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ISLAND ARCHAEOLOGY AND THE ORIGINS OF SEAFARING IN THE EASTERN MEDITERRANEAN

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In memory of John D. Evans

Eurasian Prehistory Guest Editors:
Albert J. Ammerman and Thomas Davis
PART ONE
(Eurasian Prehistory 10/2013)

Introduction

1. Introduction
   Albert J. Ammerman

2. Chronological framework
   Thomas W. Davis

Placing island archaeology and early voyaging in context

3. The origins of mammals on the Mediterranean islands as an indicator of early voyaging
   Jean-Denis Vigne

4. Cosmic impact, the Younger Dryas, Abu Hureyra, and the inception of agriculture in Western Asia
   Andrew M. T. Moore and Douglas J. Kennett

5. The homelands of the Cyprus colonizers: selected comments
   Ofer Bar-Yosef

6. Marine resources in the Early Neolithic of the Levant: their relevance to early seafaring
   Daniella E. Bar-Yosef Mayer

7. Early seafaring and the archaeology of submerged landscapes
   Geoff N. Bailey

Case studies

A. Cyprus

8. Tracing the steps in the fieldwork at the sites of Aspros and Nissi Beach on Cyprus
   Albert J. Ammerman

9. Akrotiri-Aetokremnos (Cyprus) 20 years later: an assessment of its significance
   Alan H. Simmons

10. The transportation of mammals to Cyprus sheds light on early voyaging and boats in the Mediterranean Sea
    Jean-Denis Vigne, Antoine Zazzo, Isabella Carrère, François Briois and Jean Guilaine
11. On the chipped stone assemblages at Klimonas and Shillourokambos and their links with the mainland
   François Briois and Jean Guilaine

PART TWO
(Eurasian Prehistory 11/2014)

12. Temporal placement and context of Cyro-PPNA activity on Cyprus
   Sturt W. Manning

B. The Aegean

13. The Aegean Mesolithic: material culture, chronology, and networks of contact
   Małgorzata Kaczanowska and Janusz K. Kozłowski

14. The Aegean Mesolithic: environment, economy, and voyaging
   Adamantios Sampson

15. The late forager camp of Ouriakos on the island of Lemnos: Human groups on the move at the turn of the Holocene in the Northern Aegean
   Nikos Efstratiou

16. Initial occupation of the Gelibolu Peninsula and the Gökçeada (Imbroz) island in the pre-Neolithic and Early Neolithic
   Onur Özbek and Burçin Erdogu

17. Lower Palaeolithic artifacts from Plakias, Crete: Implications for hominin dispersals
   Curtis Runnels, Chad DiGregorio, Karl W. Wegmann, Sean F. Gallen, Thomas F. Strasser, Eleni Panagopoulou

C. Central and Western Mediterranean

18. The spread of farming to the Adriatic: New insights from Dalmatia
   Andrew M. T. Moore

19. The question of voyaging foragers in the Central Mediterranean
   Marcello A. Mannino

20. Early prehistoric voyaging in the Western Mediterranean: Implications for the Neolithic transition in Iberia and the Maghreb
   João Zilhão

Looking forward

21. Setting our sights on the distant horizon
   Albert J. Ammerman
THE SPREAD OF FARMING TO THE ADRIATIC:
NEW INSIGHTS FROM DALMATIA

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Abstract
The arrival of farming in the Adriatic Basin was part of a larger phenomenon of agricultural spread around the shores of the Central and Western Mediterranean. This event is significant because the Adriatic was the first region that farmers reached as they spread westward from Greece and the Aegean. The farming economy that developed there was strongly conditioned by the system that had developed farther east which was then adapted to the local environment. It likely served as a model for the further westward expansion of farming to the Atlantic Ocean. Around the Adriatic, as elsewhere, the new economy became the foundation of all later societies and cultural developments. The Adriatic is important also because it may have served as one of the regions of departure for the spread of farming northwards into central Europe.

In this chapter I will discuss the early Holocene environment of the Adriatic region, as this was an important formative element in all human adaptations. I will review the nature of human activities during the Mesolithic, including the evidence for seafaring. Next, I will address the conflicted matter of the end of the Mesolithic and the arrival of farming. Then I will discuss the new evidence for the development of farming in the region as revealed by the Early Farming in Dalmatia Project. And, finally, I will offer some thoughts on how farming reached the Adriatic. I will argue that migrating farmers brought this new economy to the region from farther east where it had had a long prior history. It is probable that most of them traveled by sea.

