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ISLAND ARCHAEOLOGY AND THE ORIGINS OF SEAFARING IN THE EASTERN MEDITERRANEAN

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The Aegean Mesolithic: Material Culture, Chronology, Networks of Contacts

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Abstract

Contacts across the sea between/with the Aegean islands are evidenced as early as in the Middle Palaeolithic. Aegean islands were visited also in the Upper Palaeolithic, probably during the LGM.

At the beginning of the Holocene there is evidence for more intensive Early Mesolithic presence at the Aegean island. These assemblages derived from two different cultural traditions: the Balkan Epigravettian that dominates the eastern continental Greece, and from the Antalyan – the entity typical of the Epigravettian tradition of western Anatolia.

The tradition represented in the Mesolithic layers of Klissoura and Franchthi caves evolved on the substratum of the local Epigravettian and it displays some stylistic influences from the western Mediterranean (Sauveterroid and later possibly Castelnoidal traits).

The presence of the Early Holocene foragers on the Aegean islands – first the Cyclades (Kythnos, Naxos), the Northern Sporades (e.g., Cyclops Cave on the island of Gioura), and the islands of the south-east of the Aegean (Ikaria, Chalki) was the result of several visits from the continent and the contacts between the islands from the first half of 9th millennium cal BC (Maroulas on Kythnos, Kerame on Ikaria). The evolution of the Mesolithic on the Aegean islands lasted until the beginning of the 7th millennium cal BC as indicated by radiometric determinations for the younger Mesolithic layers in Cyclope Cave.

The groups of the Aegean Mesolithic must have been able to navigate across considerable distances arriving at the site of Nissi Beach on Cyprus (investigations by A. Ammerman) where the pebble-flake industry shows several features common with their origins. Thus the consequence of contacts with the Initial Pre-ceramic Neolithic on Cyprus the economy and architecture of the Aegean Mesolithic changed (e.g., Maroulas on Kythnos) supporting the observation concerning distant seafaring. Moreover, the analysis of an assemblage from aceramic layer X from Knossos on Crete (dated at the transition of 8th/7th millennium cal BC) shows a number of techno-morphological the presence of Melian obsidian in common with the Aegean Mesolithic.

On the other hand, the Epipalaeolithic sites in the northern part of the Aegean Basin, notably the island of Lemnos exhibit close techno-morphological associations with the Early Holocene Epipalaeolithic industries of south-western Anatolia, especially with the Antalyan.

Investigations of the Aegean Mesolithic revealed the existence of broad networks of contacts across the entire Eastern Mediterranean during the period from the beginning of 9th through the transition of the 8th/7th millennium cal BC, the period preceding the establishments of the full “Neolithic package” in the Aegean.

Key words: Paleolithic, Mesolithic, Pleistocene/Holocene transition, Neolithization, Seafaring

Incipient Occupations of the Islands

One of the possible reasons that brought Paleolithic groups to the Aegean islands was the lowering of the sea-level and the sea-recession during glacial maxima (notably OIS 4 and 2) and the formation of land-bridges between the islands and the mainland. In the case of islands that were not connected with the mainland even during the maximum recession knowledge of seafaring and smaller distances between the islands were additional stimulus for Late Palaeolithic humans.
Numerous Middle Palaeolithic sites, mainly Levallois-Mousterian sites, were registered on the island of Eubea which during OIS 4 was connected with the coast of Thessaly. A Middle Palaeolithic campsite is also known in the northern Sporades (e.g. at Alonessos), but in OIS 4 the Sporades together with Thessaly and northern Eubea formed a large sub-continent (Sampson 1980, 2001, 2006).

An example that could document sea-faring skills of Middle Palaeolithic humans is the site of Alonitsi on the island of Agios Eustratios that during OIS 6, was probably not connected with the mainland. The site is situated about 30 m above the present sandy beach in the zone where the palaeo-beach and the sediments at the mouth of a stream overlap (Fig. 1). In terms of eustatic changes the position of the site points to human occupation during the sea transgression, probably during OIS 5e or possibly OIS 5a or even 5c. However we have to remember that the area of the Northern Aegean with the island of Agios Eustratios is situated in a zone where major strike/slip ran (Vacchi et al., 2014). In the consequence isostatic disturbances and eustatic changes could have overlapping causing significant modifications of the coast line including the connection with the mainland. The industry at the site represents the Mousterian with denticulated tools, the double-platform, and less often Levallois preferential core techniques (Fig. 2). Flint, siliceous hydrothermal rocks, radiolarite, andesite and quartz were exploited for making the artifacts. Recently on the island of Naxos at the site of Stelida the discovery of a Middle Palaeolithic chert extraction point has been reported (Carter et al., 2014). The industry at this point is attributed to the denticulate Mousterian with Levallois technology. However as there are no absolute dates for Stelida, it is not certain whether the island was reached by a dry or sea route.

