (*Panicum miliaceum*) increased in frequency dramatically in the Late Bronze Age, a change which has been attributed to agricultural intensification, perhaps in connection with population pressure, since millet

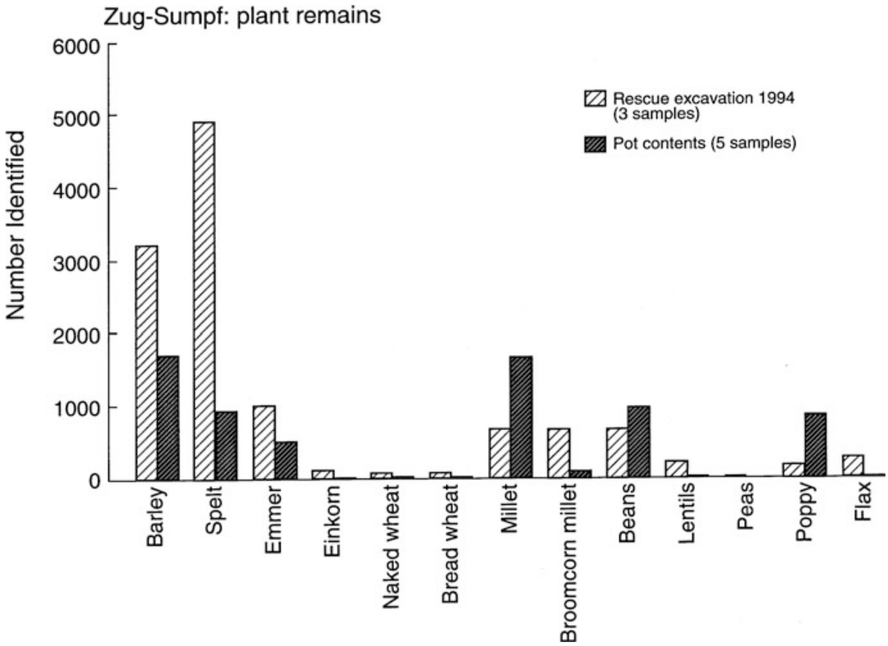

Fig. 10.22 Plant remains at Zug-Sumpf (Data after Jacomet and Karg 1996)

is tolerant of a wide range of conditions and grows fast (Harding 1989). Finally, a number of plants not usually thought of as foodstuffs were present in Late Bronze Age contexts, including poppy, flax, and false flax or gold-of-pleasure (*Camelina sativa*). Flax may have been used as an oil plant, but more likely it was being cultivated for linen production (refer above).

Through all of temperate Europe and parts of the Mediterranean as well, cattle were the commonest domestic animal, certainly eaten and no doubt used for milk as well (Bökönyi 1974, 1988). Exceptions to this rule are very few: at Runnymede on the Thames, or at Dresden-Coschütz, for example, there were actually more pig bones preserved than cattle or sheep, but cattle still formed the most important meat source, and the same is true for sheep and goats at the flint-mine site of Grimes Graves, Norfolk. In parts of the Mediterranean world, by contrast, sheep and goat must have been the most important food animal even though cattle were present: this certainly seems to have been the case in Iberia where on most analysed sites cattle rarely exceeded 20% of the faunal remains. It is also striking that in certain situations, for instance in parts of Serbia or Italy, large numbers of wild animals were killed and eaten. It is remarkable that in an area such as the Hungarian plain large animals such as aurochs were still present and occasionally killed; other species such as red deer and wild pig were a more regular part of the diet.

Trade and Industry

If subsistence was the crucial aspect of life for most Bronze Age people, there were places and contexts in which other areas of production played an important role. We have discussed the question of metal production above/below, and the way in which relatively large-scale production that merits the term "manufacturing" had become a regular part of the mode of operation of the bronzesmith by the Middle Bronze Age. Of course these were pre-industrial societies so that the idea of "industry" in a modern sense is quite inappropriate. Production was carried out in the domestic sphere and, with few exceptions, on a small scale. But in some fields of activity, notably copper production, a case can be made that the items being produced were turning from craft items into "commodities", that is, into things which acquired a meaning and a value over and above their significance merely as raw material transmuted into crafted objects (Shennan 1993). Commodities represent a different attitude to production and distribution. They imply something that can transcend the domestic and social sphere and enter that of "economics", where they can be moved and exchanged in a semi-formalised manner, where specific object-values are assigned, and on the basis of which the exchange operates.

The number of instances where one can observe these processes at work are rather few, but the movement of goods can certainly be demonstrated even where its social and economic context is not properly understood. These movements occurred in a variety of different milieus. On the one hand, it is possible to show that certain items travelled long distances – certain raw materials, for instance (amber, lapis lazuli in the east Mediterranean world, some metals) – and on the other, certain more mundane items were moved over rather short distances (pottery). The movement of certain personal items, such as razors, dress fastenings and ornaments, is especially interesting but likely to belong in the social sphere.

The cases of amber and lapis lazuli are very striking, coming from opposite ends of the Old World but occurring in the same contexts in Mycenaean Greece. The principal sources of amber are those usually called "Baltic", which means coming from deposits formed by the action of the ice-sheets of Tertiary geological age and occurring in greatest quantity on the coasts of the south-east corner of the Baltic, but also on the shores of Jutland. Artifacts of amber occur quite frequently in northern Europe from the Neolithic onwards, but what is most striking is that they are also found in Italy and Greece in the Bronze Age, and many have been shown through compositional analysis to be of northern origin. In Greece, the amber from the Shaft Graves of Mycenae is particularly noteworthy, but it occurs in many other sites of the early and middle Mycenaean period, and in lesser though still significant quantities in the late period (Harding and Hughes-Brock 1974). In Italy finds of amber are most common in the north, in contexts of the Terramara and related cultural groups. How did the material reach its eventual resting place in the far south? Clearly it was brought there by humans, since there is no known way in which natural processes could have caused the transport to Greece and Italy. Did trading parties from the south go to northern sources or entrepôts? Did northerners go south with their cargoes of the precious substance? Or should one rather look to movement within local communities stretched out over the long route between the Baltic and the Mediterranean? All of these have been suggested, without any conclusive solution having been reached.

There are a few clues which might help us make a decision on the matter, however. The forms of amber beads in Greece include a number of highly specific types, most notably the "spacer-plates" that were apparently used to separate the strands of a multiple-string necklace (Harding and Hughes-Brock 1974; Harding 1984). These rectangular plaques have parallel perforations going through them and, in a number of cases, connecting perforations in the shape of V at the edges. Such V-perforations are a specifically northern trait and not part of the Aegean repertoire. Furthermore, the V-perforated spacer-plates are at home in two areas of the north: southern Britain and southern Germany (with a few in adjacent areas). They do not occur further south or east. It seems quite beyond belief that such a specific form, in such an unusual material, could have been invented twice, or created independently in the south. In other words, these objects were made in the north (and there are reasons to believe that Britain was the place of manufacture) and transported thousands of kilometers across Europe to Greece (a sea journey across the Bay of Biscay and through the Straits of Gibraltar, while theoretically possible, seems less than credible).

The case of lapis lazuli, which is only found in the Badakhshan province of Afghanistan, is a somewhat similar case (Herrmann 1968). There is good evidence from the texts of Mari and elsewhere to point to the movement of various materials in caravans across the Syrian Desert towards the Levant, and lapis lazuli probably also came by this means. This may also be one of the routes by which tin reached the East Mediterranean. Trade in the Near East was a highly organised affair, and took place both within the context of palace organisation and through independent traders (depending on area and period); it is unlikely that European Bronze Age trade worked like this.

These two instances, both remarkable, are concerned with the movement of rare materials over long distances. But there are plenty of other cases of much more mundane substances and objects being moved. In general pottery was made locally and only moved about in the vicinity of production (perhaps over a radius of some 10–20 kilometers), but in the Mediterranean there are plenty of cases where special pot types were moved much further than that. This is most evident in the case of Mycenaean pottery, which is frequently found not only in the Levant and Cyprus, but also in Italy and Sicily, and in a few instances in Sardinia and even Spain (Marazzi et al. 1986; Martín de la Cruz 1988). Some caution is necessary in dealing with these finds however as in the later part of the Mycenaean period the pottery was being produced locally in these areas. But in the earlier period it is unlikely that the pots were traded for their own intrinsic value but rather for the substances contained within them – often assumed to be perfumes, spices or oils. Other instances may be the Maltese pots found at Thapsos on Sicily and the Sardinian ones at Lipari in the Aeolian Islands (Leighton 1999), or the finding of Beaker pottery, presumed to be Spanish, in Morocco (Harrison and Gilman 1977).

Bronzes too were sometimes moved considerable distances. Here it is necessary to distinguish those items that may have been moved in exchange from those which accompanied the movement of people. Personal items, as mentioned above, and weaponry (especially swords) may fall into this category. On the other hand, the finding of particular tools and other objects a long way from their area of production is suggestive. Bronze vessels, for instance, are believed to have been made in central Europe, but have frequently been found in southern Scandinavia (Thrane 1966, 1979); a variety of Breton palstaves have been found in the British Isles (Burgess 1969); and Irish flat axes are found on the continent (Megaw and Hardy 1938). All these finds suggest that there were mechanisms for the dissemination of individual objects or groups of objects over considerable distances. At the same time, one needs to know where particular metal forms were created. Axes of the Stogursey type in southern Britain, for instance, are distributed quite widely from mid-Wales to East Anglia and Kent (with a few examples in France), but moulds for them are found on five separate sites in two quite different areas: in the Thames Valley/central Wessex and in Cornwall (Needham 1981). They may also have been produced in Somerset, where the eponymous hoard is located, though no moulds are known there. This indicates that before a complete picture of Bronze Age metal exchange can be obtained, a true understanding of production and distribution methods is essential.

Finally, a word about the movement of goods over water, as demonstrated by shipwrecks, is necessary. A number of remarkable wreck finds have been made in recent years. The Ulu Burun wreck off the south coast of Turkey, which went down not long before 1300 BC, has provided unsurpassed information about the movement of goods, especially metals (copper and tin) in the east Mediterranean; this ship also contained many other rare finds, such as cedar and ebony wood, glass ingots, terebinth resin, elephant tusks, hippopotamus teeth, tortoise carapaces and ostrich eggshells, quite apart from the finished artifacts such as Canaanite amphorae, gold Canaanite jewellery, Egyptian objects, faience cups, bronze weaponry and a Balkan ceremonial sceptre-axe (Bass 1987; Bass et al. 1989; Pulak 1997, 1998; http://ina.tamu.edu/ub_main.htm, accessed 20 April 2009, with full list of references). Objects from a whole series of East Mediterranean cultures are represented, as well as possible Balkan and Sicilian items, which make the determination of the ship's origin and destination difficult; but certainly its ports of call must have included the Levantine coast, Cyprus and places in the Aegean. It was an immensely wealthy cargo, and the personal items on board suggest that high-status individuals were on board. Rather less grand is the cargo, assumed to emanate from a shipwreck, from Langdon Bay, near Dover (Muckelroy 1980, 1981). Most of the bronzes found there are of continental types, and most are broken or fragmentary, suggesting that this was scrap metal being transported from or through France.

Exchange seems to have been a regular and highly important aspect of Bronze Age life, over both long and short distances. A variety of technological solutions were available for the transport of goods, but equally important were the social mechanisms that existed with the cultural groups of Europe and the Mediterranean that enabled the exchange of goods and finished products to take place.

Metals and Metallurgy

As the name suggests, the Bronze Age saw the rise to prominence – not, of course, the invention, which occurred in the Neolithic – not only of the working of metals, principally copper, but also gold and silver, with tin and lead mainly being used in alloying with copper. The rise in importance of metallurgy had many consequences, technological, economic and social: technological, because a series of new skills became necessary and commonplace; economic, because both the raw materials and the finished products were abundantly available; and social, because the effects of new artifact types introduced the possibility of new scales of values, and new possibilities for the demonstration of social divisions.

Raw Materials and Extraction

Sources of copper and gold are, or were, not uncommon in Europe (Muhly 1973; Lehrberger 1995). Most attention has generally been focused on major deposits such as those of Cyprus, Transylvania, Rio Tinto in southern Spain, the Alps or the Erzgebirge (Ore Mountains) of central Europe, but in fact numerous other sources exist, some of them very small and not commercially viable in recent or historic times. Locally, some Bronze Age groups may have experienced the need to import copper and gold from some distance, for instance those in lowland Britain, the Hungarian Plain or Denmark, but in general the distances involved were not particularly great (typically up to 300 kilometers). In the East Mediterranean, however, where major centers based on palaces were present, both needs and means were very much larger than in continental Europe (Stos-Gale and Macdonald 1991). The shipwrecks of Cape Gelidonya and Uluburun illustrate graphically the existence of a trade in metals in this area (Bass 1991).

Nothing quite like these extraordinary finds exists in the rest of Europe, though other shipwrecks exist in the English Channel, off the south of France and in the Huelva river in southern Spain, and these were carrying bronzework that may have been part of a movement of metals from metal-rich to metal-poor areas. On the other hand, there is evidence both from artifact distributions and from analytical results to suggest how and where metal was moved. The distribution of the so-called ingot torcs (better known as ring ingots) is highly suggestive, since it appears to show a movement of metal northwards from the copper sources of Austria and Bavaria (Bath-Bílková 1973; Harding 1983). Analytical work on British metal objects and ores suggests that while local sources (e.g. the important copper deposit on the Great Orme, north Wales) supplied parts of Britain during the earlier part of the Bronze Age, metals from the continent and in particular the western Alps were normally used in the later part of the period (Northover 1982).

Given this multiplicity of sources, it might be expected that local people would have used local methods for the extraction and working of the metals, but in fact practice seems to have been remarkably consistent across large parts of Europe. Most is known about a very few sources, those which through luck have had their working methods preserved and investigated, such as the mines of Mount Gabriel and Ross Island in south-west Ireland (O'Brien 1994, 2004), the Great Orme in north Wales

(Dutton and Fasham 1994) and the Mitterberg area of the Austrian Alps (Zschocke and Preuschen 1932). At the Great Orme and the Mitterberg, deep shafts were cut into the ore-bearing rock, sometimes to considerable depths (100 meters on occasion). The principal method was that of fire-setting, that is, heating the working face of the rock and then quenching the fire; the stresses caused by this process formed cracks in the rock, from which blocks could then be prised out. Those blocks that contained significant quantities of ore were then crushed with hammers and the ore collected up, usually by hand but in some instances apparently by using a water device which allowed the heavier metal particles to sink more rapidly than the waste material. In many sites that were used in prehistory for ore extraction stone hammers are found, typically consisting of rounded stones up to 20 centimeters long, with a "waist" or contraction at the mid-point, which is presumed to have been where a rope was tied around so that the implement could be swung at the surface of the rock being worked (Gale 1990, 1991a).

It is hard to overestimate the importance of these mines, or the technological difficulties that had to be overcome (O'Brien 1996). Not only are the shafts and adits rather narrow, giving minimal space to swing hammers and picks, but the problems of drainage, lighting and ventilation must have been considerable. If fire-setting was used underground, as is claimed for Austria, a major consideration would have been the extraction of the smoke. The Austrian mines have produced abundant evidence for water channelling, pit props and supports, ladders, buckets and troughs, and other equipment. Apart from anything else, the requirements for timber must have been considerable.

Ores that occur on the earth's surface are typically oxidised and brightly coloured; malachite and azurite are the commonest. Much larger deposits are to be found deeper down, however, either as sulfur-bearing ores such as chalcopyrite or in the "secondary enrichment zone" between the oxidised surface and these deeper ores, where the grey-colored ores known as *Fahlerz* are found. Many deposits have several different ores and minerals present, so that the visible presence of one could have led naturally to the discovery of others. Bronze Age prospectors must have had an intimate knowledge of rock forms, no doubt drawing on the centuries of experience over which stone was extracted for axe manufacture in the Neolithic.

After extraction and separation of useful material from waste, the ore had to be smelted in a furnace (i.e. chemically converted to a useful form). Where the ores were sulfur-rich they first had to be roasted in an open bonfire in order to remove sulfur compounds and convert the ore to its oxidised form (Tylecote 1976). Furnaces consisted of single or multiple bowl-like features, over which a clay superstructure was built to contain the ore and the charcoal. During smelting, a chemical change takes place, with the unwanted constituents of the ore either escaping as gas (carbon dioxide) or concentrating in the slag (principally iron), which is tapped off (i.e. allowed to run out). The copper sinks to the bottom of the furnace, where it can be collected in the form of a plano-convex ingot (rounded on the underside, flat on the upper side).

In the Mediterranean, the pure copper was formed into ingots of a special form, the so-called oxhide ingot, basically a rectangle with projections at each corner (Buchholz 1959; N.H. Gale 1991b). Although one mould for such an ingot has been discovered at the Syrian palace site of Ras Ibn Hani (Lagarce et al. 1983), this is not a primary production site such as is known from Cyprus. Oxhide ingots may have been created specially for the movement of copper. Such ingots are depicted in Egyptian wall paintings and actual finds (or fragments of them) have turned up in both the Black Sea off Bulgaria, and in a hoard of bronzes in south-west Germany (Primas and Pernicka 1998). This find has yet to be fully understood, but it appears to suggest that the trade in Mediterranean metals reached north of the Alps.

A word is necessary here about tin, the main metal used for alloying with copper to make bronze (though lead was also used extensively for this purpose in the Late Bronze Age). All the known substantial tin sources accessible to Bronze Age technology are found in western Europe, most notably Cornwall but also Brittany and Spain (Muhly 1973, 1985, 1993; Penhallurick 1986). By contrast, no large and accessible sources were available in east-central Europe or the East Mediterranean.

Bronzesmiths there regularly added up to 10% tin to their bronze, however, so supplies were evidently reaching them. In this connection, it is notable that the Ulu Burun ship contained a number of tin ingots in addition to the copper ones, though whence they emanated is still unknown. Possible candidates include southern Turkey (the Taurus Mountains), and Afghanistan, where tin is certainly present in large quantities, but where the great distance involved might reduce the likelihood of systematic Bronze Age exploitation. In any case, neither of these sources solves the problem of the large amounts of tin that were present in the huge bronze hoards of Hungary and Transylvania, and to which smiths clearly had access.

Production and Movement of Metal Goods

Once the smith had obtained his raw metal in ingot form, he was ready to proceed to the next stage, the manufacture of objects for use. Before he could do that, however, he had to decide on the alloy he was going to use – except at the very beginning of the period, when more or less pure copper was used. The addition of certain minerals, particularly tin, is useful in the working of copper because it reduces the temperature at which copper melts and it increases the hardness of the finished metal. Other additives, such as lead (which was commonly added in the later stages of the Bronze Age), do not increase the hardness and may have been used principally as a means of bulking out the available metal. The choice of an alloy was evidently important to Bronze Age smiths, because analyses have shown that different alloys were used for the production of different artifacts (Ottaway 1994:134).

The smith also had to master the arts of pyrotechnology. The melting point of copper is 1083 degree Celsius, which required an enclosed furnace and forced draught. Little is known from Europe about the form of such furnaces, though examples survive from Timna in Israel which are probably similar to what was used in Europe. Occasionally the scanty remains of the bowl-like bottom of a presumptive furnace turn up, as on the island of Kythnos in the Aegean or at Mühlbach in the Austrian Alps. For smelting, a chimney-like superstructure of clay would have been most appropriate, with charcoal, ore and a fluxing agent (iron oxide or sand or both, depending on the rock matrix) placed inside. For melting smelted copper in a crucible, a bowl furnace would have been used. In either case, tuyères would have been placed through the walls for the insertion of bellows; crucibles were handled either by tongs or (as Egyptian wall paintings show us) by means of staves. All these items survived (albeit rarely) or are depicted; their absence in any given area does not mean they were not present. The processes involved were constrained by the available technology and materials, so that there is relatively little room for variation.

The development of artifact form and complexity was dependent on the parallel development of a mould technology, since only rather simple objects can be made solely by the forging (hammering) of hot metal. So it is possible to trace a sequence of mould forms that illustrate both the techniques utilised and the artifacts produced, going from open one-piece moulds carved onto the sides of stone blocks (or no doubt sometimes on living rock in the open air), through moulds composed of two identical halves made first of stone and later of clay, to more complex or intricate forms which used the lost wax process, and which might create separate parts of larger objects, the parts subsequently being joined by means of "overcasting" or "running on". Allied to this was a series of other technical developments that enabled the production of hollow objects, such as sockets by means of clay cores, valves that helped to produce perfect castings by allowing an even distribution of molten metal through the mould, holes for the escape of gases and so on.

By these means, a substantial range of forms was produced, a range that increased over time. In some instances it is clear that the same stone mould was used to produce numerous identical objects; still commoner was the practice of using the same master object to produce clay moulds that resulted in sets of identical end products in bronze. Unlike stone moulds, clay could only be used once; the mould was broken open after the casting had taken place. As a consequence, there are areas of Europe – particularly western Europe – where large numbers of such broken moulds are known. Equally there are others where they seem not to occur at all in spite of the frequent presence of large hoards of bronze implements; an explanation for this apparent lack is not readily available.

The final stages in the production of bronze objects consisted of the removal of the flashes and seams that were present where the molten metal had run into the edges of the mould and out of the venting holes, and the polishing of the object along with the addition of any required decoration that the mould had not produced. A certain amount of hot forging might also have been undertaken to produce sharp edges, to thin blades, or to bend items to a required shape. Even the least sophisticated of Bronze Age implements will have undergone these processes, while the elaborate decoration of some pieces is the result of extensive treatment using punches, chisels, gravers and the like. Wire-drawing was practised by pulling red-hot metal through draw-bars; thin sheet was produced by hammering metal bars on an anvil; bosses, dots, rosettes and similar motifs were produced by pushing the sheet into wooden forms (*repoussée* technique). The armoury of techniques available to the Bronze Age smith was considerable.

If moulds are in short supply in some areas, hoards (collective finds) of bronzes are not (Fig. 10.23). This phenomenon – hoarding – has been much studied and debated over the years, and has much to

Fig. 10.23 Part of a bronze hoard from Gilmonby, near Barnard Castle, north-east England (Photo: The Bowes Museum)

tell us about both the methods of operation of the smith, and the position of metals in Bronze Age society. In earlier decades it used to be thought that many, if not most, hoards of bronze resulted from the practices of peripatetic smiths, travelling from village to village and storing their stock in a safe place between visits. This view, which appeared to account neatly for the fact that many hoards consist entirely of broken objects, sometimes including metal-working tools such as hammers and anvils, has been challenged by some scholars on the grounds that ethnographic parallels are unconvincing or absent altogether; the closest parallels relate to iron-working in modern Africa, which cannot appropriately be compared with Bronze Age Europe. In any case, how would it come about that so much metal would have been lost to the people who buried it? It might be reasonable to imagine that some smiths failed to return to their buried stock, either because they forgot where it was or because fate in the form of the Grim Reaper intervened; but it seems to be stretching credulity much too far to imagine that this occurred in hundreds or thousands of instances. Instead, interpretations today tend to focus on the notion that these collections of bronzes were deposited intentionally, most of them in places where they could not have been recovered even if the depositors had wanted to. This naturally raises the question of why such deposits should have been made, to which the answer can only be that we do not know, but we assume it must be connected with ideas of the symbolic and the other-worldly, in other words, ritual. We return to this matter later.

Copper and bronze were by far the commonest metals used in the Bronze Age, and for that reason they were probably the most important in economic terms. The great bulk of bronze objects was used for mundane objects such as axes, sickles or other tools, but a sizeable number were weapons (swords and spearheads) and ornaments or dress accoutrements (rings, pins, fibulae (safety pins), bracelets and so on). Sometimes such objects were elaborately decorated and finely finished. A still smaller class of objects may be counted as prestige or art objects, and represent the finest flowering of the bronzesmith’s art.

But the use of gold, which started as early as that of copper, was perhaps more spectacular than that of bronze. Gold is not, or was not, rare in Europe; substantial deposits were available in eastern Ireland and in Transylvania, but smaller deposits are found widely in the Balkans, Spain and elsewhere, and were probably exploited through “placer mining”, essentially the use of alluvial and water-borne media through panning and the hand-picking of pebbles in river deposits. Gold melts at 1060 degree Celsius which might seem to make its metallurgy comparable to that of copper, but in practice gold objects would not have been made by casting. Gold is much softer than copper and is therefore best treated by means of hammering and cold working. By this means, a large array of spectacular objects was created during the course of the Bronze Age, ranging from the technically simple but visually impressive crescent-shaped neck ornaments or “lunulae” of the Early Bronze Age, to the highly elaborate and profusely decorated vessels, bracelets, diadems and gorgets of the Late Bronze Age. A magnificent hoard such as that from Villena near Alicante in south-east Spain illustrates the heights of technical and artistic achievement that Bronze Age goldsmiths attained.

What were the circumstances in which smiths operated, whether producing objects of high art such as these, or lowly axes and knives? Here much depends on context. In the palace societies of the Aegean, smiths seem to have operated at least partly under the control of the central administration, to judge from Linear B archives which record the distribution of bronze. It is also clear that there was a different attitude to the curation and collection of metal in that area, since unlike in continental Europe hoarding was not the normal practice, and most scrap metal was collected and reused. The extremes of wealth as measured in terms of material possessions (most notably in the Shaft Graves of Mycenae) indicate the existence of a substantial number of supremely able craftsmen who were able to tap into supply routes for exotic materials to produce large numbers of objects in gold and bronze, as well as in silver and niello (silver-copper-lead-sulfur mixture). Outside Greece, however, things may have been rather different. Clearly in some areas at some periods, smiths were working to make objects that enhanced the prestige of their owners, objects of little or no practical use; the fine weaponry and personal items deposited in a rich grave like the "King's Grave" at Seddin in north Germany are examples (Kiekebusch 1928). But elsewhere, production of everyday metal objects was a normal craft activity, essential for the maintenance of the practices of subsistence, shelter and defence. We know nothing about the status of the smith in the Bronze Age world, though history and ethnography might suggest to us that smiths were highly valued, if feared, members of society. In mythology smiths such as Hephaistos, Vulcan or Wieland are lame, perhaps a device to indicate that they were somehow different, possessed of special knowledge that was restricted in distribution yet essential for society, and yet unable to escape the society that needed them (Forbes 1950). In practice, we do not actually know that smiths were full-time specialists, though by the Late Bronze Age it is likely that they were, simply to account for the huge quantities of material involved. But how their activities were structured and ordered, how decisions on what to produce and when to produce it were taken are matters that lie beyond our reach.

Craft Production

People in the Bronze Age were active in many fields of craft production. Some, such as potting and woodworking, while undoubtedly important, were not unique or original to this period, and certainly lack the glamour associated with the working of gold or copper. Others, such as the production of faience and glass, were inventions of the period, and in still other cases, such as textile production, particular changes occurred during the course of the period.

Wood, Bone and Antler

Wood was a material of major importance in all periods of the past, for the production of artifacts, for building and for fuel (Coles et al. 1978; Taylor 1981). Only in areas with abundant and readily available stone was its architectural importance at all diminished, and even there it must have been used for superstructural elements. The working of wood was therefore a major activity, which means that woodworking tools for the use of carpenters were highly important – hence the abundance of axes and chisels in the Bronze Age, as well as (rather infrequently) saws, files and other implements. But wood, like other organic materials, survives only exceptionally, typically in wet situations, so that the sources of evidence are restricted. But a glance at the material recovered from the Alpine lakes of Switzerland, or the Somerset Levels in south-west England, illustrates for us how superficially mundane or unimportant finds can transform our knowledge of the past.

In Somerset and other areas of north-western Europe, wood was used for many purposes but above all for the building of trackways across wet or boggy ground (Orme and Coles 1983, 1985). There were specific techniques for trackway construction, based on hurdles, planks or brushwood, but these depended on the utilisation of particular types of wood – not only particular wood species, but wooden poles grown in managed forests and cut to specific lengths and diameters. The Eclipse or East Moors trackways were hurdle tracks made mainly or exclusively of hazel rods, fast grown and cut from coppiced trees. Similar conclusions may be drawn from other tracks where oak, alder, birch, ash or willow were used to a greater or lesser extent. In other words, the track-builders had at their disposal significant areas of woodland which they were managing in very specific ways.

In terms of volume, it is the lake-side sites of the Alpine area that have produced the largest quantities of wood, along with extensive evidence of how it was worked (Perini 1988). Enormous quantities of wood were needed for the piles that were inserted into the lake mud, and for the platforms and buildings that were constructed on them. Even a site of limited extent involved the felling, transport and working of hundreds of trees for these constructions. They also required the production of a variety of specific elements for tying the wooden members together – pegs, "shoes", mortices and tenons and other forms. House walls were typically post-framed, the posts infilled with wattle and daub, but planks and beams were also used. Good evidence for Bronze Age woodworking techniques comes from certain grave chambers such as that at Kupres in Bosnia, where a remarkable wooden box or cist was recovered, made of elm planks that were fastened in position with wedges (Benac 1986).

There were also many artifacts made of wood, of which bowls, buckets and other containers are the most remarkable, along with the extraordinary troughs used in salt production (below), and coffins or boats. But wood was essential too for agriculture: with the exception of sickles, there are few bronze implements used for the various processes of cultivation. Instead, hoes, mattocks, shovels, rakes and ards were made of wood (or sometimes of antler).

Bone and antler were also abundant, but unlike wood they generally survive well. Many sites from all across Europe illustrate the range of large and small objects which were made from them: hafts and handles, hammers and mattocks, points, arrowheads, polishers, spatulae, spoons and many other items. Especially in Hungary a sophisticated bone industry developed, particular bones being preferentially used for particular tool types (Choyke 1983; 1988).

Salt

Salt production was widespread in the prehistoric world, far more so than has commonly been appreciated (Nenquin 1961; Alexander 1985). This is largely because the remains of salt working are slight and easily misinterpreted. Yet salt is a basic biological need which many diets, especially those involving little meat, are not capable of supplying in sufficient quantity; the addition of salt to food in cooking, while apparently done for reasons of taste, actually serves a more fundamental need. Salt is also important as a preservative for food and may be used in certain processes such as tanning.

The archaeologically recognisable remains of salt working usually come in the form of coarse clay receptacles and other forms, known as briquetage (Fig. 10.24). These objects were used in the process of evaporating salt water by heat, and consist of trays, pans or chalices for holding the water, and pedestals for supporting them over a fire. In some parts of Europe, however, where salt springs are abundant but no briquetage is known, the evaporation may have been done in the open air in clay-lined ponds. In Romania, for instance, there is good evidence that Neolithic sites in Moldavia concentrated around salt springs, while the abundance of such springs in parts of Transylvania suggests a widespread importance of the resource in ancient as in modern times; yet no briquetage is known. On the other hand, many parts of Western Europe, particularly eastern parts of Germany, France and England, have produced abundant briquetage. The sites around Halle are especially prolific in these materials (Riehm 1954; Matthias 1961, 1976).

A remarkable development of recent years is the identification of a series of wooden troughs found in salt-rich areas of Romania and southern Ukraine (Cavruc and Harding 2008). They are perforated with a row of holes along the bottom, the holes being filled with wooden plugs that are themselves perforated, presumably to allow salt water to trickle through (Fig. 10.25). Although the technology by which these objects functioned is not yet properly understood, it appears that the troughs were regularly used and reused over decades or centuries in a process of concentrating brine to produce crystalline salt.

In the Iron Age, the great sites of Hallstatt and the Dürrnberg bei Hallein lie beside major salt sources, which (it is assumed) accounted for their wealth and importance; archaeological work at the Dürrnberg has resulted in the production of large quantities of organic and other material from the mine shafts. What is less well known is that the Hallstatt mines also include a sizeable Bronze

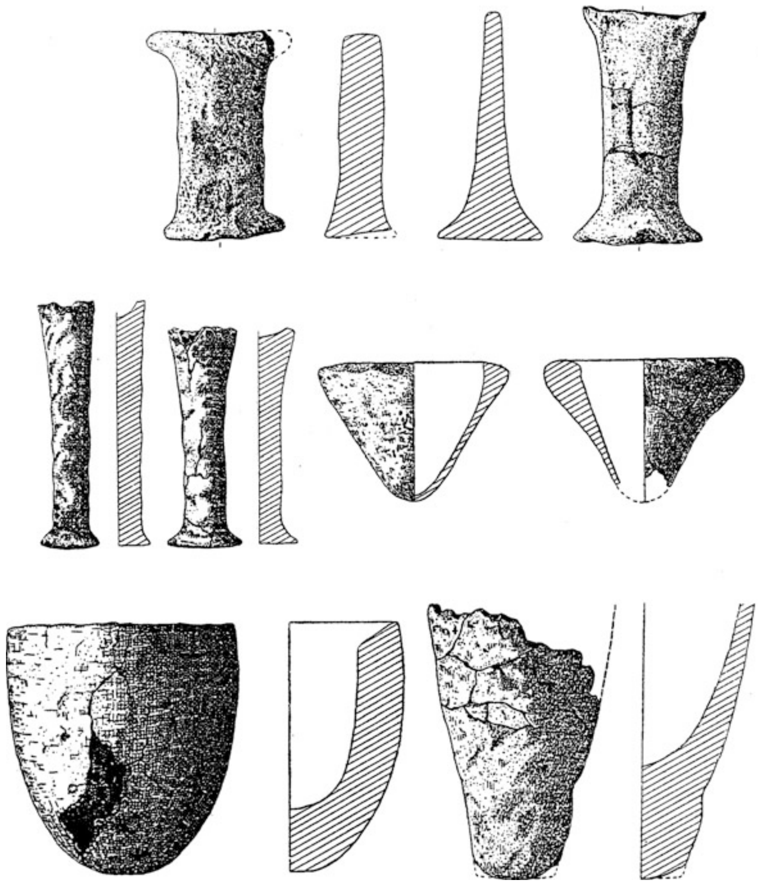

Fig. 10.24 Salt-making vessels (briquetage) from various sites in central Germany (mainly along the Saale valley) (Matthias 1961)

Age component, as radiocarbon dates have shown (Barth et al. 1975). This fact has considerable significance when one comes to consider the origins of the Hallstatt cemetery complex and its position in the world of the mid-first millennium BC.

Textiles

Textile manufacture was by no means new in the Bronze Age, but it assumed a new importance, and new materials and techniques were developed during the course of the period (Broholm and Hald 1935/1940; Hald 1980; Barber 1991; Bender Jørgensen 1992). Generally speaking, two raw materials were used: wool and flax, though other fibres were sometimes used for specific purposes (tree bast for cord, for instance, clematis for rope and grasses and nettles for other special items). It is not easy to be sure of the true Bronze Age distribution of wool and flax, because of survival factors: generally speaking, where wool survives it is in graves (particularly in oak coffins) but it is not present in the Alpine lake sites; with flax it is the converse. This gives us a picture where flax (i.e. linen) seems to be found in the south and west of Europe, and wool in the north, but that is undoubtedly misleading.

Fig. 10.25 Pine trough from Figa, near Beclean, Romania, used in connection with salt production (Photo: author)

Sadly, next to nothing survives from the Aegean area, even though frescoes show us how rich costumes and drapes must have been.

The ubiquitous presence of sheep throughout Europe – large flocks are recorded on the Linear B tablets of Knossos – illustrates how abundant wool was. Flax is recorded in many parts of Bronze Age Europe, though it seems not to have been cultivated on a regular basis until the later second millennium BC. What are interpreted as flax retting pits, in which the fibres would be softened and made more pliable, have been recovered in a few instances. Wool would also have needed pre-treatment in the form of washing, fulling and carding, though these processes cannot be specifically reconstructed from the available evidence. The process of spinning the cleaned fibres into thread is however very evident from the abundant finds of spindle-whorls that occur widely throughout the continent.

The general principles of textile manufacture are well understood, which means that the technology of the archaeological finds can be reconstructed with some certainty. Most textiles must have been made on conventional upright looms, though apart from the occasional post setting all that survives of these are the weights that hung at the bottom of the warp threads. Some of these were very large, weighing 3 kilograms or more, and must have belonged to looms that were capable of producing very sizeable lengths and widths of cloth.

The fabrics in the earlier part of the Bronze Age were all of the type known technically as plain weave or tabby, in which the warp and weft threads cross each other alternately in regular sequence. This results from a simple process of threading each weft thread in front of or behind each warp thread alternately, with each row having the opposite alternation to the one above it. Thus far the matter is quite basic and uncomplicated; but matters become more complex when one considers the way in which the thread is twisted and plied. These technical matters might be considered mere details, but it has been shown that this was not the case: there were specific patterns followed in different parts of Europe at different times. Especially detailed information is available from Denmark, where a difference can be seen in Period II between areas north and south of the Limfjord, and between Periods II and III. Later on in the Bronze Age other weave patterns were invented, notably twills, in which the weft threads are passed over or under two or more of the warps, shifting one warp sideways in each successive row. This gives a particular patterned effect, as may clearly be seen from a fabric like that from Island McHugh in Co. Tyrone. Other special effects could be achieved by using special fibres, as with the belt tassel of horse hair from Cromaghs, Armoy, County Antrim, Ireland (Henshall 1950). Cloth types, in other words, had become a means of expressing identity, to add to the others available based on the form of clothes, on ornaments and on decoration.

