The spread of farming in the Eastern Adriatic

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The authors present a new, two-stage model of the spread of farming along the eastern Adriatic coast based on the first appearance of pottery. The initial stage was a very rapid dispersal, perhaps by 'leapfrog colonisation', associated with cave sites in southern Dalmatia. The second stage was a slower agropastoral expansion associated with cave and open-air sites along the northern coast. Migration was a significant factor in the process. The mountainous hinterland formed an agricultural frontier zone, where farming was adopted piecemeal by indigenous groups.

Keywords: Neolithic, Croatia, Adriatic, farming, colonisation

Introduction

Great strides have been made in our understanding of the spread of farming in Europe, most recently through the integration and comparison of archaeological, linguistic and genetic evidence (e.g. Bellwood & Renfrew 2002; Ammerman & Biagi 2003), through the characterisation of human diets and population movements by studying stable isotopes in human bones (e.g. Milner *et al.* 2004; Richards *et al.* 2003; Price *et al.* 2002), and through the refinement of theoretical models (e.g. Price 2000; Thomas 1999; Whittle 1996, 2003). Alongside and underlying many of these advances are the ever-accumulating results of field projects.

However, even though the eastern Adriatic coast lies along a major route into Central Europe from the south-east, our state of knowledge about the spread of farming in the region remains relatively undeveloped. Even maps offering quite sophisticated models for the spread of farming into Europe can leave the eastern Adriatic region blank (Barker 1985: Figure 21; Renfrew 1987; Whittle 1996: Figure 8.2; Tringham 2000: Figure 2.1; Zvelebil & Lillie 2000: Figure 3.1) or merge it with one of the neighbouring regions (e.g. Zvelebil & Lillie 2000: Figure 3.4). Both approaches, we suspect, are a consequence of researchers not being familiar with the (admittedly meagre) data that are available from this region. In this brief paper, we hope to put the eastern Adriatic region 'on the map' through a systematic review of the available evidence and the presentation of a new model of the spread of farming in the region (Figure 1).

Models for the transition to farming in the Eastern Adriatic

The transition to farming in Europe has been explained by a wide variety of models ranging from a completely autochthonous process where local foragers turn to farming, to

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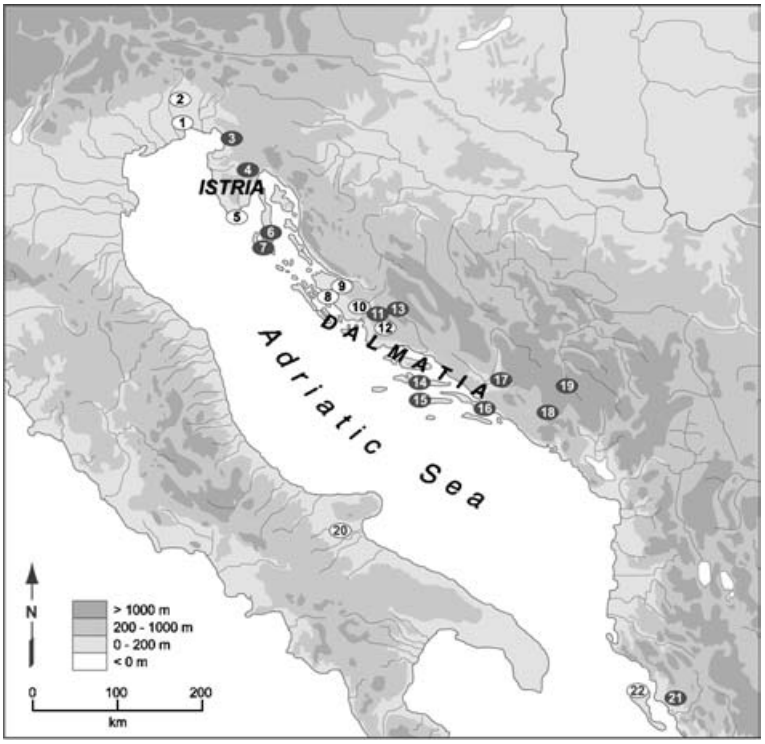

Figure 1. Some of the sites discussed in the text. Black number on white: open-air sites; white number on black: cave sites. 1. Piancada 2. Sammardenchia 3. Selected caves of the Trieste Karst (Edera, Mitreo, Benussi, Ciclami, Vlaška) 4. Pupićina 5. Vižula 6. Jami na Sredi 7. Vela spilja (Lošinj) 8. Tinj 9. Smilčić 10. Pokrovnik 11. Škarin Samograd 12. Danilo 13. Gospodska 14. Grapčeva 15. Vela Spila (Korčula) 16. Gudnja 17. Zelena pećina 18. Crvena Stijena 19. Odmut 20. Selected open-air sites of the Tavoliere (Masseria Giufredda, Scramella San Vito, Ripa Tetta, Coppa Nevigata, Lagnano da Piede, Villa Comunale, Masseria Candelaro, Masseria Santa Tecchia, Masseria Fontanella Ulivetto) 21. Konispol 22. Sidari.

