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Between Anatolia and the Aegean: Epipalaeolithic and Mesolithic Foragers of the Karaburun Peninsula

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ABSTRACT

The Epipalaeolithic and Mesolithic periods of Turkey are poorly understood. The discovery of two sites (Kocaman and Kayadibi) in the Karaburun Peninsula in coastal western Turkey opens a whole new window into our understanding of these periods in Turkey and beyond by providing the first solid evidence for pre-Neolithic foragers. This article presents typological and technological properties of the lithics from these two open-air sites in terms of raw material selection, tool types, and technological preferences and discusses the results in relation to contemporary Anatolian, Aegean, southwest Asian, and southeast European industries. Typological and technological analyses suggest that Kocaman lithics were part of the eastern Mediterranean and northern Aegean Epipalaeolithic traditions; the Kayadibi lithics, on the other hand, correspond well with the Aegean Mesolithic assemblages. The lack of any affinity between the Kayadibi and Initial Neolithic lithic assemblages from western Turkey has important implications about the Neolithization process of western Turkey and the Aegean.

KEYWORDS

Neolithization; prehistoric Anatolia; lithics; Izmir; Turkey

Introduction

One of the least investigated topics in Anatolian archaeology is foraging in the Final Pleistocene and Initial Holocene periods. Despite continuous efforts to document the Epipalaeolithic period of Turkey (Gatsov and Özdoğan 1994; Kartal 2003; Arbuckle and Ereğ 2012; Baird 2012; Özbek and Erdoğan 2014), the number of fieldwork investigations which target this period remains low, leaving vast areas (some larger than Bulgaria) of the country entirely uninvestigated in terms of early prehistory (Figure 1). Western Anatolia is such an area, an empty zone between the well-known sites of Öküzini and Franchthi Cave (Carter 2016; Kozłowski 2016).

Until the early 1990s, little systematic research had focused on the pre-Neolithic and Neolithic heritage of western Anatolia, creating a huge lacuna in our understanding of the last forager and early farmer-herder lifeways. Lack of substantial evidence in this area about forager technologies, mobility, and subsistence hampers both the understanding of forager activities and of forager-farmer interactions during its Neolithization. Starting in the 1990s, Neolithic research in western Anatolia witnessed a welcome upsurge in excavations at sites dating back to the early 7th millennium B.C. (Çilingiroğlu 2017). However, these excavations, too, failed to deliver direct evidence of pre-Neolithic forager life in the area.

This article presents new evidence from two newly discovered open-air sites in western Turkey that significantly broadens our knowledge of Final Pleistocene and Initial Holocene foragers of Anatolia, the Aegean, and the eastern Mediterranean by filling a long-standing research gap. Named Kayadibi (POI.15.31) and Kocaman (POI.16.35), the sites were discovered in 2015 and 2016, respectively, through pedestrian

surveys run by the Karaburun Archaeological Survey Project (KASP) in the Karaburun Peninsula, near the modern city of Izmir (Figure 2). Here, we discuss the results of the typological and technological analyses of Kayadibi and Kocaman lithic assemblages, set against the background of site locations, lithic densities, and distribution of forager sites in the surveyed area. We suggest relative dates for their occupation and compare the sites with each other to demonstrate the radical technological changes that took place in western Anatolia between the Epipalaeolithic and the Mesolithic periods. We contextualize the Karaburun assemblages within the European Epipalaeolithic and Mesolithic traditions, and we infer the dynamic nature of changing networks and technologies from 10,000–8,000 B.C. Finally, we discuss the significance of these discoveries in terms of the Neolithization of the Aegean. Our analysis of the lithic assemblages from these sites, first, highlights that western Turkey at this time belonged to a greater Aegean catchment “culture” at the Anatolian-Aegean interface and, second, confirms the previously identified distinction between the lithic industries of the Aegean Late Pleistocene and Initial Holocene.

The Late Pleistocene, characterized by backed bladelets and geometric microliths in post-Late Glacial Maximum deposits, has been variously defined as Final Palaeolithic, Epigravettian, or Epipalaeolithic in the Aegean and the Balkans (Perlès 1999; Kozłowski and Kaczanowska 2009; Efstratiou, Biagi, and Starnini 2014). In general, the late Pleistocene industries are characterized by a blade technology, which is particularly evident in northeastern Italy (Borić and Cristiani 2016). Blade blanks were used for producing short end-scrappers, backed points with straight or convex backs, and geometric inserts, such as trapezes or segments (Montet-White

Figure 1. Major sites mentioned in the text.

and Kozłowski 1983). This article will refer to this stage as the Epipalaeolithic.

In the Aegean, the term Epipalaeolithic denotes the Late and Final Pleistocene, typified by a microlithic bladelet industry, whereas the term Mesolithic refers to the Initial Holocene, characterized by a non-microlithic flake industry. Both of these distinct entities are characterized by foraging lifeways. The Epipalaeolithic precedes the onset of the warm and humid conditions of the Holocene, which is marked by a radically transformed toolkit. Microliths, bladelets, and geometric inserts disappear; they are almost completely replaced by a crude flake industry with a toolkit dominated by retouched flakes, end-scrapers, denticulates, and notches (Runnels 1995; Perlès 2003; Kozłowski and Kaczanowska 2009). The end of the Mesolithic in the Aegean and western Turkey is manifested by the appearance of food-producing economies. In the lithics, it reveals itself with the appearance of sickle elements and pressure-flaking technique (Milić 2019).

Research Background: Lithic Assemblages of the Last Foragers in Turkey, Greece, and the Balkans

Until the 1980s, Öküzini and Karain, in Antalya, represented the only well-documented Epipalaeolithic assemblages in Turkey. Especially the Öküzini Cave, which, with an uninterrupted sequence from 18,000 CAL B.P. into the Early Holocene, has been the type site of the entire Anatolian Epipalaeolithic (Otte et al. 1995; Kartal 2009).

In the 1980s, survey and excavation projects started exploring the Anatolian Epipalaeolithic beyond the Antalya region. Surveys by M. Özdoğan along the north shore of the Bosphorus in Istanbul produced new assemblages that came to be known as the Ağaçlı Group, a blade industry with conical cores and microlithic tools that display similarities with Balkan Epipalaeolithic traditions (Gatsov and Özdoğan 1994). Although never excavated or dated using

absolute methods, the Ağaçlı Group showed that technologies and typologies were different than the Antalya Group that existed in southern Anatolia.

Central Anatolia was another unknown region in terms of the Epipalaeolithic period, until T. Watkins and D. Baird excavated the rock shelter of Pınarbaşı B, between 1993 and 1995. Excavations here yielded a geometric microlithic assemblage with technological features comparable to Early Natufian and Öküzini Epipalaeolithic industries, offering significant insights into Late Pleistocene forager lifeways on the Anatolian Plateau from ca. 15,000–12,000 CAL B.C. (Baird 2012; Baird et al. 2013). Recent surveys in western Cappadocia continue to reveal new Epipalaeolithic sites in Central Anatolia with distinct local Epipalaeolithic lithic technologies that exploited the Nenezi and Göllüdağ obsidian sources (Duru and Kayacan 2018).