As well as cloth textiles, there were various special forms used to make caps and hair-nets, cords and sashes. Arguably the most famous item of Bronze Age dress in Europe is the skirt worn by the young woman buried in a coffin at Egtved, Jutland, made of a heavy cord formed from groups of twisted theads caught at the bottom by a spacing-cord and then rolled up into loops – a highly unusual means of creating a garment in any age, and certainly unique in the Bronze Age.

Glass and Faience

A curious by-product of the advances in pyrotechnology that occurred with increasing sophistication of metalworking was the invention or introduction of two substances which were completely new to Europe in the Bronze Age: glass and a material to which it is akin, usually named (erroneously) faience (Guido 1978; Henderson 1988; Beck and Stone 1936; Stone and Thomas 1956; Foster 1979). In the Minoan-Mycenaean world there were also variations on this theme in the form of materials known variously as faience, paste or "glass-paste". All these materials are formed of much the same chemical constituents, silica being the principal building block and sand the most obvious source. Coloring was achieved by the addition of various materials, copper and cobalt to achieve a blue color; red oxide of copper or iron oxide (e.g. from ochre) to obtain red; or compounds of antimony and lead to obtain yellow. In continental Europe, only beads were produced (Fig. 10.26); but in the Aegean, numerous decorative forms and elements were created, ranging from beads and appliqués to large-scale compositions like the gaming boards from Shaft Grave IV or the Knossos Palace.

Fig. 10.26 Necklace of faience beads from Všechsvätych, south-west Slovakia. The larger beads are of clay (Photo: author)

Glass is (or was) translucent and requires higher firing temperatures than faience or paste. Items of glass-paste such as were common in the Aegean were frequently made in steatite moulds. Simple beads were probably made by creating a tube of material around a straw and cutting off slices, or by rolling in the hand. One misconception that used to be prevalent was that some of the faience beads were glazed, a separate layer being applied in a secondary process. Experiments have shown, however, that this is not necessary. What was required was the knowledge of a rather specific technology which, though not complicated given the existing level of competence with pot-firing or metallurgy, was nonetheless unusual. How that knowledge became widespread across Europe is a matter of interest and importance.

Transport

Goods (raw materials, finished products) travelled in the Bronze Age, and therefore people travelled too. Much of what one can reconstruct of travel and transport in the period is based on inference derived from this simple fact. Only rather rarely are we given specific insights into how (by what means, along what route) the transport occurred.

Land Transport

Put in its simplest form, people in the Bronze Age, as in every other age, walked. Ötzi the Ice Man, though strictly speaking he predates the Bronze Age, was on foot when he died on the Hauslabjoch between Austria and Italy (Spindler 1994); he seems to have been carrying a pannier or rucksack on his back, and is plausibly reconstructed as having come from an adjacent Italian valley, perhaps on his way across the high pass to or from Austria. He is most unlikely to have been unique in this respect, and indeed the occurrence of finds at high altitudes (though not over 3000 meters high, as Ötzi was) indicates that the Alpine passes were well known in prehistory. Travel on foot across lower-lying areas was undoubtedly the main form of contact. After all, one can penetrate to most places on foot, given time; areas where dense vegetation or awkward land-forms hinder progress can be circumvented or modified.

This does, however, raise the interesting question of the extent to which roads, paths or tracks existed in the period. Clearly there must have been routeways along which people travelled, if only to move their animals or visit their neighbours. But were these ways formalised? Were their surfaces prepared to facilitate the passage of animals and vehicles? Only rarely is it possible to answer that question. The most famous cases are where wooden tracks were laid down across wet or boggy ground, as above all in the Somerset Levels of south-west England, but also in several other parts of Britain, in Ireland, Holland and north-west Germany. Detailed study of these constructions in Somerset has shown that three main types were present: bundles of brushwood, hurdles or longitudinally placed paired planks (Coles and Coles 1986). In Holland and Germany, the corduroy technique was preferred, timbers being laid crosswise one after another (Casparie 1984; Hayen 1957, 1987).

Such tracks, designed specifically for crossing wet ground, were for the most part only wide or sturdy enough for foot traffic (human and animal); only the largest could have supported wheeled vehicles, including probably the corduroy constructions. This raises the question of how and where vehicles normally travelled on dry land. In only rare cases have traces of paving been found, and it seems unlikely that any extensive network of paved roads could have existed, given what is known of the scale and organisation of Bronze Age communities. Presumably routeways were essentially passages across the landscape where vegetation, surface relief, gradient and conditions of dryness allowed vehicles and foot travellers to pass (or, frequently, not to pass).

Since the Copper Age, solid disc wheels had been used for carts, as is known from clay models such as that from Budakalasz in Hungary (Bóna 1960; Piggott 1968). These wheels are also known from surviving wooden finds and are usually tripartite, three parallel planks being fastened together with dowel pegs, and with a massive hub; sometimes they were of one piece, as in the case of the four wheels with inserted naves from Glum near Oldenburg in north Germany (Hayen 1972). The vehicles to which they belonged must have been very heavy and only movable at walking pace across dry terrain, probably pulled by a pair of oxen. Wheels like this continued to be made right through the Bronze Age, but in the middle of the second millennium BC they were joined by the lighter spoked wheel (and also by the so-called cross-bar wheel) (Piggott 1983). These relatively light wheels were probably used on two-wheel carts or chariots, as seen most famously on the grave stelae of the Shaft Graves of Mycenae. No actual examples survive, but in addition to the finds of the wheels themselves, there are occasional depictions on rock and other art, as for example at Frännarp in Scania, and on a pot from Vel'ke Raškovce in Slovakia (Vizdal 1972; Fig. 10.27). While some of these light carts may have been intended for easier travel along unpaved tracks, others were chariots and intended to be used in warfare. They were presumably drawn by horses, as shown on the Mycenae stelae. The harness used for horses as draught animals (though not necessarily for riding) is known from the so-called cheek-pieces of antler and bronze, which are found widely in Europe from the Early Bronze Age onwards (Hüttel 1981). Bits were probably of rope to begin with, but in the later stages of the period two-piece bronze bits are known as well.

Spoked wheels of bronze are also known, but mainly from a group of vehicles that seem to have served a cult purpose. There are magnificent sets from Stade in north Germany and Coulon in France, though in neither case does the vehicle survive (Pare 1992). There are cases from the Late Bronze Age where vehicles were included in the funeral rite, a practice which foreshadows their relatively frequent use in the Early Iron Age, when they are thought to be associated with high-status individuals. A prime example of this practice, dating to the early part of the Urnfield period, is the wagon-grave recently discovered at Poing in Bavaria (Winghart 1993).

Fig. 10.27 Depiction of wheeled vehicles drawn by horses on a pot from Vel'ke Raškovce, Slovakia (Photo: author)

Water Transport

Travel over land was a major concern in inland areas, but on coasts and estuaries it was water transport that was the major form of travel; this probably applied too to navigable rivers, especially in continental Europe. With light craft such as coracles, even relatively small waterways could have been navigated, while major rivers could have served as axial routeways across the continent. The Danube is only the largest and best known of these; the great rivers of northern Europe (Weser, Elbe, Oder, Vistula etc.), the Rhine, Meuse, Seine and Loire in the west, the Ebro and Po in the south, and the Bug, Dniester, Dnieper and Volga in the east, all satisfy this criterion.

The problem for the Bronze Age archaeologist is that few craft survive. Even the numerous depictions of vessels from the Nordic area are only of limited assistance as their interpretation is controversial and no *in corpore* examples are known. The one exception is dug-out canoes, which are quite common, but this was a vessel type that was common throughout Europe and throughout later prehistory (McGrail 1978, 1987). Examples occur widely across central Europe and in Britain, for instance a group known from the Trent near Nottingham, or from a number of Alpine lakes. Craft such as these are very heavy and would have been quite hard to manoeuvre. In calm water they would be quite stable, but they would hardly be suitable for transport across the sea even in a moderate swell.

For this, it appears that a quite different type of boat was constructed: the sewn plank boat, as known most famously from a group of finds on either side of the River Humber in north-east England (notably North Ferriby), and most recently from a large example of the type buried deep in alluvial deposits at Dover in the area of the Roman waterfront (Parfitt 2004) (Fig. 10.28 upper). The details of the Ferriby boats are remarkable (Fig. 10.28 lower), with numerous sophisticated technical refinements in the wooden parts, yew withies to sew the planks together and moss to caulk the seams (Wright 1990). Many of these features are replicated on the Dover boat, which has now been studied in exceptional detail (Marsden 2004).

The Ferriby boats were clearly used for sailing across and along the Humber, but the Dover boat was presumably also a seagoing vessel, though differing opinions have been expressed on the matter (Marsden 2004, 1994; Roberts 2004; Clark 2004). The length of the boat is unknown as one end could not be recovered, but at a minimum of around 11.7 meters in length and 2.26 meters in width it could have served that purpose adequately, except in heavy seas – though there are serious problems with the potential structural stability of the vessel, since even at a minimal reconstructed length it appears rather long for its inherent longitudinal strength. There is no sign of a mast, so presumably it was paddled; examples of paddles have turned up at various Bronze Age sites. But was this also

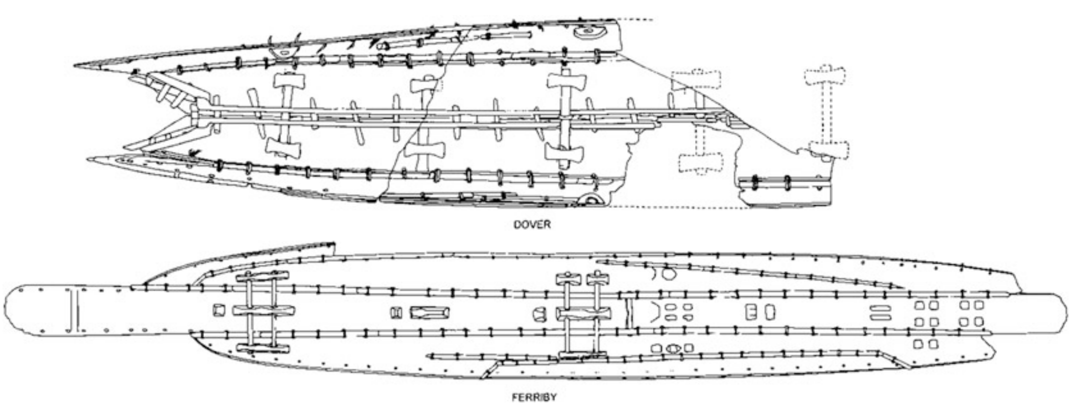

Fig. 10.28 Sewn plank boats from Dover (*above*) and North Ferriby (*below*) (Wright 2004)

the type of craft that was used around Scandinavian shores, where boat depictions are extraordinarily common?

This is hard to say. These depictions usually show what appears to be a framework of wood, with extensions at keel and deck level at prow or stern or both (Kaul 1998), and as such it is usually assumed that they are skin boats on a wooden frame. A series of vertical or oblique dashes at deck level is usually interpreted as indicating oarsmen. Certainly these vessels do not look like the sewn boats of Britain, but until the chances of discovery enable us to inspect an actual example, it is impossible to know for sure.

The boat depictions of Scandinavia, especially common along the coasts and inland waters of southern Sweden (Fig. 10.29), indicate that whatever else they were used for (ritual? boat burial?) they

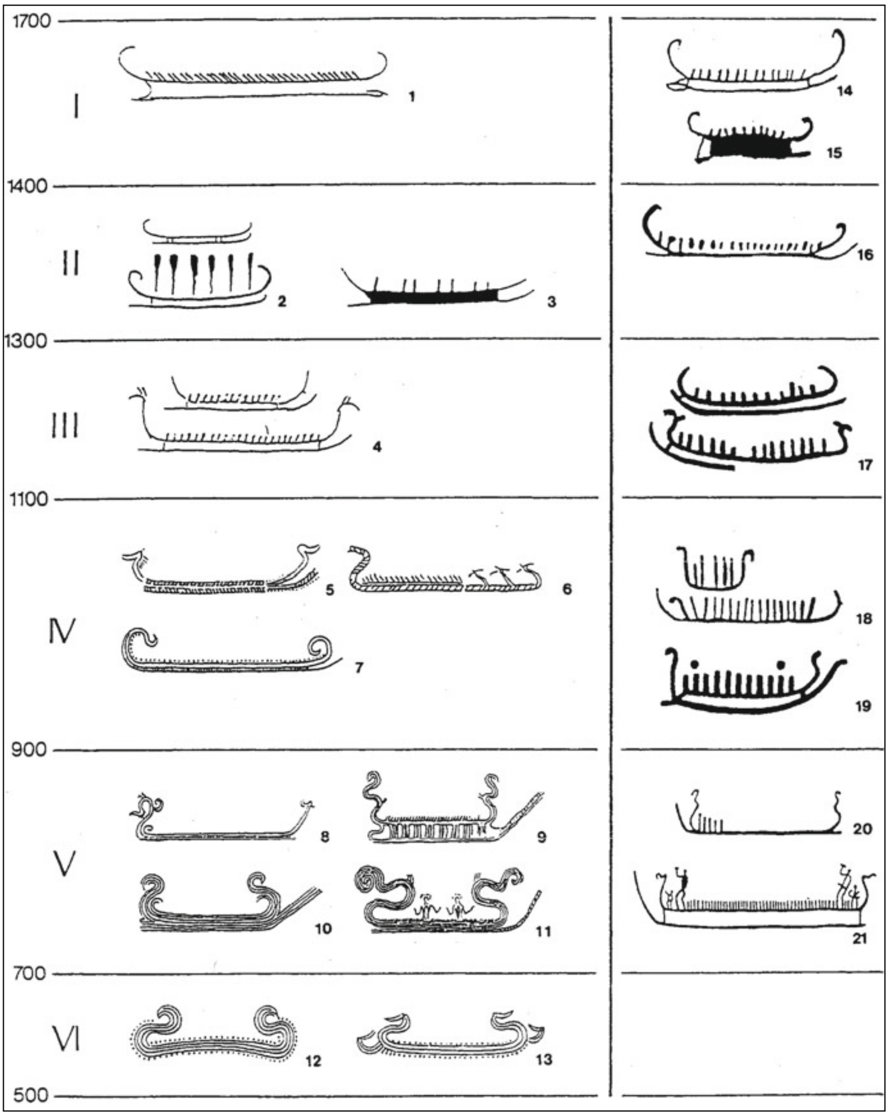

Fig. 10.29 Chronological and typological development of Nordic Bronze Age ship depictions. *Left column*: datable depictions on bronzework; *right column*: depictions on rock art that can be correlated with the datable examples. The six periods of Montelius are indicated along with approximate dates BC (Kaul 1998)

must have been the standard method of travelling from A to B in the dissected coasts and archipelagos of the area. Prior to the modern age of bridge building, communication between societies in such areas was really only feasible by sea. Fishing was no doubt another major use for the craft, even if it appears only rarely on the rock art.

In the Mediterranean, and especially in the Aegean, things were different. From a relatively early part of the Bronze Age there are depictions of boats on seals and later on frescoes (Gray 1974). The vessels depicted were much more solid craft than the log canoes or sewn boats of the north. They appear to be plank-built, and possess a mast as well as banks of oars. It was presumably these vessels, or something like them, that were used for the extensive international trade attested from finds of pottery, as well as from the shipwrecks off the Turkish coast at Uluburun and Cape Gelidonya (Bass 1967; Bass et al. 1989; Bass 1991; Pulak 1998). Unfortunately little remained of the actual vessels in these instances, though their cargoes were spectacular.

Warfare

Among the most commonly occurring objects that emanate from the Bronze Age are weapons – swords, daggers, spears and arrowheads. Some of these will have been used in hunting, for instance bows and arrows; others, such as the sword, can only be effectively reconstructed as having served for offensive combat between humans. Even if we were unsure on the point, there are depictions both on Aegean objects and on Nordic rock art which make clear to us that fighting with swords and spears was an integral part of Bronze Age life. How far we can reconstruct the way in which warfare and combat was conducted is, however, a matter of debate (Osgood 1998; Osgood et al. 2000; Harding 2007).

Finds of armour and weaponry constitute one of the two principal sources of information about Bronze Age warfare. Weaponry finds are numerous, both in graves and in hoards – though a still larger category comes from isolated finds without specific context. It is a reasonable assumption that where a dead person (usually a man) was buried with a sword or dagger, he had owned or at least used the weapon in life. Burials with swords vary greatly in frequency across Europe. In the high-status burials of early Mycenaean Greece, swords are a frequent accompaniment (Sandars 1961; Kilian-Dirlmeier 1993), though their frequently elaborate finish and decoration suggest that they were not intended to be used in earnest but as display items. In Central Europe, swords appear more frequently in graves than anywhere else, though in Britain, by contrast, they almost never appear in graves (Burgess and Colquhoun 1988). The general impression given by this situation is that the sword was an important accoutrement of many people in the Bronze Age, particularly of those people who were buried in individual graves – that is, not in cemeteries of flat pit graves but in single mounds or cists. In other words, swords, and daggers before them, suggest a warrior society in which fighting was an integral part of daily life, and a means for individuals (probably men, to judge from those instances where surviving skeletal material has been sexed) to acquire status and control over others.

In the Early Bronze Age, before the sword was invented, people were buried or depicted with a dagger at the waist and in some cases with arrows – or, as with the statue-stelae of Petit Chasseur, Sion, Switzerland, with a bow slung over the shoulder (Bocksberger 1978). The bow and arrow were usable both in human combat and in hunting, and it seems reasonable to suppose that the latter was the prior and more important use, with a use for interpersonal combat being secondary. The dagger could only be used at close quarters, and therefore could only be brought into play after sending an initial volley of arrows which, if the hunter was lucky or accurate, meant that the quarry was wounded and unable to run away. It is hard to imagine how a dagger could have been used like this against a human foe in formal battle unless the enemy was already severely incapacitated by an arrow-strike, so that the dagger would merely have delivered the *coup de grâce*. It is actually most likely that the adornment of daggers with elaborate hilts, or as in the case of the Mycenaean Shaft Graves, with inlaid blades, was a reflection of the fact that hunting was a status activity, particularly where large, dangerous or rare animals were concerned. No doubt for this reason, the tusks of wild boars were often collected and used on necklaces, or to create helmets in the Aegean world (Borchhardt 1972, 1977). And for this reason the dagger became a formalised item that in its developed forms had little to do with hunting and everything to do with the appearance and status of the warrior. It may have been for this reason that variants on the dagger theme were tried out, notably the halberd, which looks very similar to a dagger except that it is slightly asymmetrical and was mounted on its handle transversely, presumably with a view to landing blows on the opponent from above. This seems to have been a phase which did not outlast the Early Bronze Age, perhaps because halberds were cumbersome to use, though experimental evidence suggests that they could be effective in delivering damaging blows (O'Flaherty 2007a, b).

But the possibilities for warfare using a dagger were limited. For this reason, bronzesmiths began to create new, longer weapons, with the use of which the warrior could engage with his enemy at slightly greater distance. Daggers thus gradually grew in length and their handles increased in sophistication. With the sword, warfare entered a new phase. A pair of swordsmen could carry on a duel without coming into bodily contact, though the object of the exercise was presumably to land blows on the opponent's body. There has been a great deal of debate about how exactly swords might have been used, and the evidence is ambiguous or even contradictory. The earliest form of the sword in the Aegean is a long narrow-bladed form best called a rapier, thought to have been used for delivering thrusting blows, but not suitable for slashing and cutting (Sandars 1961). Depictions on seals, however, show swordsmen with rapier-like weapons raised above their heads, apparently trying to deliver just such slashing blows (Kilian-Dirlmeier 1993). If true, this illustrates that modern scholars cannot assume particular functions for ancient objects on the basis of modern experience or "common sense". Experimental evidence also shows that preconceptions of the mode of use must be modified in the light of experience. Barry Molloy has conducted a number of experiments with various swords which show that used properly, they can be effective in ways that had not previously been considered (Molloy 2007, 2008).

As well as the sword, the spearhead was of great importance, and very many examples are known (Jacob-Friesen 1967; Höckmann 1980; Avila 1983). Here too there has been much debate about whether they were hurled like javelins (in which case they would have been relatively light) or held, to defend a group of fighters, perhaps in phalanx-like formation, and to thrust when an opponent came near enough. If the former, it seems unlikely that many hits could have been scored since there would have been plenty of time to move out of the way while the javelin was in the air (unless, as apparently in Homeric warfare, there was such a crush of people that this was impossible). If the latter, then we are again talking about fighting at close quarters.

In order to protect himself against arrowshots, spear thrusts and sword blows, the warrior wore armour in a number of well-known instances (Catling 1977; Schauer 1978). Of these, the complete suit of body armour (though not a shield) found in a grave at Dendra in the Argolid area of Greece is the most famous (Åström 1977). The preserved parts of this suit are of bronze, but the helmet was of boars' tusks. Nothing else quite like it is known in Greece, and such European armour as survives is quite different. It is heavy and would seem to have impeded movement rather severely; experiments are needed to determine how easily a warrior might actually have fought in such a panoply. Depictions on Aegean art of the early Mycenaean period show two types of shield: a tall, rectangular affair, with a convex top, and a shield in the form of a figure-of-eight (Borchhardt 1977; Schauer 1980). Neither survives in actual examples, and both were almost certainly made of leather. In the late Mycenaean period, there are depictions of smaller round shields, which correspond quite closely to actual examples found across Europe (Coles 1962; Uckelmann 2004–2005, 2005).

It is very likely that warriors had shields even if they had no other armour, as a shield could be moved rapidly to counter incoming blows. The parts left unprotected would be the head and the legs, and special pieces of armour – the helmet and the greaves – were developed to cope with this problem (Hencken 1971; Borchhardt 1972; von Merhart 1956–1947; Schauer 1982). Bronze examples of all these survive. Especially with helmets, great trouble was taken to ensure that the appearance was striking, with horns sometimes being added to strike fear into an opponent's heart. It is interesting to discover, however, that these bronze items were far from satisfactory for the purpose for which they had apparently been designed. Experiments conducted many years ago by John Coles suggested that bronze shields can easily be perforated with sharp items, or cut by a sword blow (Coles 1962), but recent work by Barry Molloy has suggested that this is not always true. Leather or wood is strong enough to withstand many such blows: only direct hits with arrows can penetrate them, the disadvantage of wooden shields being their great weight and unwieldiness. This strongly suggests that much of the bronze armour that survives was intended for parade and not for real battle. In other words, in these cases the role of the warrior was more symbolic than functional. Some support for this idea comes from the rock art of Sweden, where men waving weapons (battle-axes, for instance) and wearing swords on their belts, are depicted in what look like symbolic battle scenes, which sometimes take place on board ships (Fig. 10.30). These seem designed to reinforce the notion of the warrior as a powerful individual (Nordbladh 1989).

What, then, was warfare really like in the Bronze Age? Here we must turn to another source of evidence, that of fortifications. Although fortified sites did not first appear with the Bronze Age, they certainly achieve a more prominent status in that period than in any previous age, and by the first millennium BC they were a regular feature of the landscape in much of the Bronze Age world. They feature especially prominently in Greece, with the great citadel walls at Mycenae, Tiryns and elsewhere being erected and extended in the second half of the Late Bronze Age (Iakovidis 1983).

In continental Europe there are a certain number of fortifications, or at least hilltop sites surrounded by a bank or wall, in the Early Bronze Age, as at Spišský Štvrtok in Slovakia, where a hoard of

Fig. 10.30 Rock art panel at Fossum, Bohuslän, Sweden, showing male figures and boats (Photo: author)

gold objects was discovered in the site interior (Vladár 1973). Something similar occurred at the extraordinary Middle Bronze Age site of Velim in Bohemia, where several gold hoards have been found and the site is surrounded by several lines of ditches and at least one rampart (Hrala et al. 2000; Harding et al. 2007). This certainly suggests that there was an intention to protect an area where important or valuable finds were deposited, or where certain important activities were carried on. But it is in the Late Bronze Age above all that fortifications really came into their own. In many, perhaps most, parts of Europe we find sites starting to be fortified in this period, even though conventional wisdom sees forts as essentially an Iron Age phenomenon. Not all such sites are on hilltops; in low-lying areas such as northern Germany or Poland, they may lie on or near lakes, and be surrounded by massive wooden-framed ramparts, in which case "stockade" is a better word than "fort".

One of the most remarkable and exciting discoveries of recent years, however, is that stone-built forts in Istria (part of Croatia) go back to the Middle Bronze Age. Recent excavations at Monkodonja have revealed an extraordinarily well-preserved set of fortifications, complete with elaborate gateways (Teržan et al. 1998). Such a site recalls the stone-built fortifications of other parts of the Mediterranean, for instance the tower-like constructions of the western Mediterranean islands (*torre* in Corsica, *talayots* in the Balearics, and, most famously, *nuraghi* in Sardinia). Sardinian *nuraghi* are *sui generis* (Lilliu 1962) (Fig. 10.31). They strongly resemble Scottish brochs, from which they are separated by a large temporal and geographical distance. In their most basic form, and perhaps the earliest, they are simple conical towers, with staircases and corridors built into the thickness of the walls and chambers on three floors in the inside, with corbel-vaulting forming the ceilings and roof. In this form, they are known to go back into the Middle Bronze Age, as excavations at Barumini showed originally, and more recent work at other sites has confirmed. Subsequently, some sites developed into extraordinarily complex monuments, with additional cladding of the central tower creating large lobate constructions, with a bewildering succession of corridors, chambers and courts.

Another interesting feature of the *nuraghi*, and of Bronze Age forts in other parts of Europe, is that they appear to have been spaced out across the landscape in territorial fashion (Tanda and Depalmas

Fig. 10.31 Barumini, Su Nuraxi. The nuragic complex with central tower and surrounding huts (Photo: author)

1991, and several other publications by A Depalmas). In this situation, each fort would have controlled a certain amount of land, and acted as a central focus for its "territory", probably as a refuge from trouble too. It is this situation that enables us to speculate on how they were used. Some authorities, however, have argued that *nuraghi* had no defensive function at all (Trump 1992), and should be seen in purely social terms (cf Russu 1999; Perra 1997). There is no one answer to this question, but a series of considerations suggests that the type of warfare involved was that of raiding. A stone-built tower, with limited egress and exit, would not be susceptible to frontal assault prior to the invention of gunpowder. A siege would have to depend on starving the occupants out, and given the abundance of *nuraghi* in Sardinia, it is unlikely that any one territory would have had sufficient manpower to mount a sustained siege of another. In any case, siege warfare in the ancient world was not often successful, unless one side had much greater resources than the other (e.g. the Peloponnesians at Plataea (Thucydides, *Histories* Books 2–3) – and even in that case, the besiegers were outwitted for many months). Instead, the towers are better seen as refuges against raiding for territorially based groups – in some of the Sardinian cases these can hardly have been larger than extended families (assuming that the towers operated contemporaneously, which is not certain), though in other cases, including hillforts in temperate Europe, these are more likely to have been tribal or sub-tribal groupings, bearing in mind the size of the territories involved, and the extent of the ramparts to be defended.

Raiding, probably for livestock, is a well-attested phenomenon in many periods of history and parts of the world – which is not to say that it was the mode of aggression practised in the Bronze Age. It does, however, fit the pattern of sites and artifacts known from that period rather well. Settlement studies also support the idea of very restricted group size; there can be no question of large-scale armies marching across the plains as happened in the Near East and Egypt, or later on in the Greek and Roman worlds. Even in Bronze Age Greece, under palace control, armies probably only numbered a few hundred, or at most a thousand. Raiding parties might only have numbered a few score, and most defences would have been adequate to contain such a threat.

On the other hand, the evidence of parade armour and weaponry strongly suggests that the role of the individual warrior was an important one. It is plausible that this role involved the resolution of disputes by means of single combat between pre-eminent warriors, in which the appearance of the combatants was very important. Hence the creation of armour that was more useful visually than as protection; hence the depiction of warriors wielding weapons on Nordic rock art; maybe this is also the source of the heroic legends of Greece. Bronze Age warfare was rather small scale, but it was an integral part of life.

Religion and Ritual

Few students of the Bronze Age would believe that spiritual concerns were unimportant to the people who lived in the period; but few would be bold enough to specify exactly how those concerns were met and those needs nourished. As is usual in archaeology, it is the unusual and the inexplicable that attract our attention. We are concerned primarily with sites and artifacts, or combinations of the two. Sites may consist of installations, or of what may loosely be termed art; while artifacts can refer either to the form or to the decoration of the objects, for instance symbolic representations. In some of these cases, the nature of the practices can be reconstructed with some certainty, but the beliefs behind the practices remain a matter for speculation.

Many religious activities in the Bronze Age no doubt took place in the open air, for instance in groves or clearings in woods, by springs or rivers, on mountain tops, or beside ancient trees. Some of these can be stated with certainty: in Minoan Crete, for example, the "peak sanctuaries" were a major element in Minoan religion (Peatfield 1990), with each palace site having a sanctuary close by (for instance, on Mount Iuktas overlooking the Knossos area); in Switzerland too, “fire offering places” occur with regularity in elevated positions in the mountains (Krämer 1966; Gleirscher 1996). The importance of rivers has already been stressed in connection with the deposition of metalwork, as for example with the Thames or the Rhine. But the natural location that is best known is that of caves, and of clefts and fissures in rock formations (Schauer 1981). Many examples are known where deposits of Bronze Age material (along with that from other periods) are found in caves, from the north of Scotland to the south of Italy, from Spain to Romania or Crete. The reason is probably not far to seek: caves give an impression of mystery, of other-worldliness, even of entering the underworld, as the Romans believed of some caves. In all cases they are dark and echoing; in many they are damp from percolating groundwater or from river water that runs through them and issues from their mouths.

Of the many examples of caves used for cult purposes in the Bronze Age, the cases of the Grotte de Han in the Ardennes in Belgium (Warmenbol 1996), and the Bezdanjača cave near the coast of Croatia may specially be mentioned (Drechsler-Bižić 1979–1980). In the latter, numerous human burials were deposited in the cave, and wooden constructions of some kind were created as finds of poles and other objects testify. There was much pottery and some bronzework. Burnt areas were found near some of the burials, perhaps indicating funeral feasting or possibly fumigation; the fires were not apparently for cremating the dead. In the Grotte de Han, which lies at the source of the River Lesse, large numbers of bronzes and much pottery was recovered both from the chamber floor and from the river bed. Not all depositions were in caves proper: in Austria, for instance, much material was recovered from rock clefts at Pass Luftenstein in the Saalach valley (Hell 1939). There are many more such examples from around Europe.

Sometimes it appears that Bronze Age ritual demanded the creation of an artificial installation that resembled an entrance to the underworld, as a cave does. This means that shafts or wells were dug, sometimes to considerable depths. One of the most famous examples was a shaft dug near Stonehenge on Salisbury Plain, southern England, in the parish of Wilsford (Ashbee et al. 1989), which reached some 30 meters down into the ground and in its fill contained not only the remains of wooden buckets (as one might expect from a well) but also other wooden objects, bone pins, amber beads and a shale ring, which were deliberately thrown into the shaft, much as people today throw coins into wishing wells. This shaft may have started life as a well, but it ended by being filled with cultural material (Fig. 10.32). Another such shaft at Swanwick, Hampshire, contained 20 cylindrical loom-weights and a wooden post with organic residues that have been interpreted as the remains of flesh and blood (Fox 1928, 1930).

If the use of shafts may be reconstructed with some certainty, surface buildings are much more difficult to interpret. A wooden construction at Bargeroosterveld in the Drenthe district of Holland is both enigmatic and suggestive (Waterbolk and van Zeist 1961). Resting on two planks, a square setting of upright posts had a superstructure of curving beams that terminated in horn-like ends, the whole construction being surrounded by a stone ring. Other than that this is not a domestic structure, little more can be said. Some other buildings assumed to be cultic in purpose do have various sets of unusual artifacts, such as the finding of sets of bronze spiral pendants around a wooden post at Tauberbischofsheim in Bavaria (Wamser 1984).

Settings of standing stones should not be forgotten in a consideration of cult places. The stone circles of parts of the British Isles are justly famous (Burl 1976), though their function has been much debated; certainly burials took place in them. Whether they are to be reconstructed as having astronomical functions has been a matter of controversy. In the case of the circles of north-east Scotland, where a “recumbent” stone lies in one part of the perimeter, a strong association with lunar movements has been noted, with the moon at the maximum position in its 18.5-year cycle appearing to move along the top of the recumbent stone (Burl 1980). Alignments of pairs or trios of stones on distant mountains or horizon notches are also sometimes plausible, though in many cases it is hard to be certain that the monuments are complete and that the supposed alignment really was what the original

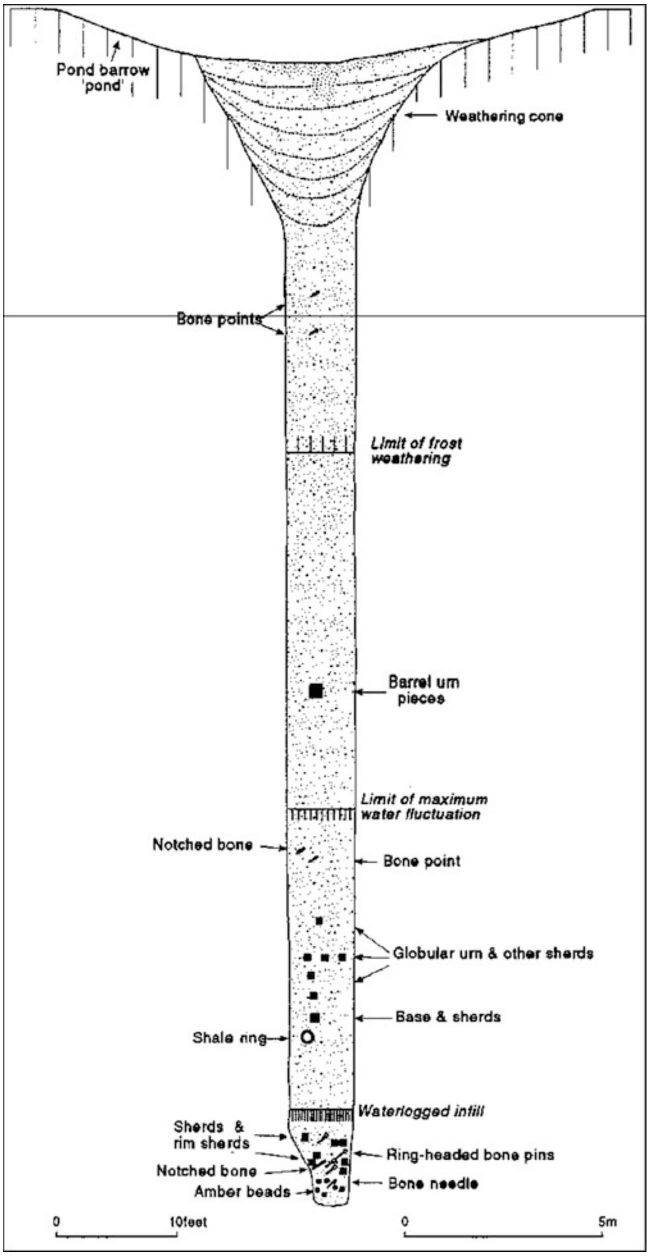

Fig. 10.32 Section of the shaft under the pond barrow no. 33a at Wilsford, Wiltshire, southern England (Ashbee et al. 1989)

site involved. Stone settings are present in other parts of the Bronze Age world as well, for instance on Sardinia and Corsica, and in Sweden in the form of "ship-settings", that is, groups of stones placed in a boat-like plan (Strömberg 1961).

These sites seem relevant to a consideration of religion because of their very strangeness. Just as mysterious, but in many ways more appealing to modern minds, is the abundant art on rock faces that litters so much of coastal Scandinavia, as well as parts of northern Italy and southern France, with lesser appearances in the Atlantic West (parts of the British Isles and Iberia). The three areas are not really similar in terms of subject matter or situation, but all the art seems to date predominantly to the Bronze Age, and all of it appears to deal with events not directly connected with the domestic sphere. This is not to say, however, that it played no part in domestic life, for it assuredly did. The frequent appearance of objects, signs and symbols that were everyday items, such as animals, ships or humans, illustrates that in Scandinavia at least the motifs are firmly grounded in reality. It is the signs of no certain meaning that cause us most trouble. Of these, by far the commonest (taking rock art as a whole) is the cup-mark. These small concave depressions pecked onto the rock surface occur in their thousands, all over Europe, and have excited the imagination of numerous commentators over the years. No precise meaning can be assigned them, and indeed it very likely varied from area to area. Instead, it is more profitable to examine local contexts, the viewsheds from particular art panels (particular views towards the sea), and the intervisibility of different sites. Such work in parts of south-west Scotland has shown interesting correlations between situation, complexity and viewshed (Bradley et al. 1993).