a completely exogenous process where foreign farmers migrate into Europe and replace the indigenous population (Barker 1985; Price 2000; Perlès 2001). Claims for a completely independent domestication of plants and animals in Early Neolithic Europe have been thoroughly refuted on genetic (Jones 2002: 94, 107, 130), morphological (Zohary 1996: 143-4; Rowley-Conwy 1995) and taphonomic grounds (Zilhão 1993). At the other end of the theoretical spectrum, models that rely primarily on migrating farmers to explain the transition to the Neolithic, for example the 'wave of advance model' of Ammerman and Cavalli-Sforza (1973, 1984), are now thought to underestimate the contribution of Mesolithic foragers to the process, whether considered in terms of the modern-day gene pool (e.g. Richards *et al.* 1996, 2002; Jones 2002: 160-1) or the indigenous adoption and transmission of parts of the 'Neolithic package' (e.g. Zvelebil 1986, 2002; Price 2000; Tringham 2000; Zilhão 2000). The Mesolithic–Neolithic transition can no longer be considered in terms of a simple dichotomy between indigenous adoption and foreign migration.

The major domestic plants and animals were introduced into Europe at the start of the Neolithic. Since the crops could not have spread naturally into Europe, and the domestic animals are very unlikely to have done so, we must consider at least some form of population

Table 1. Expectations of different models of the Neolithisation process. Descriptions and expectations based on Barnett (2000), Zvelebil and Lillie (2000)

Process	Description	Archaeological expectations
Demic diffusion	Demographic expansion of farming population leads to daughter groups budding off and colonising new areas. Migration not directional; slow rate of migration	Full Neolithic package moves; abrupt change; slow spread (1km/year)
Folk migration	Directional movement of population from old area to new. Not necessarily driven by demographic expansion. Similar to leapfrog colonisation.	Full Neolithic package moves; abrupt change; rapid spread
Elite dominance	Penetration of area by numerical minority who subsequently seize control and impose culture/language on indigenous majority	Piecemeal adoption of Neolithic package by socially central individuals, perhaps through feasting; gradual change
Infiltration	Gradual penetration of new area by small groups/individuals who are subordinate or perform specialist tasks for majority	Piecemeal adoption of Neolithic package by socially peripheral individuals
Leapfrog colonisation	Selective colonisation of areas only marginally exploited by indigenous foragers, creating enclave settlements from which further dispersal of farming proceeds. Often movement by seafaring	Full Neolithic package moves; new settlements separate from Mesolithic; little interaction with indigenous people; abrupt change; rapid spread
Individual frontier mobility	Individuals or small groups linked in social/economic exchanges between forager and farming communities. Direction and pace of change depends on existing social frameworks and communication routes and/or those established between forager and farming communities	Piecemeal adoption of Neolithic package; innovations adopted within existing Mesolithic settlements; much interaction between indigenous and colonising peoples

transfer. Zvelebil and Lillie (2000: 62) have recently listed six different forms of population transfer that may have been important in the transition to agriculture in Europe: demic diffusion, folk migration, elite dominance, infiltration, leapfrog colonisation and individual frontier mobility. We use these processes to frame our discussion of the transition to farming in the Eastern Adriatic; their definition and archaeological signatures are listed in Table 1.

Much of the Adriatic literature still tends to see population change – that is, migration – lurking behind every major change in pottery style, let alone the introduction of the earliest pottery (e.g. Benac 1979-1987; Dimitrijević *et al.* 1998). The migrationist view is echoed in syntheses by Chapman *et al.* (1996: 259), Biagi (2003) and Biagi and Starnini (1999), who note the rarity of Late Mesolithic occupation in the region and an abrupt shift

from wild to domestic animals at the Mesolithic–Neolithic transition. Other workers have undermined the unity of the 'Neolithic package' in the region, arguing that there is no necessary association between the appearance of ceramics and domestic plants and animals (Tringham 1971; Trump 1980). No researchers, however, have made a systematic case for the independent domestication of plants or animals in the region beyond Malez's (1975) identification of domestic goat and cattle from Late Mesolithic layer IV at Crvena Stijena. Tringham (1971) makes the strongest case for continuity of economic practices and lithic use from Late Mesolithic to Impressed Ware, citing evidence of wild fauna associated with impressed ceramics at Crvena Stijena (layer III), Jami na Sredi (Cres Island) and Vorganska peć (Krk Island). More recently, Budja has proposed a model of 'Neolithisation' in the region that acknowledges the acceptance by the autochthonous population of a limited number of innovations, while rejecting any form of migration (Budja 1993: 177, 1995: 160-1, 1996a: 69, 1996b: 324, 1999).