The 2000s witnessed a new wave in Epipalaeolithic research, with new fieldwork in western, central, and eastern Anatolia specifically targeting Epipalaeolithic and Initial Neolithic sites. Surveys in the Gallipoli Peninsula discovered possible Epipalaeolithic sites (Özbek 2009; Özbek and Erdoğan 2014; Kozłowski 2016). Excavations at the Girmeler Cave, in southwestern Turkey, produced evidence for occupation during the 9th and 8th millennia B.C. (Takaoglu et al. 2014). Direkli Cave, in southeastern Turkey, provided a wide spectrum of data on the seasonality of occupation, subsistence modes, and forager technologies at the Pleistocene-Holocene interface (Arbuckle and Erek 2012). Last but not least, the discovery of Epipalaeolithic layers at Körtik Tepe, near Diyarbakır, and the 10th millennium B.C. layers at Hasankeyf offered new insights into the last foragers in southeastern Anatolia (Benz et al. 2015; Kartal et al. 2018; Miyake et al. 2012; Maeda 2018).

Western Anatolia remained outside these advances in Epipalaeolithic and Mesolithic research. For instance, until the KASP started its investigations in 2015, the earliest finds from the Karaburun Peninsula dated to the 5th millennium

Figure 2. Locations of Kayadibi, Kocaman, and smaller lithic scatters in the Karaburun Peninsula.

B.C. (Koşay and Gültekin 1949). As late as 2013, archaeological evidence for pre-Neolithic prehistory in the Izmir province was limited to two accidentally discovered Palaeolithic bifaces (Kansu 1963, 1969). More importantly, not a single assemblage that could possibly relate to the Epipalaeolithic or Aegean Mesolithic traditions had been identified in the vast region between the Aegean coast and Pınarbaşı on the Konya Plain.

In contrast to Anatolia, Palaeolithic and Mesolithic research in Greece advanced significantly in the last decades. This research showed that in the Final Pleistocene, the western part of the Aegean basin continued producing Epigravettian lithics (Kozłowski and Kaczanowska 2009). During this period, most Aegean islands could be reached from both continental Greece and the Anatolian coast. The most complete sequences dating to this period are represented by Franchthi Cave, in particular its Lithic phases IV–VI (Perlès 1987, 1995), and Sarakenos Cave, in particular its horizons 5–10 (Kaczanowska, Kozłowski, and Sampson 2016), in the Argolid and Boeotia, respectively. In this period, settlement

in the insular Aegean had already started, as demonstrated by site KT 21 on Kythnos and the site of Ouriakos on Lemnos (Sampson, Kaczanowska, and Kozłowski 2010; Efstratiou, Biagi, and Starnini 2014).

The chipped stone industries in Franchthi Cave evolved from assemblages with backed bladelets, either straight or with oblique truncations (Lithic phase IV), to assemblages with inserts with double backs (Lithic phase V), and, finally, to assemblages with geometric inserts produced using the microburin technique (Lithic phase VI) (Perlès 1987, 1995). This technique was also used by groups inhabiting Cave 4 in Klisoura Gorge, a nearby site in the Argolid, to produce numerous backed inserts, most often with straight backs (Koumouzelis, Kozłowski, and Kaczanowska 2004). Insert tips were sometimes formed with the *piquant trièdre* technique. In a period corresponding to the Late Pleistocene, Cave 1, neighboring Cave 4, revealed two occupation gaps: one during the Late Glacial Maximum (ca. 16000 CAL B.P.) and the second during the Final Pleistocene (12000–10000 CAL B.P.). The latter gap, observed in Klisoura Cave 1, has

not been recorded in other caves in the Argolid, such as Kephalaria layer C (Stiner et al. 2010).

In the western part of the Aegean basin, the closing stages of the Pleistocene are also represented in Level I at Kastritsa Cave (dated to $12,400 \pm 210$ B.P.) in Ioannina, where the flake component is more pronounced, including retouched tools, even though inserts were still produced using the microburin technique (Bailey et al. 1983). At the close of the Pleistocene, a decrease in settlement density is noticeable, despite continuity in the Epigravettian traditions (Kozłowski and Kaczanowska 2009).

The beginning of the Mesolithic in Greece is usually dated to the turn of Dryas III/Preboreal, which is around 9700 B.C., while the end of this period is marked by the emergence of an agro-pastoral economy (Perlès 2001). Drastic climatic changes that coincided with the Mesolithic period in Greece allowed a broadening of the diet to include marine resources and a greater variety of plant species (Bottema 1991; Mylona 2003, 2014; Stiner and Munro 2011). Coastal areas were attractive, full of resources that could be incorporated into a varied diet, hence mitigating the risk of famine in the event of seasonal or longer-term scarcity. New subsistence strategies could, according to Mihailović (2017), have necessitated supplementing specialized hunting tools with more universal and multifunctional flake tools. Indeed, flake tools, such as short end-scrapers, *becks*, retouched flakes, notches, and denticulates, constitute significant percentages of the lithic inventories in Franchthi Cave (Perlès 1990); at the site of Kerame, on Ikaria (Sampson, Kaczanowska, and Kozłowski 2012); in the Cave of the Cyclope, on the island of Youra (Sampson, Kozłowski, and Kaczanowska 2003); and, at Sidari, on Corfu (Sordinas 2003; Kaczanowska and Kozłowski 2014). The increased importance of flake tools was also noted in inventories from the sites attributed to the contemporary inventories recovered in the Adriatic (for instance, at the sites of Crvena Stijena (Whallon 2017) and Odmuť (Kozłowski, Kozłowski, and Radovanović 1994).

Mesolithic islanders were capable of seafaring, and sea travel enabled exchange of various goods, such as Melian obsidian (Carter 2016; Carter et al. 2019). Sea routes may even have contributed to the transmission of certain elements of the southwest Asian Neolithic (such as the stone architecture, sub-floor burials, and grinding stones) as early as the first half of the 9th millennium B.C., as indicated by the finds from Maroulas, on Kythnos (Sampson, Kaczanowska, and Kozłowski 2010; Kaczanowska and Kozłowski 2014).

Inland Greece was also inhabited by forager groups (Kaczanowska and Kozłowski 2018). The lithic assemblages from Klissoura Cave 1 indicate that these groups continued local Epigravettian lithic traditions, on which Early Mesolithic Sauveterian influences from the central Mediterranean were overlain (Kaczanowska, Kozłowski, and Sobczyk 2010). Some hunter-gatherer groups, however, showed a tendency for isolation, reflected by the exploitation of local, low-quality lithic raw materials. These groups based their subsistence on hunting small and medium-sized mammals (Starkovich 2012). Some of them, in particular in Boeotia, survived until the appearance of the first Neolithic settlers, from whom they gradually adopted certain features of the Neolithic economy (primarily animal husbandry; Kaczanowska and Kozłowski 2018).