The art of western Sweden is the most intensively studied of the Nordic province, and is especially prolific and varied – though cup-marks are again by far the commonest motif (Coles 1990, 1994, 2000, 2005). In spite of this, it is the abundant depictions of ships that have attracted most attention, along with rarer motifs and symbols, and human figures (Fig. 10.33). Scenes depicting men waving weapons or musical instruments are well-known and much discussed, even though they are comparatively rare in comparison with humbler motifs. Animals, plowing scenes, trees and weapons all appear, as do signs such as discs, wheel motifs, "footsoles" (pairs of foot imprints), net or grid-like motifs and many more. Of these, the ship is especially interesting in view of its abundance and variety, and the fact that no actual examples survive (Coles 1993; Kaul 1998). Sometimes the ships have people in them, sometimes not; very occasionally there are what appear to be fishing scenes, which is surprising when fishing was presumably a major and regular activity in these coastal areas. Were the ships genre motifs? Or did they represent particular ships belonging to particular individuals or families, perhaps on the occasion of their construction or launching? Did they represent particular voyages?

It is possible that the art panels were created over a long period of time, certainly hundreds of years, and that many "scenes" are actually individual motifs added at different times, but this would not alter the fact that each element must have been invested with its own particular significance. This can further be judged from those cases where art appears on portable stones, notably in burial mounds. The great mound of Bredarör at Kivik in south-east Sweden, for instance, contained a series of decorated slabs depicting ships, spoked wheels, horses, axes and human figures, and there is a strong likelihood that these were originally placed to show a funeral procession (Nordén 1942; Randsborg 1993).

Most of the art depends on, and revolves around, symbols, some of which are identifiable physical objects (though their significance is uncertain). Symbolic depictions also occur in artifacts in the round, or as ornamentation on such artifacts. There are very many such items, ranging from tools and weapons to pendants and amulets, for instance those in the form of a double-axe, or fibulae (safety-pins) with hour-glass motifs incised on their flat bows. Small figurines and rattles, as often found in graves of the Lausitz culture in north-east Germany and Poland may have been amulets or they may have been toys. The numerous clay figurines in the form of humans and animals found at peak sanctuaries in Crete were presumably votive offerings, which tempts one to believe that comparable figures in the barbarian world had a similar purpose. Larger figures, in clay or more rarely in wood, may have depicted deities or celebrants. Sometimes such figures seem to have had a sexual significance or interest, as is the case with certain wooden figures where a detachable penis seems to be part of the complete object; the same may be true for the figures on a boat model containing several human figures from Roos Carr in Yorkshire (B. Coles 1990a). Phallic depictions are also very much part of the convention in Nordic rock art.

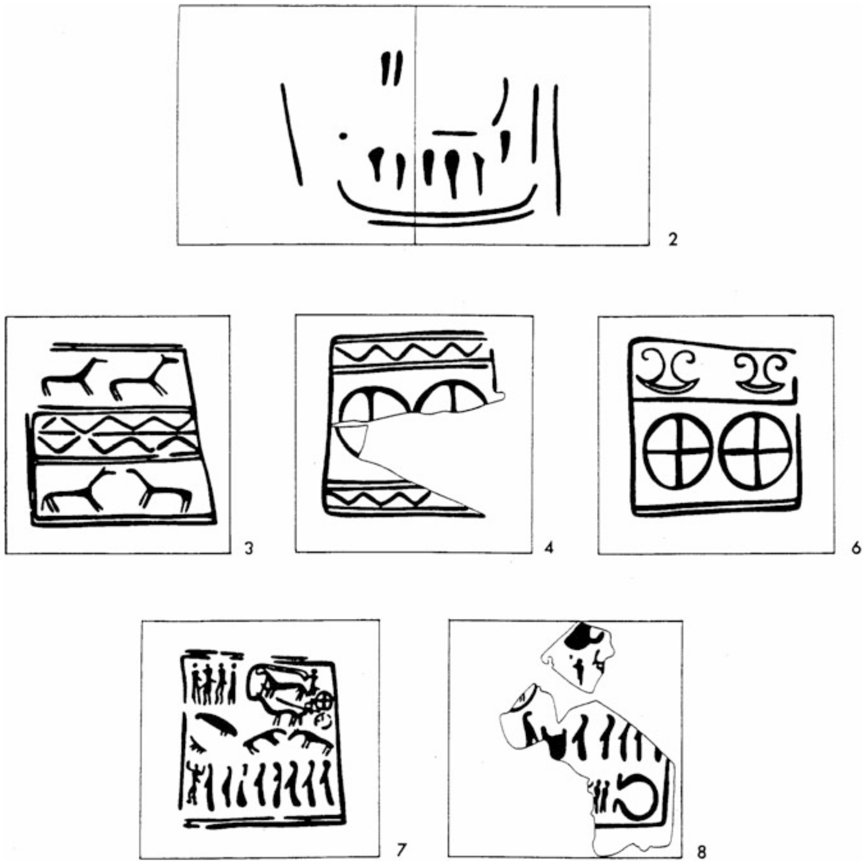

Fig. 10.33 Decorated slabs at the monumental tomb at Kivik, south-east Scania, southern Sweden, as drawn by G. Burenhult and rearranged by K. Randsborg (Randsborg 1993)

One of the most extraordinary finds of recent years is the so-called sky-disc (*Himmelsscheibe*) from Nebra, Burgenland district, in the eastern German state of Sachsen-Anhalt (Meller 2002, 2004). While the find circumstances and associations of this object are not completely clear (it was excavated illegally by metal detectorists on the Mittelberg hill, and recovered subsequently in a police sting), the object itself gives unparalleled insights into the Bronze Age view of the heavenly bodies, and (arguably) their meaning for Bronze Age cosmology. Two accompanying bronze swords provide a date of ca. 1600 BC for an object that would otherwise be undateable.

The disc is about the size of a dinner plate (32 centimeters in diameter, 2.3 kilograms in weight, and between 1.8 and 4.5 millimeters thick), and made of a tin-bronze with a relatively low tin content (2.5%). It was not cast in its present shape but cold-hammered from a smaller cake-like ingot. Most interesting, however, are the applied gold sheets, inlaid onto the bronze surface by pushing the sheet edges down into a punched groove. These show a series of objects that are plausibly seen as heavenly bodies: a disc and a crescent (either sun and moon, or full and crescent moon), a series of small discs interpreted as stars (including a group of seven, thought to represent the Pleiades), a banana-shaped object thought to represent a boat and two edge pieces (one is lost) that may represent a horizon. Interestingly, the disc went through several stages before reaching its present form: two of the "stars" were moved, for instance, in order to accommodate the horizon pieces, and at a late stage a series of holes was punched round the perimeter, piercing both the horizon pieces and the boat.

There has been much discussion about the precise meaning of this intriguing object. While the details of this debate lie beyond the scope of this chapter, what is clear is that the disc depicts aspects of the sky, probably the night sky (this seems more likely than the idea that sun and moon are shown). The "boat" may be a metaphorical representation of the nightly passage of the heavenly bodies through the sky; the "horizons" may be no more than decorative. In an environment without bright ambient lighting, such as was the case in all pre-industrial societies, the night sky and the heavenly bodies would be a familiar sight. The disc may have been involved in stories concerned with their origins and significance; it may represent the most obvious and familiar sights of the night sky; it could even be involved in some simple kind of astronomical practice. What it tells us is something of the complex nature of Bronze Age belief and representational systems, and is thus a unique survival.

Finally, a word about the various deposits of material that seem to have been votive in nature. Some of these are of pots, and one may speculate whether such deposits were really votive or rather newly manufactured objects awaiting distribution (e.g. Schauer 1996). There are good reasons why the former is preferable. Sometimes the pots contained foodstuffs or other organic deposits; sometimes they were carefully laid in the earth and covered with stones or other material in such a way that recovery would have been almost impossible. Lastly, there seems no obvious reason why complete new pots should have been stored in inaccessible holes in the ground if they were intended for distribution. But pots are in fact much rarer than bronzes where deposition is concerned. Many thousands of instances are known where groups of metal objects were deposited in the ground, often – though not exclusively – in wet places such as rivers, bogs or lakes (Torbrügge 1970–1971; Levy 1982). As discussed above, some of these deposits, when on dry land, may have been intended for recovery after being stored in a place of safe keeping, but many more cannot have been placed with this in mind. Objects thrown into bogs or rivers, for instance, would have been lost for ever; it is only the chances of modern recovery (through drainage or dredging, for example) that has found them at all. Detailed examination of the findspots of many metal items has shown that there is a great deal of patterning in how and where they were deposited: particular stretches of river were especially favoured, and different spots were favoured at different periods (Wegner 1976). In south-west Germany, there is a marked discrepancy between objects deposited on moorland (mainly pins) and those thrown into rivers (mainly tools and weapons) (Kubach 1978–1979). Such patterning cannot have occurred by chance. All in all, the practice of metal deposition is most plausibly explained by supposing that it was votive in nature and had little to do with storage for utilitarian purposes. As such, it was one of the commonest practices of the European Bronze Age – though in Greece it was almost unknown, presumably because belief systems were different and systematic collection and reuse of metal was the norm.

Religious or ritual activities were thus a major part of Bronze Age life, and cross-cut many or all of the other aspects of daily existence.

Individual and Society

The various strands of evidence that go to make up our knowledge of the Bronze Age of Europe also provide indications of how the societies and groups of the period organised themselves. The evidence of burials is especially significant in this regard, but other sources are also important, for example house plans, artifact form and elaboration, and arts and crafts.

In the Neolithic of western and northern Europe, great monuments were created, usually though not exclusively out of stone, and to accomplish these feats a considerable degree of knowledge, skill and organisation was needed. This is in spite of the fact that graves in the Neolithic were differentiated in their provision of goods only slightly, if at all. In the British Isles, this phase of monument building continued into the Early Bronze Age, particularly in conjunction with the making and deposition of Beaker pottery. Thus at Stonehenge, to take the premier example, it was almost entirely in the Beaker phase that the stones were brought to the site, erected, and rearranged; the Neolithic monument was essentially a circular earthwork (bank and ditch) with an internal ring of pits (Cleal et al. 1995). Given the massive size and weight of the largest blocks of sarsen stone, and the complexity of the arrangements (whether or not astronomical alignments were intended and incorporated), it is obvious that large numbers of people were involved in the monument's erection, and that a long period of accumulation of architectural and other skill was required before construction started. In other words, a mechanism had to be in place through which manpower could be assembled and organised. That mechanism has usually been assumed to be the differentiation of society in such a way that certain pre-eminent individuals achieved positions of power and status, specifically, that chiefdoms were in existence.

As discussed in Chapter 8, the term "chiefdom" has been much used to describe later prehistoric societies in Europe, and the usage has been much criticised.

Chiefdoms, as known from ethnography, are ranked societies, organised tribally, the population numbering somewhere in the low thousands (Earle 1987, 1991, 1997). Status is frequently linked to economic success, and often passed down from parents to children; control of religious observance is a major factor in many observed chiefdoms. The maintenance of a few rich and powerful individuals obviously depends on a much larger number of people labouring to produce food and craft products, without which nobody could survive, let alone achieve pre-eminent status. Such modes of social organisation have been identified in various parts of the world, for instance in Hawaii and in Panama (Helms 1979). It is, however, a matter of debate whether or not they are present in prehistoric Europe, and specifically in the Bronze Age. Instead of the usage "chiefdoms", we prefer to use the term "ranked societies", which is surely accurate (to judge from the available evidence) while not imposing unwarranted assumptions about social superstructure on the evidence.

In a Bronze Age context, what one has to work with, above all, is cemetery data. This depends on the fact that in many societies, ancient and modern, items are buried with the deceased, either to accompany them on a journey into the underworld, or to provide sustenance, or to provide them with their possessions and thus their role in life. It is the latter which is assumed to be the most accurate reflection of prehistoric beliefs, but it must be stressed that this is only an assumption. Various cautionary tales may be told to illustrate the possible lack of correlation between grave form or grave-good provision and modern beliefs about their significance. Nevertheless, to disregard the excellent data available in certain Bronze Age cemeteries would be churlish; provided it is treated critically, it can provide much information of value. This evidence has been considered in outline above, from which it can be seen that many parts of Europe, from an early part of the Early Bronze Age onwards, differentiated between different individuals, or groups of individuals, in terms of body treatment, positioning and grave-good provision. All of these, but the latter especially, indicate that some people had access to materials and goods that were not available to all or indeed to many; in other words, the provision of grave-goods appears to indicate the existence of status goods for privileged people. Not only is this the case with inhumation cemeteries of the Early Bronze Age such as Branč (Shennan 1975), but it also applies very obviously to certain Late Bronze Age graves with numerous high-quality goods, such as the fine pottery and bronzes from Velatice in Moravia (Říhovský 1958) or the contents of the "King's Grave" at Seddin in Brandenburg (Kiekebusch 1928; Wüstemann 1974).

This view does not, however, accord well with what is known of settlement archaeology. Very rarely can one discern houses that are demonstrably large and well resourced. It is certainly true that larger buildings sometimes occur on settlements as at Lovčičky (above), but interpretations of what the longhall AS was vary and there is nothing in the published artifactual record that would suggest this was the residence of an elite individual or family. Only in the Mediterranean area can one really see such special structures; the palatial societies of Greece are the most obvious examples, but there may be something comparable on Sicily, at Thapsos and, somewhat later, at Pantalica (both sites on the east coast), where a stone-founded building known as the *anaktoron* or “palace” was discovered many years ago (Orsi 1899). These finds contrast markedly with the situation in most of the continent, however. The lack of special dwellings, even in the Nordic area where house and village plans are now well known, has led some scholars to suggest that the social organisation of most of Bronze Age Europe was not hierarchical, as usually believed, but “heterarchical”, a term indicating that power could be displayed in different ways and vested in different categories and groups of people, depending on context (Ehrenreich et al. 1995). In such a case, we would have to envisage not a pyramidal structure, but a fluid situation where different levels of authority might cross-cut one another. What cannot be doubted is that over the course of the Bronze Age, social complexity increased; social, economic and technological roles became more distinct; and by the end of the period, the scene was set for an extraordinary explosion of personal wealth and authority in the ensuing early centuries of the Iron Age.

Where, then, did the individual fit in all this? What can one say of personal identities? In this, we depend above all on the evidence of items indicating dress rules or ornament sets, and also on weapon combinations. Correlation of artifact type and biological sex has been demonstrated in a number of cases (which is not to assume that this was accorded particular gender-based roles). Ornament sets usually accompanied women’s graves, and particularly in the Middle Bronze Age of central Europe, these sets were very area-specific (Wels-Weyrauch 1989; Stig Sørensen 1991, 1997). It has been suggested, in fact, that where such items occur outside their “normal” distribution area, they indicate the movement of women, perhaps in marriage to allied neighbouring tribal groups (Jockenhövel 1991). These sets, then, were a means by which a woman might display her identity – as married or unmarried, as older or younger (pre- or post-pubertal, for instance) or as born into hereditary elitehood or serfdom. Particular artifacts might then play particular roles or have particular meanings, and these meanings might change depending on context. Something of the same is perhaps visible in the distribution of male personal items such as razors, or particular types of leg ornament (Harding 1997, 2000). Where these have a center of distribution, and one or more examples appear far outside this area, it is possible to suppose that a man travelled and died away from his home area.

Weapons too acted as powerful indicators of identity. As we have seen, burials with status weaponry are very much concentrated in certain areas and absent in others. The attribution of warrior status probably depended on the achieving of certain goals and roles, puberty certainly, but also skill in hunting or skirmishing, perhaps. Only a certain number of people were able to achieve the highest status, if for no other reason than that there is only room at the top for a small number. But warrior bands, if we are right to imagine them as the Bronze Age order of the day, could contain many, perhaps most, able-bodied men of a certain age, and by virtue of their adherence to certain rules of behaviour and codes of honor, could maintain their status and position through general acceptance of their appropriateness and desirability (Treherne 1997).

The Wider Scene: Territory and Landscape

Sites occupied by Bronze Age people were situated within a wider landscape. Although many people probably never left the environs of their homesteads and villages (there being no towns or large centers in the Bronze Age, except in the Aegean), the movement of goods shows that there must have been knowledge of the wider world beyond local confines. Even for those who did not travel, the home site was merely the center of action, and there was a wider area over which economic and social activities were spread. In simple terms, a farmstead exploited an area of fields around it, which adjoined those of other farmsteads or villages. Those fields might have been bordered by woodland, or marshland, or rough grazing; and this "economic territory" would have been cross-cut by other types of territory, social and political. The "world view" of Bronze Age people was thus something that operated on a number of levels, some of them more visible to us than others.

In considering the lowest of these levels, the local environment and the territory within which people operated, the types of information that are of value are essentially those relating to the distribution of sites, the location and nature of fields and field systems, and the type of environment present. Clearly all these factors are widely variable across Europe and it is impossible to generalise. To take the last first, in some parts, south Scandinavia for instance, there is evidence for an open landscape, largely cleared of trees in the settled areas, though with woodland still present in damper valleys (Berglund et al. 1991; Bartholin and Berglund 1992). Pollen diagrams from the North York Moors in northern England suggest that there was a continuous fluctuation in the amount of woodland present, with relatively small-scale clearances being followed by forest regeneration in a constantly oscillating movement; widespread clearance did not take place until the Iron Age (Simmons in Spratt 1993). In many places, however, for instance hillier regions of central Europe, forest cover was still substantial (for various parts of Europe see Berglund et al. 1996).

Proxy evidence for the relationship between farmsteads, fields and unenclosed or wooded land comes above all from the downlands of southern England. The evidence of air photography is crucial in this respect. Extensive air photographic cover in many parts of Hampshire, Wiltshire and Dorset where cropmark and earthwork evidence is exceptionally well preserved reveals how small farmstead sites lie within areas divided up into field systems (Fowler 1983; Palmer 1984; Bradley et al. 1994). These systems do not, however, extend over the entire landscape; they extend over an area of up to 50 hectares and then there is usually a gap before the next block starts. This is not an artifact of discovery or destruction; the air photographs clearly show that the fields simply stop. Presumably what was in the gap was woodland, or possibly unenclosed pasture land. On Dartmoor the situation is rather different (Fleming 1988). There the long strip fields extend over large parts of the moorland of intermediate height; there are also square or rectangular fields closely associated with simple settlements. The high moor is unenclosed and must have acted as common pasture; woodland, if present, was probably on the valley sides at lower altitudes.

Settlement patterns are not as well studied for the Bronze Age as for some other periods, but there are cases where detailed work has taken place. In north-west Bohemia, for example, finds of pottery and other material made over many years enabled studies of the Late Bronze Age settlement of the cultural group named after the site of Knovíz to take place, and for a detailed picture of settlement preferences to occur (Bouzek et al. 1966). This clearly showed that some locations were preferred to others: sites on river and stream terraces or seasonal stream banks accounted for over 70% of site locations, the sites being spaced out along water courses at intervals of 1–3 kilometers. The intensive settlement of areas in West Friesland in the Netherlands has also suggested an initial intersite spacing of around 3 kilometers (Ijzereef and van Regteren Altena 1991). An intersite distance of 0.5–1.5 kilometers is repeated in several other areas that have been intensively studied, and presumably reflects a situation where agricultural technology and mobility were such that a radius of exploitation of up to about 1 kilometer was most efficient (though this assumes, of course, that the sites were all contemporary). Such a situation is present along the shores of Swiss lakes, for instance; in this case, aquatic resources were also available and this may skew the situation where dry-land exploitation is concerned. In Alpine river valleys, on the other hand, the intersite distance was somewhat greater, with a mean of around 5 kilometers being typical for sites in the upper Rhine valley, where they occur on prominent glacial knolls (Harding 1983).

Detailed studies in parts of Scandinavia have reconstructed what might be termed the total living system. At Fosie IV near Malmö, a large-scale rescue excavation has revealed the extensive settlement area occupied over time by a residence group that probably numbered three or four families (Björhem and Säfvestad 1993). On the Danish island of Als, the area around Følkergård has been shown to have acted as a kind of center in the Bronze Age, with a prominent cluster of barrows acting as a focal point and cooking pits (indicating settlement) lying 200–300 meters away on the opposite side of a slight valley (Sørensen 1992).

When one moves to consider larger areas of territory, it is necessary to take into account all sites and not merely settlements. A study of northern Scania, for instance, identified focal areas which were centers of major importance, based on the distribution of graves, rock-art sites and stone settings (Carlie 1994). An area that was not obviously of such significance that has been intensively studied is the South Dorset Ridgeway, where the published reconstruction identifies territorial units based on the presence of major ritual sites such as henges or stone circles, with burial mounds clustering in "circuits" (assumed linear configurations along which the mounds were more or less evenly spaced) near the ritual sites, and with flint scatters suggesting domestic activity in parts of the intermediate space (Woodward 1991). Comparable survey results have been obtained from a number of areas in southern England.

A rather different situation is present when we come to consider fortified sites. As discussed above, these came to prominence during the later part of the Bronze Age, but once established, they occupied an important role. This is indicated by their spacing in the landscape, which is rather regular in those areas that have been intensively investigated. In south-western Germany, for instance, forts appear on elevated land along river valleys, and give a strong impression of regular spacing (Biel 1980), with forts lying at the center of notional territories – indeed, they may have been more than notional, if the forts controlled them politically and served as a refuge in unsettled periods. This raises the question of what might have constituted political control in a period prior to the existence of state-organised societies, and what was the nature of intra- and inter-group contact. The size of Bronze Age groups, the nature of their interaction, and the scale of the operation of economy and society: all these are critical in any attempt at understanding how territorial and political organisation worked.

Estimates for population in different areas of Europe vary considerably, but many authors work on a figure for the Late Bronze Age of three people per square kilometer on average (Ostoja-Zagórski 1982). In particular areas this may be more or less accurate, but even allowing for low densities in those areas where the carrying capacity of the land was relatively low (for instance in high mountains or dense scrubland) the implications for Europe as a whole are enormous. Britain has a land area of 230,000 square kilometers, and even if one assumes an average density of only 1.5 persons per square kilometer, given that upland areas were thinly populated or not at all, a population of nearly 350,000 at any given time in the earlier first millennium BC is possible; this is much higher than previous estimates. Italy, at 301,000 square kilometers, is rather larger, while the main land mass of temperate Europe, from France to Romania, and the Baltic to the Alps, must have been home to millions of people, all living in relatively small villages and farmsteads and organised at the tribal level.

If the world view of most of these people was a local one, that is not to say that we cannot discern overarching structures affecting the lives of the whole continent and joining far-distant places. Much has been made in recent years of the theory advanced in the 1970s by Immanuel Wallerstein, and known as Core/Periphery or World Systems Theory (Wallerstein 1974/1980). This set of ideas, originally advanced by economic historians and development economists as a means of understanding the modern (i.e. post-Renaissance) capitalist world, has been applied to ancient situations with some enthusiasm, principally as a consequence of the demonstrable fact that trade over long and short distances took place between what might be termed central or "core" areas, and outlying areas or "peripheries" (Champion 1989; Sherratt 1993a, b). In the context of Bronze Age Europe, this is usually taken to mean that the developed world of the Aegean was the core, and all or parts of the rest of Europe were the periphery. This approach aims to provide a means of understanding the ways in which peripheral areas developed, and specifically to discern the presence of cycles of advance and retreat in economic terms. The main moving force in this is exchange of goods and raw materials. Specifically, Greece needed large quantities of materials (metals, but also luxury materials) with which to maintain her elite production centers. Cycles of demand in these palace economies would produce cycles of production, and therefore cycles of wealth creation, in the areas from which the materials and products came (Frank 1993). Thus the rise of the Shaft Graves, and of the second palaces on Crete, has been connected by some scholars with the rise of Aegean-type artistic styles and rich Early Bronze Age burials in central Europe (Vladár 1973).

An alternative view, which prefers to see local development as more important than connections with distant lands, sees a series of rich local power centers in various parts of Europe, sucking in raw materials and excelling in craft production based on them. The Hungarian plain, for instance, or south Scandinavia have no local copper, tin or gold, yet they produced large quantities of fine metalwork throughout the Bronze Age. The same is true of central southern England in the Early Bronze Age. These "cores" rose to prominence at particular times, perhaps through a variety of mechanisms but particularly through the ability of certain people to express power over others by means of elite craft production. The areas affected, in other words the "worlds", were not necessarily very large, probably some scores of kilometers across, but they were arguably the world within which most Bronze Age people operated. This is not to say that these people were unaware of distant lands where special materials could be obtained; they no doubt were aware, but their own world view was more limited.

Complex Societies in the Aegean

In very many respects, the situation in the Aegean is different from that in the rest of Europe. This is most obvious by the time one reaches the middle of the second millennium BC, when highly complex palace-based societies had come into existence in Crete, and were in the process of forming on mainland Greece. But the seeds of their existence can be traced back at least to the beginning of the second millennium and in some cases into the third. It is impossible to do more here than mention some of the major features that characterise the Aegean world in the Bronze Age; an excellent recent survey of the Aegean Bronze Age is that by Dickinson (1994), while the latest developments are treated by the various authors in Cullen 2001 and Shelmerdine 2008.

In the Early Bronze Age, which in the Aegean broadly covers the third millennium BC, a number of sites both on the mainland and on Crete give some indication of the expansion which was to come. In general, sites were small and based on a mixed agricultural economy, but a few grew to be larger and some, such as Chalandriani on Syros and Lerna in the Argolid, were provided with a surrounding fortification wall. On Crete, the hilltop site of Fournou Korifi near Myrtos (Fig. 10.34) on the south coast is remarkable for its numerous small rooms, constructed in two phases, some with evidence of specific craft activities including potting and olive oil production (Warren 1972); something of the same sort may be present at the valley site of Vasiliki. Whitelaw (1983) has argued that the configuration at Myrtos results from the activities of "a small, egalitarian rural community whose basic unit of organization was the nuclear family", and identifies a series of "household clusters", each of them multifunctional. This is in contrast to Warren's original interpretation of the site as the seat of a clan or tribe living communally, using the builtup area as an integrated whole.

At Lerna a large building was constructed and remodelled in the middle of the millennium, and in its remodelled form, known as the House of the Tiles, it was covered with the ceramic tiles that give it its name (Caskey 1960; Pullen 2008). Remarkably, in it were found numerous clay sealings that had originally been fastened to the necks of jars and other containers. Although the signs on the sealings (and thus on the seals that were impressed onto them) cannot be regarded as true writing, they are an indication that ownership, and control of production or distribution, was moving into a centralised

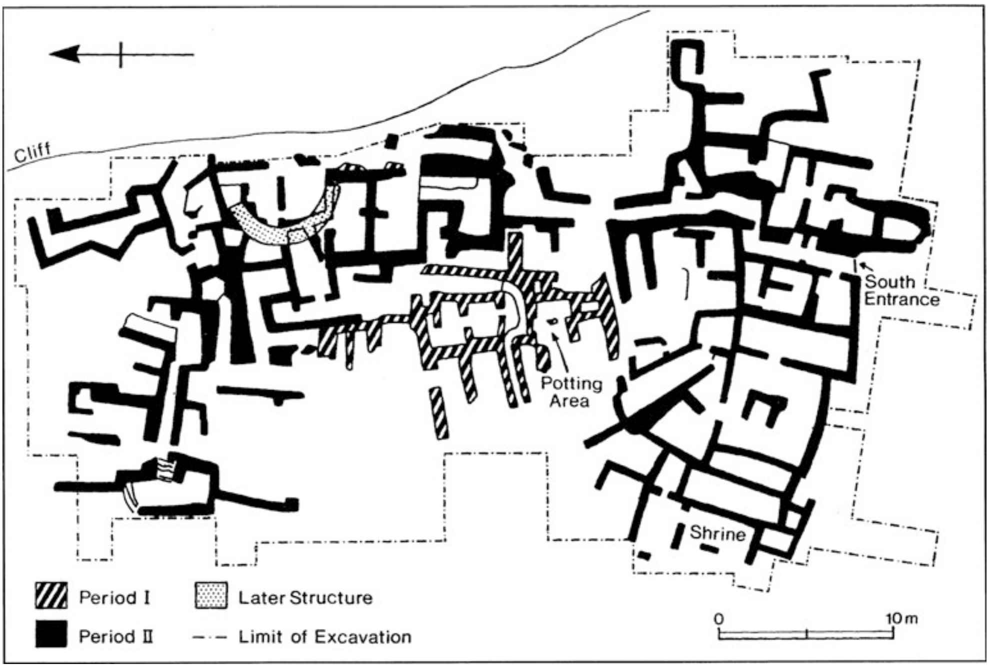

Fig. 10.34 Myrtos, Fournou Korifi, southern Crete: plan of the two phases of the settlement (Whitelaw 1983, after Warren 1972)

sphere where goods were collected together in a central place prior to redistribution out again to their ultimate recipients. The House of the Tiles is an example of the so-called corridor houses, with a large central room or rooms, and narrow axial corridors running along the sides; another is the "White House" at Kolonna on Aegina, and there are almost certainly others (Shaw 1987).

While nothing quite like this is currently known from Early Bronze Age Crete, there are indications that comparable developments were under way (Wilson 2008). Circular built tombs, commonly though not exclusively found in the southern Mesara plain, show both architectural sophistication and a degree of material wealth in the grave-goods provided with the dead (Branigan 1970). The largest and most complex of these built tomb cemeteries is the Phourni cemetery at Arkhanes (Sakellarakis and Sapouna-Sakellaraki 1997), where no less than five round tombs ("tholoi") are spread over an area some 130 meters in extent, with built rectangular structures between them; in them were numerous collections of bones and extensive grave-goods, some denoting prestige. Such structures have sometimes been termed "house tombs" after their resemblance to contemporary domestic structures, as with the large cemetery of rectangular structures on the islet of Mochlos off the north coast of Crete (Soles 1992). The construction of these circular tombs must reflect a considerable input of time and labor, and the grave-goods found in them – not only pottery, but also metal objects such as copper daggers – suggest that access to material goods was not universal, and that some people were preferentially provided for; in other words, they were "richer" than others. This certainly looks like the first clear indications of ranking in early Cretan society, and since the process continues throughout the Early Bronze Age, the fact that it immediately precedes the rise of palatial centers can only be regarded as significant.

Little is known about the earliest levels of later palace sites, but at Knossos there were certainly building levels of this date, not inconsiderable in extent. By the start of the Middle Bronze Age, the situation was becoming much more complex, though the dating of the earliest "palatial" structures

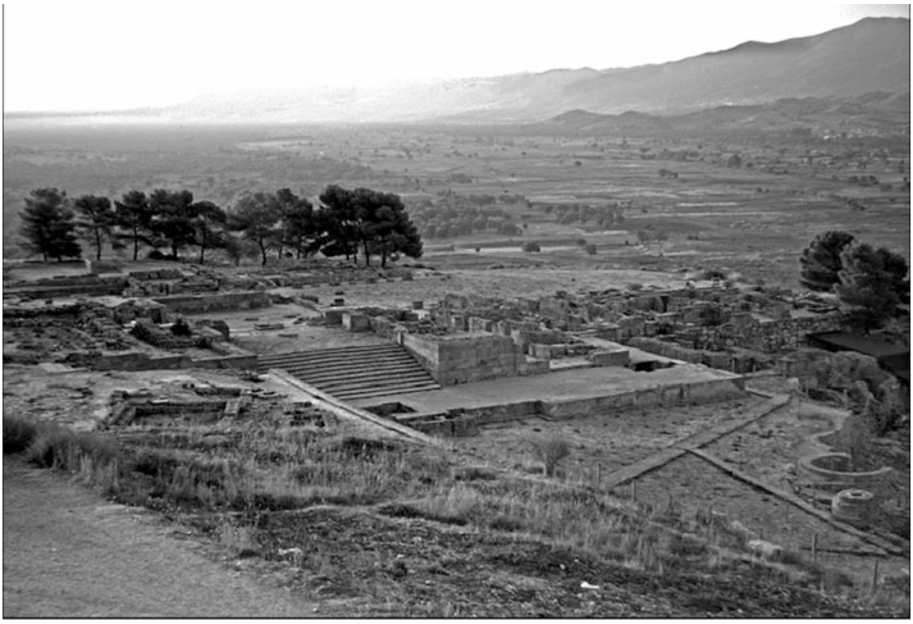

Fig. 10.35 Phaestos: the palace seen from the west (Photo: author)

is somewhat controversial. At Knossos, blocks of buildings were arranged around an open rectangle that became the central court; the development of the palace at Malia was comparably early, though the way it proceeded may have been a little different, while the sequence at Phaestos (Fig. 10.35) suggests that the central court only developed a couple of hundred years later (Manning 2008). What is important about the protopalatial period (the "Old Palaces") is that we see here a major conceptual shift in architectural and administrative terms: the palace buildings are constructed out of sawn ashlar blocks of limestone, with massive orthostat door jambs, giving a monumental appearance to the structures. The nature of the buildings thus formed is also crucial: large numbers of storerooms held pottery vessels and bins for the storage of grain, oil and other materials; and a writing system is present, in a "hieroglyphic" script that is probably derived from Egypt. This script remains undeciphered, but in general character, and the way it parallels the documents in the later Linear A and Linear B scripts, it is clear that it records administrative matters, lists of commodities and so on. If we had a larger corpus of material, which might lead to its decipherment, we might be able to discern aspects of social organisation and ranking such as are evident in later centuries.

Some 300 years after the first appearance of palatial structures, after a dramatic development (perhaps an earthquake), the palaces were remodelled on a grander scale, and other sites – Zakros in eastern Crete, Ayia Triada west of Phaestos in the Mesara plain and other smaller palatial sites – were found, in the Neopalatial period. These sites were both monumental and highly elaborate in their layout. As well as the evidence for storage, there are now extensive ranges of rooms for domestic activities, for cult and for official functions. Linear A now becomes the main script used for administrative purposes, although it had been around almost as long as Hieroglyphic; it was presumably a new way of writing the Minoan language (the nature of which remains unknown in spite of numerous claimed decipherments, none widely accepted). Even though Linear A has not yet been deciphered, some of its signs and words (and therefore tablets) can be read because they are the same as in Linear B, which *has* been deciphered; and it is clear Linear A, like Linear B, was used mainly for administrative purposes (the recording of taxation, receipts and assignments of commodities and the like). One group of tablets, however, mostly coming from the so-called peak sanctuaries, appears to record offerings or dedications, though we do not know of what or to whom.

Crete was in this period, if not an "urban" society, at least one where major centers were spaced across the island, especially along its north coast. Knossos was a town as well as a palace, the population estimated at around 17,000. Other centers were smaller but still of considerable size, while smaller towns such as Gournia (which has been completely excavated) may have been home to a population in the high hundreds (Fig. 10.36). As well as these larger urban or semi-urban sites, there were also smaller ones that may be called villas or farms, such as Ano Zakros which lies above the palace of Zakros, or Nirou Chani east of Knossos. This was a large house in a small settlement, with a storage building beside it; the architecture of the house parallels that of the palaces in many respects, with light wells, "polythyra" (rooms with multiple doors and piers), bathrooms and closets and drainage systems. Comparable arrangements have been found at other smaller-scale sites, such as Amnisos on the north coast, or Pyrgos on the south coast.

How Crete was organised in the Neopalatial period has been much discussed. From its size it would appear that Knossos was the pre-eminent center, but its relationship to the other palaces is less clear. It is unlikely that each formed an independent "state", though presumably each had a level of autonomy from the central administration and possessed its own rulers and officials. On those tablets of the Neopalatial period where words can be made out by means of signs that were the same in both Linear A and Linear B, there is some mention of identifiable places, notably Phaestos, possibly Tylissos and Knossos, and perhaps also the peak sanctuary of Mount Iuktas.

This was the golden age of the Cretan Bronze Age, when fresco-painting, stone vase-making, and the manufacture of objects in copper, gold, faience and other materials was at its height. Something of the same kind can be seen in the beautifully preserved settlement at Akrotiri on Thera, buried beneath the ash and pumice emitted by the eruption of the Thera volcano (Doumas 1983; Palyvou 2005; Davis 2008). Here, notably in the West House and Xeste 3, buildings survived to a height of two stories or more, with windows, doorways and internal partitions well preserved; furniture is present; and

Fig. 10.36 The town of Gournia, north-east Crete, seen from the south (Photo: author)

elaborate frescoes decorate the walls of many rooms. Something of the same can be seen on other islands, notably at Ayia Irini on Keos, Phylakopi on Melos and Trianda on Rhodes.

