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THESPROTIA EXPEDITION III
LANDSCAPES OF NOMADISM AND SEDENTISM

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Cover: The Bronze Age site of Goutsoura seen from the south. Photo: Björn Forsén

Layout: Esko Tikkala

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Preface

The Thesprotia Expedition has been one of the largest research bids ever undertaken by the Finnish Institute at Athens. The project which began 2004 was originally planned to last five years, but with additional funding from the Academy of Finland, field and archive work was continued for seven years until 2010. Since 2011 the focus of the project has been directed mainly towards studying the remaining categories of finds and publishing the results of the project. This volume is the third in the final publication series, with a fourth presently being prepared. Apart from these major volumes the project has also produced a series of shorter preliminary publications as well as five master theses and one doctoral dissertation, with another three dissertations being under way.

The Thesprotia Expedition has from the beginning been more than a traditional regional survey project based on an intensive archaeological field survey, combined with a study of all available historical sources and the use of different geoarchaeological, geophysical and palynological methods. Apart from all this we have conducted trial excavations at a total of five sites stretching in date from the Bronze Age to the Roman period, in addition to which we have received permission to study and publish the excavations of another handful of sites conducted by the local Greek Archaeological Service. Some of our Greek colleagues have even accepted the offer to publish the results from their own excavations in our final publication series, thus hopefully making it into a useful resource for anybody interested in the past of Thesprotia.

Due to the character of the project, collaboration over the borders of different disciplines and nations has been necessary. Thus, since the launching of the Thesprotia Expedition in 2004, around 100 colleagues and students from a total of 10 different countries have taken part in one way or another. The collaborators up to 2010 are listed in *Thesprotia Expedition* II. Since 2011, the following persons have studied either finds in Thesprotia or in the archives of Venice: Vivi Deckwirth, Sophia Doulkeridou, Björn Forsén, Jeannette Forsén, Mika Hakkarainen, Stella Macheridis, Christina Papoulia, Aristeides Papayiannis, Paul Reynolds and Tommi Turmo.

Although the main period of field work came to an end in 2010, some work has still continued. Björn Forsén together with Yannis Bassiakos and Constantinos Athanassas sampled in 2011 the prehistoric site PS 43 for Luminescence Dating, whereas Mikko Suha for several summers has continued to record Thesprotian fortifications. Finally, Björn Forsén and Tommi Turmo together with Mikko Suha, Vasiliki Zoi, Thanasis Papadopoulos and Stavros Dokos in October 2015 conducted a short control excavation of the fourth century BC kiln of Gouriza.

The Thesprotia Expedition took place with permission of the Greek Archaeological Service and the Institute for Geological and Mineral research (IGME). The archaeological field work was conducted under the auspices of the Finnish Institute at Athens, and under the supervision of the 32nd Ephorate for Prehistoric and Classical Antiquities in Igoumenitsa and the 8th Ephorate for Byzantine Antiquities in Ioannina, which since 2014 are fused into the Ephorate of Antiquities of Thesprotia. I wish to express my thanks to these organisations for their constant support and cooperation, and especially to Ioannis Chouliaras, Kassiani Lazari, Georgia Pliakou, Konstantinos Soueref, Georgios Riginos, as well as to Martti Leiwo, Jari Pakkanen, Maria Gourdouba, Maria Martzoukou and Manna Satama. Help with practical matters in Thesprotia has been given by Euthymios Dokos, Kostas Lolos, Petros Petsios and Vasiliki Zoi.

This third volume of the Thesprotia Expedition has been longer in the making than the two previous ones. After much toiling it was finally decided to split it into two, leaving part of the material available for the fourth volume. I am most grateful to all contributors and collaborators for their patience and understanding throughout the process. Esko Tikkala did not only make most of the maps and the layout of this volume, he was also always there to discuss and help in solving various obstacles. A special thanks goes also to Nena Galanidou who accepted to join as a co-editor of this volume, bringing along with her much needed expertise concerning the prehistoric periods, and to Sarah Lima who with sparkling enthusiasm took on herself to write about the grave constructions and landscape modification at Goutsoura.

Finally I want to thank the following colleagues and friends for reading and commenting on parts of the manuscript for this volume or for giving other help or advice: William Bowden, Jack Davis, Angeliki Douzougli, Nikos Eftstratiou, Patricia Francis, Lars Karlsson, Georgia Kourtessi-Philippakis, Dimitra Mylona, Argyro Nafplioti, Markku Niskanen, Paul Reynolds, Curtis Runnels, Jeremy Rutter, Giovanni Salmeri, Thomas Tartaron, Gilles Touchais, Konstantinos Zachos and Sabine Wilke.