Zvelebil and Lillie (2000: 68-71) have recently suggested that 'Neolithisation' in Dalmatia involved the introduction of pottery into local forager communities during an 'availability phase' along the agricultural frontier. Similar models have been proposed by others, although each puts a different amount of emphasis on population movement and local adoption (Barfield 1972: 204; Skeates 2000: 171-2; Zvelebil 2001: 2-6). Zvelebil's 'integrationist' model remains the most elaborate, taking into account social contexts of exchange (subsistence and otherwise) and intermarriage, and their effects on the movement of populations across agricultural frontiers. Before developing a new model for the 'Neolithisation' process in the eastern Adriatic, we summarise evidence about the pattern of change in the region.

Farming and pottery in the eastern Adriatic: a 'Neolithic Package'?

The recognition of prehistoric farming sites in the eastern Adriatic region traditionally relies on the presence of pottery (e.g. Bagolini & von Eles 1978: 46; Batović 1979; Chapman & Müller 1990: 128, 132; Müller 1994; Sordinas 1969: 407; Skeates 2000: 171), although such a simplified approach overlooks the possibility of hunter-gatherer groups obtaining pottery through exchange or adoption (Budja 2001: 40, 41). Over a decade ago, Chapman and Müller (1990: 132) concluded that in Dalmatia, an integrated Neolithic 'package' consisting of four critical innovations – domesticated plants and animals, ceramics, and polished stone – was identifiable only at lowland open-air sites. However, a reduced version of the Neolithic 'package' – domesticated animals, pottery and prismatic blade technology – is well attested on a much larger number of sites, many of which are caves, throughout the eastern Adriatic region. By contrast, convincing evidence of domesticated animals or pottery in Mesolithic contexts is extremely rare. It follows that, although far from perfect, pottery is still the most useful 'proxy measure' for exploring spatial and temporal spread of farming in the eastern Adriatic.

Recent work in caves shows some variety in the type of contact. The appearance of pottery may be associated with assemblages dominated by wild taxa, for example at Crvena Stijena (Benac 1975), Odmut (Marković 1985), Zelena pećina (Benac 1958) and Mala Triglavca (Budja 1996a), while in other caves there is a fairly even representation of wild and

domestic taxa (Edera 3/3a (Boschin & Riedel 2000), Konispol (Russell 1998), Azzurra I (Cannarella & Cremonesi 1967), Zingari 5 (Bon 1996)). At Pupićina (Miracle & Pugsley in press) domestic animals dominate the assemblages (so also at Mitreo 5-6 (6-8 excavated in 1971 and radiocarbon dated, Petrucci 1997), Podmol (Turk *et al.* 1993), Vela Spila (Čečuk & Radić 2001), Spila Nakovana (Miracle unpublished data)).

Seeds of domesticated plants have not been reported from any of the recently excavated caves where the use of flotation to recover plant remains was standard practice. It is important to point out, however, that this holds true not only for Early Neolithic levels of those sites, but for all later periods as well, when cultivation of domesticated plants is not questioned. This is not too surprising, given the fact that caves are rarely located near major tracts of arable land, but are often conveniently positioned for herders – either at, or on the way to, seasonal pastures (for site catchment analysis of Early Neolithic cave sites, see Müller 1994: 62). Such a contrast between open-air and cave sites has important implications for the process of 'Neolithisation' in the region.

The Mesolithic/Neolithic 'gap'

Expanding from observations made by Pluciennik (1997), Biagi and Spataro (2000: 48) noted that a number of well-documented and dated northern Mediterranean sequences show a hiatus between the Mesolithic and Neolithic occupations of at least several centuries if not several millennia. The timing and duration of this Mesolithic–Neolithic gap varies widely from site to site; it is not synchronous. To examine this pattern in greater detail, we briefly discuss sequences from six sites in the Eastern Adriatic (Figure 1).