The extent to which these developments represent a "Minoan", i.e. Cretan, presence is much debated, and is part of the wider question of the foreign connections of Minoan Crete. Although the quantity of Minoan pottery that reached Cyprus, Egypt and the Levant was not large, there are imports from those areas to Crete including ivory and semi-precious stones as well as stone vases and scarabs, ostrich eggs and faience objects; and a number of Egyptian tombs depict processions of tribute-bearers carrying what are clearly Minoan pots and metal vessels, along with copper ingots and textiles that may have a wider provenance. Some scholars have spoken of a Minoan "thalassocracy" (rule of the seas), but while it was certainly true that a lively trade was taking place around the Eastern Mediterranean at this time, it is unclear to what extent Crete was in political control of the Aegean.

As well as the palace sites, there were numerous others, large or small rural settlements or villas, and cult installations like the "peak sanctuaries" that were situated near each of the major palaces (Rutkowski 1986; Peatfield 1990). Sites such as Gournia or Palaikastro in eastern Crete, for instance, show how towns were composed of large numbers of small rectilinear buildings separated by streets and extending over considerably more than a hectare (Boyd Hawes 1908; MacGillivray et al. 1991).

These palaces, villas and towns reached their apogee in the seventeenth and sixteenth centuries BC, when their level of architectural and artistic achievement was as high as anything the world had seen up to that point. But nothing lasts for ever: there was a major destruction of all the Cretan sites, perhaps in the later decades of the fifteenth century BC. The causes of this destruction are unknown, but popular theories include invasion from outside, natural catastrophe or internal war (it is now clear that the eruption of the Thera volcano cannot have been directly responsible, since it happened decades or centuries earlier). Knossos was the principal survivor. In a "third palace period", Knossos continued to exhibit the signs of palace life, but it utilised a different script for administrative purposes: Linear B. This has produced much the largest number of tablets and unlike Linear A it has been deciphered, and is an early form of Greek. Significantly, clay tablets of the same kind have also been found on sites on the mainland, in most extensive form at Pylos in south-west Greece at a rather later date (around 1200 BC); the presence of Greek speakers on Crete in the Late Bronze Age is usually taken to mean that Crete (or at any rate Knossos) had been occupied by mainlanders by this time, perhaps lending support to the notion that Minoan civilisation of the early part of the Late Bronze Age was brought to an end by invaders from the Greek mainland. The date of the Linear B tablets at Knossos has for some 50 years been controversial, with one school of thought favouring a date quite early in the fourteenth century BC (in the pottery period known as Late Minoan IIIA2) and another favouring a much later date, in the mid to late thirteenth century (Late Minoan IIIB). This controversy cannot currently be resolved, and new material in good archaeological contexts will be needed before a definitive solution can be proposed. The content of the tablets is discussed below.

The course of events on the Greek mainland was rather different, as the period from 2000 BC was initially not one of notable constructions or grave wealth, but of a continuing rural existence. At Lerna there was considerably continuity of house positioning from the preceding Early Bronze Age, and villages such as Eutresis in Boeotia or Asine in the Argolid show what rural settlement looked like, while Malthi in Messenia is an unusual example of an enclosed hilltop site (Valmin 1938) (Fig. 10.37). From the middle of the Middle Bronze Age there are signs of change, as burials became provided with a greater range and number of grave-goods. The major developments occurred towards the end of the period, in the pottery phases known as Middle Helladic III and Late Helladic I At Mycenae, a remarkable group of graves were placed in a circular cemetery area; they were provided with fine polished grey pottery in elaborate forms ("Grey Minyan ware"), and in some developed cases with bronze weapons and ornaments of semi-precious stones, gold and amber (Mylonas 1973). This was the prelude to an extraordinary outpouring of wealth in a second of these Circles of "Shaft Graves",

Fig. 10.37 Malthi, Messenia, south-western Greece: plan of the hilltop settlement (Valmin 1938)

found by Schliemann in 1876 (Karo 1930–1933). Gold cups, ritual vessels, plaques, beads and face-masks, bronze swords and spearheads, imported Egyptian alabaster vases and Cretan pottery, silver probably from Anatolia and lapis lazuli from distant Afghanistan: all these items were deposited in six graves containing the bodies of some 15 individuals. There are some indications from other sites that this was not a completely new phenomenon – there are graves in other places described as "shaft graves", notably at Lerna and at Kolonna on the island of Aegina, and increasingly rich graves appear elsewhere – but the scale of provision at Mycenae is unparalleled. In social terms, this is usually taken to indicate the emergence of important leaders ("Big Men"), perhaps as a result of increasing competition between settlements and the consequent need to express wealth in a highly visible form.

At about the same time – the start of the Late Bronze Age or Mycenaean period – the characteristic grave form known as the tholos or beehive tomb began to be built, as seen in a number of examples in the south-west Peloponnese and elsewhere. These too contained burials frequently rich in gold and other precious materials though they have often been robbed out. Tholos tombs reached their most impressive form in tombs such as the "Treasury of Atreus" and the Tomb of Clytaminestra at Mycenae (Wace 1923) (Fig. 10.38), or the "Treasury of Minyas" at Orchomenos. But "normal" Mycenaean burials were in rock-cut chamber tombs, where the bones and grave-goods of one individual would be moved out of the way to accommodate the next, indicating that the bodily remains of the deceased were not regarded as important after the soft tissue had disappeared (e.g. Mycenae: Wace 1932; Prosymna: Blegen 1937).

When beehive tombs were first created in Greece, at the start of the Late Bronze Age, there were no palatial structures or citadels. That changed some 250 years later, when major fortifications were added to existing sites: Mycenae, Tiryns, Gla, Athens and others (Iakovidis 1983; Crowley 2008) (Fig. 10.39). These walls were built in the "Cyclopean" style, that is, of very large blocks of stone, dressed to shape in order to fit exactly with their neighbours, without mortar or other bonding agent. At Mycenae, the walls enclosed not only areas that had already been occupied previously (notably the Shaft Grave Circle A), but also new areas. At Gla in Boeotia, the site seems to have been constructed

Fig. 10.38 Mycenae, southern Greece. The tholos (beehive) tomb known as the Tomb of Clytaimnestra (Photo: author)

Fig. 10.39 Mycenae: the citadel as seen from the west, with the massive fortification walls visible lower left and the palace area higher up center (Photo: author)

anew at the same time as the palatial buildings themselves. At Tiryns, the palatial area was supplemented by a "lower fortress", essentially an elongated area surrounded by massive walls and containing buildings that were intended both for storage and administration, and in some cases for domestic use.

Some of these contained buildings that are usually interpreted as palaces, but the best example comes not from a fortified acropolis site but from the site of Ano Englianos, identified as ancient Pylos, just north of the Bay of Navarino in south-west Greece (Blegen and Rawson 1966). Here the central "megaron" or throne-room, with its royal seat flanked by frescoed griffins, is surrounded by store-rooms and other functional buildings, with a room beside the main entrance that was full of clay tablets written in Linear B. Other parts of the palace buildings served as living quarters (which might include bathrooms and be elaborately decorated with frescoes), workshops and areas for ritual use. At Mycenae itself, the palace buildings lay upslope from the major monumental entrance (the "Lion Gate") and are not very well preserved, but elsewhere within the citadel walls there are major buildings that served a variety of functions: Citadel House, for instance, which in the later decades of the thirteenth century contained a ritual or cult center, with remarkable frescoes and finds of modelled clay snakes and "dollies" (Fig. 10.40) (Taylour 1969).

Artistic endeavour in the Mycenaean period is different from that in Minoan Crete, arguably less proficient and varied, but remarkable in many ways. Pottery-making was a major enterprise, with colossal quantities being made, mass-produced for the most part and thus relying on a somewhat

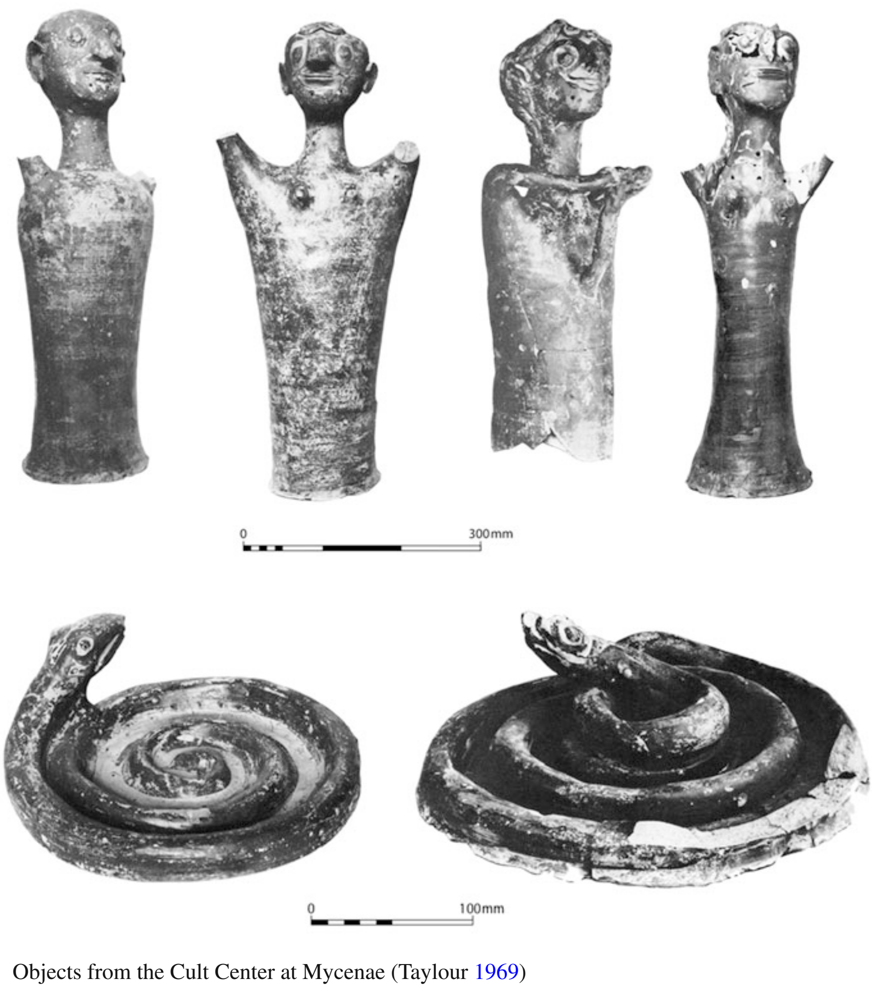

Fig. 10.40 Objects from the Cult Center at Mycenae (Taylour 1969)

limited repertoire of forms and motifs (by comparison with that of Neopalatial Crete). Seals and gemstones were favourite targets for artistic endeavour, and ivory-working and faience production were also important. Metal-working was obviously a major concern, and this raises important questions about where the raw materials came from – notably the tin with which the copper was usually alloyed. In fact, the overall quantities of metal from Mycenaean Greece are not that large in comparison with the rest of Europe, for the basic reason that hoarding was infrequent in Greece. Metal, apart from that deposited in graves, was presumably collected and reused, with the result that it usually occurs on settlement sites in very small quantities, compared with what must once have been present. Nevertheless, a good picture emerges both of weapons (especially swords and spearheads), items of domestic use (knives, axes, vessels) and jewellery – especially the rich gold ornaments of the early Mycenaean period.

It is usual to speak of a Mycenaean "koine" (area of common material culture) in the Late Bronze Age, since common pottery and architectural styles are found across most of the Aegean, probably indicating some form of centralised control. According to myth and legend, the Trojan War would have taken place in a period that we would call the Late Bronze Age, and the political picture that the Homeric poems paint, with a series of independent centers spread across Greece, but with Agamemnon of Mycenae the *primus inter pares*, might correspond to what archaeology tells us – though by common consent the *Iliad* refers to an Iron Age, not a Bronze Age situation. What is clear is that during the course of the Late Bronze Age, from at least 1600 BC to 1100 or beyond, Mycenaean material culture came to be adopted far beyond the metropolitan area of the Argolid. Mycenaean pottery turns up in large quantities in the Levant and Egypt, in Macedonia, in South Italy and Sicily, and even in rare instances further afield (notably Sardinia and Spain). Chemical analysis of fabrics has shown that while initially the pottery was probably manufactured in mainland Greece and exported, by the later Mycenaean period it was being made locally in many of these areas. The implications of this picture may be that "Mycenaeans" (however one defines that term) settled widely around the eastern and central Mediterranean, perhaps initially as traders and then as long-term residents. The importance of trade can be judged from the contents of the Uluburun ship, which contained several Mycenaean vases in addition to its large cargo of copper and tin. On the other hand, the extent to which Mycenaean traders penetrated the European continent remains controversial, though a few objects are certainly of Aegean provenance, and Baltic amber certainly found its way into Bronze Age Greece. Whether the amber beads from Bernstorf in Bavaria, with Linear B symbols incised on them, are real Bronze Age exports or modern forgeries is a matter of debate (Gebhard and Rieder 2002); while they hold great appeal for those who wish to see an extensive Mycenaean presence in central Europe, many scholars are wary of using them to bolster such arguments.

One might hope that the palace archives, as represented above all by the Linear B tablets of Pylos, might give us details of Mycenaean foreign enterprise, but in this one would be disappointed. The tablets give an extraordinarily detailed picture of administrative concerns in the palaces, both at Pylos and at Knossos. They are, of course, purely administrative documents and neither historical accounts nor literary creations (Chadwick 1976; Shelmerdine and Bennet 2008). Most are lists of one kind or another, typically of commodities, and represent the records kept by the palace administration of the movement of goods and people. Some record transactions carried out for religious purposes and list what appear to be offerings to deities. A particularly fascinating group of tablets at Pylos are concerned with taxation and record assessments for tax purposes of the amounts of different commodities payable by various villages in the year in question. This has enabled scholars to build up a detailed picture of the way the territory of Pylos was organised, with what appear to be two "provinces" within the state or polity.

Many sites on mainland Greece suffered destruction around 1200 BC, in spite of elaborate precautions to secure the defences of certain major sites. For reasons that are unclear (drought, invasion by foreigners, internal divisions and structural instability have all been suggested), most sites were abandoned either at that stage or some decades later, when literacy was lost and Greece entered what is usually called a "Dark Age" (though recent work shows it was not as "dark" as has sometimes been thought) (Deger-Jalkotzy 2008). One effect which is worth noticing is the extensive evidence for northern or "European" artifacts making a regular appearance in Greece from the late thirteenth century (Sandars 1983). This makes it easy to correlate Greek and European chronological phases, and also suggests that smiths and others (perhaps traders or mercenaries) were involved in the realignments that took place in the twelfth century BC and later. Iron came into use by the eleventh century in Greece, and by the tenth it was common. The Bronze Age story thus ends earlier in the Aegean than in parts of Europe to the north and west, and though its progress was in many ways more spectacular – in terms of sites and artifacts – the processes that we can discern at work in Aegean, social, political and economic, were for the most part the same as those present, albeit in inchoate form, in the rest of Europe. It is above all those processes that give the Bronze Age in Europe its distinctive character.

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Chapter 11
The Iron Age

Peter S. Wells

The Idea of the Iron Age

European archaeologists formulated the idea of an Iron Age early in the nineteenth century, as they began organizing the growing collections of antiquities in museums then being established in different parts of the continent (Kühn 1976). Changes in agricultural technology and the large-scale earth-moving connected with the construction of railroads resulted in the discovery of great quantities of archaeological materials. At the same time, the growing awareness of and interest in Europe's prehistoric past stimulated the establishment of many new museums and local antiquarian societies and led to ever more archaeological excavations. In the latter half of the nineteenth century, scholars concerned with archaeology began convening at international conferences to share discoveries and ideas about the growing field of study. The formulation of a detailed framework for the European Iron Age dates from these conferences of the 1870s and 1880s.

The Iron Age came to be understood as that period of time that began when iron replaced bronze as the principal material for tools and weapons and ended with the conquest of much of Europe by Rome, around the time of Christ. A precise date for the start of the Iron Age according to this technological definition is difficult to pin down, because the replacement of bronze by iron was gradual, and because it happened at different times in different regions. Today the start of the Iron Age is defined in typological terms, not just technological.

The Iron Age is different from the Bronze Age in important ways besides the development of iron technology (Sørensen and Thomas 1989), and the discussion that follows illustrates those differences. Of fundamental importance in our understanding of the societies of the European Iron Age is the existence of written texts by Greek and Roman authors that mention, and in some cases describe, the Iron Age peoples of Europe. The societies that I discuss in this chapter were non-literate, except for some very limited adoption of Greek and Latin writing at the end of the Iron Age in the context of trade with Mediterranean societies. Because we have the Greek and Roman texts to supplement the archaeological evidence, the information available about the Iron Age societies of Europe is both richer and more complex than that from earlier periods. But we must remember that the texts were all written by outsiders, not by the prehistoric Iron Age peoples.

All of our interpretations of the material evidence of archaeology are based on analogies with other things. The postholes that mark foundations of houses, the pots, and decorative pins that people made, even the graves they arranged, provide us with information about the people who created them only if we link the material evidence with what we know about human behavior. That knowledge comes from

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analogies. Greek and Roman texts provide some information, but interpreting them is a complex exercise. Analogies from early medieval Europe are often used to understand Iron Age social structures, settlement patterns, trade organization, and ritual behavior. Many of the basic circumstances of life were similar during the Iron Age and the early medieval period, and this kind of analogy can be useful, when applied with caution. More general ethnographic analogies can also be brought into consideration in interpreting the archaeological evidence from Iron Age Europe. Analogies, whether from Greek and Roman authors, medieval Europe, or world ethnography, can never explain the material evidence, but they can help us to develop models that may lead to better interpretations.

Chronology

During the 1870s and 1880s, when archaeologists working in different parts of Europe met to establish common frameworks for organizing the evidence, they agreed that the finds from the Iron Age could be divided into two main groups (Fig. 11.1). The earlier group resembled objects recovered from graves excavated between 1846 and 1864 at the site of Hallstatt in Upper Austria (Fig. 11.2), and the researchers named this early part of the Iron Age after that site. The second, later group of finds resembled those recovered at the site of La Tène on the shore of Lake Neuchâtel in western Switzerland, and the second part of the Iron Age was designated the La Tène Period (Gräslund 1987). The more detailed chronology of the Iron Age was worked out by many researchers studying materials in different parts of Europe, first around the turn of the twentieth century. Among the most influential of these scholars were Oscar Montelius in Scandinavia, Paul Reinecke in Germany, and Josef Déchelette in France (Klindt-Jensen 1975, Sklenár 1983). The basis of the chronological framework was typology and associations of objects in graves. It was common practice in the Iron Age to place metal ornaments, weapons, and pottery in burials with the dead. As increasing numbers of graves and

BC	Britain + Ireland	France	C. Europe	S.E. Europe	E. Europe	N. Europe	Italy
	Roman Conq.	Roman Conq.	Roman Conq.			Pre-Roman Iron Age Seedorf (Period III)	Roman Empire
100	Late Pre-Roman Iron Age	La Tène III	La Tène D				
200					Sarmatians		
		La Tène II	La Tène C			Pre-Roman Iron Age Ripdorf (Period II)	
300	Middle Pre-Roman Iron Age			La Tène			
			La Tène B				Roman Republic
400		La Tène I					
			La Tène A			Pre-Roman Iron Age Jastorf (Period I)	
					Scythians		
500							
	Early Pre-Roman Iron Age	Hallstatt II	Hallstatt D	Later Glasinac	Late Lusatian		Late Etruscan
600							
700							Early Etruscan
		Hallstatt I	Hallstatt C				
800				Basarabi			
					Koban		Villanovan

Fig. 11.1 General chronology of the Iron Age

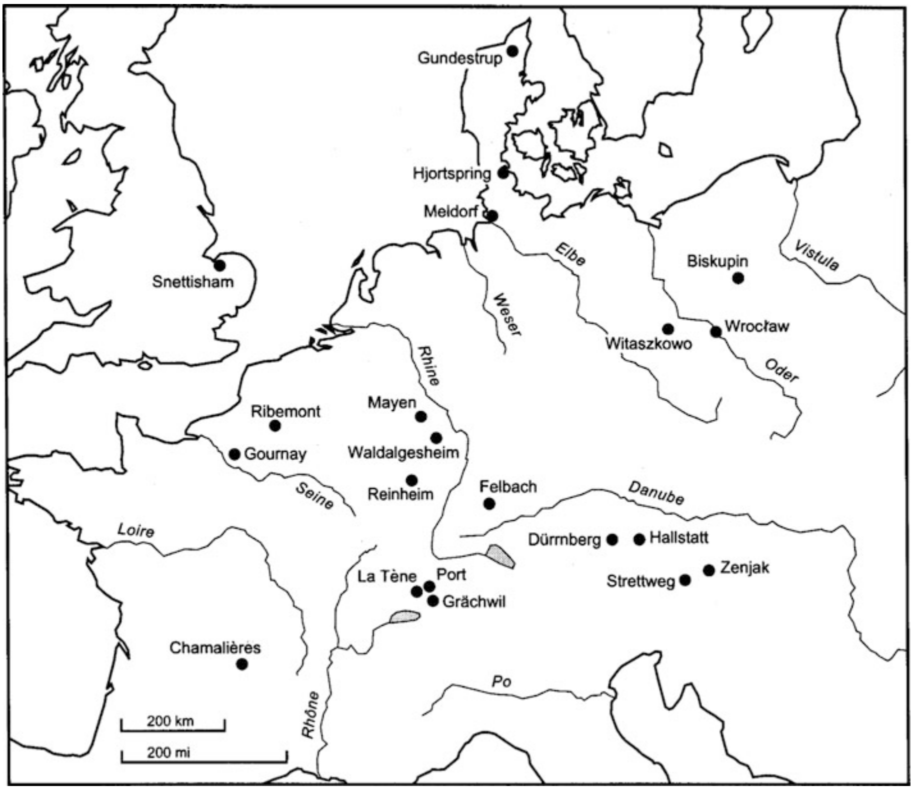

Fig. 11.2 Map of sites mentioned in the text (See also Figs. 11.12 and 11.15)

whole cemeteries were excavated and published, researchers observed that the style of pins, swords, and pots changed through time, and certain types of objects occurred together in grave groups, but not with certain other types. Over decades of analysis, they worked out chronological sequences for different parts of Europe based on typological change (Figs. 11.3 and 11.4). The chronological framework has undergone constant refinement throughout the twentieth century. The most widely accepted system is that developed by Reinecke (1965) on the basis of grave groups in southern Germany. While he designed his framework specifically for that part of Europe, researchers have found that, at least in rough outline, it can be applied more widely. Schemes devised for other parts of Europe are linked with the Reinecke framework.

Since the development of the basic chronological system for the European Iron Age, great advances have been made in absolute chronology. The principal method of connecting the relative sequence with calendar years is through Mediterranean imports (see e.g. Kimmig 1988). Throughout the Iron Age, but especially during the sixth, fifth, second, and first centuries BC, large numbers of objects such as fine pottery and bronze vessels made in Greece, Etruria, and Roman Italy were imported into Iron Age Europe (Fig. 11.5). Classical archaeologists are able to date many of these products, such as Attic pottery, very precisely, because they can connect the style of objects with historical dates in the Mediterranean world. When such imports are recovered in graves and on settlements in Iron Age Europe, they provide important links to absolute chronology.

In recent years, dendrochronology has played an increasing role in absolute dating in Iron Age Europe (Hollstein 1980, Baillie 1995, Billamboz 2008). When wooden timbers are well preserved, and a local tree-ring sequence has been worked out, it is possible to determine the date that a tree

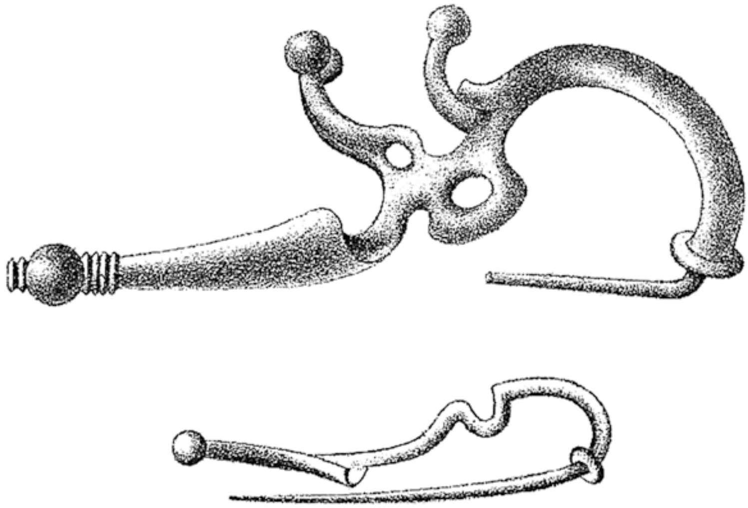

Fig. 11.3 Bronze serpentine brooches, or fibulae, of the Early Iron Age (After Deschmann 1879, plate following 144, 2.3)

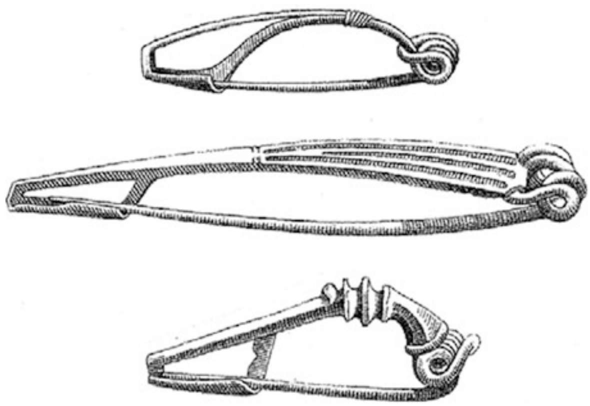

Fig. 11.4 Bronze fibulae characteristic of the middle (*top*) and late La Tène Period (After Osborne 1881:l. 3, 6.7.8)

was cut down with great precision, to the specific year and sometimes to the season. Outstanding examples of the application of this technology include the dating of the settlement at Biskupin in Poland (Rajewski 1970, Scarre 1998), burials in the Magdalenenberg tumulus in southwest Germany (Spindler 1976), and galleries in the salt mine complex at Hallstatt in Austria (for recent bibliography on this important site, see Bichler et al. 2005).

Radiocarbon dating has also been applied to Iron Age Europe, but it is of limited use compared to the other two techniques. The statistical error inherent in the method makes this method much less precise than dendrochronology and less exact than the absolute chronology based on Mediterranean imports and typological sequences extrapolated from them.

Even with the precision now available in the absolute chronology, there is still disagreement as to exactly when different phases, defined typologically, began and ended. Furthermore, the typological changes happened at different times in different regions of Europe. The following is an outline of the phases for the central part of the continent, with dates that are generally accepted by the scholarly community.

Fig. 11.5 Bronze beaked jugs, or *Schnabelkannen,* made in Etruria in central Italy and recovered in graves in Belgium and France (After Déchelette 1914:1430, figure 640)

- Hallstatt C 800–600 BC (Reinecke's phases Hallstatt A and B are considered part of the Late Bronze Age)
- Hallstatt D 600–450 BC
- La Tène A 500–400 BC (material culture of the Hallstatt tradition continued in use in some regions after that of the La Tène style appeared in others, hence the overlap)
- La Tène B 400–275 BC
- La Tène C 275–150 BC
- La Tène D 150 BC – Roman conquest

This absolute chronological framework is just a schematic model, of course. The styles that investigators use to define the different phases appear earlier in some places, and continue in use later in others. The dates given above are meant to provide a general idea of the dating of the phases.

Economy

The subsistence economy during the Iron Age was broadly similar to that of the preceding Neolithic and Bronze Ages. In most parts of Europe, the subsistence base was cereal agriculture, especially of wheat, barley, millet, rye, and oats, supplemented with garden crops that included peas and lentils (Körber-Grohne 1987, Küster 1992). Cattle, pigs, sheep, and goats were raised (von den Driesch 1993). The emphasis in the plants cultivated and animals raised varied regionally with local environmental conditions. For example, wheat was the predominant cereal in southern temperate Europe, while rye played an important role in the north. Cattle and sheep were emphasized in the sandy meadowlands of the North European Plain, while pigs thrived in the wooded landscape of the hilly uplands. Wild plants and animals continued to play a minor role in the diet. Red deer, roe deer, boar, hare, quail, and other land animals were hunted, and many kinds of fish were taken from the rivers and lakes. Nuts such as hazelnuts, fruits such as apples and plums, and a wide range of berries were collected from trees and bushes. Some of these plants may have been partly domesticated. Recent studies have emphasized the impact that agriculture had on the landscape at this time (Rösch et al. 2008, Mailänder et al. 2008).

During the Iron Age, important technological improvements made food production more efficient. By the Late Iron Age, iron plowshares and colters made possible the exploitation of heavier, more nutrient-rich valley bottom soils. Scythes first appear archaeologically in the Late Iron Age, enabling the harvesting of hay more efficiently than ever before. Exploitation of richer soils meant that more people could be fed by fewer farmers, and use of the scythe meant that more animals could be provided with hay through the winter. Other new iron tools such as shovels and hoes contributed to increased efficiency of agricultural production.

The peoples of Iron Age Europe employed a variety of different materials for making tools, ornaments, and household goods. While there is evidence for some use of iron earlier (see recent discussion in Collard et al. 2006), during the eighth century BC communities in different parts of temperate Europe began to make ornaments, tools, and weapons from iron on a regular basis. Iron had the great advantage over bronze that iron ores are widely available in Europe. Once smiths learned the techniques of smelting and forging iron, most had ready access to the metal rather than having to rely on trade systems to acquire copper and tin for bronze. Iron did not rapidly replace bronze as the principal material for implements, and for the first few centuries of the Iron Age, iron objects are not abundant on most archaeological sites. Only after about 400 BC did many communities begin to produce iron in large quantities. By the final centuries of the Iron Age, great amounts of the metal were present at the big settlements known as *oppida* (Schäfer 2002). Iron was used to manufacture tools for a wide variety of purposes, including metalworking, woodworking, leather and textile production, food preparation, and agriculture. Tools included hammers, tongs, nails, gouges, chisels, saws, axes, adzes, plowshares, coulters, sickles, scythes, pruning knives, shovels, hoes, awls, needles, cooking vessels, and andirons (Jacobi 1974) (Fig. 11.6).

In many parts of the upland regions of central Europe, surface deposits of iron ore were abundant, and bog ore could be extracted from most areas of the North European Plain. Until the final centuries of the Iron Age, smelting was a small-scale operation. One common type of furnace was constructed by digging a hole in the ground and above it building a cylinder of clay about a meter high, with ports at the base for attaching bellows (Voss 1993). The smiths loaded the furnace with alternating layers of iron ore and charcoal, with a flux such as limestone. The product of the smelting furnace was a bloom of impure iron about the size of a football. The bloom was extracted from the furnace base, reheated in a forging fire, and hammered in the red-hot state to drive off slag and other impurities. The resulting material was wrought iron, which could be forged by hammering into tools, weapons, ornaments, and other objects. Metallographic analyses of tools have shown that already in the Early Iron Age, some smiths had developed techniques to produce steel, an alloy of iron and carbon (Pleiner 1980). Steel had the advantage of yielding a much harder and potentially sharper cutting edge than wrought iron.

Bronze remained important throughout the Iron Age. In the Early Iron Age it was still much used for weapons and tools. Through the whole of the Iron Age, bronze was the principal material for personal ornaments, especially fibulae and ring jewelry and for metal vessels. Figurines of animals and of humans were also cast of bronze (Fig. 11.7). Techniques of casting and hammering bronze were similar to those developed during the Bronze Age, but new types of ornaments and vessels were created.

The most abundant material on Iron Age settlement sites in most of Europe is pottery. Good clays are available in most regions of the continent, and most communities relied on local deposits rather than importing the material. Already at the start of the Iron Age pottery in many regions of Europe was complex, with diverse forms for a variety of different functions. These included large storage vessels, thick-walled pots for cooking, dishes and jugs for serving food and beverages, and cups and plates for consuming. In some contexts pottery was fine and ornate, in others coarse and plain. The fast-turning potter's wheel first came into general use in the final two centuries of the Iron Age, and

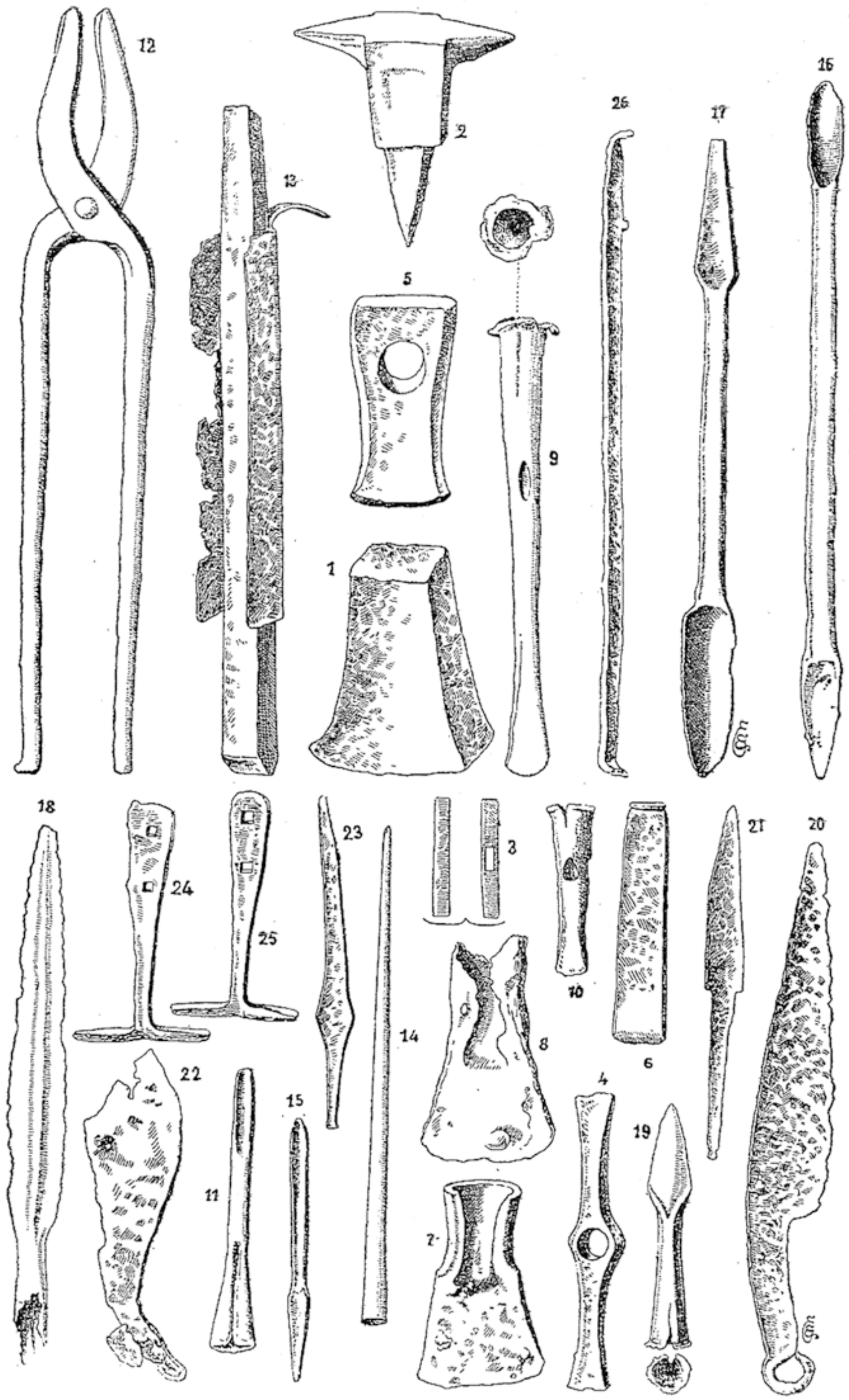

Fig. 11.6 Iron tools of the Late Iron Age, from Szalacska, Hungary (After Déchelette 1914:1376, figure 609)

Fig. 11.7 Bronze bull figurine from Býčí Skála, Czech Republic (After Wankel 1877, plate)

it is well represented at the *oppida*. Bronze and occasionally gold vessels played important roles in funerary ritual for elites, and probably in festive celebrations in their lifetimes as well.

Glass beads are common as personal ornaments throughout the Iron Age, but direct evidence of their production is rare. The enormous quantities of beads in graves in Early Iron Age Slovenia, at sites such as Magdalenska gora and Stična (Wells 1981), has led researchers to suggest that centers there were the production places, but direct evidence for manufacture is sparse. Not until the Late Iron Age is evidence for glassworking common, in the form of lumps of unworked glass recovered at many of the *oppida*.

