

Europe's First Farmers

edited by

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1

Europe's first farmers: an introduction

The transition from hunting and gathering to agriculture is arguably the most important event in human prehistory, representing a shift from foraging to farming, from food collection to food production, from wild to domestic, that sets the stage for most of the significant subsequent developments in human society. For this reason, the beginnings of agriculture have been the subject of scholarly interest since at least the middle of the last century, as evidenced by Charles Darwin's 1868 treatise on *The Variation of Plants and Animals under Domestication*, and subsequent works by various other authors (e.g., de Candolle 1882, Roth 1887).

The search for causality began early as well. Raphael Pumpelly in 1908 first suggested the oasis as the context of domestication in the ancient Near East during the time of desiccation thought to have characterized the end of the Pleistocene, invoking climatic change as a primary cause. The 1920s brought two important concepts to the study of the first farmers (Harris 1996b, Watson 1995). In 1926, the botanist N. I. Vavilov defined "centers of origin" for the domestication of plants and two years later the archaeologist V. Gordon Childe described the origins of agriculture in terms of a "Neolithic Revolution." Employing this new concept of centers, Childe argued that agriculture, along with a number of other innovations, had moved to Europe from its place of origin in the Near East.

Large multidisciplinary projects of archaeological investigation characterized research on agricultural origins after the Second World War (e.g., Braidwood 1960, Byers 1967, Hole *et al.* 1969, Kenyon 1981, MacNeish 1992). The 1960s and early 1970s saw an intensified search for causality (e.g., Binford 1968, Cohen 1977, Flannery 1973). Humans were viewed as forced into agriculture by the uncontrollable circumstances of nature, such as climatic change, environmental degradation, or inherent growth in their own numbers. Consensus views today of the origins and spread of agriculture are generally an outgrowth of these perspectives.

Since the 1970s, many details have been added to the picture and

innovative theories have been suggested. The origins and spread of farming have been considered in a variety of new publications (e.g., Anderson 1992, Aurenche and Cauvin 1989, Clark and Brandt 1984, Clutton-Brock 1989, Cowan and Watson 1992, Edmonds and Richards 1998, Gebauer and Price 1992, Harris 1996c, Harris and Hillman 1989, Helmer 1992, Price and Gebauer 1995b, Rindos 1984, Smith 1994, Zohary and Hopf 1993, Zvelebil *et al.* 1998). A synthesis is emerging from the accumulation of information, ideas, and methods that truly provides new insight on the complex process that is the transition to agriculture. More recent perspectives suggest that humans were active players in this process and that changes in the social, economic, and ideological aspects of human society were important forces in bringing about the transition.

With this acknowledged bias toward new evidence and non-traditional perspectives, *Europe's First Farmers* is intended to provide an overview of the new synthesis, some of the latest information concerning the introduction of farming in prehistoric Europe and the details of that transition in various portions of the continent, as well as the new ideas that have appeared. There is more archaeological information in Europe with which to try and answer these questions than elsewhere in the world in terms of archaeological sites, radiocarbon dates, detailed studies, and published reports. A great deal has been learned about the where, what, and when of the transition to agriculture. Major questions remain concerning who brought the domesticates and why. Fundamental issues in archaeological research are involved in these questions. Colonization vs. indigenous adoption – migration vs. acculturation – is an essential aspect of the study of culture change. Causality – why the transition to agriculture took place – is a relevant concern in every part of the globe where farming replaced foraging. These issues are the major concerns of this volume.

In this initial chapter, I will outline the generally accepted views of the transition to agriculture in Europe, followed by a brief discussion of more recent data and perspectives that document substantive changes in the traditional picture. In the subsequent chapters specialists elaborate the recent evidence, and its interpretation, in detail region by region. These chapters are organized along the lines of the spread of the Neolithic from southern and eastern Europe to the north and west. The concluding chapter provides a summary of these new data and ideas, returning to the major questions of this volume – colonization vs. indigenous adoption and the possible causes of the transition. Several major theories specifically concerned with the introduction of agriculture into Europe are evaluated in the light of the new synthesis.

Traditional views of the transition in Europe

It is important to remember that most of the major innovations in European prehistory – domesticated plants and animals, pottery, writing, and more – came initially from Asia. It is clear that the staple crops and

herd animals of the European Neolithic — wheats and barley, pulses, and flax, along with cattle, pigs, sheep, and goats — were originally domesticated in the Near East shortly after 10,000 BC. These plants and animals spread to Europe as agricultural practices moved beyond the boundaries of southwest Asia. The expansion of agriculture across Europe took place relatively quickly, within a period of approximately 3000 years — certainly within less time than it had taken farming first to spread across southwest Asia. Incipient farming communities appeared in the Aegean area and Greece some time around 7000 BC, while the earliest agriculture in northwestern Europe (Britain and Scandinavia) did not arrive until after 4000 BC.

The introduction of agriculture into Europe has, since Childe's original conceptualization in the 1920s, been thought to reflect the spread of foreign colonists bearing ceramic containers and domesticated plants and animals, and bringing permanent villages, new architecture, storage facilities, long-distance trade, and elaborate burial rituals. The indigenous hunter-gatherers of Europe are thought to have been only sparsely present, residentially mobile, socially amorphous, and eventually overwhelmed.

This traditional view of the transition was based on rather limited archaeological data and simple, logical expectations. For the last fifty years or more the textbook map of the introduction of agriculture into Europe has shown a continent riddled by large arrows, the first thrusting from Turkey across the Aegean and into Greece. That initial attack split in two as a pincer movement began, one by land and the other by sea. The inland movement brought farming, pottery, and rectangular mud brick houses to southeastern Europe. The second, maritime arm moved along the Mediterranean shore carrying domesticated sheep and goats, cereals, and pottery. The next step was an explosive expansion across central Europe, with farmers pouring out of Hungary and occupying an area from Holland, Belgium, and France to the Ukraine in the east, and from the Alps to northern Germany and Poland.