Odysseus was a shrewd fellow. According to Homer (*Od*. 10.506-520; 11.14-22) he stopped on his way home to Ithaca at the confluence of the Acheron and the Kokytos in Thesprotia in order to ask the Nekyomanteion (the Oracle of the Dead) how to find his way back to Ithaca. However, he may have been more familiar with Thesprotia than that. Returning to Ithaca in disguise he told both Eumaios and Penelope that he had heard that the real Odysseus had continued from Nekyomanteion to Dodona in order to learn if he should return to Ithaca in disguise, or in secret (*Od*. 14.327-328; 19.300-307). While being away in Dodona Odysseus had left his treasures in the care of King Pheidon of Thesprotia and thus had to return. There may have been other reasons attracting him back again, because Odysseus, at least if we are to believe the *Telegonia* (*Thesprotis*), after having killed Penelope's suitors, decided to return there, marrying the Thesprotian Queen Kallidike.

Why all this fuss about Thesprotia I have asked every time I returned there myself. Surely this place, which according to Homer was always "wrapped in mist and cloud", must also have had its sunny, bright sides? It surely had, and still has. One just has to avoid the shades along Kokytos' lifeless stream and instead head for the fertile meadows on its banks and the steep mountains further away, upon which the warm sun casts its loving rays. There the remains of Odysseus' secret are to be found, covered deep below the surface next to a pomegranate tree on the lower slope of the Paramythia mountain range. While sitting below it late in autumn I could hear the wind passing through the branches telling me to keep going, and so I have.

This volume is dedicated to the memory of Jon and Pat: May the sun shine upon you also while sailing down the Kokytos!

Björn Forsén
Helsinki, 29 February 2016

Reading the Human Imprint on the Thesprotian Landscape: A Diachronic Perspective

Björn Forsén and Nena Galanidou

Some 50 years ago Thesprotia, the northwesternmost regional unit of Epirus bordered by the Ionian Sea and Albania, was one of the least studied parts of Greece. This was in many respects still the case when the Thesprotia Expedition was launched as a new project of the Finnish Institute at Athens in 2004.[1] The aim of this interdisciplinary project was to write the diachronic history of the fertile Kokytos valley from prehistoric until modern times. However, the aim was from the very beginning also to include studies placing the study area within the larger context of Thesprotia, or studies concerning Thesprotia in its entirety, whenever this seemed helpful for understanding the history of human settlement in the Kokytos valley.

Thesprotia Expedition was thus designed as a larger umbrella project, in which everybody working in the region could take part. Thanks to EU-sponsored enhancement programmes, the four largest acropoleis of Thesprotia, i.e., Elea, Gitana, Dymokastro and Phanote (Doliani), have been extensively excavated by the Greek Archaeological Service.[2] The construction of the Via Egnatia highway, as well as agricultural improvements, have revealed many new archaeological sites, some of which have and will be published by the Thesprotia Expedition as part of our ongoing collaboration with the Greek Archaeological Service.[3] Our own work in the field has encompassed, apart from an intensive archaeological and geological survey, also trial excavations in a number of locations, as well as palynological work in the neighbouring Chotkova, Prontani and Morphi lakes in order to establish the history of vegetation and environmental change. Efforts have also been put into restudying previously found inscriptions and collecting archival sources concerning Thesprotia in Istanbul and Venice.

The first volume of the final publication series of the Thesprotia Expedition was published in 2009.[4] The aim was to create a general basis on which to build a regional history in the following volumes of the project. The contributions throw light on periods previously considered "Dark Ages" in Thesprotia, add new information on periods previously well attested in the region and set the findings from the Kokytos valley into

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[1] During the early 2000s the best overviews of the region's past were still offered by Dakaris 1972 and Hammond 1967, whereas Sakellariou's 1997 more recent overview, although stretching right up to modern times, was more general in character. Apart from these diachronic overviews there existed also particular studies of different aspects of the Epirote past, such as Dakaris *et al.* 1964; Papagianni 2000; Soueref 2001; Cabanes 1976; Franke 1961, Bowden 2003; Nicol 1984; Soustal 1981; Psimouli 1998 or Kokolakis 2003, just to mention some of the most important.

[2] The enhancement programme has led to the publication of a handful of archaeological guide books on these four acropoleis: Riginos and Lazari 2007 (Elea); Kanta-Kitsou 2008 (Gitana); Lazari *et al.* 2008 (Dymokastro); Kanta-Kitsou and Lambrou 2008 (Phanote).

[3] Very useful new publications summarising the main results of the recent archaeological work of the Greek Archaeological Service are, e.g., *HGAtlas* 2008, Kanta-Kitsou *et al.* 2008 or Ligkovanlis 2014.

[4] Forsén 2009.

a broader context. The second volume of the Thesprotia Expedition which appeared in 2011 addresses the environment and the settlement patterns, and includes a catalogue of all known sites of the central Kokytos valley, as well as detailed reports on specific sites, find groups or historical sources.[5] Last but not least, it includes the first description of the settlement patterns and regional history through time beginning from the Palaeolithic period all the way until the end of Ottoman rule in 1913.[6]

This third and present volume is devoted to specific and more detailed studies of sites and find groups beginning in the Middle Palaeolithic and continuing all the way until the advent of urbanisation during the fourth century BC, although the focus is above all on the prehistoric periods. A fourth and final volume will include all remaining studies, mainly focusing on the time period from the Early Hellenistic until the Early Modern period. The contributions of the third volume are divided into three thematic groups. The first part, consisting of three chapters, addresses the knapped stone finds recovered during our survey. The second part of the volume, comprising nine chapters, is devoted to the Bronze Age site of Goutsoura discovered in connection with the field survey and further explored by means of excavation by our team. Finally, there are two chapters on the Late Classical to Early Hellenistic period.