Wood was much used for building and for making a wide range of objects, but in most situations wood does not survive archaeologically. From places where unusual environmental circumstances preserve wood, such as the salt mines at Hallstatt and waterlogged settlements in different places, we have a wide range of objects including handles for axes and hoes, mallets, shovels, vessels, furniture, spear shafts, shields, and boats. Sculptures from sites, such as Chamalières in France (Romeuf 1986) and Fellbach-Schmiden in Germany (Planck 1982), show that wood was used for representational arts as well.

Textiles, like wood, survive only in exceptional environments. From northern Europe, especially Denmark, we have abundant textile remains preserved in waterlogged conditions. The salt mines of Hallstatt also preserve textile pieces (Bichler et al. 2005). Small fragments of textile often survive in contact with metal oxides, and modern excavation procedures have resulted in large quantities of such samples being recognized and preserved. Wool and linen were the main fibers used in the production of clothing, but animal hairs and imported silk are also represented (Banck-Burgess 1999, 2008). Recent studies demonstrate the potential information from Iron Age textiles about technology, symbolism, and group identity (Jørgensen 1992).

Flint continued to be used throughout the Bronze and Iron Ages. Even with the availability of bronze and iron, in the hands of a skilled flint-knapper, sharp and serviceable blades could be produced quickly and easily from flint. Many excavated Iron Age settlements have yielded considerable quantities of the material. It is not always clear whether the flint tools and debitage represent earlier activity on the site or Iron Age usage. But sufficient studies have now confirmed the use of flint by Iron Age peoples (Young and Humphrey 1999).

Stone was an important material for grinding grain, and in the Late Iron Age large rotary querns came into general use. Important quarries were developed where usable hard rock occurs, for example at basalt deposits at Mayen in the Rhineland and porphyry outcrops in Bohemia. The best-quality stones were highly valued, and the distribution of the products from the quarries shows that they were widely circulated.

A variety of other materials were exploited for making personal ornaments, including gold (figure 10.14), silver, amber, coral, jet, lignite, and sapropelite. These substances were limited in use, either by social status or by natural distribution, and I treat them below under "Trade."

Direct evidence for manufacturing is common on settlement sites, mostly in the form of debris from manufacturing processes (Wells 2007). From about 600 BC on, we have evidence for both centralized manufacturing at larger settlements and dispersed manufacturing in smaller communities. I discuss these patterns below, under "Rise of Centers" of the Early Iron Age and "Origins of Urbanism." A special characteristic of the European Iron Age, in contrast to urban developments in some other parts of the world, is the dispersal of manufacturing, even of special products such as ornate bronzes and gold and silver coins, among communities of different sizes.

Trade

To understand Iron Age trade in its context, we need to take account of the great amount of mobility that characterized cultural life during later prehistoric times. Many studies have demonstrated that communities throughout Europe were in regular contact during the Iron Age, and individuals and groups moved regularly through the landscape, for purposes of trading, raiding, migrating, visiting relatives, on pilgrimage, and for many other reasons (Wells 2008). Trade was not something exceptional, but was a part of this general mobility in Iron Age Europe (Stary 1993) that included landscapes of the Mediterranean and even the Near East (Bouzek 1997).

There has been a tendency in studies of trade to focus on evidence within or between particular regions, or in specific categories of goods, rather than viewing the phenomenon as a whole. The available evidence makes clear that to get a comprehensive view, we need to consider trade on the broadest scale, then examine each local network as a part of the complete system.

Sherratt and Sherratt (1993) argue that throughout much of the Mediterranean Basin there was an upswing in trade activity around the beginning of the Iron Age. The reason is that the breakdown in the palace economies of the Late Bronze Age opened new opportunities for entrepreneurial commerce, thus stimulating growth in trade. The greater availability of attractive goods from those regions, and the demand of the growing urban centers throughout the Mediterranean basin, stimulated the production of larger surpluses for trade within European communities. Furthermore, the wider availability of iron and steel cutting tools and the development of new categories of farming implements, such as iron-tipped plows, iron colters, and scythes, made possible improvements in agricultural efficiency. Thus communities could generate larger surpluses of farm products, and at the same time larger numbers of people could devote their energies to the acquisition and production of other goods that were in demand, such as furs, animal skins, pitch, tar, and metals (Pare 1997).

In an overview such as this one of trade 2000 years ago in Iron Age Europe, there is a tendency to portray the phenomenon in terms of regular, constant commercial and technological progress from the beginning of the Iron Age to the complex centers at the *oppida* at the end of the Iron Age. If we were to examine the growth and decline of individual communities, or study economic change in a single valley through the Iron Age, we find a much more complex picture of economic ups and downs, booms and busts.

Archaeological evidence for Iron Age trade shows extensive commerce in both raw materials and finished goods. Amber was a favored substance throughout prehistoric and historical times, and it is well represented in Iron Age Europe. Amber occurs most often in the form of beads and pendants, but also as inlay on bronze jewelry and other forms. Most Iron Age amber is in burials. At the Early Iron Age cemetery of Hallstatt in Austria, about 17% of the 980 graves excavated in the middle of the nineteenth century contained amber beads. At Stična in Slovenia, over 30% of the graves had amber in them (Wells 1981). Extensive trace element analyses have shown that the great majority of amber finds from Iron Age Europe come from the Baltic region (Beck 1970). At the Early Iron Age hillfort of Komorowo in Poland, large quantities of unworked amber indicate a place where amber was brought for carving and transshipping (Lang 1993). On the Late Iron Age settlement of Wrocław-Partynice were found three pits, up to 2.5 meters deep and 0.9 meter in diameter, full of unworked amber, containing a total of 1400 kilograms of the substance (Godłowski 1978). These deposits are thought to represent amber en route between the Baltic source and the large population centers to the south in central and southern Europe. Sizeable amounts of uncarved amber have been recovered at the *oppidum* site at Staré Hradisko in Moravia in the Czech Republic.

With the gradual replacement of bronze by iron for tools and weapons during the Early Iron Age, the quantities of bronze and of its components copper and tin in circulation declined. But bronze was still favored throughout the Iron Age for personal ornaments, vessels, statuary, and other special purposes, and hence the trade in these metals continued.

Trade in iron within Europe is difficult to document. Iron ore is abundant in most parts of the continent, and evidence for its extraction and smelting during the Iron Age is widespread (Schäfer 2002). Yet iron ingots found in much of Europe suggest that trade in the metal took place, at least during some phases of the Iron Age (Jacobi 1974). Attempts to identify origins of iron metal through trace element analysis generally have not been successful, because the chemical composition of individual ore bodies can vary greatly.

Gold and silver were much traded in Iron Age Europe, but the places of origin of these metals are difficult to determine. Many mountain rivers of Europe carry gold particles in their sediments, and panning was the principal means by which gold was acquired (Waldhauser 1993). From the fourth century BC on there is also some evidence for underground mining. During the later parts of the Iron Age, much gold was obtained by melting down metal acquired from societies of the Mediterranean basin, especially for the production of the massive quantities of coins minted during the second and first centuries BC. Until the development of silver coinage during the second century BC, silver played only a minor role in Iron Age Europe compared to gold. Silver also was acquired principally through interaction with the Roman world.

Numerous natural substances were gathered, processed, and traded for use as ornaments and for magical purposes (Wells 1995a). Graphite was mined in several districts of central Europe and favored as decoration applied to pottery to give it a black sheen. In the graphite-clay pottery of the final centuries of the Iron Age, graphite mixed with the clay served a practical purpose, making the fabric less likely to heat unevenly. This material was the basis for the graphite-clay cooking pots so well represented in the ceramic assemblages on Late La Tène settlements (Kappel 1969). Jet and lignite were mined, carved, and traded for use as beads and ring jewelry. Coral imported from the Mediterranean Sea was cut into various ornamental forms, including beads, rings, and inlay pieces on bronze jewelry, especially during the period between 600 and 300 BC. Ivory was imported, mostly likely from Mediterranean traders but ultimately from Africa or south Asia, and used as a decorative material on some high-status goods, such as on the handles of three iron swords in the cemetery at Hallstatt.

Salt was a commodity much traded in Iron Age Europe, but one that does not survive archaeologically in the places where it was consumed. Extensive evidence for the extraction and trade of salt during the Iron Age comes from the mining sites of Hallstatt and the Dürrnberg in Upper Austria (Stöllner 1999). At those sites, the salt-mine galleries have been extensively explored archaeologically, providing insight into the technology and scale of salt extraction. The cemeteries at Hallstatt and on the Dürrnberg yield abundant evidence for the extensive trade systems which these salt-producing centers were part of. Salt-evaporation sites are also well documented in many parts of Iron Age Europe (Nenquin 1961).

Among finished goods, personal ornaments such as fibulae, ring jewelry, belthooks, and glass beads and bracelets circulated widely. Ornaments of a particular style that characterizes one region occur in graves and on settlements in others, indicating some kind of movement. Such transmission is usually subsumed under the general heading "trade," although any of a variety of different mechanisms may have been involved, such as personal gifts, captured war booty, and travel mementoes.

Finer varieties of pottery were traded during both the Early and Late Iron Age. For example, fine painted wares produced at centers such as Mont Lassois and the Heuneburg circulated extensively into the countryside, where they are found both in burials and within settlement deposits (Dämmer 1978). In the Late Iron Age, the fine wheel-made wares manufactured at the *oppidum* production centers were disseminated both into the surrounding countryside and, in some instances, considerably further afield. Many examples of ceramic vessels manufactured at the *oppida* of southern temperate Europe have been found on settlements far north of the regions in which they were produced (Heege 1987).

During the second and first centuries BC, coins circulated widely, and they provide some of the best evidence for understanding trade systems at the end of the Iron Age. Communities at the different *oppida* minted distinctive coins, and numismatists are able to identify the places of origin of coins recovered through archaeological excavation. The result has been the demonstration of extensive commerce in gold, silver, and copper-alloy coins across the whole of Europe. Many coins circulated northward and have been found hundreds of kilometers beyond the centers at which they were minted.

Trade between communities in temperate Europe and societies of the Mediterranean world during the Early Iron Age, especially 600–450 BC, was distinctive. From the Mediterranean societies, elites in temperate Europe mainly based at the centers (see below), imported quantities of wine-drinking paraphernalia and other exotic luxuries. Ceramic wine mixing and drinking vessels from workshops in Athens have been recovered at many centers across temperate Europe, both in settlement deposits such as Mont Lassois and the Heuneburg, and in richly outfitted burials such as Vix (Mohen et al. 1988). Ceramic amphorae used to transport wine are well represented at many of the centers. Bronze mixing and serving vessels of Greek and Etruscan manufacture have been recovered in many richly outfitted graves such as those at Hochdorf, Vix, and Kleinaspergle. Other exotic ornaments show that this import trade by the European elites was not limited to feasting gear, but included other material accouterments of an elite lifestyle in which display played a major role in communicating status. Silk textiles imported from the East have been identified in burials at Hohmichele, Hochdorf, and Altrier (see discussion in Good 1995). At Grafenbühl, the leg of a bronze tripod, with carved sphinxes of amber, bone, and ivory, and with amber and ivory ornaments from furniture, attest to extravagant imports of luxuries from Mediterranean societies (Zürn 1970). Recent research at sites beyond the major centers has shown that the importation of these luxury goods was much more widely spread than had been believed (Krause 2005).

Trade with the Mediterranean world in the final two centuries of the prehistoric Iron Age resulted in the importation of a much larger quantity of wine-related equipment, but with fewer exotic items that distinguish the rich burials of the Early Iron Age. Instead, a wide range of everyday goods from the Roman world were imported, especially into the major *oppidum* centers. These included ceramic wine transport amphorae and wooden wine barrels, fine pottery, and bronze jugs, pails, pans, beakers, dippers, and sieves, all for use in serving and consuming wine. Other Roman products common at Late Iron Age centers are personal ornaments, writing instruments, glass vessels, mirrors, balances, and surgical implements (Fischer 1985, Gabler 2005).

The volume of trade in Iron Age Europe was substantial and its organization complex. It is helpful to consider the trade in terms of three different systems (Wells 1995a). (Surely it was much more complex than we could hope to model, but dividing it this way provides a useful means for us to examine the evidence.) One encompassed the luxury goods that are largely limited to the wealthiest burials and the central sites associated with them. Mediterranean wine-serving paraphernalia, furniture decorated with amber and ivory, and silk textiles show strictly limited distributions within the social systems of Iron Age societies. A second comprised manufactured objects that occur commonly in burials and on settlements. These include personal ornaments such as fibulae, glass beads and bracelets, and fine locally made pottery. These objects are much more widely distributed and seem to have been accessible to a substantial portion of the population. A third system of trade encompasses the bulk commodities such as grindstones and perhaps metals and salt.

There is good evidence for changes during the Iron Age in how these systems were organized and integrated, as well as for considerable regional variability. The occurrence of large numbers of special, often unique, objects in the richest burials of the Early Iron Age (600–450 BC), such as Vix and Grafenbühl in western Europe, and the richly outfitted burials in the kurgans of the forest-steppe zone of eastern Europe (Melyukova 1995, Rolle 2006), indicates a tight control by the elites of this luxury trade with Mediterranean societies. Trade in bulk commodities was little developed during this period. The situation changed over the course of the Iron Age. By the final two centuries before the Roman conquest, there is little evidence for exclusive elite control of luxury trade. The Mediterranean imports of this time were mass-produced Roman goods, in contrast to the unique Greek bronze objects of the earlier period. Trade in bulk commodities such as grinding stones developed into a major commercial activity, and trade in everyday personal ornaments such as fibulae was widespread and intensive (Völling 1994).

The idea of coinage was introduced into Iron Age Europe by mercenaries returning from service in armies of the eastern Mediterranean (Mannsperger 1981). The earliest coins minted in temperate Europe are of gold and date from the late fourth or early third century BC, and they were modeled on Hellenistic prototypes. These gold coins embodied considerable value, and were a form of treasure, not everyday currency. Coinage in silver and copper alloys began around the middle of the second century BC, and the appearance of those coinages is an indication of a fundamental change in the nature of trade (Haselgrove 1988). In contrast to the circulation of handcrafted products under the supervision of elites in the earlier parts of the Iron Age, the coins represent mass circulation of standardized commodity wealth in the Late Iron Age. Silver and copper coins accompanied mass-produced goods that included wheel-made pottery, series-manufactured iron tools, and mass-produced personal ornaments such as Nauheim fibulae (Furger-Gunti 1977).

Much of the elite trade, especially in the Early Iron Age, took place as gift exchange or diplomatic presentation. Classical texts provide insight to how such exchange operated and what purposes it achieved (Fischer 1973). Unique objects such as the Vix *krater* and the Grächwil *hydria* were probably presented by Greek emissaries to potentates in Iron Age Europe for the purpose of establishing trade relations or political pacts. Mercenary service by soldiers from central regions of Europe, well documented in Classical texts for the fourth and third centuries BC, provided an important mechanism for the circulation of goods, including coins, from the Mediterranean world into continental Europe. Booty captured during raids between communities was another mechanism through which goods circulated, and this means is also well documented in both Classical and early medieval contexts, and was probably a part of life during the Iron Age. Many personal ornaments that circulated between regions have been interpreted in terms of exogamy – marriage of individuals from different communities, with one spouse bringing his or her personal ornaments to the new location. Roman texts attest to such social practices among elite groups in Europe just before the start of the Roman Period (Rankin 1987).

Along with all of these socially charged mechanisms of circulation, barter trade – the exchange of goods of equal value – surely played a major role throughout the Iron Age. Much of the trade in personal ornaments, small quantities of raw materials, and pottery, surely took the form of barter trade. This mechanism probably operated both between communities within societies, and between societies, for example on frontiers between continental Europeans and their neighbors on the shores of the Mediterranean Basin.

By the final two centuries of the Iron Age, real market exchange developed, at least at the major oppidum centers and probably over a broader landscape as well (Kellner 1990). The rapid expansion of the use of coinage, that of the three-metal currency of gold, silver, and bronze, make a market-based system likely. The prevalence of equal-arm balances and of weight standards that match the Roman system, on many of the major *oppida* indicate a close link with Mediterranean markets (Creighton 2000). The mass-production of iron tools, wheel-turned pottery, fibulae, and other goods similarly indicate the creation of an economy fundamentally different in structure and organization from what had existed before. The presence of writing instruments and seal boxes indicates close connection between the merchants at the *oppida* and their counterparts in Italy (Steuer 1999). The large quantities of coins found at places away from their mint sites attest to the intensity of commerce across much of the continent. Distributions of pottery, personal ornaments, and other goods also indicate intensive commerce across Europe, including across the English Channel to Britain. For Gaul in the final century BC, Roman texts inform us of merchants who managed sizeable operations dealing in bulk commodities; the Roman writers referred to them as *negotiatores* (Timpe 1985).

Warfare

In Iron Age Europe there is considerable evidence for warfare, and also for symbolism and ritual connected with warfare. Systematic research on battle sites is relatively new, and at present it is difficult to judge how much fighting actually took place. Certainly a great deal of material and energy were devoted to military preparation and representation. Perhaps such behavior often resulted in the avoidance of actual armed conflict. But from certain times and places there is abundant evidence for warfare.

Evidence pertaining to warfare in Iron Age Europe comes from a variety of different sources. These include fortified settlements, weapons scattered around such fortifications, weapons placed in graves, weapons deposited in ritual sites, wounds on bones, pictorial representations of warriors, and references to European warriors and descriptions of battles in Greek and Roman texts. For the end of the Iron Age, several recently excavated battle sites provide important information about weaponry and tactics (Reddé et al. 1995, Schlüter 1999, Zanier 2000). It will be useful to consider the subject in three chronological units, the Early Iron Age (800–450 BC), the Middle Iron Age (450–200 BC), and the Late Iron Age (200 BC-Roman conquest).

During the Early Iron Age, many communities constructed substantial earth and stone walls around the tops of hills to create fortified settlements. Often steep sides made the hilltops difficult to access, and water had to be hauled up for community use. Clearly the builders felt that there were important reasons for constructing the massive walls and establishing their settlements in such inaccessible places. Little direct evidence for attack at these hillforts has been identified, probably because of only limited surface area excavation at most sites. Archaeological research has often focused on sectioning the walls and excavating narrow trenches on settlements in order to establish construction techniques and chronology, without large area exposure of the original ground surface. Caches of egg-sized pebbles believed to be slingstones and substantial numbers of arrowheads have been noted at many fortified settlements (Wheeler 1943:49, Mercer 1970).

What Kristiansen (1999) has called a warrior aristocracy is in evidence already during the Bronze Age, and in the Early Iron Age placement of weapons in the graves of some men was common practice. Characteristic weapons are long swords of bronze or iron, lances or spears, and shields and, especially in eastern Europe, battle axes (Stary 1982). In richer burials, helmets and cuirasses were also included. Burial of weapons does not necessarily mean a time of unusual violence and warfare, but it does indicate that weapons were in use and that they formed an important aspect of the status and identity of some men in society. In the latter part of the Early Iron Age, the fashion of burying swords in graves declined in much of central Europe, and in richer burials the dagger was the principal weapon represented. In contrast to the swords of the early part of the Early Iron Age, the daggers are often highly ornate and individualized, suggesting a special symbolic significance to these weapons. Associated with the daggers in some wealthy graves were bows and arrows, as at Hochdorf (Biel 1985).

In the situla art of the southeast Alpine region and northeastern Italy, representations of marching troops indicate the formation of larger military units than existed before. The top frieze of the Certosa situla, for example, shows a row of men wearing helmets and carrying lances and shields, marching in formation. A fragmentary helmet from Magdalenska gora and a belt plate from Vace show similarly equipped soldiers (Lucke and Frey 1962). The weapons represented match those in burials of the same region (Fig. 11.8). These scenes suggest that at the Early Iron Age centers at which the situla art was produced, such as Magdalenska gora, Stična, and Vače, military activity was carried out by highly organized units with standardized equipment. An engraved bronze sword scabbard from Hallstatt (Megaw and Megaw 1989:80–81, figure 92) shows three soldiers marching with lances and shields, four horseback riders with helmets and lances, and two scenes of fighting. In one, one man struggles with another on the ground, in the other, a horseman tramples a man. On the Strettweg wagon, also from Austria, men on horseback wear helmets and carry lances, axes, and shields (Egg 1996).

In the middle part of the Iron Age, swords and other weapons again became important components of many burial assemblages (Fig. 11.9). In the great flat grave cemeteries of temperate Europe, long iron swords, often massive lances, and shields formed a standard inventory of a large proportion of men (Waldhauser 1987) (Fig. 11.10). Such weapons also played an important role in status expression in Britain (Stead 2006). The implication is that weapons played more important roles in defining men's status and identity now than before (Bujna 1982). This was the time when Classical sources inform us about the service of Celtic mercenaries in armies of Mediterranean societies in Greece, Anatolia, and even Egypt and Carthage in north Africa (see the Section "Ritual"). While weapon symbolism, in the form of swords, lances, and shields in graves, is common in temperate Europe during this time, actual physical evidence for warfare is sparse. Hillforts did not play as important a role as they had

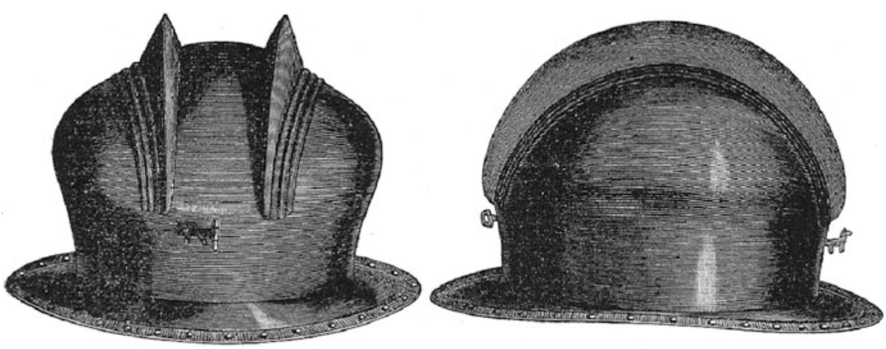

Fig. 11.8 Early Iron Age helmet from Vače, Slovenia (After von Hochstetter 1883:l. 22, 2)

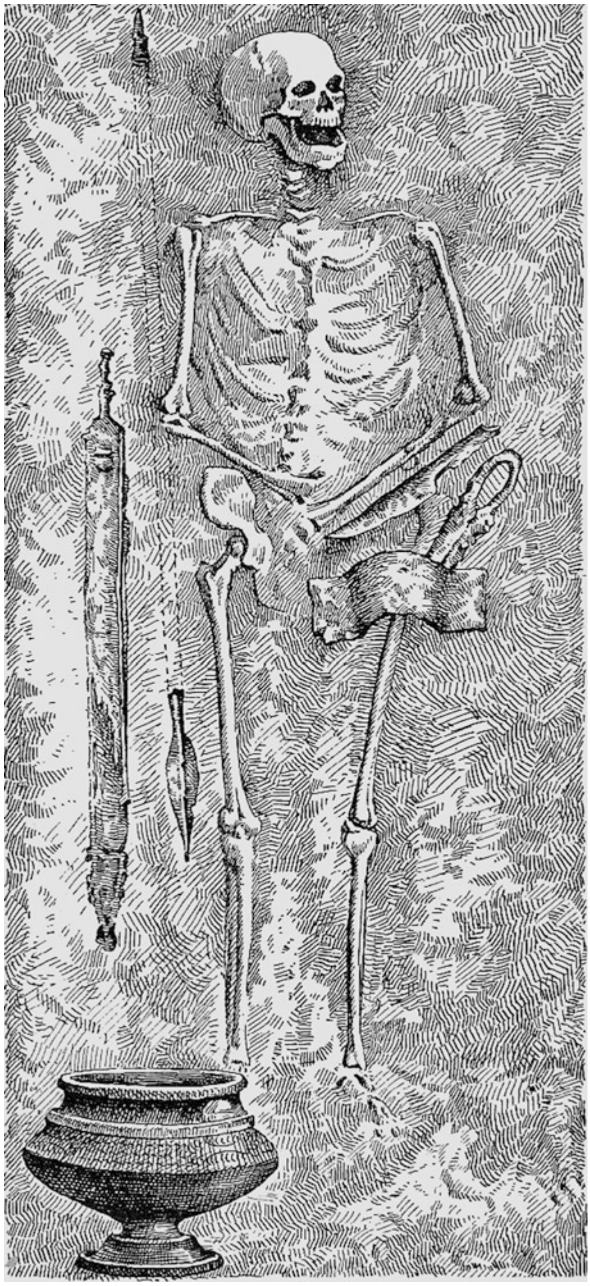

Fig. 11.9 Late Iron Age warrior grave, Montfercaut, Marne, France (After Déchelette 1914:1029, figure 427)

previously. Excavation of settlements of this period is too limited for us to draw conclusions about military activity at occupied sites.

The practice of depositing weapons as offerings is well documented during the Bronze Age, but during the fourth century BC we have the first clear evidence for the ritual depositing of large quantities of weapons representing an entire army. At Hjortspring on the island of Als off the southeast

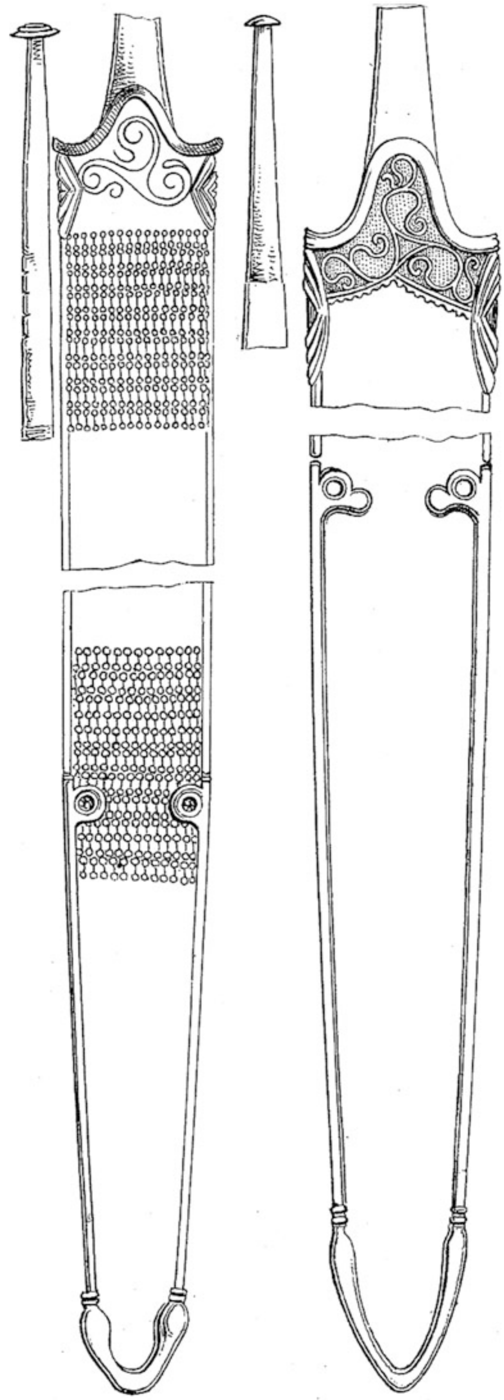

Fig. 11.10 Decorated iron sword scabbards from the site of La Tène in Switzerland (After Keller 1866:l. 74, 3. 4)

coast of Jutland, Danish archaeologists excavated a weapon deposit, apparently containing objects offered to gods by a victorious army (see section, Ritual). The site is important not only for what it can tell us about ritual activity, but also about weapon technology and military organization at this time (Randsborg 1995, 1999, Kaul 2003). The deposit included a boat, 19 meters long built of wood from unusually tall lime trees. Eighteen paddles and two poles indicate that the boat carried at least 20 warriors. The weapon deposit included 95 javelins, 73 lances, 65 shields, 11 swords, and at least 10 suits of mail armor, among the earliest examples of such armor in Europe. The archaeologists who have studied the Hjortspring find believe that the deposit represents an army of at least 80 soldiers, who must have arrived to attack this part of Denmark in four boats of the type represented by the one found. The small number of swords and mail armor sets compared to the javelins, lances, and shields has been interpreted to indicate a military force consisting of a large number of infantry men and a small number of leaders.

A scene on the Gundestrup cauldron (Fig. 11.11) illustrates the kind of large-scale army formation that characterized military activity between the Iron Age tribal groups of Europe and the armies of the Greek and Roman societies with which they came into conflict. The cauldron was found in a bog in the north of Jutland in Denmark, but scholarly consensus places its origin in southeastern Europe during the late second or early first century BC (Kaul and Martens 1995, Nielsen et al. 2005). The scene shows three different kinds of troops – foot soldiers armed with helmets, shields, and lances; cavalry troops with helmets and lances; and horn-blowers. Other elements in the scene illustrate the highly ritualistic context in which military themes are frequently represented.

The Gundestrup representation provides a good impression of what the military forces at the *oppidum* settlements of the final two centuries BC looked like. The term *oppidum*, borrowed from Julius Caesar's use of the word for the tribal capitals of Gaul during his campaigns there between 58 and 51 BC, refers to large fortified settlements that occur across the whole of upland temperate Europe during the final two centuries of the prehistoric Iron Age. Common to all *oppida* is a massive wall constructed of earth, stone, and timber, enclosing an internal area much larger than most fortifications of earlier times. Many *oppida* are hundreds of hectares in size, dwarfing the hillforts of the Early Iron Age. Most of the *oppida* are situated on hilltops, but some take advantage of other kinds of natural defensive barriers such as rivers and marshes.

Fig. 11.11 Scene showing soldiers armed with lances and shields, and horse-riding warriors with lances and helmets, on inner plate E of the silver Gundestrup Cauldron from northern Denmark. Width of this plate: 40 centimeters. Photograph courtesy of the Nationalmuseet, Copenhagen

The construction of *oppidum* walls represents an enormous expenditure of effort. The walls are faced on the outer surface with cut stone blocks and with timbers the size of telephone poles. The quarrying, transporting, and shaping of the stone was a huge task, as was the felling, hauling, trimming, and setting of the timbers. The construction of the earth rampart behind the facade, and of the ditch in front of the wall, was also a major task requiring large labor forces and considerable time (see below).

The *oppida* were primarily defensive in purpose. Field research in the vicinity of the *oppidum* at Kelheim in southern Germany has demonstrated that at the time that the *oppidum* settlement was established, smaller settlements in the region were abandoned (Murray 1993). Apparently the large fortified settlement was required to provide protection, and when it was completed, people abandoned their open, undefended settlements to move into the new fortified location. In his commentaries on his campaigns in Gaul, Caesar explains in detail how the Gauls used their *oppida* as fortresses to defend themselves. The Roman general recounts how effective the *oppidum* walls were against the Roman army's assaults.

Contemporaneous with the scene on the Gundestrup cauldron and with the *oppida* are many sites at which weapons were ritually deposited (see below). At Gournay-sur-Aronde in northeastern France, the excavator Brunaux (1996) interprets the large numbers of Late Iron Age swords, lances, shields, and other weapons deposited in the enclosing ditches to indicate that the weapon sets of some 500 defeated warriors were displayed as trophies within the sanctuary area.

The appearance over much of Europe of very similar weapon sets in burials has led to the formation of the concept of an "international warrior aristocracy" during the final two centuries BC (Frey 1986, James and Rigby 1997:24). The weapons include long iron swords with iron or bronze scabbards, frequently bearing a distinctive ornament that shows connections between individual warriors over great distances. Lances with iron points and shields are also common components of these burials. The striking similarity of the sets of weapons, and of the ornament on individual pieces, over most of Europe suggests that the weapon-bearing elites of different regions were in close contact, sharing styles and ideas, and that the warrior ideology was fundamental to political power and social status during this period (Roymans 1993). Increasing conflict with Rome played an important role in this development (see section, Roman Conquest). At this same time in Britain, changes in the use of hillforts and the deposition of weaponry has been interpreted to indicate the development of a new orientation in military conflict, toward territorial warfare aimed at gaining control of the circulation of valued raw materials and imported products (Sharples 1991).

Recent archaeological research at several sites of battles between Iron Age peoples and Roman armies provides insight into the technology and tactics of warfare by military forces such as those represented on the Gundestrup cauldron and in the sanctuary at Gournay. Excavations at Alesia in France have revealed the battle site where Julius Caesar's Roman legions defeated the final unified resistance of the Iron Age Gauls in 52 BC (Reddé et al. 1995). At Döttenbichl near Oberammergau in southern Bavaria, Germany, a site associated with a battle between Roman legions and native peoples in 15 BC has been excavated and is now being analyzed (Zanier 1997). The site of the Battle of the Teutoburg Forest, where Iron Age troops under the command of the German leader Arminius wiped out three Roman legions in AD 9 and thereby ended Roman designs on the lands east of the lower Rhine is currently under excavation (Wells 2003). Among the most direct examples of warfare between Iron Age Europeans and the Roman legions is a skeleton in a cemetery at the hillfort of Maiden Castle in southwest Britain, with an iron arrowhead lodged between the vertebrae (Wheeler 1943:63, plate 58A). I shall say more about these sites in my discussion of the Roman Conquest.

Rise of Economic and Political Centers

A special feature of the Iron Age in Europe, in contrast to earlier periods, was the rise of centers – settlements that became larger than typical farming communities and that developed to assume specialized functions in manufacturing, commerce, and political organization (Härke 1979). This phenomenon is especially apparent in two periods, the latter part of the Early Iron Age, 600–450 BC, and in the latter part of the Late Iron Age, 200 BC to the Roman conquest.

The Early Iron Age centers (Figs. 11.12 and 11.13) share a series of characteristics (Krausse 2008, Schussmann 2008). Manufacturing includes iron-working, bronze-casting, gold-smithing, pottery production, and the working of a variety of other substances such as amber, coral, antler, bone, glass, jet, and lignite. Imported goods are common at the centers in the southern regions of Europe, including Attic pottery from Greece, wine amphoras from Greek production centers in southern Gaul, and other Mediterranean products. Associated with many of the centers are exceptionally large mounds that contain rich burials distinguished by quantities of gold ornaments, Mediterranean bronze and ceramic vessels associated with wine-drinking, and other luxury goods. These graves underscore the role of the centers both in commerce with distant markets and in political hierarchies that were developing in Europe at the time. Biel (1993) argues that the Early Iron Age centers and the special burials associated with them indicate the first development of highly complex social and political structures.