Fig. 1. Agios Eustratios, northern Aegean Basin. General view of the island shore
Presence of the Middle Palaeolithic was known among the Ionian Sea islands (Ferentinos et al., 2012) that were not connected with the mainland, namely: Lefkada, Kefallinia and Zakynthos (Sordinas, 1969, 2003; Kourtessi-Philippakis, 1999; Dousougli, 1999; Foss, 2002). The identification of the supposedly Acheulian handaxes on Crete, as suggested by Strasser (Strasser et al., 2010; see also Runnels – this volume) on the basis of surface finds of bifacial artifacts from the shore-line terrace and dated to 107 kyr BP, is still questionable. In view of the absence of Acheulian is Greece and southwestern Anatolia Strasser’s interpretation should be taken with caution. Moreover, the alleged bifacial artifacts published by Strasser represent an initial phase of shaping with no Acheulian characteristics.

The next period of the sea recession of OIS 2 (LGM) when sea level lowered and causing changes of configuration of continental and islands coastlines was during the late Upper Palaeolithic. But only a few Upper Palaeolithic sites located on the Aegean Sea islands can be dated to OIS 2 with certainty.

The functioning of cinnabar mines on the island of Thassos, dated to about 20 kyr BC, probably correspond to the Balkan Gravettian and can be explained by the existence of the land bridge between the island and the mainland. Although the configuration of the Cyclades changed and a large island of Kykladia emerged there was no connection between the island of Kythnos and the mainland. Nevertheless, site KT-21 on Kythnos (Fig. 3) yielded an assemblage of probably Upper Palaeolithic artifacts (Sampson

Fig. 2. Agios Eustratios. Alonitsi site. Middle Palaeolithic artefacts: 1-3 – cores (Levallois and double platform), 4, 5 – Triangular flakes, 6-9 – notched/denticulated tools
et al., 2010). On the island of Naxos blade cores from the site of Stelida are claimed by M. Séferiadès (1983) on typological grounds to be of Upper Palaeolithic age. It should be added that on the island of Kefallinia, in the Ionian Sea Basin artifacts, believed to be of Aurignacian affinities were recorded (Kavvadias, 1984).

The evidence of sea-faring at the end of the Palaeolithic is documented by imports of Melian obsidian at the sites of the Eastern Peloponese such as in Franchthi Cave where in level VI, dated to the 9th millennium cal BC, the earliest artifacts from Melian obsidian appear (Perlès, 1987).
In cultural terms the Pleistocene-Holocene transition (9/10th millennia cal BC) the territories around the Aegean Sea were dominated by Epigravettian entities (Kozłowski, 2009; Kaczanowska and Kozłowski, 2006; Kozłowski and Kaczanowska, 2004). The northern Balkans was the domain of bladelet industries with numerous arched backed pieces (Mihajlović, 1999). On the other hand, the southern Balkans, including the eastern coast of the Aegean Sea, was the province of flake-bladelet industries dominated by geometric microliths produced by microburin technique.

For example, in the Late Palaeolithic levels of Franchthi Cave (unit VI) in Argolid nearly half of all tools are geometric microliths (Perlès, 1995, 2001) similarly to Cave 4 at Klisoura (Koumouzelis et al., 2003, 2004). On the western coast of the Aegean Sea the Early Mesolithic (unit VII at Franchthi), dated to the very beginning of the Holocene, is characterized by the predominance of flake technique and the decrease in the number of microliths. However, this phenomenon did not occur in Cave 1 at Klisoura in the layers attributed to the Mesolithic period (Kaczanowska et al., 2010).