At the same time, the arrows began to move from the Mediterranean shore inland as farmers entered the fertile valleys of Italy, France, Switzerland, and the Iberian peninsula. In central Europe the initial spread of farming was followed by a period of "regionalization" as Neolithic groups took on a distinctive, local character and in the west began to erect monumental tombs known as megaliths. By 4500 BC, most of Europe, with the exception of the British Isles and Scandinavia, had been occupied by farmers. Finally around 4000 BC the last arrows made their way to these northwest margins, blanketing most of the continent with the Neolithic.

The apparent regularity of this spread, along with the monotonic decline in radiocarbon dates for the earliest Neolithic across the continent, led Ammerman and Cavalli-Sforza in 1973 — drawing on Clark (1965) — to describe this process as a "Wave of Advance," aptly characterizing the presumed inevitability of colonization by farming communities. This wave model has been the explicit, or implicit, foundation for discussions of the

transition to agriculture for twenty-five years. In that same time, however, a proliferation of innovative ideas, new methods, extensive fieldwork, and myriad information has steadily accumulated that does not fit this traditional view.

Toward a new synthesis

The foundation for a new synthesis can be viewed as responses to a series of questions regarding the prehistoric transition to agriculture in Europe that have been revisited and investigated over the last twenty-five years. These questions concern the data used to interpret the onset of the Neolithic, certain methods of analysis, and conceptual frameworks for describing what we know and how we think about it. These questions more specifically involve matters such as the meaning of “Neolithic,” the contents of the Neolithic package, the use of radiocarbon dates and other evidence, the nature of farming, who was responsible, the role of the indigenous Mesolithic inhabitants, and why in fact the transition occurred.

The meaning of the term Neolithic itself is highly variable in its use in European prehistory (e.g., Prescott 1996, Thomas 1991b, Whittle 1996, Zvelebil 1986c, 1998) and has changed substantially since first employed. Neolithic has been used as a time period, a cultural phase, an evolutionary step, an economy or mode of production, a population, a social structure, and other variable cultural phenomena. This ambiguity has complicated an understanding of the transition to agriculture. As Dennell (1992: 92) noted, “the concept of the ‘Neolithic’ as signifying the appearance of agriculture probably has done more to obscure than to illuminate the nature of the processes involved.” It is essential to define the meaning of the term in order to know what is being observed and reported in the literature.

Other information has been employed to identify the Neolithic. Radiocarbon dates of a certain age are often the criteria used for designating the Neolithic in Britain, in spite of the fact that there is a great deal of overlap in the dates for the late Mesolithic and early Neolithic (Williams 1989, Woodman, this volume). In Scandinavia and other areas, the presence of distinctive pottery or polished flint is frequently taken as the hallmark of the first farmers. In this context, it is essential to distinguish between characteristics of the Neolithic, such as pottery, settled villages, polished stone, and the like, and the actual evidence for agriculture, the use of domesticated plants or animals. Plant and animal remains of domesticated species are the most reliable indication of cultivation and herding.

One of the reasons that criteria must be clearly stated and consistently applied has to do with the concept of the “Neolithic package.” As originally defined, the term was intended to distinguish assemblages of Neolithic artifacts from Palaeolithic ones. Neolithic included pottery and ground stone objects, in addition to the flaked stone technology typical of the Old Stone Age. Since that initial definition, more baggage has been

added to the concept, particularly as the notion of colonization as the mechanism for spreading the Neolithic became established. Colonists would have carried a set of knowledge, tools, and concepts with them, in addition to domesticated plants and animals. This package, denoting a Neolithic presence, came to include permanent villages of rectangular houses, religious objects and structures, and domesticated plants and animals, as well as pottery and ground stone tools. These items were expected to appear simultaneously with the arrival of new farming populations. Even though direct evidence of domesticated plants and animals was often missing, they were assumed to have been present as part of the package. In recent years, however, it has become clear that the package did not always arrive intact.

Increasing interest in the indigenous populations of Europe during the transition to agriculture has brought new insights as well. Scholars of the Mesolithic have been particularly active in Europe during the last twenty-five years, elaborating our knowledge and understanding of this period (e.g., Bonsall 1989, Gramsch 1981, Kozłowski and Kozłowski 1973, Vermeersch and Van Peer 1990). Views of the Mesolithic have shifted in that time from a period of quarantine or degradation between the Palaeolithic and Neolithic to a time of dynamic groups of complex foragers. This perspective has emphasized the role of indigenous people in the transition to agriculture.

Several aspects of Mesolithic adaptations are of relevance to the question of the transition to agriculture, including sedentism, population size, and plant foods (Price 1987). These characteristics have traditionally been considered as exclusively Neolithic. The presence of sedentary communities was often used as evidence of the arrival of the Neolithic, but it is now clear that permanent settlements existed in many parts of Europe in the preceding Mesolithic as well, e.g., in the Iron Gates of the Danube (Srejovic 1972), in Scandinavia (Brinch Petersen 1973), and in Ireland (Woodman 1985b).

Discussions regarding Mesolithic population remain fraught with problems in estimating past numbers of people. However, a general pattern is emerging. It now seems clear that Mesolithic foragers were concentrated in marine, riverine, and rich lacustrine environments across Europe. It is less certain how intensive occupation was in less productive river valleys and heavily forested areas of the interior of the continent. A number of authors have suggested that the dense canopy of the mixed oak forest of Atlantic Europe would not have provided substantial biomass for hunters or their prey (Noe-Nygaard 1995, Vencl 1986, Waterbolk 1982). Recent surveys in the interior basins of central Europe have failed to reveal substantial Mesolithic remains (M. Kuna, personal communication). Greece and the southeastern Balkans, with the exception of the Iron Gates, apparently had a very small Mesolithic presence (van Andel and Runnels 1995).