Key words: Central and Western Mediterranean, Holocene environment, Mesolithic vs Neolithic, Impressed Ware

THE GEOGRAPHICAL BACKGROUND

The physical geography of the Adriatic Basin and its hinterlands is distinctive. On both sides of this extended inlet from the Mediterranean the coast is backed by rugged mountains. These mountain ranges are several hundred kilometers long. In places, especially along the eastern shore, the mountains fall directly into the sea. Coastal plains, where they exist, are narrow. Only at the northern end does the landscape open out, westward across the Po plain and eastward towards Trieste. There are hundreds of islands off the eastern, Croatian, coast that extend far out into the Adriatic. Indeed, it is possible to cross the Adriatic from Croatia to Italy by island hopping while remaining always in sight of land.

Two observations may be made immediately about this landscape. Movement by land has always been difficult and so, until recently, people usually traveled by sea. The main zones of climate and vegetation are distributed vertically up the mountain slopes over short horizontal distances. This has had a marked effect upon human economy, during the Mesolithic, the Neolithic, and in more recent times. Hunters and gatherers and, later, herders moved up and down the mountain slopes in a seasonal round that has persisted into the present day.

At the beginning of the Holocene, the climate and, consequently, the vegetation around the Mediterranean were distinctly different from today. Temperature and rainfall rose sharply from their Younger Dryas lows but there were fluctuations in both that lasted many centuries.
The climate was still cooler than today for much of the period we are considering. The predominant vegetation in the Adriatic region, as elsewhere in the Mediterranean, was mixed woodland with an array of deciduous trees and scattered evergreens (Grove and Rackham, 2001:156-161; Šoštarić, 2005). Pines and firs dominated at higher elevations. Around 8,000 years ago, evergreen woodland became widespread with patches of open grassland. Thus, it was only in the mid Holocene that the vegetation took on something of its present-day aspect. The extent to which this change was influenced by the arrival of farming is a matter of debate.

Postglacial changes in sea level have had a greater impact in the Adriatic Basin than anywhere else in the Mediterranean. At the height of the last glaciation, c. 18,000 BP, the northern half of the Adriatic Basin was dry land (Forenbaher, 2002; van Andel, 1989). At the beginning of the Holocene sea levels worldwide were still ca. 55 m lower than today (Fairbanks, 1989:fig. 2). The northern Adriatic between the present-day Istrian Peninsula and Ravenna was an open plain, the coastal strip along the eastern shore of Italy was ca. 20 km wider than at present, and many of the islands off the present-day coastlines were joined to the mainland. Thus, the configuration of the Adriatic shoreline throughout the Mesolithic was significantly different than today. Even at the beginning of the Neolithic, ca. 8,000 cal BP, sea levels were still 20 m below today’s shoreline.

Several observations follow from these facts. During the Mesolithic the people of the region lived in a more open environment with fewer impediments to foot travel. Yet maritime movement would still have been preferred, especially on the eastern side of the Adriatic with its many islands and projecting peninsulas. The subsequent rise in sea level will have drowned habitation sites along the Early Holocene coastlines, thus removing from sight nearly all evidence of marine adaptations during the Mesolithic and earlier Neolithic. This poses a major problem for human habitat reconstruction and interpretation. The rise in sea level will have had two other important effects: it will have lengthened the coastline, as it reduced the area of open terrain, and it will have created many more islands as well. This will have increased the incentive for the Mesolithic inhabitants to travel by boat.

**THE MESOLITHIC**

Mesolithic sites have been found on both shores of the Adriatic, extending well inland into the mountainous hinterland and also on the present-day offshore islands (Biagi and Spataro, 1999-2000; Franco, 2011; Komšo, 2006). There are clusters of sites in Istria, in the Trieste karst, and also up the Adige Valley into the Dolomites. The best-known sites are caves and rockshelters but there are many open sites as well. Deposits on all sites are thin with relatively few artifacts, suggesting short rather than long-term occupation. The presence of sites at high altitudes in places that would have been deeply snow-covered in winter reinforces the strong inference that occupation was seasonal. The economy was based on hunting and gathering, with a focus on small and medium-sized game.