In Cave 1 in the Klisoura Gorge three Mesolithic layers were discovered (Fig. 4). All layers yielded assemblages representing blade industries strongly associated with the local Epigravettian traditions (Figs 5, 6). The high index of microliths, notably of backed pieces with a straight or a weakly arched blunted back, is characteristic of these assemblages. This type of artifacts co-occurred with geometric forms such as rectangles and obtuse triangles. The local tradition of Mesolithic assemblages can be seen in the presence of small bilaterally retouched Sauvetarian points that were shaped without the use of microburin technique (Fig. 6:5-12). These blade industries do not exhibit marked changes through time. We can assume that in the Early
Fig. 5. Klisoura, Cave 1, Argolid. Lithic artefacts from Mesolithic layer 3: 1 – core, 2 – splintered piece, 3 – blade, 4-7 – end-scrapers, 8 – burin, 9 – 13 – retouched flakes, 14 – retouched bladelet, 15-18 – backed implements, 19-25 – microliths
Fig. 6. Klisoura Cave 1. Argolid. Lithic artefacts from Mesolithic layer 5a: 1,2,20-23 – backed pieces, 3,4 – shouldered pieces, 5-12 – sauverterian points, 13-16 – rectangles, 17,18 – triangular microliths, 24 – hammerstone, 25,26 – deantalium beads
Holocene this cave was inhabited by isolated “conservative” groups producing a lithic industry rooted in local tradition.

The industries in Franchthi Cave evolved differently (Fig. 7). The Palaeolithic/Mesolithic transition spans the sequence from layers VI/VII, while layers VIII, IX are Mesolithic and in layer X novelties are in evidence in lithic production and subsistence economy (Perlès, 1990, 1995).

The lithic industries from Franchthi were derived from the local Epigravettian traditions. They provided the basis for flake industries predominantly with denticulated-notched tools. C. Perlès (2003) suggested to associate these denticulated-notched tools with the structure of activities of the cave inhabitants and the fact that better quality raw materials were unavailable. However, as the province of flake industries in the Mesolithic of Greece was fairly extensive and their occurrence in Franchthi is more likely to have been a general developmental tendency. Lithic phase VIII dated to the Late Mesolithic, contained trapezoidal inserts and trapezes with lateral retouch resembling lunates. In layer IX single items of flèches tranchantes transversales, also found in layer X, reflect the influences from the western part of the Mediterranean Sea Basin (Castelnovian ? – Perlès, 1990, 2001).

In the northern Balkans and the Circum-Pontic territory an uninterrupted evolution of Epipalaeolithic blade/bladelet industries can be seen with conical or “pencil-like” cores. Blanks from these cores were used to produce microlithic end-scrapers and perforators. To this province belong some surface sites recorded on the Black Sea coast of European Turkey (Agacli, Gumusdere, Domali; Gatsov and Özdogan, 1994).

On the eastern side of the Aegean Sea, on the Aegean coast of Turkey no sites are known from the Pleistocene/Holocene transition. On the other hand, on the western Mediterranean coast of Turkey sequences from this period were documented in the region of Antalya where the tool composition is different from the industries on the western Aegean coast (Kozlowski, 2002). The longest sequence in Turkey from the LGM

Fig. 7. Franchthi Cave, Peloponnese. View of the site
until the beginning of the Holocene, was uncovered in the Öküzini Cave (Fig. 8). The Late Glacial layers yielded blade technique that used double-platform cores reduced into sub-prismatic cores. The blade technique co-occurs with numerous geometric microliths (lunates, bladelets with a convex back, triangles). This techno-typological tradition persisted until the beginning of the Holocene, although in Epipalaeolithic assemblages (sometimes described as Antalyan) new elements appeared such as isosceles triangles produced by the use of microburin technique. Such triangles are also reported at the Early Holocene sites of Beldibi and Belbasi in the same region (Bostanci, 1965).

Fig. 8. Öküzini Cave near Antalya, Turkey. Stratigraphic sequence
It should take into account that the overall picture of coastal occupations during the Early Holocene on the continent as well as on the islands is incomplete due to post-Pleistocene sea rise from the -35 m level Mesolithic shoreline to the current sea level. Thus an unknown number of sites on the Mesolithic beaches are today submerged. The underwater investigations in the vicinity of Mesolithic sites have provided some evidence such as near Maroulas on Kythnos where burials cut out in the cliff were recorded, and in the vicinity of the Cyclope Cave on the island of Gioura.