Starting from the north (Trieste Karst and Istria), the age difference between the youngest Mesolithic and oldest Neolithic dates at Pupićina Cave is over 1800 years. The Mesolithic–Neolithic gap at Edera is over 1100 years (we treat dates from Edera Layer 3A as 'Neolithic' on the basis of pottery and some domestic animals), while at Ciclami the gap is about 1800 years. The similarity in timing and duration of the stratigraphic gaps at these sites is striking. At first glance they suggest that caves were not being visited by Late Mesolithic bands in the Trieste Karst and Istria, because of a change in settlement pattern, depopulation, or both. Other evidence, however, argues against a simple demographic explanation. Firstly, nine sites from the Trieste Karst – Edera, Benussi, Azzurra, Tartaruga, VG 4245, Zingari, Trincea, Monrupino, and Lonza – are reported to have trapeze-shaped microliths in Late Mesolithic contexts (Montagnari Kokelj 1993: 74). At Benussi, there is a sequence of three radiocarbon dates associated with Late Mesolithic assemblages and spanning from roughly 6500-5900 BC (Montagnari Kokelj 1993: 70). The time gap between the youngest Mesolithic date at Benussi and the oldest Neolithic dates from Edera and Pupićina is only about a century, and these dates overlap at 2 s.d. Late Mesolithic people were clearly in the region immediately prior to the first appearance of Neolithic pottery.

Only three sites in the south (Odmut, Konispol and Sidari) have dated Late Mesolithic and Early Neolithic components that provide direct evidence for discussing the Mesolithic–Neolithic gap. Taken at face value, dates from Odmut Cave (Srejović 1974; Marković 1985) show a continuity of occupation from the latest Mesolithic to the earliest Neolithic. There are, however, problems with both the dates and the stratigraphy of Odmut. The stratigraphic

attribution of dated samples varies somewhat by author, as does the description of particular layers. If the interpretation of Kozlowski *et al.* (1994) is correct, then there is a gap between the layers with pottery and those without pottery of at least 300 years. At Konispol Cave, four radiocarbon determinations place the Late Mesolithic component in a fairly narrow time range from 6650-6260 BC, while three dates fall within the 'Early Neolithic' and range from 6030-5800 BC (Harrold *et al.* 1999), suggesting a gap of at least 130 years between the latest Mesolithic and earliest Neolithic dates. The stratigraphy and fauna from Konispol, however, fill this gap (Russell 1998; Schuldenrein 1998). The open-air site of Sidari provides provocative evidence of an *in situ* adoption of ceramics by indigenous Mesolithic people (Perlès 2001). There is no stratigraphic break between the latest Mesolithic and the earliest Neolithic horizon. The latter contains abundant non-Impressed Ware ceramics, stone tools made using a 'Mesolithic' technology and some sheep/goat. There is, however, a significant sterile layer between this 'earliest Neolithic' and 'Early Neolithic' (Impressed Ware) occupation of the site (Sordinas 1967, 1969).

To summarise, three of six sites with dated sequences (Ciclami, Pupićina and Odmut) show a stratigraphic break and temporal gap between the Mesolithic and Neolithic. At Edera there is a temporal gap of about 1300 years, although there is not a stratigraphic break. The two sites (Konispol and Sidari) with dated stratigraphic evidence of continuity come from the southern edge of the Adriatic. How might we explain the recurrent gap in cave stratigraphies? Its time-transgressive nature, as well as the thick Late Mesolithic levels at several sites in both the northern and southern Adriatic, argue against a climatic cause of region-wide reduced sedimentation or erosion. In the Northern Adriatic the first pottery users visited caves that had long been abandoned. This abandonment more likely reflects a shift in settlement pattern (from caves to open air sites) than a decrease in population during the Late Mesolithic. In the two dated sequences from the south, in contrast, there appears to be a continuity of occupation from the Mesolithic to Neolithic; pottery use appears to have been incorporated into a pre-existing strategy. We suspect that this geographic contrast in the continuity of occupation from the Mesolithic to Neolithic may correlate with a contrast in the processes involved in the adoption of pottery and farming in the two regions.

The introduction of pottery into the Adriatic

Since Chapman and Müller's (1990) discussion of the pattern of absolute dates in the Eastern Adriatic, there has been a steady accumulation of radiometric dates from secure contexts (Figures 2 and 3). The basic pattern that they identified still holds; after the initial appearance of pottery on Corfu at the mouth of the Adriatic at *c.* 6500 Cal BC, dates become progressively younger as one moves up the coast towards the northeast to the head of the Adriatic where pottery makes its first appearance 1000 years later at about 5500 Cal BC.