Abundant remains of tuna, swordfish and other fish have been found in Mesolithic levels in the massive cave of Vela Spila on Korčula (Čečuk and Radić, 2005:61-62). Today Korčula is an island but during the Mesolithic it would have been a peninsula. The site would have overlooked a coastal plain with the open sea beyond. Similar evidence has been found at the Grotta dell’Uzzo in Sicily (Tagliacozzo, 1993). From this we may infer that Mesolithic people who lived near the coast engaged in fishing and were putting to sea in boats to catch fish offshore. Thus, it looks as though fishing, from the shore and from boats, was just as common in the Adriatic and central Mediterranean as it was in the Aegean (Moore, 2014).

The transition from Mesolithic to Neolithic – shorthand for the end of full-time foraging as a way of life and the appearance of farming – has been as much debated for the Adriatic region as elsewhere in southern Europe and the Mediterranean. In the last decade it has become clear that there was a gap in occupation on many key sites between the latest Mesolithic levels and the earliest Neolithic deposits. This insight has been explored most thoroughly by Biagi and Spataro (1999-2000) for
The spread of farming to the Adriatic: New insights from Dalmatia

The arrival of farming

Farming reached the Adriatic about 8,000 years ago. The modes by which farming spread around the Mediterranean and the nature of the agricultural economy itself have been debated for several decades. Those debates and differences of view are well known to the participants in the Wenner-Gren Workshop and so need not be set out again in this essay. We may remind ourselves, however, that farming spread from western Asia to Cyprus during the eleventh millennium cal BP and to the Aegean by 9,000 cal BP. There seems then to have been a pause lasting perhaps a thousand years (Ammerman, 2011), the reasons for which have yet to be explained. Then, after passing through the Greek mainland at a rather slow pace during the next 1000 years, the new way of life arrived in the Central and Western Mediterranean. This latter dispersal was rapid and covered a very large area of coastline: the Adriatic, Tyrrhenian and Ligurian Italy, Southern France and Spain, parts of North Africa, and the Atlantic coast of Portugal, which it reached by ca. 7,400 cal BP (see the chapter by Zilhao in this volume). If we accept that we are seeing a spread of farming peoples looking for new lands to exploit (Moore, 2014), then it is likely that a particular stimulus was the catalyst for this process. The best candidate for this at present is the temperature reversal and associated episode of aridity that took place ca. 8,200 cal BP (Weninger et al., 2006; Berger and Guilaine, 2009). We have long known that an onset of aridity at around this time set populations on the move in Western Asia (Moore, 1985:52). It now looks as if this too was one of the consequences of the 8,200 cal BP event. The same climatic changes would have caused stress in the farming economies of settlements in the Aegean and adjacent hinterlands and thus have inclined some farmers to move westwards in search of new land to clear and till and fresh pastures to open up.

Given the physical geography of the Adriatic, the main routes for the spread of farming would have been by sea (Forenbaher and Miracle, 2005:523). Throughout the Neolithic there is very little evidence on the Croatian side for contact across the Dinaric Alps with farmers in the Danube Basin (Težak-Gregl, 2001:36). It follows that, as in Italy, cultural contacts were focused on the Adriatic itself. This is manifest from the beginning in the ubiquity of Impressed Ware at Early Neolithic sites. Neolithic sites have been found on the offshore islands and in places along the mainland coast, with concentrations in areas of especially fertile soil, for example on the Gargano Peninsula in Italy and from Zadar to Šibenik in Croatia. On the eastern Adriatic shore, there are few such locations that would have been attractive to farmers. Many of the Neolithic sites on the islands and, indeed, some on the Croatian mainland were caves and rock shelters, which were usually in locations unsuitable for agriculture. Consequently, they provide limited information about the nature of farming and society in the Neolithic. Only the sites on potentially arable land can yield a more comprehensive picture of the farming way of life in the Early Neolithic. It is this insight that our Early Farming in Dalmatia Project has been designed to explore.