THE EARLY PHASE OF THE AEGEAN MESOLITHIC

The local lithic tradition of the Mesolithic of continental Greece continued to survive and the isolation of particular sub-regions is reflected in the minor flow of extralocal raw materials. This flow required such as in the case of groups who occupied the Sarakenos Cave in Beotia, to use local limestone pebbles (Sampson et al., 2008b). The inhabitants of the islands in the Aegean Sea, unlike in the continental Mesolithic, succeeded to develop broad networks of contacts. The visits on the islands must have taken place by people from the continent in several episodes, who were responsible also for repeated contacts between the various islands. The sequence of dates from the site of Maroulas on Kythnos (Fig. 9) (Facorellis et al., 2010; Sampson et al., 2002) points to a relatively early settling of the Cyclades (the first half of the 9th millennium cal BC). At Maroulas remains of stone dwelling structures were discovered (Figs 10, 11), with floor levels renovated several times, and sometimes with burials underneath the dwelling structures, or between them (Fig. 12). The filling of several dwelling features yielded single human bones.

Foraging played an important role in the diet of the inhabitants of Maroulas, especially the gathering of Helix figulina snails. Fishing was practiced catching seasonal migrating species.
Fig. 10. Maroulas, Kythnos island, Cyclades. Map of the excavated area (C1 - stone constructions, G1 – graves, T1 – trenches)
such as tuna, as well as fish whose habitat was the littoral zone such as morays/conger eels, groupers, and scorpion fish. The presence of numerous grinders and grinding stones (Fig. 13) indicates that plant foods also had a considerable importance in the local diet. A controversial issue is the evidence for pig domestication, though the agency of humans in the presence of pig on the island is highly likely (Trantalidou, 2010).

The lithic industry at Maroulas shows a high proportion of the extralocal Melian obsidian (31.1%). The most frequent among the tools are denticulated-notched forms, end-scrapers, perforators and arched backed pieces (Fig. 14).

The dates from the west trench in the Cyclope Cave on the island of Gioura are only slightly younger (the middle of the 9th millennium cal BC). The small lithic inventory from this site consists mainly of flakes and flake tools, end-scrapers, retouched flakes and notched tools (Sampson et al., 1998, 2008a).

Mesolithic remains were found also on other islands in the Aegean Sea. For example groups of sailors reached Ikaria (Fig. 15). Analysis of the inventory from the site of Kerame I showed its similarity to the industry from Maroulas on Kythnos (Fig. 16). Thus, it can be assumed that Ikaria was occupied fairly early. Regrettfully, radiocarbon dates could not be obtained, while dates from obsidian hydration are not sufficiently precise. No stone dwelling structures were discovered except for stone rings around hearths. Artifacts from extralocal raw materials are mainly obsidian from Melos and Ghiali thus confirming the contacts between territories lying some 170 km away to south-west of Melos and about 130 km to south-east of Ghiali. Mesolithic foragers of the Aegean islands apparently mastered seafaring and were adept at taking advantage of local currents and favorable winds.
Fig. 12. Maroulas, Kythnos island, Cyclades. Burial no 24 under construction no 22)

Fig. 13. Maroulas, Kythnos island, Cyclades. Ground stone implements: 1, 2 – stone vessels, 3 – pestle, 4 – grinder
Fig. 14. Maroulas, Kythnos island, Cyclades. Chipped stone implements: 1-3 – end-scrapers, 4-8 – bees, 9-22 – microliths, 23-26 – denticulated/notched tools
Fig. 15. Kerame, Ikaria island, Eastern Aegean. Excavations of the Mesolithic site

Fig. 16. Kerame, Ikaria island, Eastern Aegean. 1-3 – double truncations, 4-14 – backed pieces
THE LATE PHASE OF THE AEGEAN MESOLITHIC

Sites ascribed to the Late Phase of the Mesolithic on the Aegean Sea islands are poorly recognized. The most complete sequence was discovered in Cyclope Cave on the island of Gioura (Fig. 17). The Late Mesolithic layers, dated to the second half of the 8th millennium cal BC, provided an industry with mainly flake and splintered techniques, with retouched tools (up to 25% of all artifacts) including end-scrapers, retouched flakes, and denticulated-notched tools. Two, fairly large backed blades of which one is with bipolar retouch, support the suggested Epigravettian tradition of this industry (Fig. 18). Most the inventory was made on flint that possibly was obtained from primary deposits indicated by the striations on the flakes’ cortex, whereas the use of Melian obsidian is uncertain. Assuming that the few obsidian artifacts came from the Late Mesolithic layers then they could indicate the use of microblade technique and the production of backed inserts: trapezes and arched backed pieces.