Poorly fired, mostly plain pottery appears just south of the Straits of Otranto around 6500 BC (Sordinas 1969: 401, 406, note 14). It is roughly contemporaneous with, or only slightly later than, the earliest pottery found elsewhere in Greece (Perlès 2001: 94-5). Around (or soon after) 6200 BC, a characteristic pottery style known as Impressed Ware emerges somewhere on the northern Ionian coast (e.g. Corfu), and then spreads rapidly into the immediate hinterland (Albania), up the Adriatic to southern Dalmatia, and across

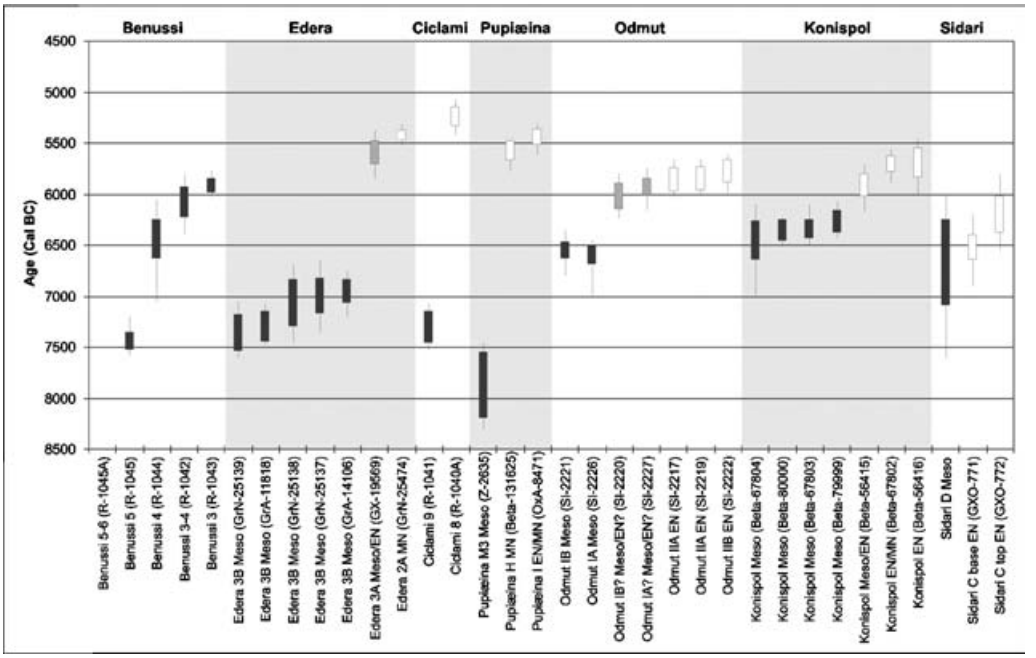

Figure 2. Calibrated radiocarbon dates from sites with Late Mesolithic (Benussi) or Mesolithic and Neolithic assemblages in the Trieste Karst, Istria, Montenegro, Albania, and Corfu. Black symbols: Mesolithic; grey symbols: uncertain association; white symbols: Neolithic pottery. Dates listed in Tables 2 and 3 which will be found on the Antiquity website http://antiquity.ac.uk./projgall/forenbaher

the Otranto Straits to south-eastern Italy (Sordinas 1969; Skeates 2000). Over the next few centuries, Impressed Ware spreads deeper into the Adriatic, reaching northern Dalmatia by around 5900 BC, and southern Istria by around 5750 BC. By that time it also reaches the deep hinterland of the eastern Adriatic (Marković 1985). On the Italian side of the Adriatic, its spread is somewhat delayed, reaching Abruzzo by 5750/5650 BC and Eastern Romagna by 5300 BC (Skeates 1994). Impressed Ware (Batović 1979; Müller 1994) was the earliest pottery to appear almost throughout the length of the eastern Adriatic. It seems, however, that it never reached the extreme north-western part of that region – northern Istria and the Trieste Karst (Forenbaher *et al.* 2004; Velušček 1997). Some time around 5600 BC, a new style known as Danilo (or Danilo/Vlaška) emerges in the eastern Adriatic, where it soon replaces the Impressed Ware. Only at that point does Danilo-like pottery reach the interior of Istria and the Trieste Karst, and as far to the north-west as Sammardenchia in Friuli (Pessina & Rottioli 1996: 85, Figure 6), where it merges with pottery styles derived from western Adriatic traditions.