Fig. 11.12 Map showing locations of some Early Iron Age centers and other important sites from around 500 BC

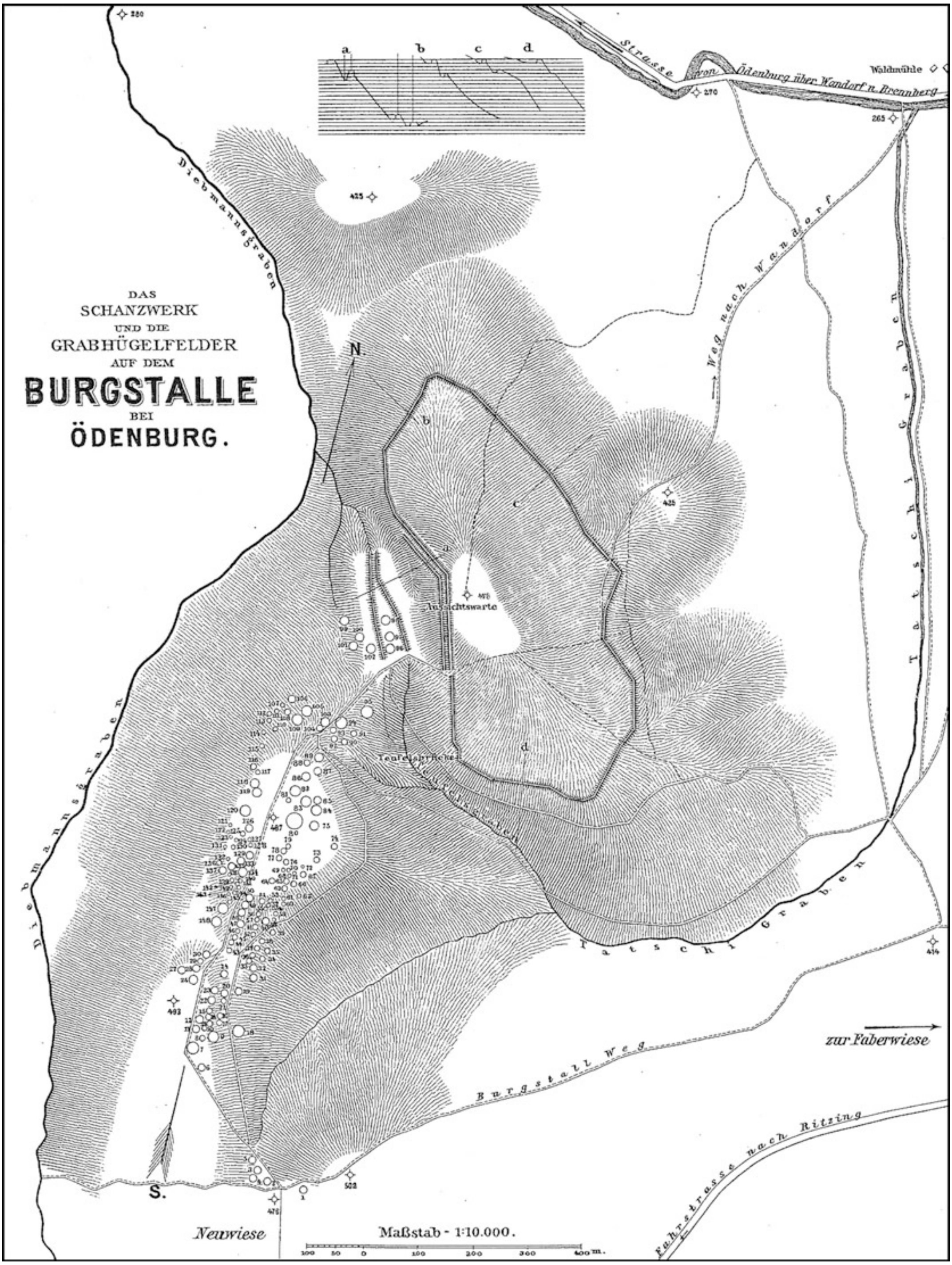

Fig. 11.13 Plan of the Early Iron Age hillfort center at Sopron (Ödenburg), Hungary (After Bella and Müller 1891:l. 4)

The formation of centers in Iron Age Europe needs to be understood in the context of changes that were happening not only in Europe but more broadly in the Mediterranean Basin and the Near East as well. As mentioned above in the discussion of trade, fundamental changes in the east Mediterranean region at the end of the Bronze Age and start of the Iron Age opened up new possibilities for commerce, and as a result, trade increased greatly throughout the greater Mediterranean region (Sherratt and Sherratt 1993). Since the Early Bronze Age, continental and even Scandinavian Europe had been part of a "world system" linked to the Mediterranean and the Near East (Harding 2000). When Greek cities sent out colonies to different places along the shores of the Mediterranean and Black Seas beginning in the eighth century BC, they transplanted Greek urban traditions to Italy and the east coast of the Adriatic, the Pontic coasts of the Black Sea, and later to Iberia and southern Gaul. Many of these colonial cities engaged in commerce with the peoples in the lands around them (Boardman 1999).

As a special phenomenon of the Early Iron Age, the centers have attracted considerable research attention. The reasons behind the emergence of these centers at this particular time have been much discussed. Among the issues of most lively debate is whether they developed more through local processes of change or more as the result of the effects of Greek commerce (Pare 1991, Sherratt 1995b). Rather than trying to argue for one or the other factor as the determining one, it is more productive to try to understand the interactions between the different elements. No single factor can explain a complex phenomenon such as the emergence of these centers.

In parts of the Iberian Peninsula, fortified hilltop settlements were established from the sixth century BC, characterized by active manufacturing and participation in trade with Mediterranean societies (Santos Velasco 1989). Richly outfitted burials associated with the centers contained luxury imports, especially equipment for feasting, and lavish personal ornaments. The formation of these centers is apparent earliest and most intensively along the southern coastal regions of Iberia, and slightly later and less intensively northward and in the interior (Alvarez-Sanchís 2000).

Mont Lassois (Chaume 1997, Mötsch et al. 2008) and Bragny-sur-Saône (Feugère and Guillot 1986) are representative sites of this development in eastern France. Both have yielded extensive evidence of on-site manufacturing in a variety of materials, and importation of luxury products from the Mediterranean world, especially vessels connected to feasting rituals. The richly outfitted burial of Vix lies at the foot of the fortified hilltop settlement of Mont Lassois containing some of the most important evidence for political ties with the Greek world of the Mediterranean (see section, Contact).

In southwestern Germany, the Heuneburg on the upper Danube River is one of the most extensively investigated of all Early Iron Age centers (Kimmig 1983). The settlement deposits have yielded abundant evidence for manufacturing in many different materials, as well as commerce with the Greek and Etruscan societies. A special feature of the Heuneburg is a wall of sun-dried clay brick, modeled on a type of wall characteristic of Greek cities in the Mediterranean region and foreign in material and design to temperate Europe. Some of the houses on the settlement have floors paved with clay brick as well, interpreted as the residences of the political elites at the site. These elites are well represented in the numerous exceptionally rich burials situated around the settlement. Recent research at the Heuneburg demonstrates that around the hilltop settlement were extensive suburbs that indicate a hitherto unappreciated level of complexity to the occupation of the landscape (Kurz 2005, Bofinger and Goldner-Bofinger 2008, G. Kurz 2008, S. Kurz 2008).

New excavation results show that the patterns of economic and social centralization so well documented at Mont Lassois and at the Heuneburg were by no means limited to those well-studied sites. At the Hohenasperg (Balzer 2008) and at the Ipf (Krause et al. 2008), for example, very similar developments are in evidence.

Of a number of Early Iron Age centers identified in Slovenia, Stična is the best documented (Gabrovec 1974). The settlement was established in the eighth century BC, and during the seventh and sixth centuries this hilltop fortress became a major center of iron production, bronze working, and glass bead manufacture. Below the hillfort are the remains of a large tumulus cemetery. Some of the burial mounds contain well over 100 graves, many outfitted with fine products of local industries and with luxury imports from other parts of Europe. Unusually large quantities of amber beads attest to regular trade with the Baltic region, and many imports show connections with northern Italy. Imported luxury goods in the graves come from as far away as the eastern coast of the Mediterranean Sea.

At Závist in Bohemia in the Czech Republic, a hilltop fortified settlement contained workshops for the manufacture of a variety of goods, and imported materials from distant source areas, including amber from the Baltic coast and glass beads from the southeast Alpine region (Motyková et al. 1988). Unusual at Závist is a large and elaborately constructed enclosure that has been interpreted as a ritual complex of regional significance. The evidence is not yet clear as to the nature of the rituals practiced at the site, but the structure underscores the central role in ceremonial life of the surrounding populations that this hilltop settlement played.

In southwestern Poland, the lakeside settlement of Biskupin is an unusually well-preserved and investigated center dating to the beginning of the Iron Age. Dendrochronological determinations indicate that the first phase was constructed between about 740 and 710 BC. The 1.5-hectare (3.7 acres) site was protected by a stockade and built, in its first phase, of oak from some 80,000 trees. Remains of 102 log-built houses were uncovered, indicating a community considerably larger than the characteristic farming settlements. The unusually good preservation and exceptionally careful excavation resulted in rich documentation of plant and animal remains as well as implements of wood, together with objects of ceramic, stone, and metal. Imported materials from outside include bronze, amber, and glass beads (Rajewski 1970, Scarre 1998).

A site that was probably a center similar to those discussed above has been identified at Oprisor in Romania, but it was largely destroyed by sand and gravel quarrying before full investigation was possible (Kull and Stinga 1997). Signs of the special nature of the site include the presence of wheel-made pottery earlier than at most sites in temperate Europe, and especially a bronze stamp designed for impressing an acorn or lotus bud pattern into sheet metal. The stamp is similar to designs on two silver vessels in the great silver hoard at Rogozon in Bulgaria and links Oprisor with other sites along the west and north coasts of the Black Sea.

Among Early Iron Age centers in eastern Europe, the site of Belsk on the middle Dnieper River in Ukraine is well documented (Melyukova 1995:47–48, Rolle 2006). This exceptionally large settlement covers a total of 4021 hectares (about 9900 acres). It is surrounded by a ditch and a wall built of timber and earth, still standing to a height of up to 9 meters. The complex was first constructed around 700 BC as two separate fortresses, then during the sixth century BC an enclosing wall was built that included them and the land between. Extensive remains of iron production, bronze casting, and other crafts have been recovered, along with many luxury objects imported from the Greek world. As western European centers, including Mont Lassois and the Heuneburg, interacted with Greek merchants at colonial cities such as Massalia on the Mediterranean coast of Gaul, the community at Belsk was situated near Greek colonies on the north coast of the Black Sea, including Olbia.

The Early Iron Age centers, of which I have discussed several examples here, are the most apparent indication of major social, political, and economic changes that took place in Europe during the Early Iron Age. But other kinds of evidence in regions where these centers do not occur also point toward the formation of more complex social and political hierarchies. Fortified farmsteads, enclosed by walls and ditches, are characteristic in parts of central Europe and may reflect the emergence of new elites in a context where the larger centers did not emerge (Nagler-Zanier 1999). In northern parts of the continent, the construction of wooden trackways to serve as roads across bogs attests to a level of political organization considerably larger than that of the individual farm or hamlet. At Ockenhausen in east Friesland, a track 650 meters long and 3.3 meters wide was built of oak, from some 1,500 oak trees felled between 717 and 714 BC (Fansa and Schneider 1993). Construction on this scale for the purpose of improving the efficiency of movement through the landscape can only have been undertaken through the planning, organization, and direction of a political authority operating in the interests of many communities concerned with creating favorable conditions for the movement of people and goods. This political complexity has not yet been identified in other evidence in that region, however, such as in more complex settlements or unusually richly equipped burials.

In Britain many hillforts were constructed during the fifth and fourth centuries BC. Among the best studied of these sites are Danebury in Hampshire (Cunliffe 1994a) and Maiden Castle in Dorset (Sharples 1994). These British sites were centers of population, and there is substantial evidence for manufacturing on them. But they do not appear to have played the same role as centers of long-distance trade that the Early Iron Age centers in the southern parts of central Europe did at the time.

La Tène and Other New Styles

When the chronological framework for European Iron Age archaeology was established in the latter half of the nineteenth century, the Late Iron Age was defined by the La Tène style of ornament. Since that time, the La Tène style has formed the basis for discussion of the start of the Late Iron Age. But like all categories established by archaeologists and historians, the La Tène style is an artificial construct, and was most likely not a reality to the people who made and used the objects bearing that decoration. Whereas early investigators sought to define the essence of Early La Tene style and viewed it as a uniform phenomenon, with the large database now available we can see that there is great regional and individual variability in the design of objects linked to this style (Frey 1995a, Müller 2009). Archaeologists have recognized other new styles that appeared at about the same time, such as Jastorf in north-central Europe and the Scythian Animal Style in eastern Europe. Yet as the quantity of archaeological data increases, it is becoming increasingly evident that all of these “styles” are artificial categories created by modern researchers. A detailed discussion of new approaches to this issue is beyond the scope of this chapter, however, and for present purposes, I consider three of the accepted styles that became current in the fifth century BC – the La Tène, the Jastorf, and the Scythian.

The La Tène style of ornament first appeared around the beginning of the fifth century BC (or perhaps earlier – see Möller 2000), probably in the area of the middle Rhineland, where most of the earliest examples have been recovered in richly outfitted burials. In contrast to the dominant decorative style of the Early Iron Age in the central parts of Europe, which was constructed around geometrical forms such as circles, triangles, squares, and rectangles, the new ornament was based on floral ornamentation introduced on objects imported from the Mediterranean world. Stylized flower petals, leaves, and tendrils form the basis of the ornament, integrated with stylized faces of humans, animals, and imaginary creatures. The development of this new style can be understood in terms of responses by Iron Age craftworkers and their customers to designs and motifs they observed on imported objects. In his foundational studies of what he called Early Celtic Art, Paul Jacobsthal (1944) traced the new elements in La Tène style primarily to Greek and Etruscan origins. He mentioned Eastern motifs as well, but thought they were transmitted via the eclectic cultural mix of the Etruscan arts. Recent work has documented strong links with artistic traditions of Eurasian peoples (Guggisberg 1998), thus broadening the discussion of the origins of the La Tène style. The adoption of themes of figural representation played a special role in the creation of the new style, reflecting the evolution of a new system of beliefs (Frey 1993).

The earliest expressions of La Tène style are on objects crafted for the Iron Age elites, such as gold neckrings and bracelets, gold pendants, gold bowls, bronze sword scabbards, bronze fibulae, and bronze jugs. Recent studies by Echt (1999) and Verger (1995) highlight the diversity of the new style, even in the core areas. But among the rich men’s graves with objects ornamented in the new style, Echt draws attention to some important common elements in landscapes from central France in the west to Bohemia in the east. These include standard sets of weapons – short swords most frequently, but also spears and, less commonly, helmets; two-wheeled vehicles; bronze vessels from Etruria in central Italy; and, in the wealthiest, gold jewelry consisting of neckrings, bracelets, and plaques. He interprets the strong similarities between men's graves across this broad expanse of the continent to indicate regular interaction between these elite males. The emphasis on weaponry in the graves suggests that warfare played an important role in gaining and maintaining power and wealth, probably through raiding expeditions. Echt suggests that many objects in the rich women's graves of this period, such as the large numbers of figural representations and beads made of special substances as in the burial at Reinheim, indicate special religious or ritual roles for women. The rich graves of women contain gold ring jewelry and feasting equipment similar to that in the rich men's graves, suggesting similar status with respect to the political and social roles implicit in the display of the personal ornaments and the hosting of feasts.

The proliferation of figural representations in Early La Tène art merits special attention. Human and animal heads are much more common in this style than in any earlier traditions (Müller 2009). In a study of 559 figural fibulae of the Early La Tène period, Binding (1993) notes the extreme attention to detail in the sculpting of faces, compared to similar representations from the Early Iron Age. The much increased concern with such representations is thought to reflect important changes in religious ideas (Frey and Müller 1995). We do not know how the Iron Age Europeans imagined their gods and spirits looked, but these Early La Tène figures could be representations of such deities. We know that at the start of the Roman Period, indigenous European peoples adopted the Roman medium of anthropomorphic sculpture to represent their deities (Wells 1999:184–186). Perhaps a similar transformation took place during the fifth century BC as the result of interaction with the Greek world and its traditions of figural sculpture.

After a generation or two, La Tène style ornament appeared more widely among peoples of Europe (Fig. 11.14). Geographically, the style was disseminated far beyond its places of origin in western and central Europe, and socially, it came to be applied to many objects in modest burials, not just in the richest (see following paras).

At the time that the La Tène style developed and spread in central regions of Europe, in northern Europe a tradition known as Jastorf became characteristic. Whereas the La Tène style was associated most often with inhumation burial, the Jastorf tradition was associated with cremation. Characteristic objects were straight bronze pins, some with U-shaped bends near the head, others with flat disks or globes on the head. Other typical Jastorf objects are long triangular belthooks, sheet-bronze earrings, bronze neckrings, several different types of fibulae, and plain pottery (Müller 2000). Ornamentation of objects is much less pronounced than with the La Tène style, and human and animal faces played a negligible role in the Jastorf tradition. The Jastorf style is characterized by the shapes of objects – especially the metal ornaments – rather than by decorative elaboration.

In eastern Europe and Eurasia, the tradition known as Scythian Animal Style developed from the sixth century BC (Reeder 1999). The most commonly represented animals were the stag, horse, and boar, often portrayed more naturalistically than the animal figures of La Tène style. Plant motifs became common in the fifth century BC, borrowed from Greek prototypes, as in the case of the La Tène tradition (Melyukova 1995). In the regions north of the Black Sea, communities established similar kinds of relations with the Greek world as communities in western and central Europe had, and we see similar patterns of Early Iron Age centers, rich burials, and Greek imports. In both of these instances, we can understand the formation of the new styles – La Tène in the west and Scythian in the east – in terms of the interplay between indigenous traditions and new ideas introduced via Greek trade. As the archaeology of eastern parts of Europe becomes better known, we are seeing increasing evidence for the application of these styles in regions hitherto considered outside their core areas. For example the gold ornaments found at Witaszkowo in Poland are now thought to be local products

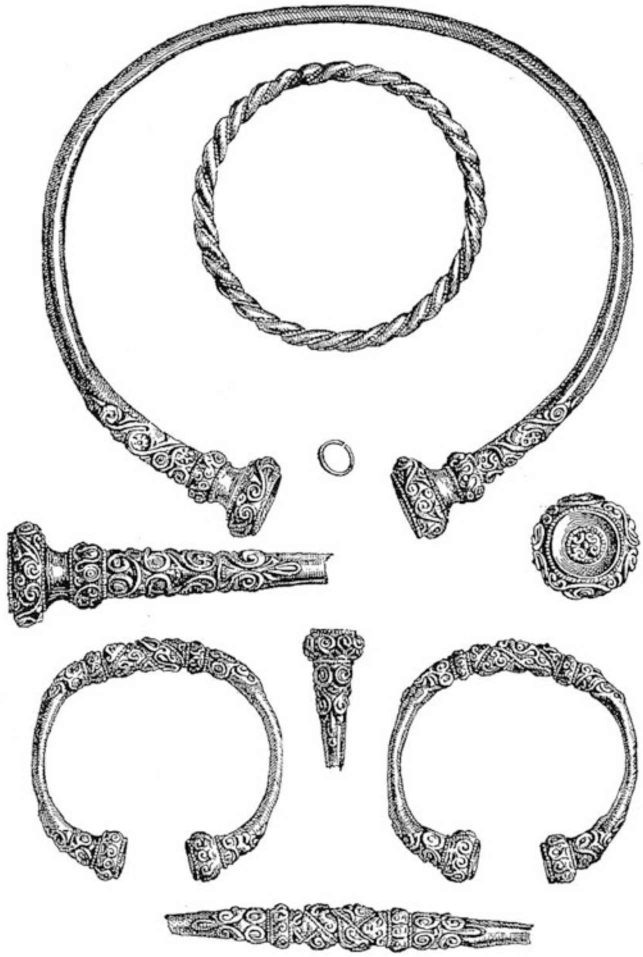

Fig. 11.14 Ornate gold rings from Waldalgesheim, Rhineland, Germany. The set includes a neck ring, three bracelets, and a finger ring. The decorative style represents a development from the earliest La Tène ornament (After Déchelette 1914:1333, figure 582)

crafted in a style similar to that of the Scythian arts north of the Black Sea, rather than imports from that area (Bukowski 1981).

La Tène style fibulae appear in Britain shortly after the creation of the style on the continent. A small number of actual imports have been identified, but the vast majority are distinctively British in style (Haselgrove 1997). Throughout the Late Iron Age, the material culture of the British Isles remained closely connected to the traditions on the continent, but at the same time distinctive (Fitzpatrick 2007, Macdonald 2007). Artisans working in Britain created their own versions of the new styles developing across the Channel. In Ireland, the earliest appearance of the La Tène style is dated to the third century BC. Much La Tène style metalwork has been found in Ireland, but most of it consists of isolated objects, without burial or settlement contexts, making both chronological and functional interpretation difficult (Raftery 1996).

Migration and Change

The fourth and third centuries BC are commonly known as the period of the great Celtic migrations (Szabó 1991a, Kristiansen 1998). This idea is based on texts by Greek and Roman authors, who describe movements of peoples north of the Alps whom Greek writers call Celts and Roman writers call Gauls. Much discussion revolves around whether the archaeological evidence supports the statements by the Classical authors, or whether it suggests different kinds of developments.

Roman tradition describes migrations of peoples from north of the Alps, whom the Romans knew as Gauls, southward across the mountains into Italy (Frey 1995b). Most of the accounts concern migrations beginning around the start of the fourth century BC, but some investigators have argued that some accounts point to a time as early as the sixth century BC. The Greek author Polybius and later the Roman historian Livy name specific tribal groups that settled in northern Italy after their arrival from beyond the Alps. This tradition of southward migration into Italy is presented in greatest detail and most colorfully by the historian Livy, who wrote at the end of the first century BC, almost four centuries after the events he describes. His text was based on what we would today call oral history and legend. According to Livy's version of the events, Gauls crossed through Alpine passes, descended into the Po Plain, and attacked Etruscan cities there. Some of the migrants settled in the Po region as farmers, others continued southward toward Rome. In 387 BC they defeated a Roman army sent to intercept them, entered the city of Rome, and pillaged and set it on fire. This experience of destruction at the hands of northern barbarians played a major role in the decision by Rome's inhabitants to build up its defenses and to create an army to protect Rome's interests in the future.

Livy's text and others that relate the same events are difficult to interpret. Since the many accounts are more or less consistent in describing a migration across the Alps, settling in the Po Valley, and moving on toward Rome, it seems clear that some kind of large-scale movement must have taken place that included an assault on the city. But none of the accounts are by eyewitnesses, and all were written down long after the events. Thus it is difficult to separate fact from tradition. Certainly many of the details in Livy's version of the story were added by the historian to make the account colorful and popular with readers.

The archaeological evidence in Italy supports the idea of movements between regions north of the Alps and northern Italy, but it does not suggest migrations on the scale indicated by Livy and the other writers (Frey 1995b). Cemeteries and individual graves in the Po Plain and south as far as Ancona on the Adriatic coast indicate the introduction of new burial practices during the fourth century BC that include, in some cases, weapon burial in men's graves and lavish personal ornaments in women's. Many specific objects, including swords, neckrings, bracelets, fibulae, and belthooks, point to connections with peoples in eastern France and southern Germany (Frey 1998).

A number of texts refer to Celtic mercenary soldiers hired to serve in armies in lands bordering on the Mediterranean Sea (Szabó 1991b). They are mentioned in Greece in 369–368 BC, in Sicily shortly thereafter, in north Africa in 307 BC, and in Egypt in 277–276 BC. These warriors earned a reputation for exceptional fighting ability and were apparently in great demand by Mediterranean potentates fighting for power. Other texts describe Celtic tribal warrior bands migrating into the middle and lower Danube valley and into Greece during the first part of the third century BC (Szabó 1991a). In 278 BC, 10,000 armed men are said to have crossed Hellespont into Asia Minor. But there is very little archaeological evidence to support these textual accounts.

Archaeologists have long searched for material evidence that corresponds to these migrations described in the ancient texts. A major problem has been that archaeologists have been too eager to interpret the texts literally, without being critical enough about the sources and purposes of the texts. Before the fourth century BC, we have very little written information about the peoples north of the Alps (see the Section "Contacts"). The first more detailed information about them occurs in the context of the migrations represented by Livy, Polybius, and other writers. Thus we do not know whether the movements about which those Classical authors wrote were unusual, or whether they were common but only described first for the fourth century BC.

Another problem concerns the character and scale of the migrations. The movements recounted by Livy and other writers, like other migrations described from early times, are portrayed as one-way, large-scale migrations. But recent cross-cultural studies of migration as a cultural phenomenon show that most migrations in human history have been accompanied by back-migration; in most instances, a large proportion of migrants move back to where they came from (Anthony 1997). The ancient authors do not discuss such return migration. Nor do they indicate clearly how many people were involved in the movements they describe. From Livy's descriptions, the movements across the Alps into Italy could have involved just a few hundred men in warrior bands, or they could have consisted of thousands or even tens of thousands, including men, women, and children, with their belongings. The Greek and Roman writers do not indicate the geographical origins of the migrations. The same lack of detail applies to the references about Gallic mercenaries. According to the vague and general way that the Greek and Roman authors used the names Celt and Gaul, Gallic mercenaries could have come from almost all of the central and southern regions of temperate Europe (see below). Nor are the writers clear about how many such mercenaries were involved.

The textual sources concerning migrations and mercenary service are thus complex and problematic, and they do not seem to correspond closely to the archaeologial evidence. But they are nonetheless important sources of information, and the archaeological picture is similar enough to indicate that some important movements were taking place during the fourth and third centuries BC.

Archaeological evidence throughout much of the European continent shows that the fourth and third centuries BC were a time during which styles and practices spread widely. The La Tène style became an important decorative fashion from Spain in the west to Ukraine in the east, from Italy in the south to Scandinavia in the north. Over much of continental Europe, a uniform burial practice was adopted, consisting of flat inhumation burial, with many men buried with sword, lance, and shield, and women with sets of jewelry that included neckrings, bracelets, fibulae, and glass and amber beads. This increasing uniformity of style and practice was been interpreted as "the spread of the Celts," but as Fitzpatrick (1996) and others have shown, there is no evidence that these changes resulted primarily from migration. The better model is one of increased mobility – that is, greater movements of individuals and groups for many different reasons, and adoption of new styles and practices because they were attractive for one reason or another (Frey 1995c). Even though the spread of the La Tène style and common burial practice shows increased interest among peoples across Europe in sharing objects and behaviors, regional differences are still apparent which we would not expect if the principal mechanism of spread were migration. Some migration surely took place, but more important were movements of limited duration, along with sharing, borrowing, exchanging, and copying.

An important series of movements at the end of the second century BC are noted in Roman texts. According to these sources, peoples known as the Cimbri and the Teutones migrated in large numbers from northern Europe southward (Last 1932). In 113 BC they confronted and defeated a Roman army at a place called Noreia, thought to be somewhere in Austria or Slovenia. During the next decade they moved across central Europe into Gaul, met and defeated Roman forces several times, until finally they were conquered by Rome at a place called Vercellae, somewhere in northern Italy, in 101 BC. As in the case of the earlier migrations already discussed, the texts are unclear about many important details, especially the location of their places of origin in northern Europe and the numbers of people involved (Kaul and Martens 1995). These migrations are often invoked in discussion of disturbances in central Europe at the end of the second century BC, but there is no clear archaeological evidence for these migrations or for the people said to have taken part in them.

Contacts with Literate Societies

Much that is written today about the Iron Age peoples of Europe is based on descriptions of them by Greek and Roman authors who provide the earliest information about contacts between the prehistoric peoples of temperate Europe and members of literate societies of the Mediterranean world. These early written accounts of cross-cultural interactions can be very informative, but they must be used with informed caution (Wells 2001). Too often the early texts have been adopted as if they are straightforward, matter-of-fact reports about neighbors.

In eastern Europe, Greek writers wrote of peoples they called *Skythai*, or Scythians, at the end of the seventh century BC (Alekseev 2000). In western Europe, Greek authors in the sixth century BC refer to peoples living around the Greek colonial city of Massalia (modern Marseille) as *Keltoi*, or Celts (Freeman 1996). These early contacts between prehistoric peoples of temperate Europe and members of literate societies of the Mediterranean world developed in a specific context. Beginning in the eighth century BC, Greek cities established colonies along the shores of the Mediterranean basin, for purposes of growing grain to feed the populations of the mother cities and acquiring needed goods through trade with peoples throughout the Greater Mediterranean world (Boardman 1999). These Greek colonies brought the literate world of Greece into direct contact with peoples inhabiting Iberia, southern France, Italy, Sicily, the east coast of the Adriatic, and the Black Sea coasts (Pare 1997).

From the early phases of this colonization process, we have only scanty literary texts about the native peoples of Europe. But from the fifth century BC the texts gradually become more extensive and more abundant. Herodotus, around the middle of the fifth century BC, wrote a detailed account, what we might call an ethnography, of the Scythians north of the Black Sea. During the second century BC, Polybius described people he called Gauls living in the north of Italy. From the first century BC, we have abundant written accounts of the Iron Age peoples of Europe by Julius Caesar, Diodorus Siculus, Livy, Strabo, and others (Crumley 1974, Rankin 1987).

In assessing how we can use such accounts to understand the peoples of Iron Age Europe, we must apply a number of critical judgments to the Greek and Roman texts (Champion 1985, Hartog 1988). As historians have emphasized in recent decades, historical texts are cultural artifacts, and must be subjected to analysis as such. In assessing any text about the Iron Age peoples, we must ask a series of questions. What political bias did the writer bring to his or her consideration? For what purpose was he or she writing? Did he or she have direct personal contact with the people being described, or does the reporting consist of secondhand information?

All writings by Greek and Roman authors about the Iron Age Europeans reflect a general attitude toward those peoples as barbarians (Dauge 1981). The word barbarian did not have the same connotation of savagery and violence that it has today, but meant to the ancient Greeks and Romans foreign, different, with an implication of inferiority.

All descriptions of Iron Age peoples presuppose earlier interaction that had already affected the native peoples. This point is often ignored by modern writers, yet it is critical to assessing what we can learn from the texts. By the time Herodotus learned about the culture of the people he called Scythians, and by the time Polybius became familiar with the Gauls of northern Italy, these peoples had been in close contact with the Greek and Roman societies for decades. Modern investigators consistently adopt Polybius's descriptions of Gallic culture (because it is one of the few early accounts) and apply what he says about the Gauls he came to know in Italy to the peoples north of the Alps. But the people Polybius called Gauls in Italy had changed considerably from their relatives to the north, through migration and close interaction with the peoples of the Italian peninsula.

In addition to this general caution concerning the effects of interaction with the literate Mediterranean societies on the Iron Age peoples of Europe, we need to consider a more specific issue. During the final two centuries BC – the time from which we have many more Greek and Roman texts about the Iron Age societies than for earlier centuries – interactions between indigenous peoples of Europe and Romans frequently took the form of warfare. Mediterranean observers had already established in their minds that the peoples to their north were warlike. Many of the earlier accounts of the peoples called Celts (Gauls) and Scythians describe their bellicose character. And of course since Mediterranean armies often hired "Gallic" mercenaries, the Gauls became known for their martial prowess.

By the first half of the second century BC, Rome was expanding northward to the Alps and beyond, and becoming increasingly engaged in military and political affairs in southern France. These ventures brought the Roman world into increasing interaction with the indigenous peoples of Europe (Timpe 1989). Hence the great majority of accounts about the Celts (Gauls), and later the Germans, describe military confrontations and characterize the natives as warlike. This type of representation is the result of the nature of the written sources. We have no accounts by Roman anthropologists who lived in villages in the Netherlands, say, and described the way of life of the natives there.

Finally, in judging how to utilize the Classical written sources concerning the Iron Age peoples, we need to consider the specific purposes for which the Greek and Roman authors were writing. Herodotus, for example, was attempting to write a world history. In order to make his account interesting, he emphasized customs of other peoples that his Greek readers would find particularly unusual and fascinating. Livy, in recording the ancient traditions of early Rome, used the story of the Gallic invasion of Italy and sacking of Rome early in the fourth century BC as a cautionary tale at the time of Augustus's imperial rule, to warn Romans of his day to be on their guard against external enemies (Galinsky 1996). Julius Caesar, in his commentary on his military campaigns against the tribes of Gaul, was writing accounts that would help him to win Roman support for his military ventures and ultimately to achieve supreme power in Rome. In every case, the Greek and Roman texts do not provide an "objective" description of the Iron Age peoples (whatever that might be). In order to make use of the texts, we need to be aware of why the texts were being written and what was behind their composition.

Linguistic and Ethnic Groups

Traditionally, the Iron Age peoples of western and central Europe are referred to as Celts (Gauls), those of northern Europe as Germans, those of the eastern regions north of the Black Sea as Scythians, those of Spain and Portugal as Iberians, and myriad different groups in southeast Europe by names such as Illyrians, Thracians, and Dacians (many other groups are named as well, especially on the shores of the Mediterranean Sea). From the point of view of written history, these are the names by which the Greek and Roman writers designated the preliterate peoples of Europe. But from the perspective of archaeology, or indeed from the perspective of those Iron Age peoples themselves, the situation is much more complex.

Space does not permit me to examine the situation for all of the different groups of Iron Age Europeans named by the Greek and Roman writers. I limit myself to those designated Celts and Germans to illustrate the basic points. The earliest documented use of the name *Keltoi* is by the Greek writer Hecataeus of Miletus in the sixth century BC, when he uses that name to designate peoples living in what is now southern France, in the region around the Greek colony of Massalia. In the fifth century BC, Herodotus informs us that *Keltoi* live in the western regions of Europe and that the Danube River originates in the land of the *Keltoi*. From the fourth century BC on, Greek references to the Celts become more frequent, and they use the name to refer generally to peoples throughout western and central Europe (Freeman 1996). Historians and archaeologists have employed these texts to conclude that people named Celts inhabited western and central Europe while those Greek writers were writing, from the sixth century BC on.

But examination of this usage in the light of recent research on the ways that literate societies name groups in non-literate ones brings up serious problems with this procedure (Wells 1995b). The name *Keltoi* was, as far as we know, a Greek creation. We do not know what the people whom the Greeks called *Keltoi* called themselves. Furthermore, there is no reason to think that all of the groups the Greeks called *Keltoi* had any sense that they belonged to a unified people. The archaeological evidence showing regional variation could be interpreted to indicate that they most probably did not think of themselves as members of one people. That unity was an image in the minds of the Greeks, not of the Iron Age Europeans.

We do not know what other categories Hecataeus, Herodotus, and other authors had in mind when they used the name Celt. Were they contrasting Celts with others, or did Celt simply mean something akin to "all of the natives" in a particular region? The fact that for centuries no other group in the west-central regions of Europe is named by Greek authors casts serious doubt on the significance of that name. There is no useful linguistic evidence from the region (except the southernmost areas such as Mediterranean Gaul) until the second half of the second century BC.

The earliest written text that provides detailed information about the peoples the Romans called Germans (*Germani*) is by the Roman general Julius Caesar (Pohl 2000). (The slightly earlier Greek commentator Posidonius may have written about the Germans, but his works do not survive.) His remarks about the Germans were specific. In his commentary on his military campaigns in Gaul, Caesar writes that the peoples who lived east of the Rhine were Germans, while Gauls (Celts) lived west of the river. These groups whom Caesar and subsequent Romans called Germans occupied a part of Europe between the two large divisions that the Greeks had recognized for centuries – the Celts to the west and the Scythians to the east (Timpe 1989).

Caesar portrays the Gauls and the Germans as very different (Walser 1956, Dobesch 1989). The Gauls, in his account, have towns, political counsels that he likens to the Roman Senate, and elaborate religious rituals similar in some ways to those of Rome. The Germans, on the other hand, Caesar represents as more primitive than the Gauls, and much less like people of Rome. They have no towns, little-developed agriculture, no permanent political leaders, and no elaborate rituals. Caesar even goes so far as to describe mythical animals that he claims live in the forests inhabited by the Germans. When we compare the archaeology with Caesar's assertions, it is clear that Caesar did not know much about the peoples east of the Rhine. Either he wrote on the basis of poor information gathered from others, or he made up most of what he wrote to suit his purposes.

Today linguists distinguish between Celtic and Germanic languages. But Caesar did not make any use of language as a distinguishing feature between Gauls and Germans, probably because he did not know much about the languages the indigenous peoples spoke. Furthermore, as Untermann (1989) points out, the categories "Celtic" and "Germanic" in reference to languages were only created in the nineteenth century by scholars in the field of historical linguistics. The languages that Iron Age peoples west and east of the Rhine spoke might not correspond to either of those categories. Recent linguistic studies of inscriptions (mostly from the early Roman Period) and place-names suggest that many groups probably spoke languages that modern linguists could not easily classify either as Celtic or Germanic, but rather languages that mixed elements of what modern linguists recognize as distinct categories (Meid 1986).

The earliest evidence of what linguists consider a Celtic language in Europe is on inscriptions in southern France, starting in the third century BC, written in Greek letters (Kruta 1991). Slightly later examples include Celtic names inscribed on sherds of pottery from Manching in southern Germany, and the Celtic name KORISIOS on the blade of a sword from Port in Switzerland. Celtic names in Latin letters first appear at the end of the second century BC on coin inscriptions, including some in central Europe (Allen and Nash 1980).

The earliest traces of a language that linguists consider Germanic are also inscriptions. Among the earliest are the inscriptions on a bronze helmet from Zenjak (Negau) in Slovenia, thought to date to the late second or first century BC (Egg 1976), and on a fibula from Meldorf in northern Germany from the first century AD (Düwel and Gebühr 1981).

The linguistic evidence for the Celt-German distinction is thus sparse and ambiguous. It suggests in a very general way that, at the time Rome was expanding across the Alps and into western and central Europe (see below), when inscriptions were being carved more frequently, Celtic languages were more common in western and central Europe, Germanic languages in northern and central Europe (Mallory 1989). But there is considerable overlap in the regions where inscriptions in the different languages are found.

The archaeological evidence provides yet another picture. Traditionally in European archaeology, the La Tène style of ornament has been considered a sign of Celts. This connection was first made in the latter part of the nineteenth century, when excavators of cemeteries in northern Italy recognized that metal objects in fourth and third century BC burials, such as iron swords, bronze fibulae, and bronze ring jewelry, were similar to metal objects in graves in northeastern France. The written sources about migrations across the Alps into Italy (as already discussed) included tribal names that matched later tribal names of groups that lived in northeastern France. Thus the connection was made – the cemeteries in northern Italy were those of immigrants whom Livy and other writers called Gauls, hence the peoples in France who shared similar objects must also have been Gauls. Furthermore, Herodotus had said that the peoples of western Europe, and those around the headwaters of the Danube, were Celts (Gauls).