The Late Mesolithic layers from the Cyclope Cave provided abundant information concerning the subsistence that facilitated the formation of the
material culture of its occupants. For example, fish hooks in various stages of manufacturing made from bone and antlers (Moundrea-Agrafioti, 2003) document on-site production. These specimens have been AMS dated to 6,900–7,800 cal BC.

Archaeozoological studies revealed the complex structure of the local economy. Besides marine fishing (Powell, 2003; Mylona, 2003) and bird hunting an important role, from the Early Mesolithic, played by suids and caprids whose status probably suggests early phase of domestication (Trantalidou, 2003, 2008, 2010).

The Late Mesolithic sites on the other islands of the Aegean Sea were not dated. Nevertheless, the techno-morphological features ascribes the finds from the surface collection of A. Sampson on the island of Naxos (Cyclades) and Chalki (Dodecanese) to the Late Mesolithic. Artifacts from Row on Naxos made from white-patinated flint and Melian obsidian mainly represent the splintered and flake technique (Fig. 19). Sporadic blades were used for the production of end-scrapers, backed pieces and some trapeces that were sometimes made on flakes. All the truncations, notched tools, and atypical perforators were also shaped from flakes. The main bulk of the inventory from Naxos, although not without some Neolithic admixtures such as a macroblade with bilateral retouch used as a sickle, belongs to the flake tradition of the Aegean Mesolithic, while the presence of typical trapeces points to its Late Phase.

Similar evidence indicates that the surface finds from the island of Chalki can be attributed to the Late Mesolithic. This inventory was mainly made on obsidian from Melos and from Ghiali, and on some less frequent siliceous rocks. The specific feature of this inventory is the presence of flake cores and hypermicrolithic microblade cores: single-platform sub-conical and double-platform specimens. Splintered technique is less frequent than on Naxos. Among the tools the microlithic backed pieces are much more numerous including lunates, backed pieces with a straight and with an angulated blunted back, typical trapeces, some of which bear three retouched sides, and truncations. Other tool groups consist of end-scrapers, notched and denticulated tools, retouched flakes and becs (Fig. 20). Although the industry from the island of Chalki shows the impact of the Aegean Mesolithic tradition, yet – at the same time the presence of microlith technology and a more numerous group of geometric and para-geometric inserts makes this industry different from the Cycladic tradition, and may point to contacts with southwestern Anatolia.

Fig. 18. Cyclope Cave, Gioura island, Northern Sporades. Flint (1,2) and obsidian artefacts (3-9)
Analyses of lithic raw materials exploited in the Aegean Mesolithic confirm the existence of systematic networks of marine contacts between islands. The Cyclades and the northern Sporades were supplied with Melian obsidian whose proportion could be as much as half of an inventory. In the eastern part of the Aegean basin, in addition to Melian obsidian, also the poorer quality obsidian from Ghiali was brought to islands. Both on Ghiali and on Melos the obsidian nodules were obtained from secondary deposits on the beaches as the size of the concretions and the rolled cortex suggests (Figs 21, 22). Melian obsidian was also brought to the mainland and occurs at Mesolithic sites in the eastern Peloponese, but in smaller quantities than in the islands.

Much less is known about the provenance of siliceous rocks whose deposits on Aegean islands have not been identified. In the Cyclope Cave on the island of Gioura flakes bear fresh cortex and striations from scraping which suggests that the flint was quarried from primary deposits, possibly from extraction pits (Kaczanowska and Kozłowski, 2008). On the other hand, in the Mesolithic inventory from Maroulas on Kythnos a Middle Palaeolithic flake from white-patinated flint was found. This flint may come from the mainland where it was collected from an outcrop in the vicinity of Middle Palaeolithic sites.