Karaburun Archaeological Survey Project (KASP): Aims and Methods

Karaburun is a north-south oriented peninsula located on the western side of the Izmir Gulf in western Turkey. One of the westernmost points in Turkey, it is located just 18 km east of Chios and 33 km south of Lesbos. The peninsula is composed of rugged and mountainous terrain, varying from the Akdağ peak, at 1212 masl, to long and indented strips of coast. The complex and mainly pre-Quaternary geological elements of the area include mostly limestone and, to a lesser extent, Neogene volcanic formations (Erdoğan et al. 1990). Holocene sedimentation is limited to a few stretches of land. The coastal areas, with their thick limestone formations, grey-blackish basaltic rocks, and weak floral presence offer perfect surface visibility, while the rugged hinterland is covered by evergreen shrubs hampering visibility, as well as field walking. The area contains several important raw material sources that make it interesting for prehistoric research. Apart from the occasional presence of good-quality chert and the common presence of fine-grained basalts, the area also has sources of cinnabar, marble, and serpentine.

The Karaburun Archaeological Survey Project (KASP), led by one of us (Ç. Ç.), has been investigating the peninsula's archaeological past with a holistic approach since 2015. Prior to our investigations, the area's archaeology was known only through non-systematic archaeological fieldwork (Koşay and Gültekin 1949; Uhri, Öz, and Gülbay 2010). KASP embraces a landscape archaeology perspective, with an aim to document the variety of human activities over the landscape from the Lower Palaeolithic to the Early Turkish Republic period, using extensive pedestrian survey (Cherry, Davis, and Mantzourani 1991; Alcock and Cherry 2004; Roosevelt and Luke 2008, 2009; Bevan and Conolly 2013). Accordingly, the KASP team is composed of different specialists, including not only field archaeologists, but also zooarchaeologists, epigraphers, material specialists, underwater archaeologists, and art historians, all taking part in the fieldwork. KASP targets small-scale activity sites, camp sites, potential taskscapes, and raw material sources by documenting both intensive and less intensive surface scatters and other traces of human activity, such as architectural remains and cemeteries. Walking in 2–5 m transects enables the team to systematically cover specific landscape types intensively. When the rugged landscape and heavy vegetation prevent the team from walking in transects, the team follows goat paths or other open landscapes that are accessible. Each covered area that has common geological and vegetational characteristics is called a “Survey Unit” (SU), which receives a unique code. SUs may or may not include any archaeological remains. SU forms record GPS coordinates, geological formation, geomorphology, flora, surface visibility, and archaeological observations. The project has so far covered the coastline, along with a few inland areas of the Karaburun Peninsula, totaling 69 survey units. Human-made remains are recorded separately and receive unique codes as “point of interest” (POI). A POI can be a settlement, an architectural feature, a workshop, a burial ground, a cave, an epigraphic find, or a surface scatter of archaeological materials. In the case of surface scatters, a POI number is assigned when the density reaches at least one archaeological object per square meter. Areas that contain less density of archaeological finds are recorded as a “scatter” and are recorded under the

SU number. All POIs are documented using standard forms in the field, which are subsequently recorded digitally using a Microsoft Access database and an ArcGIS database. At each SU and POI, finds are sorted, counted, photographed and—when necessary—collected for further documentation and analysis in the KASP lab, located at Ege University. Five seasons of fieldwork in the Karaburun Peninsula have produced 133 POIs.

The surveyed area contains Neolithic ($n = 3$), Chalcolithic ($n = 6$), and Bronze Age ($n = 11$) sites. The remainder of the POIs documented date to the Iron Age or the Antique, Late Antique, or Ottoman periods, when the area enjoyed a surge in population and commerce (Çilingiroğlu et al. 2018b; Aktaş, Sezgin, and Çilingiroğlu 2019). Eight POIs discovered by KASP are open-air sites of pre-Neolithic age. A further seven localities were recorded as surface scatters of pre-Neolithic age. These were recorded to gain insights about forager mobility during the Palaeolithic, Epipalaeolithic, and Mesolithic periods. Previous research in the area has demonstrated the exploitation of cinnabar by Chalcolithic groups during the 5th millennium B.C. (Koşay and Gültekin 1949). Our survey discovered that basalt was the preferred raw material of the Lower and Middle Palaeolithic periods (Çilingiroğlu et al. 2016). Neolithic and later prehistoric groups consumed local chert sources, as well as obsidian from Melian and Cappadocian sources (Çilingiroğlu and Dinçer 2018).

This article focuses on the chipped stone assemblages from two of the prehistoric POIs: Kayadibi (POI.15.31) and Kocaman (POI.16.35), discovered by KASP in the 2015 and 2016 fieldwork seasons, respectively (Figures 3, 4) (Çilingiroğlu et al. 2016, 2017, 2018a). The assemblages were initially studied by B. Dinçer and İ. Baykara in 2015 and 2016 during the survey season. Detailed documentation and techno-typological analysis by J. Kozłowski and M. Kaczanowska took place at Ege University in 2017, with the assistance of Ç. Çilingiroğlu and D. Turan. J. Kozłowski and M. Kaczanowska studied and drew the lithic material with the method they had implemented in their previous studies. All specimens

were measured using calipers; information regarding raw material, condition, blank or core types, and presence and type of retouch were recorded using a standard data sheet. The lithic comparisons rely on first-hand knowledge of the lithic assemblages from the Aegean, Anatolia, and the Balkans.

Below, we present the analysis of the lithic assemblages from these two sites and discuss their significance for the understanding of the prehistory of Anatolia and the Aegean.

The Lithic Industries of Kocaman and Kayadibi

Kocaman (POI.16.35)

Kocaman is located on a west-east oriented slope that runs parallel to the modern coastline in the southeastern part of the Karaburun Peninsula. The site is situated on a Triassic limestone bedrock (Erdoğan et al. 1990). The reddish-colored soil covering the bedrock is rather thin in some parts, while some sections of the site are densely covered with maquis. Covering an area of 0.5 ha, the surface showed a relatively intense distribution of chipped stones. A team of nine people surveyed the area in 2 m transects initially, and a second visit to the site was undertaken in 2017.

Raw Materials

The site provided 282 artifacts (Figure 5). The high proportion of cores ($n = 43$, 15%) could indicate an important role for local production or may have resulted from other factors, such as depositional conditions.

The majority of artifacts are entirely covered with a white patina, which, in most cases, makes it impossible to identify the raw materials macroscopically (Figure 6). Some of these show pinkish spots ($n = 32$). Among the macroscopically identified raw materials, white chert with dark intrusions is the most frequent ($n = 16$), grey-brown flint comes next ($n = 10$), followed by yellow-brown siliceous rock with opaque limestone intercalations ($n = 7$). Other raw materials are represented by 1–5 specimens (grey-brown siliceous rock, banded flint, grainy or smooth beige flint, reddish grainy flint, grey opaque flint,

Figure 3. General view of Kocaman (POI.16.35).

Figure 4. General view of Kayadibi (POI.15.31).

Figure 5. Comparison of the assemblage components of Kocaman and Kayadibi.

and spotted flint). Only three artifacts are made of radiolarite. Seven specimens show traces of burning.