There is mounting evidence for the use of wild plants in the

Mesolithic (Hansen and Renfrew 1978, Price 1989, Zvelebil 1994a). At the Grotto dell'Uzzo in Sicily, the Mesolithic layers, dating before 6000 BC, contained the remains of grass pea, pea, wild strawberry, wild olive, and wild grape (Constantini 1989, Dennell 1992). Holden *et al.* (1995) have identified a number of species in charred plant remains from the Roc del Migdia in Catalonia, including fragments of hazelnut and sloe and several roots and tubers. In northern Europe, there is substantial evidence for the use of nuts (hazelnuts and acorns), water chestnuts, and nettles; fruits such as wild strawberry, apple, and sloe and rowan berries and raspberries have also been found (Price 1989, Regnell *et al.* 1995, Zvelebil 1996). Zvelebil (1994a) has gone so far as to suggest that wild plant food husbandry was practiced in the Mesolithic as a pre-adaptation for the arrival of the Neolithic.

Another issue is the question of domesticated plants and animals in Mesolithic contexts. There have for some years been a number of instances of cereal pollen with early dates from many parts of the continent. In virtually every instance, these have been dismissed on the grounds of weak chronology or questionable identification. Recent evidence, however, suggests that domesticated plants may have been present during the later Mesolithic in some parts of Europe. The best example of this comes from pollen cores from the Zurich region in Switzerland where cereal pollen (*Triticum* sp.) and a seed of flax (*Linum usitatissimum*) have been dated to c. 6400 BC cal., almost 1000 years before the accepted start of the Neolithic in this region. Domesticated animals may also appear before the traditionally recognized arrival of the Neolithic. Examples are known from several areas (e.g., Scandinavia, Jennbert 1984; the Mediterranean, Geddes *et al.* 1989, Schvorer *et al.* 1979). Additional examples are needed before these pre-Neolithic contexts are fully accepted, but evidence is certainly accumulating.

Because of an increasing appreciation of the Mesolithic period, significant questions have arisen about the degree and extent of colonization involved in the transition to agriculture. It seems clear that local inhabitants often played an important role in the transition. The simple distinction between demic diffusion (colonization by immigrants) and indigenous adoption obscures a great deal of variability and often is inadequate for explaining observed evidence. This problem has been recognized by a number of authors and various models of diffusion and acculturation have been proposed (van Andel and Runnels 1995, Anthony 1994, Arnaud 1982, Dennell 1985, Gregg 1988, Moore 1985, Renfrew 1987, Whittle 1996, Zilhão 1993). Zvelebil and Lillie in this volume and Zvelebil elsewhere (1995b, 1996) propose several different mechanisms to explain how materials, ideas, and/or people move into new areas. Each of these has implications for the nature and for the kind of evidence that result as new subsistence strategies, technologies, and material culture spread into a given region.

In addition to changing views and methods, there are substantial new data from Europe on the transition to agriculture. Research on this

question has resulted in a great deal of fieldwork, analysis, and publication in the last twenty-five years (e.g., van Andel and Runnells 1995, Barker 1985, Biagi 1990, Bogucki 1988, 1996, Bogucki and Grygiel 1983, Chapman 1994b, Coudart 1991, Demoule and Perlès 1993, Dennell 1992, Gregg 1988, Harris 1996c, Hodder 1990, Milles, Williams, and Gardner 1989, Perlès 1992, Price and Gebauer 1992, Price *et al.* 1995, Price 1996b, Renfrew 1989, Rowley-Conwy 1995, Thorpe 1996, Tilley 1996, Whittle 1996, Zvelebil 1986c, Zvelebil and Dolukhanov 1991).

Some of this information is briefly summarized in the paragraphs below to provide a region by region overview of Greece and the Aegean, southeastern Europe, the Mediterranean shore, central Europe, eastern Europe, and northwestern Europe, following the path of the spread of agriculture. It is not my intent to provide a detailed description of all of the new evidence and ideas that have accumulated in the last twenty-five years, but rather to note some of the major developments. The following chapters will provide more of the details for specific areas.

The eastern Mediterranean

The earliest farmers in Europe appeared in the Aegean and Greece by the beginning of the seventh millennium BC (Demoule and Perlès 1993). This has traditionally been seen as a classic case of colonization. There is very little evidence for a human presence on the islands of the eastern Mediterranean until the Neolithic, suggesting a distinct pattern of colonization by sea (Broodbank and Strasser 1991, Cherry 1990, Jarman 1996, Sondaar 1971). These first colonists often quickly diverged from their original character, as Ronen has described for the first Neolithic inhabitants of Cyprus (Ronen 1995).

The early Neolithic sites on the plains of Thessaly in Greece appear to be substantial, long-term communities, largely dependent on domesticated plants and animals (Halstead 1996). These settlements were located on perennially wet floodplains with very fertile soils (van Andel and Runnells 1995). Little is known of the Mesolithic and earliest Neolithic occupation of this area; the low number of sites from this period suggests that a rather empty landscape may have been available for colonization throughout Greece (Runnells 1995). Perlès (1993, 1995) and others have pointed out that the early Neolithic environment of Greece resembled the Near East more than the remainder of Europe. Because the first Neolithic settlements on mainland Greece were villages housing grain-cultivating, cattle-herding agriculturalists, their inhabitants are thought to have arrived as colonists from the Near East (Demoule and Perlès 1993, Papathanassopoulos 1996).