**THE EARLY HOLOCENE SITES ON CRETE**

Surface collections from the sites on the southern coast of Crete in the region of Plakia (Strasser *et al.*, 2010) have been interpreted as reflecting the presence of Mesolithic foragers on the island.
Mesolithic artifacts, the authors claim, supposedly, occur at nearly 20 sites. The most numerous collections come from Schinaria 1 (564), Danmoni 1 and Ammoudi 3. The artifacts in the collections were dominantly made from local rocks, mainly from quartz, occasionally from siliceous rocks (cherts). The artifacts from these sites exhibit the removal of flakes that were mainly retouched as well as shaped into forms of denticulated-notched tools, end-scrapers and atypical perforators (Fig. 23). The presence of tools groups that the authors view as diagnostic for identifying Mesolithic industries such as backed pieces, burins and geometrical microliths is questionable. The alleged geometric microliths, predominantly on quartz flakes are solely accidental forms although
sometimes they demonstrate steep retouch resembling the *raclettes* but they do not fall within the definition of geometric microliths (Strasser *et al.*, 2010:fig. 16a–k, 21, 22:a–e). The specimens in fig. 15 of this publication of a mesial fragment of a blade (Strasser *et al.*, 2010:fig. 15 left) made from siliceous rock is most probably of Neolithic age. It is juxtaposed a piece of quartz whose trapezoidal shape is not the result of intentional retouch (Strasser *et al.*, 2010:fig. 15 right).

The sites from the Plakias region area exhibit some features in common with flake industries made on quartz from the Cyclades (notably from the island of Kythnos), but they have not provided diagnostic forms that would allow to ascribe them to the Mesolithic. The radiometric determinations from the site of Danmoni announced in the internet, were unfortunately not mentioned in the report from the latest excavations et this site (Strasser *et al*. 2014).

Searching the links with the Aegean Mesolithic in the lithic industry that co-occurs with the “Aceramic Neolithic” (or the “Initial Neolithic”) from layer X at Knossos (Evans, 1994; Conolly, 2008; Efstratiou, 2005) is important. This industry has been dated to the 8th/7th millennium cal BC transition and the beginning of the 6th millennium cal BC and contains the complete “Neolithic package” indicative of links with the eastern part of the Mediterranean Basin. The simultaneous presence of numerous artifacts from Melian obsidian (69.7%) is the evidence of contacts with the Cyclades, whereas techno-morphological characteristics of this industry, which used micro-flakes and splintered technique (19.1% of splintered pieces) indicates links with the Aegean Mesolithic, while the presence of blades/bladelets (8.1%) indicates its Late Phase.

In terms of morphology the common elements of the Aegean Mesolithic and the Initial Neolithic
from Knossos are obviously the denticulated-notched tools and retouched flakes, as well as some specific types or variants of tools (Kaczanowska and Kozłowski, 2011:pl. III 7) such as nosed end-scrapers (Sampson et al., 2010:pl. XIV 1–6). In addition, small arched backed pieces from Maroulas (Sampson et al., 2010:pl. XVIII 1–6) and from Kerame (Sampson et al., 2012:fig. 2.2–6) that are thicker at Maroulas than in Crete, should be noted (Figs 24, 25). Moreover, some trapezes/double truncations from Knossos (Kaczanowska, Kozłowski 2011 Pl.III 4) resemble the specimen from Maroulas (Sampson et al. 2010, Pl.XVII 12-14).

Thus, several techno-morphological features of the inventory from layer X at Knossos are common among the assemblages of the Aegean Mesolithic and this supports the contention that both had a shared cultural tradition.

**WESTERN AEGEAN EPISODES DURING THE EARLY HOLOCENE OF CYPRUS**

Undoubtedly the oldest occurrences of human presence on Cyprus are the Epipaleolithic sites. Regrettfully, in the present state of investigations we are unable to identify in Cyprus homogeneous Epipalaeolithic assemblages. Even at Aetokremnos, in the supposedly “pure strata” 2 and 4, the large and middle size blade blanks, mainly used for the production of burins (Simmons, 1999:fig. 6.5), co-occur with a microlithic bladelet-flake industry which is dominated by short end-scrapers and a small number of geometric microliths (Simmons, 1999:fig. 6.6a–d).

The origins of the first occupants of Cyprus is probably, connected with the makers of Epipalaeolithic industries in the middle-south Anatolian coast such as in layer Ia1 from the Öküzini Cave (Yalçinkaya et al., 2002:fig. 24a) dated at 10th-9th millennium cal. BC.
Recent discoveries by A. Ammerman at Nissi Beach near Agia Napa in south-eastern Cyprus (Ammerman et al., 2007, 2008) contributed to a better understanding of the sequence of Epipalaeolithic to PPN in Cyprus (Fig. 26). The techno-morphological analyses carried in 2010/2011 of the lithic finds from Ammerman’s excavations at Nissi Beach allowed us to distinguish two assemblages in this site, namely, one that is based on microflake technology and the other characterized by macroblade technology (Kaczanowska and Kozlowski, 2014).