Cores and core fragments

The largest group is the single-platform cores ($n = 24$), which are 16–30 mm long and 8–38 mm wide. Some specimens were produced on larger flakes ($n = 2$). The cores are blade-flake types. Cores with a flat flaking surface, often sub-triangular, are the most numerous (Figure 7A–E). In the final stage of reduction, a flake was detached that removed the entire flaking surface. Core platforms are, as a rule, rejuvenated by a single blow. In the case of specimens that remain blade cores until the final phase of reduction, the flaking surface can be rounded or angular (Figure 7F–G), even extending over the entire

circumference, shaping a cylindrical core (Figure 7H), or it can remain flat, while the platform is oblique (Figure 7I). Only one core was used as a splintered piece in the final stage of reduction. Some cores show centripetal scars from core preparation (Figure 7J) or a change of orientation. It should be added that the length of cores was also reduced by detaching tablets which—as a result—produced short cores (Figure 7K).

Change-of-orientation cores ($n = 10$) range between 20–28 mm in length and 14–26 mm in width. Change-of-orientation was executed by perpendicular removals on the core back (Figure 7L) or core side (Figure 7M). Microlithic cores also occur, with change-of-orientation carried out from the back and from the platform (Figure 7N). One of the variants

Figure 6. Chipped stones from Kocaman.

of change-of-orientation is the installation of an opposite platform, which, as a result, formed a double-platform core ($n = 3$; [Figure 7O–P](#)). In addition to double-platform cores formed by change-of-orientation, the assemblage contains specimens with two opposite platforms shaped intentionally in the initial stage of reduction (see a flake in [Figure 7Q](#)). Additionally, the assemblage contains small core fragments.

Flake and flake fragments

From the site of Kocaman, 131 flakes and fragments were collected, including five blade-like flakes. These artifacts make up 47% of the assemblage. Flake length ranges from 10–36 mm, width from 8–31 mm, and thickness from 2–13 mm. The majority of the specimens come from advanced stages of reduction and show no remnants of cortex. Cortical flakes account for 9%, which includes flakes with cortex covering the entire surface (5%). Flake butts ($n = 49$ specimens with preserved butts) are predominantly flat (41%). Punctiform and linear butts are less numerous, together accounting for 30% of all butts. Facetted butts are 14%, whereas unprepared (8%) and dihedral butts (6%) are relatively rare. Core angles are predominantly straight (77%) and less often obtuse (24%), whereas acute angles do not occur. Dorsal scars are, as a rule, parallel to the flake axis (35%) or perpendicular (31%). Less frequent are opposite (15%), convergent (8%), or centripetal (8%) scars. Moreover, the assemblage contained 71 small flake and blade fragments, accounting for 25% of the entire inventory.

Blades

The site provided 39 blades, but only five are complete. Blades make up 13% of the inventory. The dimensions of complete blades are 17–20 mm in length, 7–10 mm in width, and 2–4 mm in thickness. If we take into account that some fragments are 37 mm long and 17 mm wide, we can assume that some blades produced by the group were fairly large. Blades were detached from blade cores, which are evidenced by the presence of blade scars almost exclusively on the dorsal side. Blade butts are usually single-blow ($n = 8$) or prepared ($n = 6$). Unprepared or linear butts are represented by single items. Wholly cortical blades do not occur: only two specimens have lateral cortex. The dorsal pattern is mainly unidirectional, and blade edges are parallel. All these features indicate that blades were obtained in advanced stages of reduction of blade cores, following preliminary preparation.

Chips

Chips, i.e. artifacts less than 15 mm long, number 32 and account for 11% of all finds. Splinters are few ($n = 4$). Their dimensions are 17–20 mm in length, 9–17 mm in width, and 1–5 mm in thickness.

Tools

The assemblage includes 28 tools and 9 fragments of retouched tools, which constitute 13% of the inventory ([Figure 8](#)). The most frequent tools are backed pieces of various forms, followed by flakes and denticulated-notched tools ([Table 1](#)).

Figure 7. Chipped stones from Kocaman. A–P) cores; Q) flake.

Primary burin spalls. The primary burin spalls in the assemblage are detached from the proximal part of a blade (Figure 8B) and from a blade-like flake (Figure 8C).

End-scrapers. End-scrapers include one blade specimen with a weakly oblique, steep front (Figure 8D) and a fragment of a retouched edge of, probably, a flake end-scraper (Figure 8E).

Burins. The assemblage contains a lateral dihedral burin and a single burin in the proximal part of a blade (Figure 8F), as well as a single-blow burin shaped in the distal part of a blade-like flake (Figure 8A).

Perforator. There is only one perforator in the assemblage. This piece is made on a robust flake, with the point shaped by denticulated-notched retouch (Figure 8G).

Backed pieces. There are nine backed pieces in the assemblage. These are a backed piece with an angulated truncation (Figure 8H); a backed piece on a short, blade-like flake, with a convex-shaped truncation (Figure 8I); a robust backed piece, with two-sided, irregular retouch (Figure 8J); an angulated backed blade resembling a robust triangle (Figure 8K); two microlithic backed pieces with weakly convex truncations (Figure 8L); a fragment of a backed blade with a straight truncation, the blade of which has been damaged by a transversal

Figure 8. Retouched tools from Kocaman: A) burin; B–C) primary burin spalls; D–E) end-scrapers; F) burin; G) perforator; H–N) backed pieces; O–P) retouched truncations; Q–R) denticulated-notched tools; S) side-scraper; T–U) retouched flakes.

fracture; and, two regular blade crescents (lunates), one with contiguous retouch (Figure 8M) and the other with obverse retouch (Figure 8N).

Retouched truncations. Retouched truncations contain a mediolithic transversal truncation on a blade, as well as two microlithic specimens: one with a slightly oblique truncation (Figure 8O), the other with a slightly concave truncation (Figure 8P).

Denticulated-notched tools. All three of the denticulated-notched tools are made on blades. These are a specimen with bilateral notched retouch (Figure 8Q); a specimen with

lateral, denticulated retouch (Figure 8R); and, a specimen with distal retouch.

Side-scrapers. There is one lateral-distal side-scraper in the inventory (Figure 8S).

Retouched blades. The only retouched blade in the assemblage is a fragment of a blade with lateral retouch in the proximal part.

Retouched flakes. Four retouched flakes were identified. Three of these are microlithic specimens with distal and distal-lateral alternate retouch (Figure 8T). One flake with distal

Figure 9. Chipped stones from Kayadibi.

and proximal retouch, slightly denticulated (Figure 8U), is also included in this category.

Summary of the assemblage

Flakes predominate the assemblage at the site of Kocaman. Yet the proportion of blades (13%) is much higher than at Kayadibi (5%). The tool inventory is dominated by flake or blade-backed pieces. The presence of segments and retouched truncations is noteworthy. Retouched flakes and denticulated-notched tools are lower in proportion. Other tool groups are represented by single items.

In terms of blank size, Kocaman flakes (with a range of 17–20 mm) are much smaller than Kayadibi flakes (with a range of 15–54 mm), whereas the lengths of complete blades from both sites are very similar to each other. In comparison, both core and blank size at Kocaman are noticeably smaller than at Kayadibi, giving the Kocaman assemblage a micro-lithic character.