During the fourth and third centuries BC, the La Tène style of ornament became popular over much of temperate Europe (as stated earlier). This happened to be the same time that Greek authors wrote about increasing contacts with barbarians north and northwest of Greece whom they called *Keltoi*. Thus in the developing field of Iron Age archaeology, investigators came to consider the La Tène style as emblematic of the Celts. But as Fitzpatrick (1996) has argued, this link does not hold up to modern scrutiny.

In the Late Iron Age, during the second and early first century BC, the archaeology in the lands west and east of the Rhine is very similar (see below). The large and complex fortified settlements known as *oppida* dominated the cultural landscape, with intensive industrial production, long-distance commerce, and a developed money economy (see the very informative papers in Dobiat et al. 2002). The pottery, personal ornaments, tool technologies, and ritual practices on the two sites of the river show fundamentally similar societies, with the degree of regional variation that we would expect. The distinction that Caesar draws between complex Gauls west of the Rhine and simple Germans east of the Rhine is not reflected in the archaeology, at least not before Caesar's arrival in Gaul to begin his campaigns (Wells 1995b).

In the course of the Gallic War between 58 and 51 BC, we can recognize changes in the archaeology east of the Rhine. During this period, many of the *oppida* were abandoned, the intensive production systems based there fell out of use, and economic and social systems declined in size and complexity. The way of life of the communities east of the Rhine during these years might well correspond to the character of the peoples Caesar describes as Germans. This was not an ethnic distinction, but rather a case of rapid cultural change, in which the Roman military actions west of the Rhine (and including two forays across the Rhine by Caesar in 55 and 53 BC) played important roles. The distinction that Caesar drew between Gauls and Germans, and that modern researchers have largely accepted, may have been between groups of closely related and similar peoples who, for specific historical reasons, were experiencing different circumstances at the time of Caesar's military activities north of the Alps.

Origins of Urbanism

Until the final two centuries of the Iron Age, settlements and communities in temperate Europe were small. Settlements consisted of isolated farmsteads or small groups of farms that we can best call hamlets. Population estimates based on cemetery evidence suggest that most communities were fewer than 50 people, and the settlement evidence supports that number. The only major exceptions to this general pattern before 200 BC were the centers of the Early Iron Age (see above). Even they were small compared to communities in the Mediterranean world, which could attain tens of thousands of people by that time. Even the population of the larger centers, such as Sticna and the Heuneburg, is unlikely to have been more than a thousand.

Population sizes in the past are extremely difficult to determine, but we can make educated guesses on the basis of a variety of data. Population of all of Europe during the Iron Age may have been around 15–30 million, with a steady but slow increase from the beginning of the Iron Age to the time of the Roman Empire. The Mediterranean lands were the most densely inhabited. Around 400 BC Greece is thought to have had around three million people, at the start of the Roman Empire, Italy may have had as many as seven million. In central regions of the continent, the land that is now Germany is estimated to have had around three million during the final century BC, England and Wales about 600,000. In all of Scandinavia, there may have been around 500,000 people at the time of Christ, about half of them in Denmark (McEvedy and Jones 1978).

Compared to conditions in the modern industrial West, life expectancy during the Iron Age was determined largely by rates of infant mortality and mortality for women in their child-bearing years. Before the modern development of antibiotics and understanding of sanitation, infant mortality tended to be high – often as high as 50% in the first 2 years of life. Living conditions varied widely throughout Europe, and life expectancy surely differed from region to region and over time. Based on skeletal studies of some Iron Age cemetery populations, life expectancy at birth in some regions may have been between 25 and 30 (Pauli 1984, Sellevold et al. 1984, Waldhauser 1987). For individuals who had attained young adulthood – 20 years of age – life expectancy may have been 35–45. Analyses at a number of cemeteries indicate that adult life expectancy was somewhat higher for men than for women, probably because of the effects of infection in childbirth. Though life expectancy during the Iron Age was low compared to that in modern Europe, skeletal evidence shows that many individuals lived to advanced ages – 60, 70, and beyond. In societies without writing, the older individuals in communities were particularly important for remembering events of the past and passing on cultural traditions to the younger generations.

With the emergence of the *oppida* during the second century BC, some centers much larger than those of the Early Iron Age developed throughout southern regions of temperate Europe (Collis 1995). The word *oppidum* (plural *oppida*) is Latin and was used by Caesar to designate the tribal capitals of the Gauls against whom he fought between 58 and 51 BC. The term has been adopted by Iron Age archaeologists to refer to all of the large-walled settlements of the second and first centuries BC. *Oppida* are distributed across the whole of upland temperate Europe, from central France in the west to Slovakia in the east, from the Alps in the south to the Lahn River in the north (Fig. 11.15; for a more complete map of *oppida*, see Wells 1999:50, figure 6). Around 150 have been identified. Even on the surface, these settlements are distinctly different from earlier ones by virtue of their size. The walls are often still enormous despite two millennia of erosion, and they enclose often huge areas. The enclosed area of the Early Iron Age Heuneburg is 3.2 hectares (about 8 acres): that of the *oppidum* of Manching is 380 hectares (939 acres).

The amount of labor and material that went into building the *oppidum* walls was enormous. The walls were constructed mostly of earth, but they had stone and timber facing as well. For walls of the type known as the *murus Gallicus* (Gallic wall, after Caesar's description), large iron spikes were used to fasten together the horizontal support beams. For one phase of the wall at Manching, Lorenz (1986:25–33) estimates that about 60,000 large trees were felled and their trunks cut and trimmed to create the basic timber structure. Around 18,000 nails around 25 centimeters in length were required to secure the bottom layer of timbers. The limestone used for the outer facing of the wall was quarried 30 kilometers to the north and hauled in wagons to the site. A total of some 250,000 cubic meters of stone and earth were used for the Manching wall. Altogether Lorenz reckons around 500,000

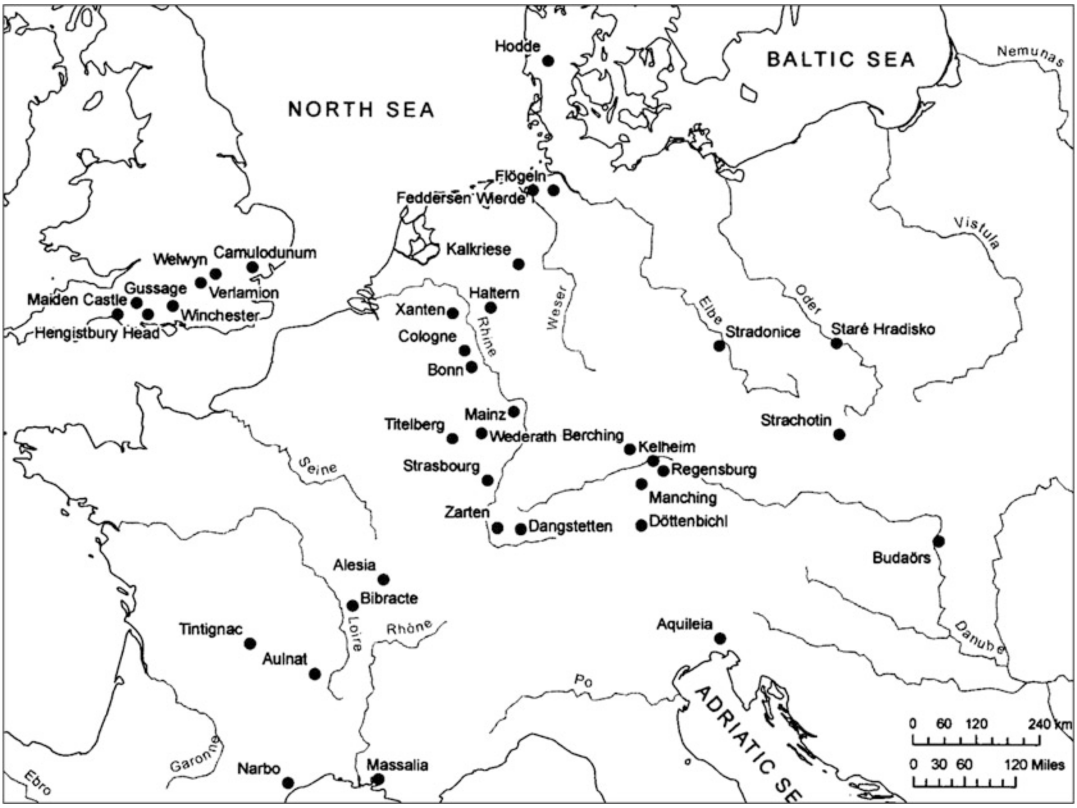

Fig. 11.15 Map showing *oppida* and other sites of the final two centuries BC, and sites associated with the Roman conquest

person-days were required to build the one phase of the Manching enclosing wall. At present, we have little information about either the population of Manching or the scheduling of the wall construction; hence we do not know how long the process took.

All of the *oppida* are situated in places of natural defense. Most are on hilltops, with the walls encircling the upper portions of the hill. A few are in low-lying areas, where they are protected by rivers and marshes. Most of the *oppida* have yielded evidence for industrial and commercial activity. Some, such as Bibracte in France, Manching in Germany, and Stradonice and Staré Hradisko in the Czech Republic, have dense occupation remains showing large numbers of inhabitants, intensive industrial activity, and extensive trade. The populations of those major sites were probably in the several thousands, perhaps approaching ten thousand. Others, such as Kelheim in Germany show much smaller-scale occupation. Sites such as Zarten in Germany have so far yielded only very sparse occupation remains and may have served as fortresses in times of emergency but may have never been permanently inhabited. Excavations at the different *oppida* show that while all share similar wall construction and large enclosed areas, each *oppidum* was unique in its internal structure. Since these settlements are so large, none has been completely or nearly completely excavated. The most extensively excavated is Manching. Of the 380 hectares of enclosed surface area, 18 hectares (44.5 acres) – an enormous area – have been excavated. Still, that represents less than 5% of the site. Thus even with considerable fieldwork at some of the *oppida*, only a tiny fraction of any of the sites has been explored as yet.

Julius Caesar's descriptions of the *oppida* in Gaul make clear that they were urban centers, and he used the word *urbs* (city) to describe three of the sites. East of the Rhine in Germany, Austria, the Czech Republic, Hungary, and other regions, we have no contemporaneous Roman descriptions such as those of Caesar, but extensive archaeological research makes clear that these centers meet most of the criteria for urban places. Many yield remains of intensive industrial production on a scale much larger than anything earlier. Particularly striking is the iron industry. Nearly all excavated *oppida* have produced evidence for iron working on site, often, as at Manching and Kelheim, on a very large scale. Mass production is evident at Manching, with substantial numbers of nearly identical axes, knives, hammers, and other tools. Iron nails were produced in large quantities for the first time in this period, indicating the application of this metal to fabrication of such structures as houses, furniture, and vehicles (Fig. 11.16). Other new kinds of tools such as iron plowshares, colters, and scythes made possible much greater efficiency in agricultural production. In his study of the iron objects recovered at Manching, Jacobi (1974) documented some 200 different types of iron implements.

Bronze casting was practiced at all of the major *oppida* as well, primarily for personal ornaments and other decorative objects, such as parts associated with horse-riding and wagons and chariots. Many of the *oppida*, including Manching and Kelheim, yield evidence for manufacturing glass beads and bracelets, as well as a variety of other crafts.

At the principal *oppida*, most of the pottery was manufactured on the fast-turning potter's wheel, a technological innovation that first became dominant in this period. Wheel-thrown pottery is produced much more efficiently than hand-built pottery, and it usually is a sign of specialized potters, not domestic craft. This pottery evidence, together with the iron-working and other crafts, suggests that manufacturing at the major *oppida* was organized in specialized manufacturing groups, no longer carried out by part-time craftworkers. Additional evidence for this change with the *oppida* is in the character of the most common personal ornaments – the fibulae. In contrast to previous times, nearly all of the fibulae at the *oppida* are forms that lend themselves easily to mass production, not to individual crafting (Furger-Gunti 1977). This change has implications for the way people marked their identities through their personal ornaments, as well as for how manufacturing was organized. Earlier,

Fig. 11.16 Typical iron nails form the final phase of the prehistoric Iron Age. From the *oppidum* at Kelheim on the Danube River, southern Germany (Photograph by the author)

fibulae were largely individually crafted, and there is evidence that different kinds of fibulae and different types of ornament communicated information about the individual – perhaps the family to which he or she belonged, the person's status, or other information about the individual's identity. With the mass production of fibulae, variability between objects was much reduced, suggesting that they played a much less important role as devices for signaling information about the wearer (Gebhard 1991).

The communities at many of the *oppida* minted coins. By around the middle of the second century BC, the major *oppida* were minting three-metal coinages, gold, silver, and bronze. With this trimetal coinage, we can for the first time speak of a real-money economy with three metals of different values. Ceramic molds for the casting of coin blanks have been recovered at many *oppida*, and dies for stamping the coins have been found at some. This development of a full-money economy at the *oppida* represents a substantial change in the economy and social system of Late Iron Age Europe (Kellner 1990). When a money-based market economy replaced a barter or redistributive system, relationships between individuals changed. Social relations ceased to be the principal basis of goods exchange, and market-determined values replaced them. Different archaeologists studying the economic changes apparent in this phase of the Iron Age have reached similar conclusions about this fundamental shift from family-based settlement and economic organization to a system driven largely by specialized manufacturing and commerce (Meduna 1980:157, Gebhard 1989:185).

Another sign of the changes at the *oppida*, and the urban character of these centers, is the proliferation of keys (Fig. 11.17). Keys and locks are sparse in prehistoric Europe before the second century BC, but at the *oppida* they are common. The proliferation of keys suggests two important changes. One was the need to secure one's possessions in a large community in which one did not know and trust all of one's neighbors. This was surely a major change in the creation of the new urban centers. The other was the presence of wealth in sufficient quantity to require locking up on a large scale. The *oppida* were commercial centers, and large quantities of goods were collected and circulated there. Many people derived wealth from the commerce, and they had reason for wanting to secure their possessions.

Commerce is abundantly in evidence at the *oppida*. At Manching writing implements have been found, two sherds with Celtic names scratched in Greek letters, lead weights, Roman amphoras, fine Italic pottery, millefiori and mosaic glass, and Roman bronze vessels. In the amphoras were imported

Fig. 11.17 Iron keys from the Late Iron Age *oppidum* at Kelheim, southern Germany (Photograph by the author)

not only Mediterranean wine, but also the pungent fish sauce known as *garum* so beloved in the Roman world. A barrel made of fir wood, probably originally used as a container to bring wine by wagon from the Mediterranean north to Manching, was used subsequently as the liner of a well (Maier 1993).

The excavations at Manching have yielded good evidence for an urban settlement plan. Dwellings, workshops, warehouses, and other specialized structures have been identified, including ritual buildings within the settlement (see below). Among the dwellings, the excavators have been able to distinguish buildings that were occupied by elite individuals at the site. These are associated with storage cellars, horse-riding equipment, and keys (Sievers 2007) – all signs of access to greater wealth than was available to most residents. Habitation areas of elites have also been identified at Kelheim on the basis of special objects recovered on parts of the settlement (Wells 1997).

While the *oppida* were sites of specialized manufacturing and commercial activity, recent research at smaller, unenclosed settlements also yields evidence for extensive manufacturing. At Aulnat in France (Collis 1995:163–165), Berching-Pollanten in southern Germany (Fischer et al. 1984), and Strachotín in Moravia (Cizmár 1987), for example, small farming communities were engaged in manufacturing well beyond their local needs. In Britain, the settlement of Gussage All Saints, which in other respects resembles a typical farmstead of the final century BC, also shows specialized metalworking, including the casting of ornate bronze chariot ornaments (Cunliffe 1995a). Much recent research in Britain has focused on the special characteristics of the unfortified sites (Davies 2007, Hill 2007).

The reasons behind the development of the *oppida* from the second century BC on have been much discussed and debated (Collis 1995). Since they are such complex phenomena and dominate the cultural life of the final two centuries of the Iron Age throughout the southern regions of temperate Europe, many different perspectives have been advanced. The defensive aspect is readily apparent in the massive enclosing walls that demarcate all of the *oppida*. But the evidence for intensive production at many of the *oppida*, including the application of new technologies to agricultural and industrial productivity, has led many investigators to argue for an explanation involving increased productivity. Commerce also looms large in interpretations of the *oppida*, and their role as trade centers has been discussed with reference to their origins.

Recently several scholars (Woolf 1993) have emphasized the great variation in the character of the *oppida*. Individual *oppida* were established at different times, ranging from the end of the third century to the first century BC (Rowlett 1988, Colin 1998). Given their variety, it is likely that no single explanation can account for all of them. Following new trends in archaeological interpretation, many investigators have drawn attention to the element of display in the *oppidum* walls. At Kelheim, for example, the course of the walls is about 7 kilometers (4.3 mile) long, but the excavation evidence so far suggests a relatively modest population, compared to more densely inhabited sites such as Manching and Stradonice. Even assuming participation of warriors from smaller communities around the *oppidum*, the available combatants could not possibly have successfully defended the walls of Kelheim. But the massive ramparts, with their gleaming facades of white limestone, would have served as a strong symbolic statement by the elite at the site of their status and of the special character of Kelheim relative to communities outside (Wells 1993).

In Britain, the development of complex urban settlements at the end of the prehistoric Iron Age was similar in some ways to the process on the continent, different in others. In the course of the second century BC, marked changes took place, especially in southern Britain. Large centralized complexes developed, including huge fortified settlement such as Maiden Castle (Fig. 11.18), but after about 100 BC few remained sited on hilltops like the continental *oppida*. Coinage appeared, long-distance trade grew in intensity, and large cremation cemeteries were established (Hill 1992, 1995a). The site of Hengistbury Head on the south coast has yielded abundant evidence for long-distance trade during

Fig. 11.18 View of the banks and ditches at the western entrance to Maiden Castle (Photograph by the author)

the first century BC, including importation of wine from the Mediterranean, glass for working into jewelry, and pottery from Gaul (Cunliffe 1994b). Many imports were destined for consumption by the emerging elites of the period, who are represented in a series of richly outfitted burials in southern Britain such as that at Welwyn Garden City (Stead 1967). In the second half of the first century BC, after Caesar's two incursions into Britain during the 50s BC, large centers of manufacturing, commerce, and political power emerged at sites such as Verlamion (St Albans) (Haselgrove and Millett 1997) and Camulodunum (Colchester). Many archaeologists believe that interaction with the Roman world, dated by imports at Hengistbury Head back to the final decades of the second century BC, was an important catalyst, but not the main cause, for these developments toward urbanism and state formation (James and Rigby 1997, Creighton 2000).

In southern Scandinavia, although no centers developed that could be called urban, there is also evidence for growth in social, political, and economic complexity at the same time as the formation of the *oppida* to the south. From around 200 BC on, true villages appear in Denmark, not just the isolated farms and hamlets of the earlier Iron Age. The most striking example of the change is the settlement at Hodde in Jutland, with a village comprising 28 farmsteads, all enclosed by a common fence (Fig. 11.19). One farmstead is distinguished by larger buildings than the others and by finer pottery, suggesting that the emergence of larger communities was accompanied by sharper status distinctions between members of the communities (Hvass 1985, Rindel 1999). Similar processes of nucleation are apparent in the final century BC in northern Germany at such sites as Feddersen Wierde and Flögeln, as well as in the Netherlands (Gerritsen 1999).

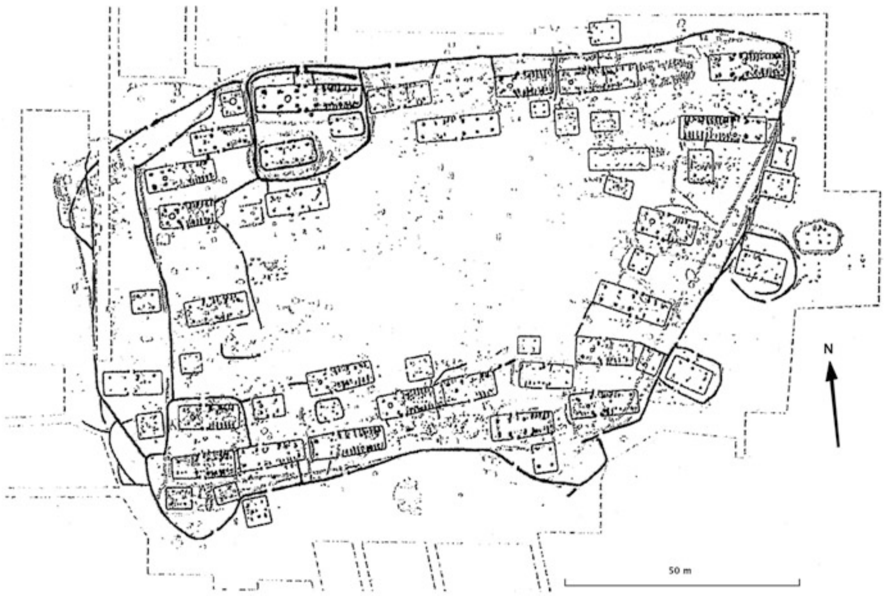

Fig. 11.19 Plan of the settlement at Hodde, Denmark, showing the posthole foundations of farmhouses, with stalls for livestock in their eastern ends, smaller structures, and the fence enclosing the settlement. Note the unusually large buildings surrounded by the separate fence in the upper left part of the enclosure. (After Hvass 1985:309. Used by permission of Steen Hvass and the Nationalmuseet, Copenhagen)

Ritual

In the past two decades, there has been a great increase in concern with the subject of ritual in European archaeology. Archaeologists have increasingly realized that Iron Age Europeans may have viewed their world in fundamentally different ways from the way we view ours, and from the way that archaeologists have approached prehistoric societies (Hill 1992). In the past, there has been a strong tendency to look in the archaeological material for indications of lifeways that seem familiar to us and thus lend themselves relatively easily to interpretation – reconstructing settlement patterns, subsistence practices, and technological and commercial behaviors. But as ethnography demonstrates, other people have different worldviews from ours. By looking beyond the most obvious (to our eyes) aspects of the archaeological material, and taking into account that the Iron Age peoples we are studying may have thought and behaved in ways that are unfamiliar to us, archaeologists increasingly are identifying new patterns in the evidence that provide insight into ritual practice, if not into the beliefs that lie behind the practice.

For discussion here, I understand ritual as symbolic behavior performed with the intention of interacting with and influencing supernatural powers or other human beings. Ritual can relate to religion – it can be a means of communicating with gods and spirits with the intent of affecting a future outcome. It can also be part of social interaction, in feasts, political ceremonies, and other structured events in which all human communities engage. Ritual thus includes a broad range of human practice. We can identify ritual archaeologically through the recognition of regular, repeated patterns and associations (Renfrew and Bahn 2000:408–409). Understanding the meaning behind ritual is much more difficult. I organize my discussion around four main topics – burial, offering deposits, enclosures, and ritual on settlements. There is no reason to believe that Iron Age peoples thought in terms of these categories, and there is considerable overlap between the evidence for ritual activity at these different kinds of sites.

Burial is the most familiar and best represented form of ritual practice in Iron Age Europe. Throughout most of the continent, large numbers of graves are documented from the Iron Age. There are notable exceptions – contexts in which practices of disposing of bodies did not include subsurface burial. For much of the Iron Age in Britain burial evidence is sparse, and for the Late La Tène period in central regions of the continent, we know only a handful of graves. But for the majority of Iron Age communities, the dominant means of disposing of the dead was burial in the ground. Cremation and inhumation were practiced at different times and in different places, and there was considerable variation in treatment of the body, arrangement of the grave, and nature of above-ground structures.

In earlier traditions of archaeological research, the principal emphases of cemetery study were on chronology, differential distribution of wealth, and study of grave goods as evidence of crafts and trade. Much recent work concerns examination of the rules that governed burial practice in different contexts. As Pearson (1999b) shows through analysis of burial patterns in Britain, we can learn much about social relations within a community from examination of ways in which the dead were treated in the burial process.

Iron Age graves often contain information about different kinds of rituals that were part of the funerary celebrations. One ritual that has attracted considerable research attention is feasting and especially drinking of alcoholic beverages (Fig. 11.20). Rich graves throughout the Iron Age and from many regions of Europe contain special vessels associated with the serving and consuming of wine and other intoxicants. These vessels often are luxury imports from Greece, Etruria, or Rome, and in other cases are lavish local products, such as the huge gold-banded drinking horn at Hochdorf and the figurally ornamented bronze jugs from Basse-Yutz and the Dürrnberg (Megaw and Megaw 1990). As a number of investigators (Dietler 1990, Krausse 1996, Arnold 1999) have shown, the drinking and feasting vessels often form structured sets in the graves. Arnold demonstrates how these sets can be linked to rituals that played important social, political, and ideological roles in their communities.

Graves represent only a final stage in the funerary ritual celebrated by the survivors. Recently research attention has turned to the landscapes of which graves are part, with important results for reconstructing aspects of the ceremony that preceded the outfitting and closing of the grave. At the site of the rich woman's burial at Vix in eastern France, investigators have uncovered a rectangular enclosure 23 meters on a side, defined by a ditch, that may have been the site of funerary ritual carried out in connection with the woman's burial. Next to the entrance of the enclosure were lifesize stone sculptures of a woman and a man. The woman is portrayed with a neckring similar to that found in the rich burial, and the man is shown with weapons that characterize the rich graves of the sixth and early fifth century BC. Quantities of pottery and animal bones in the enclosure ditch may represent remains of a funeral feast (Chaume 1997).

Fig. 11.20 Representation of a feast on the situla from Vače, Slovenia (After von Hochstetter 1883:l. 20, 2)

At the Glauberg in central Germany, excavators have uncovered a complex cultural landscape of which a tumulus containing two well-outfitted burials was a part (Frey and Herrmann 1997, Hansen and Pare 2008). In ditches surrounding the tumulus were remains of four lifesize stone statues, which apparently had been arranged next to the burial mound. The nearly complete statue represents a man portrayed with the same accouterments as the individual buried in one of the two graves in the mound, including a sword, a neckring, and even a bracelet on his right arm and a ring on the fourth finger of the right hand. The ditch surrounding the tumulus was connected to two parallel ditches that defined a 10-meter wide avenue that extended 350 meters to the southeast. The western ditch then turned sharply to the west, the eastern to the east. The scale of this earthwork was enormous, indicating a vast structured landscape apparently built for the funerary ceremony for one or both of the individuals buried in the tumulus. Future research may help to illuminate the nature of the rituals that were carried out in connection with these landscape features during, and perhaps after, the burials.

A third example is at the eastern edge of Europe. Excavations at the huge Kurgan 1 at Filippovka near the Ural River in Russia revealed not just a rich burial in the center of the mound, but a complex arrangement of special objects that played roles in the funerary ritual at the time of the burial. Five 50-centimeter high figures of stags, carved of wood and covered with sheet gold, were among objects arranged at the entrance of the passage into the tumulus. Two pits that had been dug into the mound contained a total of 12 more wooden stag figures covered with silver and gold, along with silver and gold vessels, all apparently used in the funerary ceremony and buried subsequently in the mound (Pshenichniuk 2000).

As these three examples indicate, recent research is showing that graves are often parts of complex cultural landscapes in which elaborate traces of funerary rituals are often preserved. We are still in the early stages of investigating these kinds of data and only beginning to understand the full implications of the available information. As we learn more about the cultural landscapes in which burial monuments were situated and about the character of the rituals carried out in connection with the burials, we shall be able to develop a much more dynamic picture of Iron Age funerary rituals than we have at present.

Iron Age Europeans deposited large quantities of metal objects and other materials in special places, apparently as parts of ceremonies of offering to deities (Bradley 1998). The interpretation of these sites is based largely on information from inscriptions from the early Roman Period. For example, at the site of Bath in England, metal objects, including Iron Age coins and ornaments, were thrown into the hot springs gushing from the ground. The practice was continued in the Roman Period, during which time the items deposited in the spring included pieces of sheet lead with inscriptions on them indicating that they were offerings dedicated to a deity, Sulis Minerva (Cunliffe 1995b). At a spring at Chamalières in the Massif Central region of France, associated with many hundreds of carved wooden figures of humans was a lead tablet bearing an inscription written in an Italic script and in a Celtic language (Romeuf 1986). The text indicates that the offerings were made to local deities. At Empel in the Netherlands, continuity in offering practice from the Late Iron Age into the Roman Period is apparent at a rectangular enclosure (Roymans and Derks 1994). There the local deity, represented in an inscription and a bronze figurine, was Hercules Magusenus. As in the case of Sulis Minerva at Bath, a local deity was combined with a Roman one.

Similar practices of offering are well represented throughout the Iron Age and in many parts of Europe. For example, at a spring at Duchcov in the Czech Republic a bronze cauldron was discovered, containing a large number of bronze fibulae, bracelets, and other objects. The find was made in 1882, and a complete count of the objects is lacking. A recent inventory identified a minimum of 1600 objects, including 850 fibulae, 650 bracelets, and 100 finger rings. The style of the objects indicates a date in the fourth or third century BC (Motyková 1986). In southern Denmark at the site of Hjortspring, a 19-meter long wooden boat was deposited in a pond, together with the weaponry of an army of some 80 warriors (see above). The weapons included javelins, lances, swords, shields, and chain mail. Many stones had been placed inside and on top of the boat in an apparent effort to sink it into the pond and to keep it from floating to the surface. Many of the weapons had been intentionally bent before being deposited, and associated with them were remains of several animals. The Hjortspring site, dated to the second half of the fourth century BC, is the earliest of a large series of weapon offerings in northern Europe believed to represent the armaments of a defeated army, offered to the gods in thanks for victory (Randsborg 1995, Kaul 2003).

A deposit of iron implements and ornate bronze metalwork found at Llyn Cerrig Bach in northwest Wales may have served a similar ritual purpose (Fox 1946). About 150 objects excavated from a bog included 11 swords, six spears, parts of shields, metal fittings for harnesses and for chariots, two cauldrons, tongs, a chain perhaps for human captives, a horn, and other metalwork. The materials are thought to have been deposited in the late second or early first century BC. Noteworthy is the composition of the find, consisting largely of high-status items (otherwise found in rich burials), including weapons, a decorated vehicle, horse-riding equipment, and bronze vessels.

Many sites linked with water have yielded human skeletal remains, suggesting the offering of humans – whether alive or not is not clear – as well as of metal objects. At the site of La Tène on the shore of Lake Neuchâtel in western Switzerland, along with the many hundreds of iron weapons and other objects found were numerous human skulls and some other skeletal parts (Bradley 1998). Hundreds of skulls, mostly those of young adult males, have been recovered from the Thames River, with dates ranging from the Bronze Age to the early medieval period (Bradley and Gordon 1988). In the Meuse River at Kessel in the Netherlands, human skeletal remains, especially of young adult males, have been recovered together with weapons (Roymans 2007). Throughout the northern regions of Europe, humans were ritually deposited in ponds and bogs. Among the best-documented finds of this category is the body known as Lindow Man, discovered in a bog near Manchester in the Midlands of England (Joy 2009).

Another type of offering site, not always clearly distinguishable from the water-finds, is pit deposits. While objects placed in watery contexts are well represented throughout the Late Iron Age, pit deposits are especially common in the final two centuries BC. Two main categories can be recognized, iron tool deposits and precious metal hoards. In their study of the iron deposit at Kolín in the Czech Republic, Rybová and Motyková (1983) observe that many such deposits are characterized by tools associated with agriculture such as plowshares, sickles, scythes, and axes, and those associated with food preparation, including andirons, cauldrons and the chains from which to suspend them, jugs, and spits. The common themes suggested by these deposits are fertility and nutrition.

Precious metal hoards include coin hoards, hoards that combine coins with other objects, especially ring jewelry, and hoards that consist mainly of rings. Hoards that contain hundreds of gold coins, and hoards with numerous silver coins, are common. At Niederzier in the Rhineland of Germany, a pit on a Late Iron Age settlement contained three rings made out of sheet gold – two neckrings and a bracelet – and 46 gold coins (Göbel et al. 1991). This find is one of about 10 such deposits that contain the combination of one or more gold neck rings and gold coins. At Snettisham in East Anglia in England, 11 small pits have been found on a field, containing gold and silver neckrings, bracelets, coins, and other items, including ingots and some bronze objects. The Snettisham complex is noteworthy for many reasons. A large proportion of all the gold known from Iron Age Britain is in the 11 pits at this one site. In addition to the ritual deposition of all of this treasure, the complex raises questions about the nature of the local political power that controlled such wealth (Stead 1991). The recent discovery on a hill near Winchester in southern England of a hoard that contained two complete sets of gold necklaces, pairs of fibulae, and bracelets (Hill et al. 2004) similarly relates to important questions about political power and the display of precious metal. The Winchester hoard dates to around the middle of the final century BC, about the time that Julius Caesar led his Roman legions in invasion of Britain from Gaul. Whether that deposit of gold relates in some way to the Roman invasion remains to be determined.

Another type of offering deposit is associated with fire. Especially in the Alps and the foothill regions to the north of the mountains, numerous places have been investigated that consist of burned areas covering several square meters, with deposits of quantities of metal objects and animals bones. The layers of charcoal and ash can be substantial, and the objects deposited include personal ornaments, horse-riding equipment, weapons, and metal vessels. These categories are similar to those found in the water deposits (as well as in rich burials), suggesting similar ritual practices and similar meanings in connection with deposits associated with both fire and water (Zanier 1999).

Like the small enclosure near the Vix burial (above), the great majority of enclosures linked with ritual activity in Iron Age Europe are rectangular. At some, rituals involved the depositing of objects of the same categories as those associated with water and fire sites. Among the best-studied enclosures are those at Gournay-sur-Aronde and Ribemont in northern France, but similar sites have now been investigated all over France and in surrounding regions (Brunaux and Malagoli 2003). At Gournay, a rectangular enclosure was constructed around 300 BC and used, with renovations over time, for about three centuries. Pits inside the enclosure, and the ditch surrounding it, contained large quantities of animal bones, especially those of cattle, pigs, and sheep. About 2000 iron weapons, including swords, scabbards, lances, and shields have been recovered from the ditch. The excavator believes that the animals were sacrificed on the site as part of ritual activities, and the weapons were displayed in the form of some 500 complete sets (Brunaux 1996, 2001). At Ribemont, human skeletal remains are especially abundant. One deposit on the site contains the skeletons of about 80 individuals, all without skulls, together with weapons. Much of the deposit at Ribemont consists of separate bones arranged and piled together, suggesting rituals that involved the manipulation of human skeletal materials after the removal of the flesh. Brunaux reports that skulls are lacking from the deposit at Ribemont. They must have been removed to a different location for some particular purpose.

A recent discovery at Tintagnac in central France provides strong evidence for close connections between ritual and warfare (Maniquet 2008). Underneath a temple complex of Gallo-Roman date archaeologists found a rectangular enclosure, about 25 meters on a side, defined by a ditch system. Inside the enclosure were traces of a wooden building and, at one corner of the enclosed surface, a pit that contained an extraordinary quantity of special military equipment. Among the objects recovered were nine iron swords, all deliberately broken, with remains of scabbards; 10 or 11 helmets, also damaged; many ornaments from horse harnesses; and seven bronze war trumpets with open ends in the shapes of animal heads, of a form known from a few other sites and from a representation on the Gundestrup cauldron. This pit at Tintagnac also contained a bronze cauldron and additional fragments of figurines of animals made of sheet bronze. The deposit dates to sometime during the final century BC. The excavators believe that the weapons may have been displayed within the enclosure as war trophies, then buried. Their date in the final century BC indicates that they were probably associated with military activities connected to the Roman invasion of Gaul or with events just before or just after it.

At the time of the *oppida*, rectangular enclosures defined by a bank and outer V-shaped ditch were constructed throughout the central regions of temperate Europe. Around a thousand of these enclosures have been identified, and more are discovered every year, especially through aerial reconnaissance. Typically they are slightly smaller than a football field, they have an entrance halfway along one of the walls, and they often have a rectangular post-built structure in one corner (Wieland 1999). Often, but not always, there is one, sometimes multiple, deep shafts inside the enclosures. These enclosures have been variously interpreted as ritual spaces, livestock pens, forts, and farmsteads. Following excavations of one at Holzhausen in Bavaria, most investigators accepted the idea that the enclosures were mainly ritual in nature. Discoveries of unusual wooden animal sculptures at the bottom of the shaft in the enclosure at Fellbach-Schmiden near Stuttgart (Planck 1982), and the association of the well-known carved stone from Msecké Zehrovice with such an enclosure in Bohemia (Venclová 1998) have contributed to this idea.

But recent excavations at other enclosures have cast doubt on this theory. At many sites, excavators are finding remains that suggest the same kinds of domestic activity that show up on typical settlements sites – posthole remains of wooden buildings, domestic pottery, typical animal bones, and other characteristic residential residue (Wieland 1999). The result has been that many investigators now reject the idea that the enclosures were intended for ritual purposes and view them in profane, everyday terms.