Traditional assumptions regarding the similarities between the Neolithic in the Near East and the Aegean area, however, have been brought into question. Özdoğan (1993, 1997) and others, for example, have pointed out that the Neolithic of southwest Asia is not a monolithic entity, that

there are substantial regional differences. The Anatolian Neolithic differs significantly from the traditional area of the western Fertile Crescent; in addition to differences in material culture, sedentary communities were dependent on hunting and gathering to a much greater extent than in the Levant (Özdoğan 1997). Anatolia may well have been the source of the first Neolithic inhabitants of the Aegean and perhaps the Greek mainland (Özdoğan 1989). Direct comparison of the European situation to the Neolithic of the Levant is not warranted.

Other lines of evidence suggest indigenous adoption in mainland Greece, rather than colonization. Very little is known about the earliest Neolithic in this area. There are questions about the completeness of the Neolithic package in this area (Halstead 1996, Tringham, this volume). An enigmatic “preceramic” phase is known at a few sites (e.g., Argissa, Gediki, Sesklo) where pottery is absent but domesticated plants and animals are present. The radiocarbon dates for the Greek Preceramic Neolithic sites all cluster around 6800 BC. The lithic assemblages in these preceramic levels are described as Mesolithic (Tringham, this volume).

To the south, in the more rocky and isolated areas of the Peloponnese, local foragers may have gradually adopted cultigens and herd animals as part of the transition to agriculture. The evidence for this comes largely from the site of Franchthi Cave in the Peloponnese (Jacobsen 1981). A mix of local and foreign traditions can be seen at Franchthi in lithic tradition and faunal remains; moreover, the earliest ceramics are distinct from those elsewhere in Greece (Demoule and Perlès 1993). The use of wild barley and wild lentils is documented in the late Pleistocene and early Holocene and suggests that hunter-gatherers in this area were already consuming substantial amounts of plant foods (Dennell 1985, Hansen 1991, 1992, Hansen and Renfrew 1978). The pieces of the Neolithic package appear to have arrived here sequentially as domesticates were gradually added to the diet over time (Halstead 1996). In this area local adoption of farming and the Neolithic appears to have been the case.

Thus, current views on the transition to agriculture in the Aegean and Greece are mixed. Many authors (van Andel and Runnels 1995, Demoule and Perlès 1993, Lewthwaite 1986b, Perlès 1993, and others) argue for colonization on the basis of the similarity to materials in Anatolia, the fact that the islands of the eastern Mediterranean were inhabited for the first time in the early Neolithic, and the general absence of Mesolithic occupation in the primary areas where the first farmers appear. Others (Budja 1993, Chapman 1994b, Dennell 1983, Theocharis 1973, Tringham, this volume, Whittle 1996), supporting indigenous adoption, point to contrasts with the materials in the Near East, the apparent existence of a preceramic Neolithic with Mesolithic affinities, and the gradual transition indicated at Franchthi Cave. In fact, the varied evidence — and more research and information on both the late Mesolithic and the early Neolithic are badly needed

— suggests a situation in which both colonization and indigenous adoption took place in different areas.

Southeastern Europe

During the seventh millennium BC, farming and pottery followed two main pathways from the Aegean area into the rest of Europe: by land into the southeastern quarter of the continent and by sea along the north shore of the Mediterranean. The Neolithic spread quickly to the Balkan Peninsula (i.e., Bulgaria, Romania, and Hungary, and the present countries of the former Yugoslavia). In the other direction, distinctively impressed Cardial pottery, the bones of domesticated sheep, and cereals are found in caves and rockshelters along the Mediterranean and southern Atlantic coasts of Europe.

Less than 1000 years after the appearance of agriculture in the Aegean, the first farming appears in the interior of southeastern Europe. The radiocarbon dates for the Early Neolithic in the southern Balkan peninsula are 6600–5800 BC and for the northern area around 6500–5200 BC (Chapman and Dolukhanov 1993, Todorova and Vajsov 1993, Tringham, this volume). The traditional view of the Neolithic in the Balkan peninsula involved the expansion of farmers out of the plains of Thessaly and northern Greece, moving up the natural corridors of the major river valleys, into southeastern Europe. Indeed, there are areas such as the Vardar-Morava corridor, the Maritsa basin, and the middle and lower Danube basins which witnessed the simultaneous arrival of early Neolithic material culture and a change in settlement pattern. With a few exceptions, the early Neolithic is known primarily from large tells with deep deposits containing rectangular houses, pottery, and domesticated plants and animals. The similarity of these sites to those known from the Near East gave obvious support to a model of colonization by immigrant farming populations. The subsequent sixth millennium BC witnessed the flowering of Neolithic cultures in southeastern Europe — elaborate religious systems, rich graves, gold and copper mining and metallurgy, and extensive trade networks, again supporting the idea of outside influence.

However, substantive questions have been raised about the colonization of southeastern Europe (Bogucki 1996, Budja 1993, Radovanovic 1996, Whittle 1996). Chapman (1994b) and Whittle (1996) take the position that little evidence exists for incoming farmers in southeast Europe. Deep tell deposits do not easily reveal their lowest levels. Greenfield (1993) reports that variation in faunal assemblages at early Neolithic sites in the Balkans indicates local adoption rather than wholesale insertion of farmers. Van Andel and Runnels (1995) suggest that Neolithic settlement in most of southeastern Europe was quite sparse and irregularly distributed on floodplains and other particularly hospitable areas for agriculture. Willis and Bennett (1994) point to the sparsity of pollen and other evidence for substantial

cultivation in southeastern Europe prior to 5000 BC. Such information suggests that initial farming populations in southeastern Europe were relatively small and that networks among foraging populations may have been responsible for the spread of agriculture.