As far as core reduction is concerned, we can see attempts at maintaining—as long as possible—the blade character of cores until the residual stage. Extraction of blades was continued by rounding the flaking face until a cylindrical form was obtained. Exploitation of blades with a triangular flaking surface was continued by attempts at change of orientation on the back or by retrimming. Some specimens were shortened by detaching tablets until a short blade was produced. This operation was also preferred in the case of double-platform cores. When change-of-orientation was used, the new flaking surface was situated on the core back, perpendicular to the original flaking surface. This method of core reduction differs from that at the site of Ouriakos, on Lemnos (Efstratiou, Biagi, and Starnini 2014). At Kocaman, careful

preliminary preparation is absent; in other words, lateral trimming flakes are missing.

An almost total absence of splintered technique is noteworthy, as this technique is indeed uncommon for the Epipalaeolithic.

Kayadibi (POI.15.31)

Kayadibi is situated at 140 masl, near the limestone outcrops overlooking Balıklıova Bay, located near Mordoğan, İzmir. The site consists of a lithic scatter covering 0.14 ha in an area sloping gently southwards. The soil is reddish-brown and of compact formation. Although the site is surrounded by pine trees, the surface of the site itself is devoid of vegetation, allowing good surface visibility. Despite this good visibility, the site produced a rather low density of chipped stones. It is our impression that the surface scatter in this area is not in situ and that there is no stratigraphic deposition. The lithics do not show the kind of alteration that is characteristic of heavy rolling. For this reason, we assume that the material was possibly washed down from the close vicinity, probably a camp/activity site at the caves or rock shelters located above the low-lying slope. However, our visit to these limestone formations did not result in the discovery of archaeological remains.

Raw materials

The investigations at Kayadibi yielded 126 artifacts made from siliceous rocks (Figure 9; Table 1). Macroscopically, 14 types of raw materials were identified, of which the majority are probably of local or mesolocal origin. Most artifacts are covered with a thick layer of white patina that made macroscopic identification of the raw material difficult. The

Table 1. Typological list of tools from Kocaman and Kayadibi.

Tools	Kocaman	Kayadibi
End-scraper	2	4
Burin	2	-
Primary burin spall	2	-
Perforator	1	1
Backed piece	9	2
Retouched truncation	3	-
Retouched blade	1	1
Retouched flake	4	6
Denticulated-notched tool	3	5
Side-scraper	1	3
Fragments of retouched tools	9	-
Sickle blade	-	1
Indeterminate tool	-	1
Total	37	24

state of preservation of the artifact surfaces varies. Some specimens have glossy surfaces that could be eolian in nature or related to exposure to temperature, but there are also specimens with strongly weathered and pitted surfaces, as well as burnt specimens. The various states of preservation of the surfaces are, in all likelihood, the effect of the differing conditions of deposition of the finds. Other rare raw materials, namely beige chert and red radiolarite, are represented by only three artifacts in total.

Cores

The assemblage yielded 14 cores, including seven small, indeterminate fragments. The white patina makes macroscopic identification of the raw materials used for core production difficult. One core was made of white chert with dark intrusions.

There are four single-platform blade cores, measuring 30–50 mm in length and 20–25 mm in breadth (Figure 10A–C). The cores have lateral, one- or two-sided trimming edges, while the flaking surfaces are situated in between the distal parts of the trimming edges. Platforms are prepared, and core angles are straight or acute. Blades and bladelets measuring between 18 and 30 mm in length were detached. Cores are in a middle stage of reduction. During use, they were modified into multiplatform specimens (Figure 10D) or, possibly, into low, single-platform blade-flake cores (Figure 10E). Discoidal flake cores (Figure 10F) in the reduction phase prior to the residual stage are present as well. There is also one initial core or side-scraper on a flake (length 54 mm, width 27 mm, and thickness 34 mm).

In addition, six splintered pieces and fragments were found that could have been used as cores, as well as tools. Their length ranges between 29 and 32 mm, their width between 13 and 35 mm, and their thickness between 6 and 12 mm. These are bipolar splintered pieces, mostly made on flakes (Figure 10G); only one specimen was made on a core. The raw material used for their production is white-patinated flint; one splintered piece is made from beige, grainy flint.

Flakes

The assemblage contained 71 flakes, comprising 29 complete specimens and 42 fragments. It also contained nine fragments of either blades or flakes. Only one flake represents a definite preparation stage (a tablet). Complete flakes are 14–54 mm long, 11–47 mm wide, and 3–24 mm thick. Flake butts are, as a rule, unprepared ($n = 13$); some were possibly shaped by a single blow ($n = 8$). Only one flake has a dihedral butt.

Three flakes were entirely covered with cortex, and eight were partially cortical. The dorsal pattern of most flakes is unidirectional or perpendicular ($n = 11$). Only one specimen has an opposite, convergent, or divergent scar on the dorsal side. A few flakes show blade scars on the dorsal side ($n = 4$).

Blades

No blades have been preserved intact. The assemblage contains seven fragments, mainly proximal. Their width measures 11–20 mm and their thickness 3–8 mm. Butts vary, comprising single-blow, faceted ($n = 2$), and punctiform ($n = 1$) specimens. The dorsal pattern is mainly unidirectional ($n = 4$), and in a few cases opposite ($n = 1$) or perpendicular ($n = 1$). The assemblage also yielded two chips and two splinters.

Tools

End-scrappers. The end-scrappers ($n = 4$) are made from what is either flint or brown, transparent limno-quartzite and from white-patinated flint with pink spots. These can be described as a specimen on a blade-like flake, with an oblique, fairly high front (Figure 10H); a short blade end-scraper with lateral retouch (Figure 10I); and, two double end-scrappers, of which one is made on a regular blade with weakly oblique fronts (Figure 10J) and the other on a blade-like flake with alternately retouched fronts.

Perforators. The perforator was made on a thick cortical flake with steeply retouched point and sides (Figure 10K). The raw material is white-patinated flint with pink spots.

Backed pieces. Backed pieces include a specimen on a flake, with a strongly rounded, robust backed back (Figure 11A), and a blade specimen, with a rounded back that in the distal part is continued as a kind of front (Figure 11B). These specimens are made from white chert with dark intrusions.

Retouched flakes. The retouched flakes comprise six pieces in total: two specimens with lateral, fairly fine retouch (Figure 11C); a specimen with transversal inverse retouch (Figure 11D); a specimen with transversal obverse retouch; a flake with bilateral alternate retouch (Figure 11E); and, a specimen with very fine, steep, lateral-transversal retouch. Moreover, one small flake had fine retouch. The specimens are covered with white patina. One flake is made from beige grainy flint and one from either flint or brown, transparent limno-quartzite.

Retouched blades. The assemblage contains only one retouched blade. This is a distal fragment of a blade with lateral retouch on one edge and nibbling on the other edge, in all likelihood caused by use (Figure 11F).