The project is investigating the spread of farming to the Adriatic and, more broadly, the Central Mediterranean, by focusing on sites in the Šibenik region and using them as a case study. Our approach is a multidisciplinary one embracing a variety of disciplines within an ecological perspective. We have emphasized matters of environmental context and change through time in what has always been a dynamic karst landscape. We have re-excavated two sites,
Pokrovnik and Danilo Bitinj, or Danilo for short (Fig. 1), which had been investigated previously by an earlier generation of archaeologists (Brusić, 2008; Korošec, 1964). These sites were known to have substantial cultural remains in situ. Pokrovnik was occupied from the Early Neolithic through the Middle into the Late Neolithic, and Danilo is the typesite for the Middle Neolithic in Dalmatia. Danilo is located in a valley that is heavily cultivated today (Fig. 2) and Pokrovnik is surrounded by a mix of arable land and open pasture (Fig. 3). By applying modern methods of recovery, mainly dry sieving and flotation, we have recovered substantial evidence for the economies of each site in the form of charred plant remains and animal bones, for the first time in this region.

The two sites have proved to be very extensive (Pokrovnik ca. 3 ha, Danilo ca. 9 ha), and are among the largest Neolithic village sites known in Southeast Europe. It is likely that the area of each site that was inhabited at any one time was less than this but, still, they attest to unusually intensive occupation by a relatively large number of people. At Pokrovnik the village was occupied for at least a millennium, apparently without interruption, a very long span of time indeed.

The immediate results of our investigations may be briefly stated. The inhabitants of both sites were full-time farmers throughout. At Pokrovnik this was so from the founding of the village at the beginning of the Early Neolithic, or Impressed Ware, phase ca. 8,000 cal BP. They cultivated a range of crops, including several cereals and legumes, and raised flocks of sheep and goats with some cattle and a very few domestic pigs (Legge and Moore, 2011; Moore et al., 2007a, 2007b). There appears to have been no “transitional” or “settling-in” phase at Pokrovnik. The new

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**Fig. 1.** The location of Pokrovnik and Danilo Bitinj in Dalmatia. The map includes several other key Neolithic sites in the region, which are currently being investigated. The probable location of the shoreline ca. 8,000 cal BP (6,000 cal BC) is indicated (Sarah McClure and Thomas Harper)
The spread of farming to the Adriatic: New insights from Dalmatia

Fig. 2. The location of Danilo Bitinj in the Danilo Valley, looking west. The Adriatic Sea and several offshore islands can be seen in the distance.

Fig. 3. The Neolithic settlement of Pokrovnik, looking southwest. The site is located under cultivated fields at the foot of the hill called Sveti Mihovil (St. Michael).
economy was immediately adjusted to local circumstances as soon as it arrived. Our interviews with local farmers confirm that this system was highly adapted to the ecological constraints of the region. The fact that traditional farming today is remarkably similar to the Neolithic system also demonstrates how successful this adaptation has been over many millennia. The local impact of the introduction of such systematic farming to the region would have been severe, with stripping of vegetation in the valleys and also a severe reduction in woodland on the hill slopes caused by cutting of wood for fuel and browsing by animals. This would have resulted in changes to the vegetation cover and probably have encouraged soil movement downslope, topics that we are currently investigating.

We found marine shells in some abundance at Danilo and they were also present at Pokrovnik, though less common there because the site is farther inland (Marguš et al., 2005, 2008). Although never a major source of food, they do attest to regular visits by the inhabitants of Danilo to the seashore, then about 9 km away, or, in the case of Pokrovnik, to the lower brackish reaches of the Krka River. These visits to the shoreline indicate some interest in the sea and its potential for food and more distant contacts.

The strongest evidence for the use of the sea is the import of obsidian, beginning in the Middle Neolithic or Danilo phase. From then on obsidian occurred in regular but small amounts at both Pokrovnik and Danilo. Robert Tykot has analyzed all the pieces that we recovered using X-ray fluorescence to determine their sources and has found that most of them came from Lipari (Tykot, 2011). Whatever other means of transmission may have been involved, it is clear that the obsidian was carried at least part of the way to Dalmatia by sea. Thus, the regular use of the sea for the transport of goods was fully in place in the Adriatic in the Middle Neolithic.

AMS dates from Pokrovnik and Danilo provide a preliminary chronology for each site, and also new information about when farming reached Dalmatia and, by extension, the Adriatic (Table 1, Table 2). The dates indicate that Pokrovnik was inhabited for the entire eighth millennium cal BP (sixth millennium cal BC). The surface of the site was eroded, so it was probably occupied for significantly longer than this. The parts of Danilo that we excavated seem to have been inhabited for about half a millennium: from perhaps 7,250 to 6,750 cal BP (ca. 5,250 to 4,750 cal BC). Given the great extent of the site, it may well have been inhabited for several centuries more than our dates indicate.