Calibrated radiocarbon dates allow us to consider the rates at which the pottery was spreading (Figure 4). The straight-line distance from Corfu to Trieste Karst is roughly 875km. It took about 1000 years for pottery technology to move this distance. This gives a rate of spread of about 0.9km/year, which is close to the 1 km/year rate of the 'wave of advance' proposed by Ammerman and Cavalli-Sforza (1973) over 20 years ago. If, however,

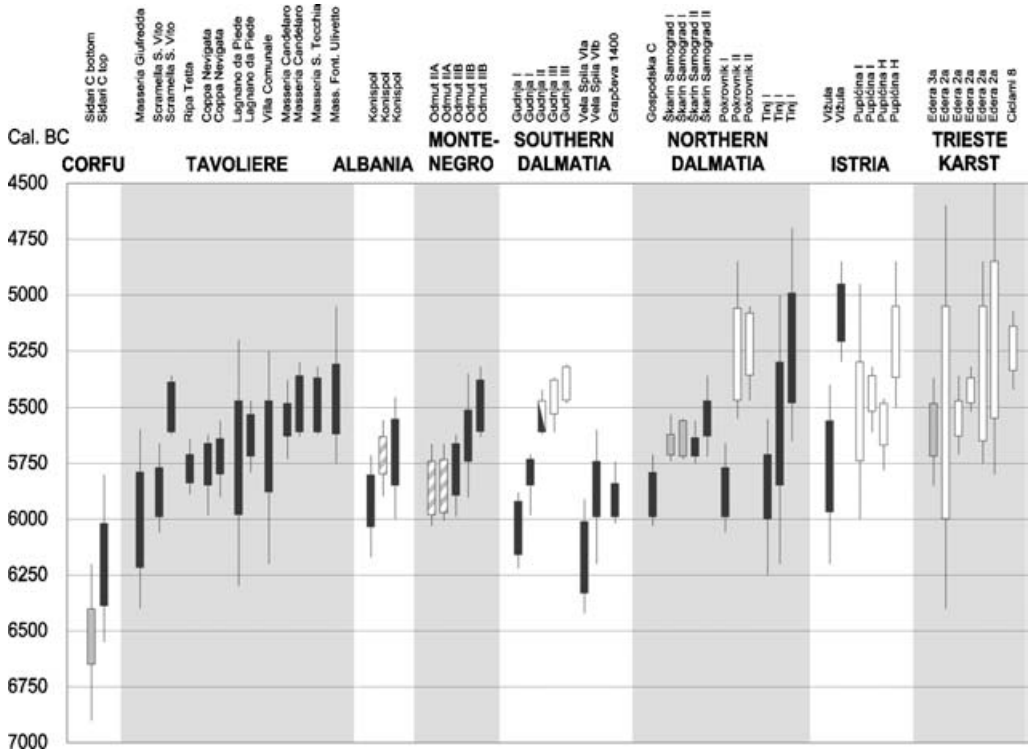

Figure 3. Calibrated radiocarbon dates associated with Early and/or Middle Neolithic pottery from sites from Corfu, the Tavoliere, Albania, Montenegro, Dalmatia, Istria, and the Trieste Karst. Black symbols: Impressed Ware; grey symbols: plain pottery; white symbols: Danilo/Vlaška pottery; striped symbols: other Neolithic pottery. Dates listed in Table 3 which will be found on the Antiquity website at http://antiquity.ac.uk./projgall/forenbaher

these were sea-faring people, for whom there is good evidence (Bass 1998; Forenbaher 1999), 1km/year seems like a fairly leisurely pace.

If, on the other hand, we consider in some detail the spread of Impressed Ware, then we have a somewhat different pattern. The straight-line distance from Corfu to Vela Luka (Sidari to Vela Spila) is roughly 460km, and it took only *c*. 100 years for Impressed Ware to be moved this distance. This gives a considerably quicker rate of spread of about 4.5km/year. Moving further to the north, the straight-line distance from Vela Luka to Pula (Vela Spila to Vižula) is roughly 300km, and it took about 300 years for Impressed Ware to be moved this distance (Figure 4). Our rate of spread has dropped down to only 1km/year. Furthermore, the early dates from southern Dalmatia come from only caves, while those from northern Dalmatia and Istria come from both caves and open-air sites. From these admittedly scanty data, we suggest that the spread of the Neolithic along the eastern Adriatic was not a smooth and continuous process, but one punctuated by several pauses. There may also be a shift in settlement from short-term visits to caves in the very earliest phase to longer-term occupation of open-air sites in the later phase.