Denticulated-notched tools. Denticulated-notched tools are produced both on flakes and blades. The examples in this assemblage comprise a flake with retouch on the entire circumference, with two notches in the proximal part and one notch in the distal part (Figure 11G), made from flint or limno-quartzite; a blade-like flake with denticulate retouch in the distal part (Figure 11H), made from red radiolarite; a blade with lateral denticulated retouch and nibbling in the distal part, possibly use-wear (Figure 11I); a large flake detached from a discoidal core with a lateral notch

Figure 10. Chipped stones from Kayadibi: A–F) cores; G) splintered piece; H–J) end-scrapers; K) perforator.

(Figure 11J), made from yellow-brown siliceous rock with calcareous intercalations; and, finally, a robust flake with denticulated lateral-proximal retouch.

Side-scrapers. This category comprises a bilateral, straight-convex side-scraper shaped by scaled stepped retouch, on a robust flake (Figure 11K) made from beige flint, probably extra-local; a bilateral side-scraper shaped by denticulated-notched retouch (Figure 11L); and, a lateral-convex side-scraper on a small flake, shaped by flat retouch (Figure 11M).

Sickle blades. One specimen is identified as a proximal-mesial fragment of a sickle blade (Figure 11N) made on a small

blade. The cross-section is triangular, with some gloss and fine nibbling along the sinister edge. The dimensions and type of the blade suggest that this could be a later intrusion. It is made from beige, glossy flint of possible extra-local origin.

Indeterminate tool. This category comprises a fragment of an indeterminate tool (n = 1).

Summary of assemblage

Despite the smaller sample size at Kayadibi in comparison with Kocaman, it is still possible to draw conclusions about the general character of the assemblage. Siliceous rocks are

Figure 11. Retouched tools from Kayadibi: A–B) backed pieces; C–E) retouched flakes; F) retouched blade; G–J) denticulated-notched tools; K–M) side-scrapers; N) sickle blade.

the only raw material used for the production. Single-platform blade and discoidal flake cores are present, while flakes comprise 56% of all blanks ($n=71$). Blades, on the other hand, make up only 5%, while one of these, a sickle blade, possibly belongs to a post-Mesolithic period. It is known that blades do not exceed a few percent at Aegean Mesolithic sites (Figure 12). Bipolar splintered pieces produced mostly on flakes is a recurrent type in the assemblage, another feature reminiscent of Aegean Mesolithic industries. Most tools are produced on flakes. There is only one retouched blade. End-scrapers, side-scrapers, retouched flakes, and denticulated-notched tools constitute the major tool groups.

Discussion

The sites of Kocaman and Kayadibi are significant because they contain archaeological material from previously unknown prehistoric periods in western Anatolia, with implications for technological preferences and cultural connections during the Late Pleistocene and Early Holocene in the wider Eastern Mediterranean.

Kocaman is the first site documented in all of western Anatolia that displays Epipalaeolithic features known from the rest of the Aegean and the eastern Mediterranean. Although Kocaman is located near the coast today, because Pleistocene coastlines differed considerably in this area

Figure 12. Components of the chipped stone assemblage of Kayadibi compared with other Aegean Mesolithic sites (excluding chips). Data after Sampson, Kozłowski, and Kaczanowska 2003; Sampson, Kaczanowska, and Kozłowski 2010; Sampson, Kaczanowska, and Kozłowski 2012.

(Lambeck 1996; Lykousis 2009), we know that the site must have originally been located inland. It was probably a seasonally visited locality where both the production and the consumption of lithics took place, as indicated by the presence of cores, blanks, tools, and chips. The function of the site is not clear, although we can eliminate the possibility that it was only a workshop. The assemblage is homogeneous enough to suggest a short and probably continuous period of site use.

The raw materials indicate that the Kocaman group possibly exploited a variety of local chert sources. We note that, despite the relatively large sample size, there is a complete absence of obsidian at the site. It is tempting to construe this absence either as a lack of obsidian mobility during the time in the Aegean or as an indication of the exclusion of the Karaburun Peninsula from the exchange networks. This exclusion is certainly a temporary situation, because Karaburun communities had access to Melian obsidian from the late 7th millennium B.C. onwards into the Early Bronze Age (Çilingiroğlu and Dinçer 2018; Ünlüsoy 2018).

The tool inventory from Kocaman displays features in common with the Epipalaeolithic (Final Pleistocene) of the greater eastern Mediterranean, such as the Natufian microlithic blade-based assemblages (Grosman and Munro 2017). Some technological and typological similarities can be detected with the Epipalaeolithic sites of Öküzini Cave, specifically its geological layers Ia1–Ia2, and Karain B, both in the Antalya region (Kartal 2009).

Kocaman and Öküzini have some characteristics in common in terms of the use of single-platform cores, bladelets, and geometric inserts. At Öküzini, the first geometric microliths appear in Cultural Phase 2 (14,500–13,000 CAL B.C.), along with trapezes and lunates, grinding instruments, and marine shell ornaments, while backed bladelets from the earlier phase continue to be present (Kartal 2009). Geometric

microliths and backed bladelets produced from uni-polar and prismatic cores dominate the following phase, Phase 3 (13,000–10,500 CAL B.C.). But the lunates from Kocaman are longer (21 and 22 mm) than the average length of lunates from Öküzini (i.e. 17.3 mm) (Kartal 2002, table 21). In this respect, the Kocaman examples are similar in length to the lunates from the Epipalaeolithic site of Pınarbaşı B, in central Anatolia, with an average length of 20–26 mm (Baird et al. 2013, 187). Also in contrast to Öküzini, there is no indication that the microburin technique was used at Kocaman. Finally, it is known that the entire sequence at Öküzini is characterized by a blade-based industry, with over 10% geometric inserts, without a flake component among the microliths (Kartal 2002, table 3). At Kocaman, however, the ratio of flakes to blades is very high (1:3.3), showing that the knappers actually targeted flake production.

The closest techno-typological parallel to Kocaman, however, is the tool inventory documented at Ouriakos, on Lemnos, dated from a single ^{14}C sample to 10,437–10,198 CAL B.C. (Efstratiou, Biagi, and Starnini 2014, 3). The largest tool group at Ouriakos is fine backed pieces and geometric microliths, predominantly lunates (Efstratiou, Biagi, and Starnini 2014). The very high proportion of lunates at Ouriakos (over 50%) led researchers to suggest that Ouriakos was a workshop specializing in the production of inserts (Efstratiou, Biagi, and Starnini 2014). The dimensions of lunates from Kocaman correspond to the largest specimens from Ouriakos, which are between 12 and 22 mm long (Çilingiroğlu et al. 2018a). Just like the specimens from Ouriakos, the specimens from Kocaman were produced on small bladelets, triangular in cross-section.

Kocaman and Ouriakos do, however, exhibit differences in core reduction techniques. The high proportion of trimming blades/flakes at Ouriakos, which indicates preliminary preparation, is absent at Kocaman. Another difference is that at

Ouriakos, the opposite platform was frequently installed, whereas at Kocaman, cores are mainly single-platform. Blade and flake end-scrapers are also known from Ouriakos, and they occur sporadically at Kocaman. It should be emphasized that at Kocaman, flakes with various kinds of retouch constitute a higher proportion, while at Ouriakos they are virtually absent. This may be the result of differences in the activities that took place at the two sites.