The earliest dates from Pokrovnik are 7,090 ± 25 bp (7,969-7,856 cal BP, 6,020-5,907 cal BC) and 6,999 ± 37 bp (OxA-17194, 7,934-7,737 cal BP, 5,985-5,788 cal BC) (Table 1). This establishes closely the inception of farming in central and northern Dalmatia. Indeed, farming probably began slightly earlier, given that the dates come from samples a little above the natural subsoil. The dates suggest that farming reached the Central Adriatic by ca. 8,000 cal BP, or 6,000 cal BC. This estimate is as early as any obtained for the central Mediterranean in recent years using high precision dating methods. It suggests that the initial spread of farming was rapid through much of the Adriatic. On the other hand, the Early Neolithic, on the basis of the radiocarbon dates currently available, makes its first appearance at the head of the Adriatic in Italy some several hundred years later.

IN SUMMARY

Agriculture reached the Adriatic as a complete system, incorporating the full array of domestic plants and animals familiar from early Neolithic sites in western Asia from whence it had originated. It was a relatively mature mixed farming economy that from the beginning was practiced full time. How did it reach the Adriatic? Evidently by sea as this was the most practical route. And, given the apparent absence of any contribution by the preceding Mesolithic foragers, farming seems to have been brought in by immigrants who probably came from Greece. We need not suppose that there were very many of these newcomers but, given the size of at least some of the early villages they founded, their numbers began to increase quite rapidly once they settled there.

The first generation of farmers must also have been skilled seafarers as they were able to transport their families, enough domestic animals to establish breeding flocks of caprines
The spread of farming to the Adriatic: New insights from Dalmatia

and cattle, sacks of seed grains, and tools. This implies that they were traveling along the coasts and out to the islands in quite large, seaworthy craft. We need to consider here that, on analogy with Irish curraghs, such vessels were likely to be at least 8 m long (Johnstone, 1980:129) and probably bigger. The Bronze Age Ferriby planked boats were, of course, significantly longer than this (Wright, 1990:fig. 5.17). The Neolithic log canoes recovered from Lake Marmotta in Italy are of the appropriate length but too narrow to have served the need of maritime migrating farmers (Fugazzola Delpino and Mineo, 1995). Apart from this example, we have no solid evidence of how these Neolithic boats may have been constructed and maneuvered. The speculations of Johnstone (1980:56) and other authors do not help us very much, and Farr’s recent suggestion that Neolithic seacraft were reed or log boats (Farr, 2006:90) does not match the demonstrated need for more substantial vessels. For the moment we do not know what these craft were like.