Neither these initial farmers nor the late Mesolithic inhabitants of southeastern Europe are well known or documented, yet one of the most important aspects of the transition to the Neolithic is the relationship between them. The basis for this ambiguity lies in the significance of a series of settlements from the Iron Gates region of the Danube, along the Yugoslavian–Romanian border. Evidence from these settlements, and especially from the site of Lepenski Vir, indicates that Mesolithic hunter-gatherers in southeast Europe already had adopted the complexities of a sedentary way of life (Bonsall *et al.* 1997, Radovanovic 1996, Tringham, this volume).

The stratigraphy and chronology of Lepenski Vir has been debated for some time; the interpretation of the site is critical for understanding the transition to agriculture in the Balkan peninsula. The major question concerns the dating of the Neolithic component at the site. Jovanovic (1975), Tringham (this volume), and others have argued that the radiocarbon determinations from Lepenski Vir place the occupation between 6500 and 5700 BC, making much of the settlement entirely contemporary with early Neolithic sites in the Morava, middle Danube, and Tisza valleys, no more than 100 km distant. Radovanovic (1996) has proposed a detailed chronology for Lepenski Vir with six phases of occupation, dating from approximately 7500–5500 BC. Pottery is present at the site by 6500 BC, indicating connections with Neolithic groups, but domesticated plants and animals are missing in the archaeological remains. Bonsall *et al.* (1997) report a change toward more terrestrial diets at Lepenski Vir also around 6500 BC, correlated, they suggest, with the introduction of domesticated plants and animals, perhaps appearing before the introduction of pottery.

The presence of Neolithic ceramics and other materials at Lepenski Vir is generally seen as evidence for interaction between the Iron Gates foragers and farmers in nearby areas. The archaeological data on subsistence, stability, and use of resources suggest to Tringham that, in a situation of interaction between the two populations, the foragers were the more dynamic partners. Faunal assemblages show pronounced differences between the hunters and farmers: Iron Gates sites were based largely on hunting and fishing; Neolithic sites were dependent on farming and herding. The stone tools of these early Neolithic settlements were made of local pebbles, even though good raw materials were located nearby (Tringham 1988, Voytek and Tringham 1989). The stone artifacts of the late Mesolithic settlements of the Iron Gates (including early Lepenski Vir), however, are made from both local and imported lithic resources. This pattern of limited use of local materials in the early Neolithic is also seen in

other areas of Europe in the early Neolithic (e.g., Binder, this volume; Price, this volume). Tringham (this volume) views the interaction between farmers and hunters as the key aspect of the Neolithic transition, “a two-way process of ‘Neolithisation’, in which the agriculturalists as well as the foragers were radically (and quickly) transformed.” Clearly, the long-term survivors of this relationship were the farming populations of southeastern Europe.

The western Mediterranean

The other arm of the early Neolithic, spreading from the eastern to the western Mediterranean in the sixth millennium BC, is characterized by the rapid appearance of stylistically uniform ceramics, domesticated plants and animals, and long-distance exchange of items such as obsidian and ground stone (Lewthwaite 1986a, Tykot 1996). The terms Cardial and Impressed Ware have often been used interchangeably for the pottery; in some areas the terms are distinguished chronologically. The spread of Impressed Wares appears to have taken place in two stages. The first stage carried from the east along the Dalmatian coast to Italy and southern France during the first half of the sixth millennium BC (Binder, this volume, Donahue 1992, Evin 1987, Pluciennik 1998a, Rowley-Conwy 1995). The second stage of this expansion covered the area from southern France around the coast of Spain to the Atlantic coast of Portugal, in the second half of the millennium (Lewthwaite 1986a, Zilhão 1993). In each stage, radiocarbon dates suggest a very rapid expansion (Zilhão, this volume). The coastal location and sporadic distribution of these sites have traditionally been interpreted as the result of colonization by sea.

Until recently, the Cardial culture was generally poorly known because of the limited range of excavated materials, the location of most sites in disturbed caves and rockshelters, and the inundation of the early Neolithic coastline of the Mediterranean (Guilaine 1979, Guilaine *et al.* 1984). Cave and rockshelter sites probably represent only one aspect of Cardial settlement (Chapman and Müller 1990); other facies are not well known. The recent discovery of the underwater lakeshore site of La Draga in Catalonia, Spain, demonstrates that primary Cardial settlements were most probably open-air agricultural villages (Tarrus *et al.* 1994). Excavations revealed the remains of posts and planks, preserved in chalk deposits, from structures estimated to be 3–4 m high, three paved platforms, and more than thirty hearths. The vast majority of the animal bones were from domesticates; large quantities of plant remains (wheat, barley, and legumes) were also recovered. Radiocarbon dates indicate the site was occupied early in the sixth millennium BC.

The appearance of the Cardial culture varies from east to west (Whittle 1996, Zilhão 1993). The earliest dates for the Cardial along the Dalmatian coast are immediately after 6000 BC (Chapman and Müller 1990,

Müller 1993, 1994). In this area a complete “package” of Neolithic materials appeared only in lowland coastal sites, not in the interior. An adjacent area along the Mediterranean coast, the Po basin, experienced a late arrival of agriculture, primarily in the form of ceramics after 5250 BC (Bagolini 1990). This process was marked by the piecemeal adoption of different parts of the Neolithic package. From around 5250 to 4750 BC throughout northern Italy, early Neolithic groups demonstrate a clear link with Mesolithic technology (Bagolini 1990). The Neolithic in this traditional Mesolithic area was accompanied by an impressive amount of exotic, prestige goods, which are generally rare and less diversified in Impressed Ware cultures. These goods included a wide range of raw materials: obsidian from Lipari Island and the Carpathian Mountains, stone axes from the Alps, Veronese flint, and imported pottery. The Early Neolithic in the Po basin, although quite late in time, had an economy based largely on hunting.