In conclusion, the high proportion of blade cores and blades, as well as the presence of geometric inserts, such as lunates, renders the site highly interesting concerning its affinities with the eastern Mediterranean and the Aegean. Despite some technological differences in the core reduction techniques and the proportion of different tools, there is compelling evidence that Öküzini Ia1–Ia2, Ouriakos, and Kocaman may belong to roughly the same temporal horizon. Efstratiou, Biagi, and Starnini (2014) have already noted the similarities between Ouriakos and Öküzini Ia1–Ia2. These authors suggested that these sites may share a common cultural origin and thus indicate sustained links between Antalya and the northern Aegean during the Younger Dryas. Based on these techno-typological similarities, we suggest that Kocaman may be roughly contemporary with Ouriakos and may also date to the late 11th millennium B.C.

The technological affinity of the Kocaman inventory with that of Ouriakos presents a missing link between Antalya and the northern Aegean cultural facies. Considering that most of the eastern Aegean islands, including Lemnos, were connected to western Anatolia during the Terminal Pleistocene, the movements of foragers must have been facilitated by land routes.

Kayadibi shows a lithic industry that is completely different from that of Kocaman. The site is located inside an open woodland area and close to limestone rock shelter formations. Research in the Argolid has demonstrated a preference for locating sites at the boundaries of different ecological zones, which allowed for the exploitation of a broad range of food sources (Runnels et al. 2005). The location of Kayadibi, which would not have been as close to the coast in the past as it is today, is broadly in agreement with this pattern.

Despite its small sample size, the Kayadibi assemblage is heterogeneous in character, suggesting the presence of non-contemporary elements. Although we think that the bulk of the assemblage belongs to the Aegean Mesolithic horizon, one sickle blade and a few of the cores display technological characteristics that are typical for later prehistoric periods, such as the Neolithic or Chalcolithic. However, the absence of non-lithic finds, pottery, and absolute dates from the site makes it difficult to make any further suggestions on the issue of chronological span.

In terms of raw material preference, mostly local chert is exploited, and obsidian is non-existent. Considering the use of Melian obsidian in the production of Mesolithic toolkits across the Aegean, implying raw material mobility in the region at the time (Carter 2016; Reingruber 2018), the absence of obsidian at Kayadibi is noteworthy, perhaps indicating a differential raw material mobility or exploitation strategy of this particular group. Alternatively, the absence of obsidian at Kayadibi may simply be a result of sample size.

Kayadibi produced a lithic industry previously unknown from Anatolia. The few traces of human activity in the volcanic region of Salihli, such as the footprints in the lava formation or the rock art from the site of Çakallar, ca. 160 km

east of Karaburun, have been tentatively dated to the Initial Holocene (Kayan 1992). Recent radiometric dates indicate that the footprints at Çakallar date to around $11,200 \pm 1100$ B.P. (Heineke et al. 2016). However, these footprints are not accompanied by any datable artifacts or occupation that can be related to our sites in Karaburun.

The high number of unretouched flakes and absence of true microlithic tools had already suggested that Kayadibi may be a Mesolithic site (Çilingiroğlu et al. 2016). The detailed examination of the assemblage attests to affinities with Aegean Mesolithic sites in Greece, such as Maroulas, on Kythnos (Sampson, Kaczanowska, and Kozłowski 2010); Kerame, on Ikaria (Sampson, Kaczanowska, and Kozłowski 2012); and, the Cyclope Cave, on Youra, in the Northern Sporades (Sampson 2008). Excavations at these sites provided larger assemblages than Kayadibi; because of this, the comparisons should be approached with caution.

A characteristic feature of the Aegean Mesolithic lithic assemblages is the high proportion of flakes, which make up more than 50% of the inventories at all sites except for Kerame, where the small size of the blanks allowed some flakes to be described as chips. Thus, the inventories of the Aegean Mesolithic can be described as flake industries. Obviously, a small number of blades, as well as blade cores, also occur at these sites. At Maroulas, obsidian was mostly used for bladelet production, although robust, large cores of quartzite were also used for the manufacture of both flakes and blade blanks (Sampson et al. 2002, pls. I–X). At Kayadibi, blade cores are present, but the proportion of blades is extremely small, displaying a very similar character to the Aegean Mesolithic sites. On the other hand, the proportion of tools (17%) is fairly high, which indicates that tools were both produced and used at the site.

At the Aegean Mesolithic sites, the most important group among the tools is retouched flakes. The frequency of the various tool categories confirms the similarity of the Kayadibi assemblage with those from the Aegean Mesolithic. The differences in frequency (e.g. of perforators) is most likely the effect of functional differences among particular sites. C. Perlès (2001, 224) suggests that perforators were used to drill shells and that they therefore cannot constitute diagnostic tools indicative of a particular cultural tradition. We would argue that other differences, also functional, can occur between open-air and cave sites.

In short, Kayadibi, on the Karaburun Peninsula, demonstrates significant parallels to Aegean Mesolithic lithic technologies and thus can be tentatively dated to the Initial Holocene (ca. 9000–7000 CAL B.C.). Recent studies show that similar industries were prevalent in the Cyclades and on Crete, as well (Carter 2016; Carter et al. 2016). The heavy presence of flakes and ad-hoc flake tools may be indicative of a similarity in subsistence patterns and lifeways between western Anatolian foragers and their Aegean counterparts.

It is also worth highlighting that Öküzini Phase 4, identified as a mixed deposit with Epipalaeolithic, Neolithic, Chalcolithic, and Roman remains, is reported to contain microliths, backed blades, triangles, and trapezes characteristic of the Final Pleistocene (Otte et al. 1995; Kartal 2009). This observation suggests that the microlithic blade-based production persevered in the Antalya region during the Holocene, a situation contrasting sharply with the Kayadibi and other Aegean Mesolithic assemblages.

Farther to the east, the Initial Holocene involves the appearance of early Pre-Pottery Neolithic assemblages, which are typically blade-based and characterized by the production of points. The only flake-based industry known from the eastern Mediterranean is that of Epipalaeolithic Cyprus, where such sites as Nissi Beach and Aspros employed technologies and produced lithic products similar to each other (Ammerman 2010; Kaczanowska and Kozłowski 2014). Recent excavations at the Cypriot site of Vretsia-Roudias likewise produced from its lower layers an industry heavily dominated by flake production (Efstratiou et al. 2012). The technological similarities between the Cypriot Epipalaeolithic and the Aegean Mesolithic may be related to activities held in common. However, Kozłowski (2016, 59) suggests that there could be a cultural link between Cypriot Epipalaeolithic and Aegean Mesolithic groups, despite the fact that these are not contemporary cultural facies. This hypothesis needs to be further tested with new fieldwork, preferably excavations on the southern Turkish coast and in the Dodecanese. For now, the microlithic and blade-based assemblages from Öküzini and Karain fail to corroborate this proposal.