At Nissi Beach most artifacts belonging to the “microflake assemblage” were found on the surface of a consolidated sandy dune (eolianite), whereas most lithics attributed to the “macroblade assemblage” were excavated in the loamy-clay paleosol filling the depressions in the dune surface.

The “microflake assemblage” is based mainly on single platform reduction of microflake cores, produced on-site from pebbles of local chert and flint. Blanks were shaped into side-scrapers, retouched flakes, backed pieces, becs, and denticulated/notched tools (Fig. 27).

Fig. 23. Schinaria, Crete. Mesolithic (mostly quartz) artefacts according to Strasser
It is difficult to find analogies to the “microflake” assemblage on Cyprus. There are some similarities with surface assemblages of sites in the region of Akrotiri such as site 2 (Vounarouthkia tōn Lamnion) and site 3 (Limassol Lighthouse). We must remember, however, that these are surface sites and could be a palimpsest of various episodes. Shells from these sites provided dates that are later than prehistoric times (Simmons, 1999).

Closer analogies to the “microflake” assemblage can be found in the assemblages of the Aegean Mesolithic. The Aegean Mesolithic from Maroulas and the “microflake” assemblage from Nissi Beach show similarities of major retouched tool categories, although the frequencies of these categories are different. The morphology of diagnostic groups such as perforators-becs, straight and arched backed pieces, truncations resembles a number of forms of those in the “microflake” assemblage at Nissi Beach (Sampson et al., 2010:pl. XVI, XVII, XVIII 16).

The “macroblade” assemblage from Nissi Beach, found in the paleosol filling the depressions, is based mostly on macro- and middle-size blade technology. Blades were mostly produced off-site from good quality flint imported from Mesozoic formations on the eastern slopes of the Trodoos Mts. These blade blanks were transformed into burins, retouched blades and used as sickle inserts (Fig. 28). The “macroblade assemblage” from the techno-morphological point of view could be attributed to the Late Phase of the Cypro-PPN. This attribution is confirmed by AMS dates on shells from the paleosol in Nissi Beach, between 7750 and 7100 cal BC (Ammerman et al., 2008:14).
Fig. 25. Knossos, Crete, layer X. Artefacts from aceramic layer: 1 – burin, 2-4 – retouched truncations, 5-7 – end-scrapers, 8,9 – retouched blades

Fig. 26. Nissi Beach, Cyprus. View of the site
The basic problem is the chronological relationship between the “microflake” and “macroblade” assemblages in Nissi Beach. Numerous radiometric dates from the Aegean Mesolithic fall in the interval between 8800–8600 cal BC (Facorellis et al., 2010), i.e., they are earlier than the dates of the shells from the “macroblade” assemblage at Nissi Beach. Therefore, if the “microflake” assemblage is later than the “macroblade” assemblage, as indicated by the stratigraphic sequence, then the chronology of the “microflake” assemblage must be much later than that of most of the Aegean Mesolithic sites.

The hypothesis about the catastrophic event of a tsunami that may have caused the displacement of big blocks and artifacts found on the surface at Nissi Beach is a plausible explanation for the reversed stratigraphic sequence at Nissi Beach (Ammerman et al., 2008; Ammerman, 2010).

The surface “microflake” artifacts possibly originate from the Early Holocene coastal sites, today situated below the sea level. The coastal camps of foragers in the Aegean Sea Basin could be at least partially contemporary with inland settlements of food producing groups of the Cypro-PPN.

**THE PLEISTOCENE/HOLOCENE TRANSITION IN THE NORTHERNMOST AEGEAN**

While the islands of the southern and central part of the Aegean Sea basin were frequently visited only at the beginning of the Holocene, the islands of the northern part – on the other hand – Lemnos is the first, provided numerous sites dated from the latest part of the Younger Dryas. Moreover,
Fig. 28. Nissi Beach, Cyprus. “Macroblade industry”: 1, 2 – burins, 3, 4 – retouched blades, 5-7 – retouched truncations, 8-10 – sickle inserts
the occupants of the Early Holocene sites in the Cyclades, the Dodecanese and the Sporades originated from eastern Greece, whereas the sites of the northern Aegean are linked with western Anatolia.