In southern Italy, on the other hand, the Cardial culture is marked by the presence of large farming communities in substantial settlements dating early in the sequence, but not before 6000 BC (Donahue 1992, Pluciennik 1998a, Whitehouse 1992, 1994). These sites are marked by ditched enclosures, up to a kilometer in diameter. More than 500 enclosures are reported from the Tavoliere plain, a small area along the east coast above the boot heel (Brown 1991). The largest of these, at Passo di Corvo, is a multi-ringed enclosure of 28 ha containing some ninety small inner compounds of C-shaped ditches (Jones 1987). Little is known of the preceding Mesolithic in this region and colonization is often cited as the mechanism responsible for the arrival of these first farmers. A gap of more than 1000 radiocarbon years between the latest Mesolithic and the earliest Neolithic (with only one or two exceptions, Skeates and Whitehouse 1997, Tinè 1996) supports such a perspective (Pluciennik 1998a)

For northwestern Italy and southeastern France, the Impressed Ware tradition first appears in Liguria around 6000 BC. Excavations at the Pendimoun shelter near the Italian border revealed a complete series of Early Neolithic deposits with two major episodes: Early Cardial in the upper levels with characteristic geometric features and Impressed Ware deposits in the lower layers, with the pottery showing clear affinities with the Adriatic and Balkan regions (Binder *et al.* 1993). The first Impressed Ware economy at the site of Pendimoun was fully Neolithic, with both cultivation and herding present (Binder *et al.* 1993, Binder, this volume).

The Impressed Ware tradition quickly spread along the Tyrrhenian coast between 6000 and 5600 BC. The late Mesolithic has not been identified in eastern Provence or on the Riviera in spite of numerous excavations both along the coast and inland (Biagi *et al.* 1989, Binder 1989). Mesolithic and Neolithic sites in southern France and northern Italy have a mutually exclusive distribution, suggesting the spread of a colonizing Neolithic population along the coast (Binder 1989, 1995, Binder *et al.* 1993, Binder and Courtin 1987). The *Impressa* and the subsequent Neolithic groups settled

only in areas where Mesolithic groups were absent; Mesolithic people were focused on aquatic environments and the Impressed Ware groups were terrestrial. The western Mediterranean Impressed Ware culture in this area has been considered fully Neolithic, producing distinctive ceramics and polished stone and bone artifacts; subsistence was based on food production.

The second stage of expansion dating to c. 5400 BC, or perhaps slightly earlier, saw the appearance of Cardial materials in the west Mediterranean region of France and the coasts of Iberia. Evidence from the Aude valley in France documents the local evolution of projectile points and the lithic industry into the early Neolithic (Barbaza *et al.* 1984). In Cantabrian Spain, the transition begins almost 1000 radiocarbon years later and is probably related to the adoption of the new economic system by local populations. Zilhão (1993, this volume) argues that the Cardial arrived in Portugal as a package brought by seafaring colonists from the east. The transition there is signaled by the appearance of new items of material culture (pottery, polished stone axes, bone tools) in association with domesticated plants and animals (cereals and ovicaprids). Enclave colonization is the term used by Zilhão (this volume) to refer to the pattern of small group movement into unoccupied areas. Radiocarbon dates indicate that these agriculturalists were contemporary with Mesolithic foragers less than 100 km away.

There is other evidence, however, contradictory to the larger picture of Cardial as introduced by farmers. One of the important aspects of this controversy has to do with the debate over a number of sites dating to the seventh millennium BC. If accepted, these sites indicate the presence of domesticated animals and pottery in Mesolithic contexts (e.g., Donohue 1992). Barnett (1990a, 1995, this volume) has examined the production and distribution of Cardial ceramics and demonstrates two scales of interaction: long-distance transport of a few, very well-defined ceramic types, and more localized movement of more regionally decorated ceramics. Presumably the smaller scale movements relate to inter-community interaction, perhaps associated with local exchange (Barnett, this volume).

The very rapid expansion of the Cardial culture certainly suggests the prior existence of routes of communication and exchange. The question remains as to who carried domesticates and ceramics along these routes. The evidence presented here and subsequently in this volume indicates that the mechanisms for the spread of the Cardial Neolithic were varied and may have included both colonization of uninhabited regions by small enclaves and local adoption of farming or other aspects of the Neolithic in other parts of the Mediterranean shore.

Central Europe

The next stage in the inland expansion of the Neolithic reached into central and eastern Europe. The first Neolithic communities in central Europe traditionally have been thought to be Bandkeramik groups, based

on a distinctive and remarkably homogeneous pattern of ceramic shape and design. The Bandkeramik originated around 5500 BC in villages along the middle Danube and its tributaries in eastern Hungary.

The expansion of the Bandkeramik, like the Cardial, was very rapid. Within a period of less than two hundred years, around 5500 BC, small farming villages appeared across an area stretching from Belgium and northern France, through central Europe to the Ukraine. Settlement was not continuous but appears to have occurred as scattered clusters of hamlets and farmsteads situated on loess soils in well-watered valleys. These early farming communities produced a suite of crops, including emmer and einkorn wheat, barley, peas, flax, and poppy, and herded cattle and pigs. The uniformity of the architecture, artifacts, burials, subsistence, and settlement plan that characterize these communities is striking.