<table>
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<tr>
<th>Trench</th>
<th>Level</th>
<th>Material</th>
<th>Laboratory Number</th>
<th>Date BP</th>
<th>CalBP @ 95.4% confidence</th>
<th>CalBC @ 95.4% confidence</th>
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<td>A</td>
<td>8</td>
<td><em>Triticum monococcum</em> (einkorn), charred grain</td>
<td>OxA-17195</td>
<td>6,626 ± 39</td>
<td>7,574-7,439</td>
<td>5,624-5,490</td>
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<td>A</td>
<td>33</td>
<td><em>Triticum dicoccum</em> (emmer), charred grain</td>
<td>OxA-17328</td>
<td>6,810 ± 40</td>
<td>7,702-7,580</td>
<td>5,752-5,631</td>
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<td><em>Triticum dicoccum</em> (emmer), charred grain</td>
<td>OxA-17124</td>
<td>6,197 ± 39</td>
<td>7,245-6,989</td>
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<td><em>Triticum dicoccum</em> (emmer), charred grain</td>
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<td>7,562-7,425</td>
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<td><em>Triticum dicoccum</em> (emmer), charred grain</td>
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<td>7,167-6,960</td>
<td>5,218-5,011</td>
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<td>9</td>
<td><em>Ovis musimon</em> (sheep)</td>
<td>PSU-4960/ UCI-AMS-106477</td>
<td>6,280 ± 20</td>
<td>7,256-7,158</td>
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<td><em>Bos taurus</em> (cow)</td>
<td>PSU-5294/ UCI-AMS-116206</td>
<td>6,190 ± 25</td>
<td>7,168-7,004</td>
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<td>7,573-7,440</td>
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<td><em>Ovis musimon</em> (sheep)</td>
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<td>6,840 ± 25</td>
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<td><em>Triticum monococcum</em> (einkorn), charred grain</td>
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<td>6,999 ± 37</td>
<td>7,934-7,737</td>
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<td>PSU-5293/ UCI-AMS-116205</td>
<td>7,090 ± 25</td>
<td>7,969-7,856</td>
<td>6,020-5,907</td>
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Table 1. AMS radiocarbon dates from Pokrovnik
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<td>OxA-14449</td>
<td>6,284 ± 40</td>
<td>7,159-7,275</td>
<td>5,341-5,330, 5,323-5,206, 5,176-5,141, 5,115-5,078</td>
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<td>7,253-7,010</td>
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<td>7,158-6,907</td>
<td>5,208-4,958</td>
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<td>PSU-5290/UCI-AMS-116202</td>
<td>6,155 ± 25</td>
<td>5,211-5,026</td>
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<td><em>Triticum dicoccum</em> (emmer), charred grain</td>
<td>OxA-15681</td>
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<td>7,158-7,019</td>
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<td><em>Rosa</em> sp. (wild rose), charred seed</td>
<td>OxA-17329</td>
<td>6,204 ± 38</td>
<td>7,245-7,000</td>
<td>5,296-5,240, 5,232-5,051</td>
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<td>6,931-6,737</td>
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<td>OxA-17198</td>
<td>6,093 ± 36</td>
<td>7,156-6,806</td>
<td>5,207-5,149, 5,136-5,128, 5,120-5,096, 5,080-4,907, 4,864-4,857</td>
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<td>OxA-17199</td>
<td>6,103 ± 37</td>
<td>7,157-6,884</td>
<td>5,208-5,090, 5,084-4,935</td>
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<td>7,164-6,957</td>
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<td>7,155-6,800</td>
<td>5,206-5,167, 5,116-5,110, 5,076-4,896, 4,866-4,850</td>
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<td><em>Triticum monococcum</em> (einkorn), charred grain</td>
<td>OxA-17126</td>
<td>6,237 ± 37</td>
<td>7,257-7,017</td>
<td>5,308-5,201, 5,176-5,068</td>
</tr>
<tr>
<td>E 14</td>
<td></td>
<td><em>Triticum monococcum</em> (einkorn), charred grain</td>
<td>OxA-15765</td>
<td>6,245 ± 39</td>
<td>7,262-7,019</td>
<td>5,320-5,200, 5,180-5,060</td>
</tr>
</tbody>
</table>

Table 2. AMS radiocarbon dates from Danilo
It is possible that some of these farmers reached the Adriatic overland through Albania. Current excavations at Vashtëmi near Korçë in southern Albania suggest that a farming settlement was established there in the mid ninth millennium cal BP (Allen 2012). The antecedents of people who inhabited this settlement were presumably in Northern Greece.

The spread of farming to the Adriatic was part of a much wider phenomenon of agricultural dispersal through the Central and Western Mediterranean, as evidenced by the presence of the various forms of Impressed Ware throughout this extensive region. These farmers moved swiftly and were highly discriminating in where they chose to settle. Along shores that were often unattractive to farmers, they selected places to live that offered the essentials for successful mixed farming: open, well-watered land with rich soils and good grazing nearby. By the Middle Neolithic we see this colonizing phase giving way to cultural regionalization, expressed most obviously in the widely different traditions of pottery making that came into existence then.

And it was during the Middle Neolithic that long distance maritime exchange seems to have taken on systematic form, as seen most clearly in the circulation and exchange of obsidian.

The initial spread of farming around 8,000 cal BP may have been rapid but the following period of consolidation of this new way of life lasted many centuries, into the Late Neolithic and beyond. It was not until the sixth millennium cal BP that we see any serious attempt to exploit less promising territory in the hinterlands for farming and pastoralism. This suggests that, despite the initial rise in population that took place following the establishment of farming societies in the Adriatic and farther west, the agricultural system that was first established in the most productive locations was capable of supporting growing numbers of people for a considerable span of time. Only when a new level of population density had been reached, and a ceiling established on the productive capacity of those lands settled first, did people begin to move into new, less attractive locations.

NOTE
All radiocarbon AMS have been calibrated using OxCal 4.2.

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