Most importantly are the investigations by N. Efstratiou on Lemnos who excavated a complex of sites at Ouriakos that provided a sequence of assemblages with microblade technology based on subconical, single-platform and double-platform cores (Fig. 29). The most characteristic tools are microliths, dominated by lunates and bladelets with an angulated back, shaped by steep retouch, often bipolar, but without the use of microburin technique. Other tools are end-scrapers, mostly short, and atypical burins. Surface sites on Lemnos with microblade inventories are much more numerous such as in the area of Fyssini. All the assemblages used local flint, radiolarite, opalite and jasper.

So far only one radiometric determination have been obtained from the lowest part of the sequence of Ouriakos (10,437-10,198 cal BC; Efstratiou et al., 2014), corresponding to the end of the Younger Dryas (Fig. 29). Close analogies for Ouriakos can be found in south-western Anatolian sites such as Öküzini Cave, near Antalya (Yalçinkaya et al., 2002). The similar assemblages in Öküzini Cave date to the Late Pleistocene between layer VI (12th millennium cal BC) and layer Ia1 (10-9th millennium cal BC). Assemblages with microblade technology were also recorded in the Early Holocene layer 0 in that cave. The continuation of this technological tradition in the Early Holocene is evidenced in the sequence from Beldibi Cave where geometric microliths, made by using the microburin technique, occur in the Early Holocene layer C, and even co-occur with ceramics in layer B (Bostanci, 1965). In the Final Pleistocene

Fig. 29. Ouriakos, Lemnos, Northern Aegean. View of the site
Gokceada together with Lemnos formed a mega-island which could have been reached from Anatolia by a sea route.

CONCLUSIONS

Although the origins of Mesolithic industries in continental Greece and on the Aegean Sea islands are similar, their evolution was somewhat different. The “continental Mesolithic” is more strongly bound with the local substratum and shows a greater variability. Possibly, this was the impact of environments shared by the groups in continental Greece during the Early Holocene. Particular groups lived in isolation and the proportion of extralocal raw materials at the investigated Mesolithic sites is therefore small. Changes become conspicuous only around the middle of the 7th millennium together with the diffusion of the food-producing economy.

The result of maritime contacts is manifested, among others, in the broad distribution of obsidian, that was an early adoption of selected components from the “Neolithic package”. A. Ammerman (2010) put forward the hypothesis that the economy of some forager groups on Cyprus was focused on the exploitation of marine environment as an alternative to the Neolithic economy. The islanders from the Aegean Sea managed to combine elements of food producing economy, acquired via contacts with the territories in the eastern part of the Mediterranean Sea, with elements of traditional foraging. On Cyprus the sites with flake industries such as Nissi Beach are the evidence for these contacts. Paradoxically, the “creative adaptation” had not accelerated the process of Neolithization proper, but just the opposite – it caused the halting of this process.

Selective adoption of elements form the “Neolithic package” by some Mesolithic communities of the Aegean Mesolithic, or even the presence of the full “Neolithic package” (e.g., the Initial Neolithic from Franchthi layer X and Knossos layer X) does not fully explain the origins and mechanisms of the spread of the Ceramic Neolithic with the macroblade technique in the Aegean Sea basin and in the Balkans. The concept proposed by S.K. Kozłowski (in press) concerning the “Castelnovization” of Europe as a proxy of autochthonous neolithization has not been confirmed by the current knowledge of lithic industries in the Aegean Sea Basin and the Balkans. Neolithization was a much more complex process that combined elements of adaptation to local environmental conditions, as well as migrations (Kozłowski and Kaczanowska, 2009).

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REFERENCES


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GATSOV I., OZDOGAN M. 1994. Epipalaeolithic sites from North-Western Turky. Anatolica 20, 97–120.


and Anatolia. *Mediterranean Archaeology and Archaeometry* 4, 5–18.


KOZŁOWSKI S.K. (in press). The Preneolithic (R) evolution or what in Europe around 7000 years cal BC.


(Cyclades, Greece) and the Mesolithic settlement at Maroulas. Polish Academy of Arts and Sciences, Kraków.