The interpretation of the Bandkeramik has seemed equally clear, as a prime example of colonization by farming groups (Lüning 1988a, Whittle 1987). Bogucki in this volume and elsewhere (1996) summarizes the recent evidence for the Bandkeramik in the northern part of central Europe, between the middle Danube valley and the lower Oder, Vistula, and Elbe rivers to the north and the Paris basin to the west. He examines the question of colonization vs. adoption in detail and finds no evidence for adoption. Keeley (Price *et al.* 1995) also makes an argument for colonization as the mechanism for the spread of LBK. He finds evidence of contact between farmers and foragers on the western and northern fringes of the Bandkeramik distribution in north-central Europe, in the form of imitative ceramics, the fortification of farming settlements, and ultimately the adoption of agriculture by foraging communities.

On the other hand, recent studies in central Europe are beginning to ameliorate the dogmatism of LBK interpretations, postulating a greater role for Late Mesolithic inhabitants and at times challenging the entire notion of an agricultural colonization (e.g., Gronenborn 1994, Lüning 1997, Stäuble 1995, Tillmann 1994). These authors point out that the earliest phase of the Bandkeramik in the heartland of central Europe is characterized by significant heterogeneity among assemblages and patterns of exchange that suggests indigenous change rather than homogenous colonization. In the southern part of central Europe and the Alpine Foreland, Jochim (this volume) and others (Whittle 1996) report new evidence that has raised questions about the traditional scenario for the Bandkeramik. Whittle (1996), in fact, now views the Bandkeramik as simply another example of foragers becoming farmers.

The most important new evidence comes from a recently identified, earlier archaeological culture, La Hoguette, characterized by the presence of distinctive, bone-tempered pottery and sheep/goat remains (Jeunesse 1995). The earliest remains date to around 5500 BC. The lithic industry associated with La Hoguette is clearly Mesolithic (Gronenborn 1990b). The La

Hoguette sites show a distribution across the middle Rhône valley, northern France, and much of Switzerland and Germany. These materials are thought to be derived from Cardial groups to the south (Lüning *et al.* 1989). La Hoguette materials are often found together with early LBK materials in excavations. The association of LBK and La Hoguette suggests either contemporary interaction between the two cultures or mixing of diachronic settlement remains. However, relatively pure deposits such as at Stuttgart-Wilhelma (Schütz *et al.* 1992) in the Neckar valley are known.

The earliest known Neolithic settlements in Switzerland and the lake country of the upper Rhine and the Rhône date more than 1000 years later, around 4400 BC, and often contain a mixture of local Mesolithic and early Neolithic elements (Barker 1985, Bogucki 1996, Sakellardis 1979). Mesolithic groups in this area participated in wide-ranging networks of exchange and interaction extending to the southwest and southeast where they encountered early Neolithic communities. Examples of exchange items include the presence of Neolithic polished stone axes in the late Mesolithic of southern Germany and domesticated plants in Switzerland (Erny-Rodmann *et al.* 1997, Jochim 1993, this volume, Nielsen 1997). Very early dates, *c.* 6500–6400 BC cal. – roughly 1000 years before the Early Bandkeramik culture – have recently been obtained for finds of domesticated flax seeds and cereal pollen (Erny-Rodmann *et al.* 1997, Haas 1996) in the area around Zurich. Similar situations in the Alpine areas of Italy also suggest that Mesolithic foragers in this area began to use pottery, herd sheep and goats, and cultivate some cereals, but not until after 4000 BC. Technology and settlement were not dramatically changed with the arrival of the Neolithic (Barker 1985, Biagi 1985, 1990).

At the northwestern periphery of the Bandkeramik distribution, distinctive ceramics and settlement remains have been uncovered on areas reclaimed from the sea in the Netherlands. Survey of Mesolithic and Neolithic material in the Meuse valley and elsewhere in the Netherlands documents a gradual intensification in interaction between Bandkeramik farmers and Mesolithic foragers prior to the adoption of agriculture (Verhart and Wansleben 1997). Early Neolithic sites outside the classic area of the LBK document this pattern. Excavations at Swifterbant, for example, exposed an early Neolithic horizon dating to *c.* 4500 BC (van der Waals and Waterbolk 1976). Neolithic occupations on clay levees contain well-preserved evidence for both animal husbandry (cattle and pigs) and cultivation (barley and emmer wheat), and for ceramics and house construction. The sites were seasonally occupied during the summer months. Wild plants and animals contributed significantly to the diet and fishing was particularly important. The pottery is coil-built with thick walls; profiles are generally S-shaped with a pointed base (de Roever 1979). This material most closely resembles early Neolithic ceramics in the Roucadour area in France (Roussot-Larroque 1977), dated to *c.* 5000 BC, the contemporary Dummer

materials from northwestern Germany (Deichmüller 1969) and the Ertebølle pottery of southern Scandinavia and northern Germany (Andersen 1975). The lithic assemblages contain substantial numbers of trapezes, perhaps indicative of continuity with the local Mesolithic (Deckers 1979).

Eastern Europe

The introduction of agriculture into Europe north and east of the Balkan peninsula is not well understood beyond the basic parameters of characteristic artifacts, chronology, and geographic distribution (Dolukhanov 1979, Potekhina and Telegin 1995, Telegin 1987). The appearance of the Neolithic, at least in its ceramic form, is relatively early. The first agricultural settlements attributed to the Cris-Körös culture in Romania and Moldavia date to the first part of the sixth millennium BC, marked by features which link the culture to the Mesolithic, for example in the technology of stone tools, in house architecture, and in economy (Degarchev 1989, Whittle 1996, Zvelebil and Lillie, this volume).

At about the same time, in the river valleys of the Ukraine, comparatively small sites belonging to the Neolithic Bug-Dniester culture appeared (Lillie 1998). The Bug-Dniester sites show strong continuity with earlier Mesolithic assemblages in lithic industry, settlement pattern, house structures, and economy. Domesticates form less than 20 percent of the faunal assemblage during the early phase; most of the faunal remains are of wild species, notably wild pig, red deer and roe deer, fish, and edible molluscs. Grain impressions in the pottery sherds include a variety of wild and some domesticated cereals (Zvelebil and Dolukhanov 1991).