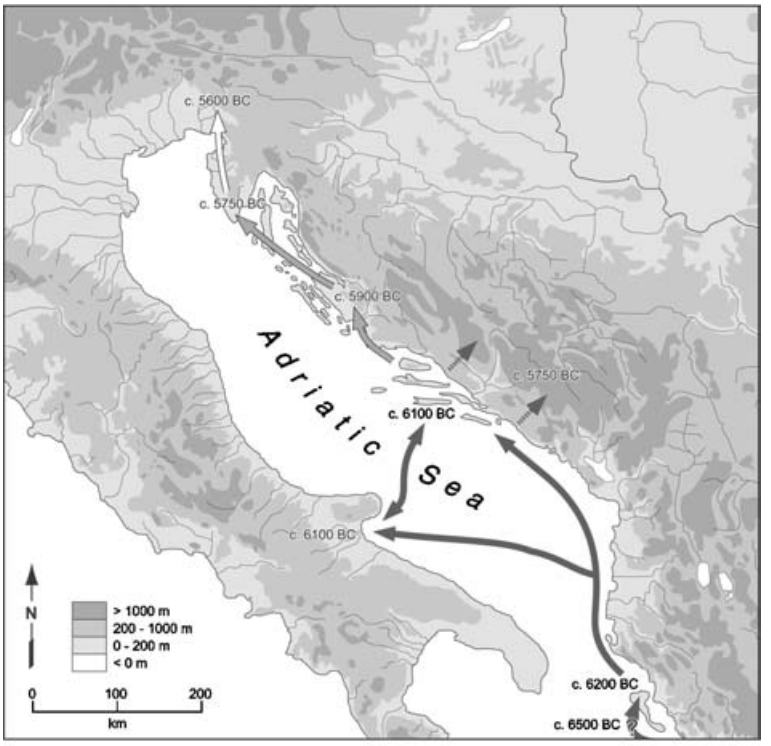

Figure 4. Model of the spread of farming and herding in the Eastern Adriatic region. Black, solid lines: first phase of rapid 'leapfrog colonisation' associated with Impressed Wares. Grey lines: second phase of slow 'agropastoral expansion' associated with Impressed Wares. White lines: third phase of 'agropastoral expansion' associated with Danilo/Vlaška pottery. Black, dashed lines: adoption of herding and farming through 'individual frontier mobility'.

Discussion: processes of change

There is thus interesting temporal and geographic variability in the cultural practices associated with the first pottery and the apparent speed with which it moved up the Adriatic, whether piecemeal or as part of a package. On the basis of the existing data, we think that several different processes were important across the Mesolithic–Neolithic transition along the eastern Adriatic.

We start on the southern edge of the Adriatic, just beyond the Straits of Otranto at Sidari and Konispol Cave. These two sites provide the most compelling evidence of the adoption of pottery and domestic animals within a 'Mesolithic' context of relatively small groups of seasonally mobile hunter-gatherers. The first pottery found at Sidari in Layer C base at about 6500 BC is apparently unique to the region. The piecemeal nature of the adoption of only parts of the 'package' and their appearance within an existing Mesolithic site suggests adoption through social interaction and exchange – probably 'individual frontier mobility' (Table 1). These first 'Neolithic' technologies did not spread far at the time; neither pottery nor domestic animals are present only 35km away across the Strait of Corfu in Late Mesolithic layers dating to *c*. 6500-6200 BC at Konispol Cave. These cultural novelties were

not moving between Mesolithic populations. It is only with the appearance of Impressed Ware that the Neolithic starts to move in the region.

Impressed Ware makes its first appearance in the region at Sidari Layer C top at about 6200 BC. There is little indication, however, of cultural continuity between the two early Neolithic layers; there is a major stratigraphic and chronological gap (*c*. 300 years) between them. Impressed Ware at Sidari is associated with the full suite of domestic animals and other changes in lithic technology and typology (Perlès 2001: 49-50). The identity of the inventors of Impressed Ware remains elusive. Were they from the indigenous population, who perhaps acquired or invented new pottery making techniques during the several centuries when they were not occupying the site, or were these new immigrant agropastoralists from the south-east who brought pottery with them? We doubt that there will be a satisfactory answer to this question any time soon. Rather, we think it is more productive to try to understand how and why Impressed Ware started to move.

The coastal distribution of Impressed Ware sites and their presence on most of the eastern Adriatic islands, including a number of isolated islets far from the mainland (Bass 1998; Forenbaher 1999), indicates clearly that maritime communication was the key ingredient of its dispersion. Seafaring was not necessarily a Neolithic invention. There is indirect evidence of pre-Neolithic (eleventh millennium BC) seafaring from Franchthi Cave, based on the exploitation of deep-sea fish and procurement of obsidian from the island of Melos (Perlès 2001: 28, 35), as well as the Mesolithic colonisation of Corsica and other Mediterranean islands during the early Holocene (Costa *et al.* 2003).

The radiocarbon dates indicate that Impressed Ware and domestic animals took less time to move almost 500km up the Adriatic to Vela Spila and Gudnja Caves than they took to move 35km across the Strait of Corfu to Konispol Cave. The former pattern is compatible with the model of 'leapfrog maritime colonisation' by small seafaring communities (Zilhão 1993: 37, 50; Zvelebil 2001: 5), although the lack of dated open-air sites (permanent villages) associated with the earliest Impressed Ware in the southern Adriatic undermines the fit. We may have early Neolithic 'colonists' without evidence of their colonies. Without more information about the Late Mesolithic in the coastal region, it is difficult to exclude an alternative hypothesis that local Mesolithic foragers acquired pottery and other innovations, and then dispersed them by sailing up and down the Adriatic.