The presence of Epipalaeolithic and Mesolithic settlement in the Karaburun Peninsula has implications for the Neolithization of western Anatolia as well. The earliest known Neolithic sites from the region date back to the early 7th millennium CAL B.C. The role of local forager groups and, possibly, of forager-farmer interactions in the Early Holocene in western Anatolia have been discussed only in passing, since, in the absence of solid archaeological evidence, any suggestions could not have gone beyond speculation (Çilingiroğlu and Çakırlar 2013). The Karaburun sites validate the presence of forager groups in this area and allow us to compare and contrast the lithic assemblages from Mesolithic and Neolithic horizons. Such an analysis would help to test the hypotheses concerning autochthonous Neolithization (Kyparissi-Apostolika 2000), gain insights about the input of forager know-how into the Neolithization process (Reininger 2018), and provide a better understanding of changes in foraging strategies following encounters with farming groups (Çilingiroğlu 2017).

The available literature on the Initial Neolithic of western Turkey gives a general idea about lithic inventories. The Çukuriçi XIII (Horejs et al. 2015; Horejs 2017), Ulucak VI, and Uğurlu VI chipped stone assemblages show strong similarities with each other in terms of characteristics (Guilbeau et al. 2019). The presence of pressure technique, conical blade cores, and sickle elements in these assemblages dating to the first half of the 7th millennium B.C. represents radical technological and economic changes associated with early farming-herding. Along with these changes in lithic industries, we witness the first appearance of Melian obsidian in western Turkey in the first half of the 7th millennium CAL B.C. (Milić 2019). When compared with the Kayadibi assemblage discussed above, we see no clear relation in terms of lithic technologies between the Mesolithic and Initial Neolithic groups in western Turkey—not only because the Mesolithic assemblage from Kayadibi contains no blades or conical cores that display pressure knapping, but also because Initial Neolithic assemblages are not typically characterized by ad-hoc flake tools, notches, and denticulates.

The differences between the Aegean Mesolithic and the western Anatolian Initial Neolithic are not limited to lithic

industries and raw material choice. Subsistence strategies, material culture, and technology of early farmer-herder groups in western Anatolia in the first half of the 7th millennium B.C. also show distinct characteristics related to southwest Asian counterparts in the late Pre-Pottery Neolithic period (Çilingiroğlu and Çakırlar 2013; Horejs et al. 2015; Çilingiroğlu 2017; Milić 2019). Architectural features, such as mud-based rectilinear architecture and red plaster floors, recall southwest Asian counterparts, whereas four-species animal husbandry and cultivated grains are good indicators of well-established food-producing economies that have contemporary parallels only in the Levant and southwest Asia (Arbuckle et al. 2014; Çilingiroğlu 2017). These fundamental aspects of economy and technology are easily distinguished from the preceding Mesolithic culture in the Aegean. It is known that, apart from the flake industry, Mesolithic material culture is composed of pointed bone instruments, bipoints, hooks, polished objects, and ad-hoc bone tools (Galanidou 2011; Moundrea-Agrafioti 2011), accentuating the idea that there is no gradual and entirely autochthonous transition from Mesolithic to Neolithic lifeways across the Aegean Basin. Relying on the available literature, one can postulate that there is little, if any, discernible similarity in terms of typology and technology between the Kayadibi Mesolithic and the basal Çukuriçi, Ulucak, and Uğurlu Initial Neolithic assemblages. The picture that emerges from the current evidence is that there is a remarkable difference between Mesolithic and Initial Neolithic lithic industries in western Turkey and the Aegean (Guilbeau and Perlès 2019; Guilbeau and Erdoğan 2019; Milić 2019). Needless to say, these insights have to be tested with well-dated Mesolithic deposits in western Turkey.

Conclusions

Evidence for the Epipalaeolithic and Mesolithic periods was completely unknown from western Turkey until the discovery of the two lithic assemblages introduced here, which were recovered during pedestrian survey of the Karaburun Peninsula, in coastal western Turkey. We discuss these two assemblages in relation to inland Anatolian, Aegean, and southeast European lithic industries. The typological and technological analysis of the survey material revealed that Kocaman is an Epipalaeolithic site that possibly dates to the Terminal Pleistocene (ca. 11,000–10,000 B.C.) and that Kayadibi represents the Aegean Mesolithic lithic tradition and dates back to the initial Holocene (ca. 9000–7000 B.C.). The identification of these assemblages is a significant step towards defining the pre-Neolithic sequence of western Anatolia and its connections to contemporary groups in the Aegean and in Anatolia and for gaining much sought-after insights into the Neolithization of western Anatolia.

The lithic assemblage from Kocaman contains features both of the Epipalaeolithic facies of the Antalya Group and of the northern Aegean. The microlithic character of the chipped stones, the appearance of bladelet cores and bladelets, as well as the presence of geometrics, such as lunates, connect Kocaman with the Late Epipalaeolithic of the eastern Mediterranean. Ouriakos, on Lemnos, in the northern Aegean, and Öküzini, also in the Antalya region, offer the best comparative material, leading us to suggest that these sites may be roughly contemporaneous. In terms of its geographical position, Kocaman fills a gap between sites in

Antalya and the northern Aegean, indicating that hunter-gatherer groups were spread along the south and west coasts of Anatolia. We can therefore now suggest that western Anatolia was culturally part of the eastern Mediterranean Epipalaeolithic traditions during the Late Pleistocene, at least in terms of its chipped stone industry. In addition, it now becomes possible, for the first time, to suggest that the Younger Dryas foragers of the Levant, Antalya, western Turkey, and the northern Aegean employed similar knapping technologies and produced analogous tools. This is a new insight for assessing the patterning and variability of cultural and economic behaviors of foragers in the greater eastern Mediterranean.

The picture changes radically with the onset of the Holocene. The typological and technological character of the Kayadibi assemblage manifests its close connection with the Aegean Mesolithic facies of the 9th and 8th millennia B.C., indicating that during the Mesolithic period, western Anatolia was “culturally” part of the greater Aegean catchment and had no archaeologically visible relations with the Pre-Pottery Neolithic of southwestern Asia. These observations confirm the idea that the Aegean Mesolithic was somewhat isolated at the very beginning of the Holocene and maintained an idiosyncratic cultural whole. Kayadibi also confirms that the Aegean Mesolithic tradition was not confined to islandscapes but was also employed on the coastal Anatolian mainland. This observation implies that these forager groups were in contact via land and sea routes across the eastern and western Aegean.

The information from Kocaman and Kayadibi has implications for the Neolithization of the region as well, suggesting that the area was inhabited before early farmer-herder settlements were established. The comparison of Mesolithic and Initial Neolithic assemblages from western Turkey shows an almost complete break in terms of technology and typology. The Kayadibi assemblage, with its Aegean Mesolithic character is barely related to the early 7th millennium B.C. lithics from the same region, which are typified by conical cores, pressure blades, and sickle elements. That being said, we still lack absolute dates for Kayadibi and cannot exclude the possibility that Final Mesolithic assemblages investigated in the future will change these postulations. Therefore, these first insights need to be tested with excavated Mesolithic assemblages and absolute dates.

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