The contact zone between the Tripolye culture and the Dnieper-Donetz culture in the Dnieper basin is centered on the middle and lower Dnieper valley, with the Tripolye culture to the west, and the Dnieper-Donetz occupying the Dnieper valley itself and the areas to the east (Ellis 1984). There was a period of 800 years or so during which contacts were increasing between the Tripolye farming culture and the essentially hunter-gatherer-fisher Dnieper-Donetz communities, prior to the full transition to farming of the latter.

In the eastern Baltic area, farming was adopted at a very slow rate over a period of some two thousand years (Dennell 1992, Dolukhanov 1979, Zvelebil 1981, 1993, Zvelebil and Dolukhanov 1991). There is little difference to be seen in this region between the artifact assemblages of the late Mesolithic and the early Neolithic. Dennell (1992) describes the earliest Neolithic in the eastern Baltic and western Russia as exhibiting minor changes in basic foraging strategies that were added piecemeal following the introduction of pottery. Cultivation does not appear to have been employed in this area until after 3500 BC; wild resources continued to be heavily used.

Zvelebil and Lillie (this volume) argue for a pattern of gradual, limited adoption of farming by indigenous hunter-gatherers throughout eastern Europe. Within the area of Dnieper-Donetz cultural tradition, as well as in the east Baltic and in the eastern parts of the North European Plain, these interactions appear to follow a similar pattern, marked first by cooperation, then by competition among the forager communities, followed by a shift to farming. This transition was often subsequently reversed as farming was abandoned in favor of foraging.

Northwestern Europe

The fourth millennium BC witnessed the spread of agriculture to northwestern Europe. This area had been at the margin of the Bandkeramik region during the fifth millennium BC. One of the curious aspects of the Bandkeramik is the fact that its explosive movement stopped before it reached the Atlantic and Baltic coasts. Bandkeramik materials spread from Hungary to southern Holland and northern Germany within a hundred years. Yet further expansion by farmers beyond those borders did not occur for 1500 more years. The reason for this delay must be attributed to the presence of substantial Mesolithic groups along the Atlantic and Baltic coasts of Europe. There is evidence of contact between these late Mesolithic hunters and early Neolithic farmers to the south in the form of early ceramics, distinctive tool types, raw materials, and in a few cases domesticated species (Bogucki 1996, Fischer 1982, Price 1985, 1995, 1996b). Examples are known from northern France, Belgium, the Netherlands, northern Germany, and Scandinavia (e.g., Bogucki 1996, Louwe Kooijmans 1993, Price *et al.* 1995). Intriguingly, however, examples of borrowed Neolithic items are largely unknown in the late Mesolithic of the British Isles.

The archaeology of early farming in Scandinavia and the British Isles is in fact surprisingly different. Both are rather marginal areas on the edge of Europe, separated from the continent by large bodies of water. The transition to agriculture in Scandinavia is extensively documented; the transition to farming in the British Isles is not well known and opinions are more easily discovered than facts (Woodman, this volume). Settlement sites and chronological evidence are often missing or disputed in Britain and Ireland.

Another problem in Britain and Ireland lies in identifying transitional assemblages. Foragers and farmers may both have been present in this area for several hundred years at the end of the fifth millennium BC given the overlap in current radiocarbon dates (Dennell 1983, but see Woodman, this volume). Yet, unquestionable evidence for cereal cultivation is not present in England until after 4000 BC (Helbæk 1952, Thorpe 1996) and only a few Neolithic sites in southern England are older than this date (Woodman, this volume). The contrast between the varied Mesolithic groups of the British Isles and the appearance of a relatively uniform

Neolithic material culture in many areas within a very short period of time around 4000 BC is remarkable. This pattern has suggested to some that colonization was responsible. Yet a similar phenomenon occurred in Scandinavia and in that area there is little evidence for the introduction of agriculture by new peoples. Moreover, the pronounced difficulties in distinguishing between Mesolithic and Neolithic assemblages in the British Isles support an interpretation involving indigenous adoption.

The first evidence for the Neolithic in Scandinavia appears around 4000 BC in the form of Funnel Beaker pottery, large tombs, flint mines, and bog sacrifices (Price, this volume, Price and Gebauer 1992). As in other areas of Europe, farming seems to have spread very quickly into Scandinavia, appearing almost simultaneously across a large area from northern Germany to western Norway and middle Sweden. The demonstrated continuity in settlement location (e.g., Andersen 1991), lithic artifacts (Stafford 1998), aspects of pottery production (Koch 1998), skeletal morphology (Bennike 1995), burial practice, and other criteria, however, indicates that farming was adopted by indigenous peoples in this area.

In sum

Today, archaeologists have reasonable answers for the what, when, and where questions about the transition to agriculture in prehistoric Europe. The important remaining questions concern the who, how, and why of Europe's first farmers. It is with regard to these that the new synthesis has a great deal to contribute; that is what this book is about. The following chapters examine the various regions of Europe with these questions in mind. The major implications of the new synthesis are brought together in the concluding chapter, along with a discussion of their impact on current theories and perspectives.

For the moment, suffice it to say that the spread of agriculture across Europe involved different mechanisms, probably involving new groups of colonizing farmers, exchanges of population between foragers and farmers, and indigenous adoption by foragers. Europe is a large area. There was no single means through which farming and herding became the primary form of human subsistence; rather there were a variety of ways in which agriculture spread, either carried by new people or moving as ideas and materials beyond existing farming groups to local foraging populations. I will return to these questions of who and why in the concluding chapter.

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