Beyond the coastal strip in the southern Adriatic and Albania, Impressed Ware and other innovations were introduced through contact between agricultural and hunter-gatherer groups. Radiocarbon dates suggest a piecemeal adoption of parts of the Neolithic package at Konispol Cave, Odmut Cave, Crvena Stijena and Zelena pećina, slightly after the initial spread of Impressed Ware up the Adriatic. Some of these sites are located in areas unsuitable for agriculture, in remote parts of the hinterland separated from the coast by high mountain ranges; others overlook valleys with good agricultural potential. Only at Konispol do we have detailed enough data to discuss the process of adoption of pottery and domestic animals. Russell (1998: 149) suggests that cattle were relatively important in the transitional assemblages at Konispol and that these animals may have been provided to the hunter-gatherer inhabitants as bridewealth. Cattle and other domestic animals may have also been important in feasts. Without further information about the social contexts of consumption and use of food and pottery, it is impossible to refine further the process by which these novel

resources were adopted by the Mesolithic hunter-gatherers. For the time being, a variant of Individual Frontier Mobility would appear to be the most likely process.

After 6000 BC, Impressed Ware made its way up the northern Adriatic, reaching southern Istria by *c*. 5750 BC. Along the way our Impressed Ware potters started to live in open-air sites (perhaps more permanent villages). Faunal assemblages, whether from caves or open-air sites, are dominated by domestic animals. Direct evidence about plant foods is scarce, although site locations show a preference for land suitable for agriculture. Although the evidence is patchy at best, we suggest that it is only at this time that we have the assembly of the entire 'Neolithic package'.

Why did the pace of pottery adoption change after 6000 BC? One possibility would be that the northern Adriatic supported larger and more successful groups of native hunter-gathers, who resisted the immigration of farmers. Some evidence for this model comes from the large number of Mesolithic sites at the head of the Adriatic, and the delay in the appearance of agriculture in the region. On the other hand, the relative population densities might have been reversed (relatively lower in the north and higher in the south), suggesting that social levelling mechanisms in relatively small indigenous populations in the northern Adriatic undermined the acquisition and spread of prestige items like pottery and domestic animals. Regardless of whether Impressed Ware was carried by migrating farmers or passed among resident hunter-gatherers, the density and social organisation of Late Mesolithic people is key to our understanding of the process.

We are thus proposing a two-stage model for the dispersal of Impressed Ware in which there is an initial stage of pioneer exploration followed by a later stage of colonisation (Fiedel & Anthony 2003). The first stage is limited to the southern Adriatic, occurs rapidly, and is initially limited to the coastal strip. Rather than establishing permanent settlements, these people may have made short-term, seasonal camps in caves and the open-air. They apparently brought domestic animals with them, and may have seeded islands with flocks in anticipation of future visits. The Impressed Ware 'pioneers' rapidly explored the southern Adriatic, establishing contacts with indigenous hunter-gatherer groups in the hinterland, and probably relying on these native groups as a source of information and perhaps marriage partners. The initial Impressed Ware occupations at Vela Spila and Gudnja may be evidence of these first 'scouts'.

During the second phase of Impressed Ware expansion, settled farmers became established. There was less reliance on native hunter-gatherers for information and other resources, and in any case, those that held on in the region had probably been decimated by the loss of personnel to farming, disease, through marriage, or conflict. Exceptions might have been the hinterland of Montenegro where important elements of the foraging lifestyle continued on into the Middle Neolithic (Crvena Stijena) or even Late Neolithic (Odmut). Farming eventually reached the head of the Adriatic about 5600 BC, now associated with Middle Neolithic Danilo/Vlaška pottery.

Conclusion

The combined archaeological evidence suggests that immigration played a major role in the introduction of farming into the eastern Adriatic. That is not to say that this introduction

was a single-sided affair in which indigenous foragers were passive recipients. It must have been a complex process that involved both the actual movement of people and the active participation of the local population. There is no reason to believe that this process unfolded along identical lines throughout the region. There is provocative evidence that the transition to farming occurred in a two-stage process. There was an initial stage of very rapid dispersal, perhaps by exploratory parties along the coast in the southern Adriatic. During the second stage, the eastern Adriatic littoral was probably colonised by farming communities (possibly, by a number of enclave-forming farmer settlements), while the hinterland (and maybe also parts of the coast) remained an agricultural frontier zone.

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