Until recently, most archaeologists tended to hold firmly to the categorization of sites as settlement, burial, or ritual, without exploring the possibility that places may have had multiple functions for the people who used them. Today much interesting research is exploring ritual practices that were carried out on settlements. At the hillfort settlement at Danebury in southern Britain, Barry Cunliffe (1992) notes that of the roughly 1700 pits studied by the early 1990s, some 40% contained what he calls "special deposits" – things other than remains of stored grain and the sort of discarded rubbish that archaeologists always assumed comprised pit contents. These special deposits in the pits at Danebury included human skeletons, skeletal remains of animals, especially horses, dogs, and birds, sets of horse and vehicle equipment, and complete ceramic vessels.

In a study of pit fill on many Iron Age settlements, J.D. Hill (1995b) has demonstrated that a large proportion of pits contain not just random debris from the settlement surface, but materials that were carefully selected and intentionally deposited, similar to the special deposits that Cunliffe identified at Danebury. Hill found that particular kinds of animal remains, types of pottery, and metal objects are especially common in these contexts. He uses the term "structured deposition" to characterize these selected assemblages of materials that Iron Age inhabitants placed in the pits around their houses.

The particular meanings of these pit deposits have not yet been worked out. What is so important about this work is the demonstration that in settlements – sites that until recently had been interpreted almost exclusively in terms of economy and social organization – there is clear evidence for activities that we consider ritual. This of course is how human societies work – what we consider different aspects of experience are always bound together and inseparable. This new recognition opens great possibilities for future research and thinking about how Iron Age peoples viewed and interacted with the world in which they lived.

In the greater attention being devoted to ritual aspects of settlements, archaeologists are also reconsidering the enclosing features – walls and ditches – that surround many Iron Age sites. Traditionally, these have been interpreted as defensive structures to protect the community from attack, or, when on a smaller scale, to keep wild animals such as wolves out of the settlements and domestic animals in. But recently some investigators, adapting ideas from folklore and ethnography, have begun research on symbolic aspects of boundaries as means of creating feelings of community and place (Hingley 1990, Bevan 1997). The use of enclosing walls and ditches in many Iron Age cemeteries in different parts of Europe, for example in the Arras cemeteries of Yorkshire (Stead 1979) and at Wederath in the Moselle valley (Haffner 1989), underscores the ritual significance of enclosure at this time in European prehistory.

The ritual significance of individual buildings on settlements has also become an important issue of research. In settlements in northern England, Pearson (1999a) has shown that particular attention was paid to the orientation of house entrances and the organization of space in the interior of dwellings. Fitzpatrick (1994) demonstrates the same for houses in southern Britain. At the *oppidum* of Manching in southern Germany, investigators have identified a series of settlement components that they link to ritual. The foundation of an octagonal building near the center of the site has been identified as a possible temple. Ditches similar to those that surround the rectangular enclosures have been found in recent excavations at Manching (Sievers 1999). Special finds that investigators link with ritual include a bronze tree coated with sheet gold with sheet gold leaves (Maier 1990) and an iron figure of a horse 70 centimeters high (Krämer 1989). Large numbers of weapons, many of them intentionally bent, have been found over much of the settlement surface (Sievers 1989). The character of the deposited weapons is similar to that of the weapons at Gournay-sur-Aronde.

Also found on the settlement at Manching are the skeletal remains of at least 420 humans. In most cases, they consist of individual bones, especially skulls and longbones, rather than complete skeletons. Many show traces of cuts with sharp implements. Extensive study of the human remains at Manching (Lange 1983, Hahn 1992) suggests that most reflect ritual practices carried out on the settlement, not death from battle wounds or sacrifices. Similar human skeletal remains from other settlements of the period, and the dearth of graves from the latter half of the second and the first century BC in much of temperate Europe, support the idea that funerary rituals included some kind of exhumation or excarnation and ritual manipulation of bone, with final deposition of human skeletal remains on settlements. The treatment of human bone at Manching is reminiscent of that at the enclosure at Ribemont. At the settlement of Glastonbury in southwest Britain, the excavators recovered human skulls both within the settled area and just outside the perimeter fence (Coles and Minnitt 1995).

The possibility of human sacrifice as a ritual in Late Iron Age Europe has been raised by Lambot and Méniel (1998) in their investigation of the settlement of Acy-Romance in northeastern France. At the center of the settlement was an enclosure defined by a palisade and ditch. Substantial numbers of animal bones, especially those of cattle and horse, were recovered from the postholes. In the northern part of the enclosure, burials of 19 young men were found, all in a flexed position. Near them was a skeleton of another young man whose right temple showed that he had been killed by a blow from an axe or similar implement. These graves within the settlement of Acy-Romance are unusual in that they are all inhumation (most of the graves known from this period in the region are cremation), and they contain no grave goods, unlike the majority of burials.

The evidence from Manching, Glastonbury, Acy-Romance, and many other settlements suggests that rituals involving human bodies – alive or dead – played a significant part in settlement activities at the end of the Iron Age. Settlements are still an under-represented category of archaeological site in Iron Age Europe, and future excavation of settlements is likely to yield more evidence of these and related practices.

As the discussion in the preceding pages indicates, archaeologists now recognize a wide variety of sites that contain evidence of ritual practice in Iron Age Europe, in all cases involving the deposition of things – weapons, ornaments, fine vessels of pottery and sheet metal, coins, and human body parts. The category "ritual" seems much too broad to contain the wide range of behaviors indicated by these diverse sites and objects. As research on these sites progresses, it should be possible to distinguish different kinds of practice that resulted in the various patterns that we see in the evidence.

The Roman Conquest

Most archaeologists and historians regard the Roman expansion northward into temperate Europe and the conquest of much of the continent as a separate, external factor from the development of the European Iron Age societies. This tendency to view the Roman world of the Mediterranean basin and the Iron Age peoples north of the Alps as distinct entities with different historical and cultural trajectories is fostered by the disciplinary separation of research into prehistoric Europe and into Roman culture and history. The Iron Age peoples of Europe are a subject of study by prehistoric archaeologists, while the Roman world is the academic domain of ancient historians and Classical archaeologists.

As suggested above that we can understand the Early Iron Age centers and the growth of trade in that period best by considering temperate Europe as part of a larger universe that included the Mediterranean basin and the Near East, so too what is known as the "Roman conquest" can be best approached as a part of the interactions that were taking place for centuries between peoples of temperate Europe and societies of the Italian peninsula. Iron Age European and Roman society shared a great deal in common.

Rome's expansion of territory and power began by the fourth century BC, and during the third century BC Rome had begun to conquer overseas territories (Dyson 1985). By early second century BC, Rome had conquered northern Italy, and in 181 BC Rome established a colonial city at Aquileia at the northern end of the Adriatic Sea, which was to serve as a major trade center for commerce northward over the Alps. Also during the second century BC, Rome became increasingly involved in military and political affairs in southern France, where the Greek city of Massalia had been a dominant political and cultural influence. According to written sources, several times during that century, Roman military forces came to the aid of the city of Massalia in its struggles with surrounding peoples. By 118 BC Rome had founded a colonial city at Narbo on the coast to the west of Massalia, thus establishing a firm Roman presence in Gaul.

During the second century BC, as Rome's political, military, and commercial interests extended northward in Europe, Roman trade goods spread across the continent. At Manching in southern Germany, Roman wine amphoras appear already early in the second century BC (Will 1987), and amphoras from that century have been recovered throughout Gaul and neighboring regions (Cunliffe 2001:389). Along with the importation of wine into temperate Europe, large numbers of Roman bronze vessels used to serve and drink the beverage are also found, including dippers, sieves, cups, and other feasting equipment (Feugère and Rolley 1991). The *oppida* appeared at this time, and many of the Roman imports are recovered at or in the vicinity of those large settlements. The relationship between Roman political and economic expansion and the establishment of the large centers in Europe north of the Alps was complex and is not well understood, but the processes were closely interconnected. The activities of Roman merchants plying their wares northward from Aquileia and from the Mediterranean coast of southern France, and of Iron Age merchants traveling southward to the Roman centers to negotiate their commercial interests, played major roles in the growth of industry and commerce at the *oppida*, and in larger-scale economic and political changes as well.

In addition to commercial interactions, Rome also cultivated political alliances with the peoples who inhabited the lands on the other side of the Alps. In the course of political struggles for power in Rome, Julius Caesar began 8 years of military campaigns in Gaul – the territory west of the Rhine and the Alps and north of the Pyrenees – in 58 BC. The precise nature of the reasons behind Caesar's decision to intervene in Gallic affairs is not clear. In his written commentary about the war, Caesar says that he responded to requests for assistance from allies in Gaul who were being troubled by enemies. But modern historians believe that Caesar used such excuses as a pretext for intervention, when his real goal was to win a stunning military victory and conquer a rich territory for Rome, in order to win ascendancy over his political rivals, Pompey and Crassus (Goudineau 1990). The strategy succeeded – Caesar gained great glory through his successes in Gaul, and the people of Rome named him dictator. His enemies, fearing a one-man rule, conspired against him and murdered him in 44 BC.

The course of Caesar's campaigns in Gaul between 58 and 51 BC is fully described in his commentary, *The Gallic War*. Unusual for an ancient general, Caesar wrote a detailed description of each season's campaigns, providing us with an extraordinary account of the Roman military and political interaction with the Late Iron Age peoples of Gaul. Many of the places Caesar describes can be identified archaeologically, and ongoing excavations are revealing important information about the campaigns (Duval 1994). Recent research at Alesia (Reddé et al. 1995), the *oppidum* at which united Gallic tribes made a final stand against Caesar's forces in 52 BC, reveals the earthworks the Roman army constructed for its assault and has yielded abundant weapons from the battle, many with the kinds of knicks and dents that we would expect on weapons used in combat. These include helmets, shields, swords, daggers, lances, spears, javelins, catapult bolt points, and lead slingstones. Analysis by Sievers (1995) reveals the interesting fact that the great majority of weapons recovered are of types used by the Late Iron Age peoples, not the Roman legions. Most of the distinctively Roman weapons are types used at a distance, such as catapults, javelins, and spears, not weapons used in hand-to-hand combat such as swords and shields. This pattern may reflect the fact that the Roman army employed many auxiliary troops consisting of warriors from Iron Age tribes who were allied with Rome, and that Caesar used the auxiliaries in the front lines against the enemy. Roman legionary soldiers may have fought from positions in the rear, launching their projectile weapons from a distance but remaining behind the front-line troops when they moved forward into combat.

Caesar with his Roman legions and auxiliaries from allied Gallic tribes defeated his enemies at Alesia, and in 51 BC he completed the conquest of Gaul. Over the next several decades, Gaul was gradually integrated into the growing Roman world. The establishment of full Roman infrastructure – building of roads, establishing of towns on the Mediterranean model, introducing the villa system of rural organization – was delayed by civil war and political chaos in Rome following Caesar's assassination in 44 BC, and by frequent uprisings among people in Gaul. Many of the *oppida* in Gaul continued to be occupied after the Roman conquest, including the major center of Bibracte (Duval 1994) and the large *oppidum* in eastern Gaul at the Titelberg (Metzler 1995). The Titelberg experienced its greatest period of economic and commercial activity in the decades following the conquest, with vast numbers of luxury imports brought in from Italy and from southern Gaul.

During his campaigns in Gaul, Caesar made two forays across the English Channel to Britain, where he encountered tribal armies similar to those of Gaul. He did not conquer territory in Britain, but through his military actions there he succeeded in establishing patron-client relationships between Rome and several of the powerful tribes of southern Britain. Before Caesar's invasions, Roman imported goods had been arriving in Britain during the final decades of the second and the first half of the first century BC, where they are especially well represented at Hengistbury Head on the south coast (Cunliffe 1994b). After Caesar's incursions the connections with Rome expanded greatly. Roman imports, as well as goods from Gaul, became much more common, and a whole series of complex cultural changes that investigators link with the increased interaction with Rome is apparent in the archaeological evidence (Creighton 2000).

Rome pursued further conquests on the continent in the final two decades BC (Wolters 2000). Between 16 and 13 BC the Roman Emperor Augustus directed the building of a series of Roman military bases on the west bank of the Rhine River, of which those at the modern German cities of Xanten (Roman *Vetera*) and Mainz (*Mogontiacum*) were to play special roles in the launching of campaigns eastward across the Rhine. Archaeological research in these cities regularly yields important new evidence for understanding the development of the military bases and of the urban centers that grew around them (Schönberger 1985). In 15 BC the Emperor's two adopted sons, the generals Tiberius and Drusus, conducted what is known as the Alpine campaign. Tiberius led his legions from Gaul eastward, and Drusus led his from northern Italy northward across the Alps into southern Bavaria. The result, according to historical documents, was the conquest of 45 tribes of the greater Alpine region, including all of the peoples as far north as the Danube. Two important sites associated with that Alpine campaign have been discovered and excavated recently.

At Dangstetten on the north bank of the upper Rhine River on the border between Germany and Switzerland was a military base about 13 hectares (32 acres) in size, discovered in 1967 (Zanier 2000). The objects recovered through excavation place the occupation of the base between 15 and 9 BC. The fort was protected by a wall built of earth and timber, typical for Roman bases of this early period, and the structures in the interior were made of wood. At Döttenbichl near Oberammergau in southern Bavaria, at the north end of a pass through the Alps, remains of a battle between Roman legionaries and indigenous people were discovered and excavated in the 1990s. Among the finds are three Roman daggers, part of a helmet, more than 350 Roman arrowheads, about 20 catapult bolt points, and numerous nails from soldiers' boots (Zanier 1997). Early reports about the site offer two interpretations – it was the actual place on which a battle took place, or it is an offering site at which local people ritually deposited weapons lost by Roman soldiers after a battle. The final report on the site is in preparation.

Between 12 BC and AD 9 the Romans launched a series of annual campaigns across the Rhine, most of them from the bases at Xanten and Mainz, in an effort to conquer the tribes east of the Rhine the way Caesar had done with the tribes west of the river (Kühlborn 2000). Archaeological research has revealed a series of military bases east of the Rhine constructed for these campaigns. One group is along the Lippe River just east of Xanten on the lower Rhine, another across the Rhine from Mainz on the middle Rhine. At Haltern on the Lippe archaeologists working since the end of the nineteenth century have produced the most information about a Roman military base of the Augustan Period (von Schnurbein 1981). The excavation results from Haltern provide a detailed view into the archaeology of the Roman troops who fought against the Iron Age peoples of Europe.

In their campaigns between the lower Rhine and the Elbe River, the Roman legions had some successes, but they were never able to achieve a decisive victory in this part of Europe. Two main factors hindered their efforts. The environment of the northern part of central Europe, north of the central uplands on the North European Plain, was difficult for Roman troops to negotiate. Unlike Gaul, this landscape consisted largely of forests and bogs, environments in which Roman legions were unaccustomed to maneuver. Equally important was the lack of any major centers comparable to the *oppida* of Gaul, at which the local tribes congregated and which could be besieged by the Roman troops. Instead, the Roman legions had to march great distances, only to have the highly mobile local warriors depart from their territories, taking their belongings with them.

Roman attempts to conquer the lands between the Rhine and Elbe rivers were finally stopped by a massive surprise attack in September of the year AD 9. A local leader called Arminius had organized an army of united tribal warriors to confront the Roman army under the command of Publius Quinctilius Varus. In the ensuing battle, known to history as the Battle of the Teutoburg Forest, three Roman legions, the Seventeenth, Eighteenth, and Nineteenth, were annihilated, together with several contingents of auxiliary troops – around 15,000–20,000 men in all. This defeat was one of the greatest Rome ever suffered, and it caused Rome to give up its attempts to conquer the peoples east of the lower Rhine and to consolidate its position at the Rhine. In the following years Rome conducted several punitive campaigns into the same territory, but without winning any decisive victories. In AD 16 the new Emperor Tiberius recalled his general from that theater of operations and ceased attempts to conquer the region. Instead, Rome strengthened its military presence on the west bank of the Rhine. The buildup of troops in the Rhineland led to the establishment and growth of towns there, many of which, such as Cologne, Bonn, Mainz, and Strasbourg, have thrived for the past 2000 years. During the first and second centuries AD, the Rhineland was one of the most prosperous parts of the Roman Empire, in part because of the large number of troops stationed there.

In 1987 the site of this great battle was identified for the first time, at Kalkriese north of Osnabrück, on the topographical divide between the central uplands and the North European Plain (Schlüter 1999, Schlüter and Wiegels 1999, Wells 2003). So far well over 4000 Roman objects have been recovered. About a third of them are coins, and the others are mostly weapons. They include all of the equipment that legionary soldiers carried and wore – swords, daggers, helmets, shields, belts, boots, cooking pots, and clothing pins. Horses that cavalry troops rode are represented, as are mules that pulled the baggage weapons. A large number of preliminary reports have been published, and the site is still under intensive excavation. Kalkriese is one of very few Roman battle sites to be extensively excavated, and the final analyses of the excavation results will yield important new information about Roman battle tactics, and about those of the Iron Age warriors that confronted them.

Some later conquests in Europe added more territory to the Roman Empire. In AD 43, Roman legions under the Emperor Claudius invaded Britain and went on to conquer most of the island (Creighton 2006, Mattingly 2006). In AD 83, the Roman army added the land between the upper Rhine and upper Danube rivers to its imperial domain, creating a diagonal frontier from the middle

Rhine to the northernmost point on the Danube. And in AD 106 Roman armies on the lower Danube conquered the territory of Dacia north of the river.

Although the written sources from the Roman Period suggest that following the conquest, political, social, religious, and cultural systems in the new provinces changed greatly to become "Roman," the archaeological evidence presents a different picture. The texts were all written from a Roman perspective, but the archaeology allows us to study the perspective of the conquered native peoples (Millett 1990, Wells 1999). Examination of the burials, settlements, ritual sites, pottery, personal ornaments, and other categories of material culture enables us to see how the native peoples adapted to the changed conditions of incorporation into the Empire. The archaeology shows strong continuity among the populations of Europe after the Roman conquest (Wells 2005). At many settlements, such as the recently studied site at Budaörs in Hungary, archaeological evidence shows that occupation was continuous from the pre-conquest Late Iron Age into the post-conquest Roman Period (Ottományi 2005), which of course is not surprising. The complex interplay between continuity of cultural traditions and changes introduced by the Roman presence can be examined particularly well in cemeteries that were used continuously from prehistoric Iron Age times into the Roman period, such as Wederath in eastern Gaul (Haffner 1989) and King Harry Lane at St Albans in Britain (Stead and Rigby 1989).

Peoples in the lands beyond the Roman frontier were also much affected by the proximity of the Roman Empire. Throughout the four centuries of Roman imperial presence north of the Alps, intensive trade took place across the frontier, and many thousands of Roman objects have been recovered throughout those regions (Hansen 1995). There too, as in the conquered territories, the cultural traditions of the prehistoric Iron Age were transformed, but not obliterated, by the interactions with the new political and economic configurations introduced by Rome (Bispham 2008).

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Chapter 12
Conclusion

Sarunas Milisauskas

The large numbers of archaeologists working on European prehistory have made detailed studies of a wide range of materials. Mastering the diversity and complexity of this data is a challenge. The sheer quantity of archaeological data and publications has grown greatly since the 1970s, making it very difficult for any archaeologist to master even small parts of the various sources. Writing syntheses covering large geographical areas has become much more difficult and many worthwhile studies cannot be included in this survey. Yet we should not shrink from writing broad overviews, otherwise students of the discipline would be limited to isolated prehistories of Yorkshire, Brittany, Scania, Silesia, etc.

We have traced cultural developments, as they are reflected in European prehistory, from their beginnings in hunter-gatherer societies to the origin of states and empires. More than one million years of cultural behavior are fossilized in the archaeological remains found in Europe, and these remains are rich, varied, and explored to a greater extent than on other continents.

For explanations and interpretations of the Paleolithic, Mesolithic, Neolithic, Bronze Age, and Iron Age records archaeologists often use ethnographic analogies, but the relevance of recent societies in Africa and the Americas to the study of prehistoric Europe is problematic, to say the least. Since there are thousands of societies in the ethnographic record, we can make many choices to support our arguments. How do you evaluate which choices are the best? There are no easy answers.

In each period there are continuities from the previous times, but also changes and innovations. As Jochim has pointed out, the period 40,000–10,000 BP was one of remarkable developments. Fully modern humans made their appearance on the continent, as did technological innovations such as the working antler, bone and ivory, the introduction of pressure flaking, the development of systematic food storage, the appearance of cordage and the first uses of fired clay. New tools such as the spear thrower, the eyed needle, and the bow and arrow appeared. One of the most spectacular developments was that of cave art.

Starting around 7000–6800 BC, the first farmers in the Aegean area initiated economic, ecological, settlement, ritual, and ideological changes that gradually affected the entire continent. By the end of the Neolithic, around 3300/3100 BC in Greece and 2200 BC in central Europe, the continent was occupied by numerous societies both small-scale and ranked, and populations have increased greatly. Relationships between communities ranged from peaceful to warlike. We should not romanticize the world of the Paleolithic or Neolithic. It is all too easy to make up stories of golden ages about Paleolithic foragers or Early Neolithic farmers and create myths about prehistoric cultures.

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The amounts of archaeological data from the Bronze and Iron Ages are enormous. There are, for example, approximately 2000 Linear Pottery burials excavated in the large territory occupied by this culture during the Early Neolithic. In contrast, around 20,000 Iron Age burials have been excavated in the Kaliningrad district of Russia, Latvia and Lithuania, an area comparable in size to England and Wales (Tautavičius 1994).

With the passage of time archaeological periods become shorter. The Neolithic lasted 3400 years in central Europe, the Bronze Age 1400 years, and the Iron Age less than 1000 years. As noted by Harding, the cultural processes that were intensified during the Bronze Age had already made their appearance in the Neolithic: metallurgy, mining, interregional trade, ranked societies, and warfare. In some parts of Europe, such as the East Baltic area (Grigalavičienė 1995), *Early Bronze Age* is almost a courtesy title, since most tools were still made of wood, bone, or stone. Only 439 bronze artifacts have been recovered in 204 findspots in this region (Sidrys and Luchtanas 1999:169). The increased European use of bronze may reflect social and symbolic, as well as technological, change. Metal artifacts were tools and weapons, but they also signaled rank and status and were the paraphernalia of ritual. But the more practical need for bronze weapons should not be overlooked. The advantages of metal daggers, axes, and swords in conflicts provided a strong incentive for individuals and communities to acquire them, or the means to make their own.

The Bronze Age is associated with the increase of warfare. As Pearson (1999:92) has pointed out, "The axe, that powerful symbol and tool of Neolithic societies, had been eclipsed by the dagger," by the end of the Early Bronze Age. Harding suggests that one type of conflict involved cattle raiding. This does not imply that the period was dominated by endemic warfare.

To some archaeologists, the Greek epics illuminate Europe's Bronze and also Iron Age. *The Iliad* and *The Odyssey,* are generally held to depict Greek society in the Late Bronze Age and Early Iron Age, but may also reflect life in many other societies in Europe: Achilles, Patroclus, Agamemnon, and Odysseus may be pan-European hero figures. The Greek legends present us with a picture of a society dominated by the values of the warrior elite. The heroes pass their time in raids for cattle and plunder, in hunting, feasting, and boasting of their prowess. They are sensitive about matters touching their personal honor and courage, but successful chicanery is admired. The chivalry of the medieval heroes like Lancelot is not a virtue in this earlier society; it developed when the ideology of so-called barbarian Europe fused with Christianity during the Dark Ages.

The first European states appear in the Aegean area during the Bronze Age. Various factors such as interregional trade played a role in their development, but we can assume that the creation of these complex societies involved violence. We should not view Minoan society as we might wish it to have been: matriarchal and peaceful. There is little archaeological evidence it was either.

If we look at Bronze and Iron Age archaeology from a gender perspective, we see much more emphasis on men's activities. Daggers, swords, and other weapons are important components of burial assemblages and as Wells noted weapons played an important role in defining men's status and identity. Men are portrayed as warriors and Kristiansen (1999) has suggested that a warrior aristocracy was already in place during the Bronze Age. It is possible that embryonic warrior aristocracies appeared in the Late Neolithic.

The spread of iron technology across Europe was faster than that of agriculture or bronze working. Iron ore is more widely distributed in Europe than copper or tin ores. This availability made it possible for people of all ranks of society to acquire metal tools.

As Wells noted in his chapter, there are written Greek and Roman sources for the Iron Age to supplement archaeological data. No one wrote from a northern or eastern European perspective, and Roman and Greek writers were usually biased against those whom they called barbarians. The strange customs of foreign people have always been hard to understand and it was easy to laugh at the wearing of trousers by people north of the Alps. This did not appear natural to inhabitants of the toga-wearing Roman world.

Archaeologists continue to debate the relative importance of internal and external causes for the changes observed in prehistoric European societies. At no time during prehistory were European societies isolated from the Near East, northern Africa, or other surrounding geographical regions. There was always interaction between populations of different regions.

Archaeologists attempt to locate various historic, linguistic, and ethnic groups in Europe, especially those of the Iron Age. As mentioned by Wells in his chapter, some Celtic groups occupied areas of central and western Europe. Recently, the debate over Celtic identity has been very intense among European archaeologists. Tina Thurston (2009) and John Collis (2008) have succinctly summarized the various interpretations of Celtic identity. Germanic peoples are placed in northern Europe, Slavs in eastern Europe. In the eastern Baltic area were located the Balts (ancient Prussians, Lithuanians, and Latvians) and, further north, Finno-Ugric-speaking peoples (Estonians and Finns).

By the end of the first century AD, large parts of Europe had been incorporated into the Roman Empire. Until the emergence of the Roman Empire, no major regions were politically united or controlled by one power. "Transition from the societies of the pre-Roman Iron Age to the Roman period is usually perceived by archaeologists and historians as one of the clearest examples of cultural change in the history of Europe" (Keay 1997:192). At least, the elites of conquered lands participated in the new political and economic system. These changes had less effect for the majority of common people. Thus, what happened to non-elites must be assessed case by case using archaeological and historical data. The Roman Empire included peoples with diverse linguistic and ethnic backgrounds. The continent has never been united politically; ideologically, only Christianity united Europe in medieval times. Outside the Aegean area, urban civilization was a very late development in Europe, compared to the Near East.

Europe has always been a rich human mosaic, with strong differences in culture and history compressed into a relatively small part of the world's surface. Consequently, the picture of European cultural developments presented in this book is necessarily simplified. Trends of culture change have been stressed instead those of stability and stagnation; pattern and regularity have been overemphasized at the cost of the randomness and variation which are just as much a part of the human condition. As archaeological research in Europe progresses, we will gain a better understanding of these cultural differences and of the processes that link European societies to one another and to their past. Thus, we look forward to seeing this account of European prehistory amended, rounded out, corrected, and redrawn. Such developments will strengthen a basic assumption that underlies this book, namely, that European prehistoric archaeology is a dynamic field of research that has made, and will continue to make, important contributions to our knowledge of the past.

Europe's place in human history, considering its small geographical size, is extraordinary. No continent influenced other geographical areas so much as Europe later in historic times, for better or worse. European prehistory, therefore, is not just the heritage of those who trace their ancestry to that continent. In a very real sense, it is the heritage of the entire world. What Europe has done in the past half-millennium is the consequence of its earlier past. And that past does not begin, as the old schoolbooks averred, with ancient Britons, ancient Gauls, or ancient Romans. It is a continuity which stretches back past Iron Age hillforts and Bronze Age cemeteries, past single graves, megalithic monuments and ditched enclosures, past Balkan tells and Linear Pottery longhouses to the hunters-foragers of the Early Holocene and Late Pleistocene. It is that continuity that this book has attempted to describe.

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Glossary

Absolute chronology determination of age in specific years before present
Acheulian a tone tool industry or period of the Lower Paleolithic
Adze a stone tool with polished blade, usually used for working wood rather than just cutting it
Alloy a solid mixture of two or more metals to form a new metal, i.e., copper plus tin to make bronze
Amber fossilized pine or spruce gum found on the shores of the Baltic and in some Mediterranean areas, a valued trade good at different times in prehistory
Amphora a two-handled vessel with a narrow neck
Annealing heating metal to improve its properties
Anthropomorphic the attribution of human form or attributes to nonhuman beings and objects
Ard an early form of plow
Artifact any object made by humans
Assemblage a group of artifacts occurring at a particular time and place
Aurignacian an early period of the Upper Paleolithic, 34,000–27,000 BP
Aurochs European wild cattle, became extinct in the seventeenth century AD
Balkans a geographical area in southeastern Europe or countries in the Balkans: Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Greece, Hungary, Kosovo, Macedonia, Montenegro, Romania, Serbia, Slovenia
Balts a linguistic group consisting of Latvians, Lithuanians, and Old Prussians
Band a small egalitarian society of hunters and gatherers
Barbarian Europe Europe beyond the boundary of the Roman Empire
Barrow a burial mound
bc uncalibrated ^{14}C date
BC Before Christ (calibrated ^{14}C date)
BCE Before Common Era
BP – Before Present
Beaker a handleless drinking vessel
Bit the part of a bridle that goes in a horse's mouth
Blade a piece of flint with parallel sides and at least twice as long as it is wide
Bronze Age a period between the Neolithic and Iron Age characterized by the use of bronze
Bronze an alloy of copper and tin
Brooch a pin used for fastening clothing
Burin a chisel-like stone tool used for engraving wood, bone, antler, etc.
Cairn a mound of stones, often covering a burial
Causewayed camp a site with surrounding banks and/or ditches
Celt/Celts speakers of Celtic languages (pronounced Kelts): Gauls, Britons, Welsh, Irish, etc.
Celt a stone axe (pronounced selt)

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Cenotaph an empty grave without a skeleton
Chalcolithic (Copper Age) period of the beginnings of metal working, casting of copper
Chatelperronian an early period of the Upper Paleolithic, 37,000–33,000 BP
Chiefdom a type of sociopolitical organization with a hierarchy of authority
Chopper earliest type of stone tool
Cire perdue (lost-wax process) a method of casting metal objects in which a wax model is encased in a clay mold and then replaced by pouring in the molten metal
Cisalpine area south of the Alps
Cist a slab-lined pit
Cold hammering technique hammering of metals to produce various objects; actually the metal is usually heated to a low temperature
Core a piece of flint from which flakes or blades are removed
Cremation the burning of a dead body to ashes
Culture (archaeological) an assemblage of artifacts and/or features, often presumed to represent a past society
Debitage the waste produced in stone tool production
Dendrochronology a method of dating by counting tree rings
Diffusion the movement of ideas or cultural traits from one society to another
DNA (deoxyribonucleic acid) a class of molecules that provide the basis of heredity
Dolmen a megalithic burial chamber, usually two upright orthostats capped by a horizontal lintel
Domesticates plants and animals whose breeding is controlled by humans
Domestication the technical/ecological processes by which humans domesticated plants and animals
Enclosure a site enclosed by a ditch and/or bank
Eneolithic Late Neolithic or Copper Age
Ethnoarchaeology the study of living societies and the application of the data to the archaeological record
Etruscans a people in central Italy from the eight century BC
Extended burial in which the body is laid out on its back
Faience a glass-like material
Feature non-portable effects of past human behavior, hearths, pits, postmolds, houses, etc.
Flake a fragment of flint or other stone detached from a core
Flat settlement non-mound or non-tell settlement
Fibula a Latin term for pin (brooch); an ancient safety pin
Finno-Ugric a non-Indo-European language family including Finnish, Estonian, Hungarian, and a number of Asian languages
Flexed burial in which the body is buried with its knees bent; in the fetal position
Forest Neolithic defined by presence of pottery but not by farming in Belarus, Lithuania, Latvia, Estonia, and northwestern Russia
Gallery grave a rectangular megalithic burial chamber
Gauls Celtic groups stated by Caesar to have lived west of the Rhine
Geochronology geological dating
Germanic a linguistic group including English, Dutch, German, Danish, Swedish, Norwegian
Grave goods objects placed within human burials
Gravettian a period of the Upper Paleolithic, 30,000–27,000 BP
Halberd a weapon, both a spear and a battle-axe
Hallstatt an Iron Age site, period or culture, 800/750–450 BC
Hand axe a pear-shaped Paleolithic stone tool
Hectare an area of 10,000 square meters or 2.47 acres

Henge a circular enclosure with a bank and a ditch and one or more entrances, sometimes, but not always using stone
Heterarchy groups or individuals who share the same position of power and authority, each having an equal role
Hillfort a hilltop site enclosed by ramparts and ditches, sometimes arranged concentrically one inside the others
Hoard a deliberately buried deposit of artifacts
Holocene the most recent geologic period, the last 10,000 years
Iron Age a period characterized by the use of iron
Kerb a ring of retaining stones around a mound
Lactose a sugar present in milk
Lactose intolerance inability to digest milk
Lake dwellings prehistoric houses built on dry land, on beaches, on the edges of marshland water, and sometimes over water in the Alpine zone of Europe
La Tène an Iron Age site, period or culture, 450–0 BC
Loess loamy soils derived from Pleistocene windblown deposits
Long barrow an elongated mound of earth covering burials
Longhouse an elongated structure constructed of wooden posts
Lower Paleolithic the earliest period of the Paleolithic
Lithic artifacts artifacts made from stone
Mace a club with knobs
Magdalenian a late period of the Upper Paleolithic, 17,000–12,000 BP
Mead an alcoholic drink produced by fermenting honey and water
Megalith large stone monument and/or tomb
Menhir a single standing stone (megalith)
Mesolithic a period between the Upper Paleolithic and the Neolithic, beginning around 10,000 years ago
Midden a trash heap, layer, or deposit
Middle Paleolithic a period associated with the Mousterian culture and Neanderthals
Microlithic a tiny stone tool, usually a segment snapped off a blade
Migration the movement of people from one territory to another
Mold a hollow form in which objects are cast
Mousterian a Middle Paleolithic industry or period
***Murus gallicus* (Gallic wall)** a stone faced construction with a timber and rubble core
Mya millions of years ago
Neolithic a period characterized by the first farming societies in Europe
New World the continents of North and South America
Nuraghe a tower-like structure in Sardinia
Obsidian volcanic glass
Ocher (ochre) an iron oxide mineral pigment
Old World the continents of Africa, Asia, Australia, and Europe
Oppidum/oppida a large fortified Iron Age settlement
Orthostat an upright large stone in a megalithic structure
Paleolithic the Old Stone Age, from the appearance of the earliest stone tools to the end of the Pleistocene glaciations
Palstave a form of axe with side flanges
Passage grave a tomb with a passage leading to a central tomb
Pastoralism a subsistence system based on the herding of animals
Periglacial regions immediately beyond the ice during glaciations

Pleistocene a geological period between 1.8 million and 10,000 years ago
Primary burial the first burial
Quern a stone slab on which grain, etc., is ground using a smaller stone
Radiocarbon dating dating of an organic material by measuring the decay rate of a radioactive isotope of carbon (^{14}C)
Rapier an early form of the sword
Relative chronology chronological sequence without reference to a fixed timescale
Romance a linguistic group including Latin, Italian, French, Portuguese, Spanish, Catalan, Romanian, etc.
Rondel a round or oval ditched enclosure surrounded by multiple concentric ditches
Sarsen a type of sandstone found in southern England
Secondary interment a burial placed in a grave, mound, etc. that has already been used for an earlier burial
Sherd a fragment of pottery
Site any location where artifacts and/or features are found
Situla a bucket-shaped vessel, often of bronze or other metal
Slag refuse from smelting metal
Slash and burn cultivation clearing land by burning and then planting crops
Slavs a linguistic group consisting of Russians, Poles, Ukrainians, Belorussians, Sorbs, Czechs, Slovaks, Bulgarians, Macedonians, Serbs, Croats, and Slovenes
Slip a solution of water and clay applied to pottery to provide a smooth surface
Smelting the separation of metal from its ore by heating
Solutrean a period of the Upper Paleolithic, 21,000–17,000 BP
Spindle whorl a device used to twist fibers into thread
State a stratified society with a centralized political authority
Taphonomy the study of processes that have affected organic materials after death
Tell a mound made up of the layered debris left by a succession of settlements in one place
Temper material added to clay to give extra strength to vessels in pottery making
Three-Age System a classification of archaeological data into a stone–bronze–iron sequence
Tradition a cultural continuity through time
Transdanubia a region in Hungary, west of the Danube river
Transhumance the seasonal movement of grazing animals to different locations, often upslope/downslope in hilly or mountainous regions such as the Alps
Transylvania a province in northwest Romania
Tumulus a mound containing a burial
Urnfield a cemetery of cremations placed in urns
Varves annual clay deposits in lakes made by retreating glaciers, used for relative dating
Wattle and daub a technique for constructing walls of houses, in which a framework (wattle) of thin pieces of wood is covered with daub (mud)
Wrist-guard a rectangular piece of stone used to protect the inner wrist from the snap of a bowstring

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