The articulation of the content of this book was guided by the long time span of our findings and the interdisciplinary character of our research, which brought together archaeologists of different specialisations, as well as historians, geoarchaeologists and palynologists. Through the dialogue and communication of the different contributors a more nuanced picture of the human imprint on the landscape and its change through time emerges. The purpose of this introductory chapter is twofold. First we summarise the most important conclusions reached and how the studies published here change or add to the overview of the settlement patterns and regional history of the Kokytos valley published in *Thesprotia Expedition* II. We also examine the implications of these new findings for our picture of Thesprotia, Epirus and northwestern Greece. Secondly, while contextualising the results we want especially to do so with reference to the notions of nomadism and sedentism, a topic which we only have touched upon in the previous volumes of Thesprotia Expedition. The subtitle of this volume highlights the importance of nomadic and mobile lifestyles in the long-term history of Thesprotia and Epirus.

Geographical setting and research background

The Kokytos valley is, next to the Kalamas river basin, the most fertile part of Thesprotia. The valley follows the course of the Kokytos river which originates somewhat to the north of the modern town of Paramythia, thereafter flowing southwards for some 20 km until it reaches the Acheron river. In the north the valley is connected via Neochori to the Kalamas river, Thesprotia's second largest river after the Acheron. In the east the valley is demarcated by the dramatic Paramythia mountain range, rising abruptly like a wall to a height well over 1000 masl (the highest summit to the east of Paramythia reaching 1658 masl). In the west the valley is again separated from the valley of Margariti and the coast

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[5] Forsén and Tikkala 2011.
[6] Forsén 2011.

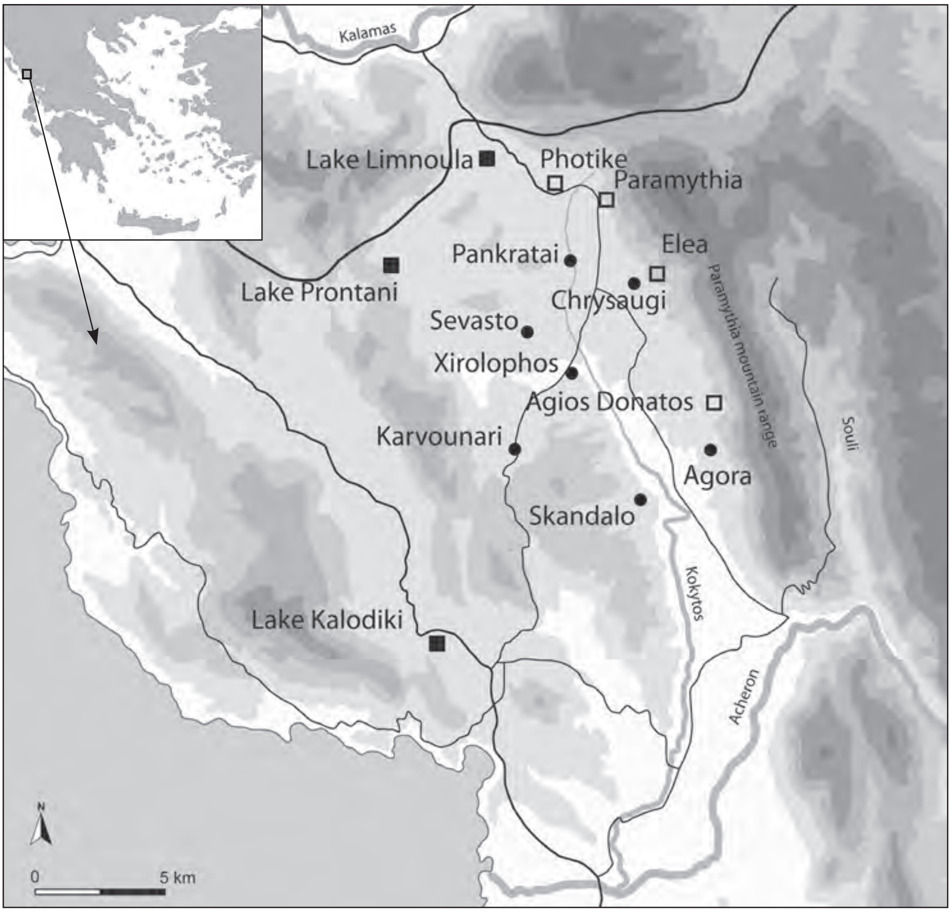

Fig. 1. General map of the Kokytos valley.

by a row of lower hills with a height around 400-500 masl (the highest summit to the west of Karvounari reaching 745 masl).

The archaeological work of the Thesprotia Expedition was limited to the central Kokytos valley. The northern limit of the study area was drawn at a line between the modern villages of Chrysaugi and Pankratai, whereas the southern limit roughly corresponds to a line between the villages of Agora and Skandalo (Fig. 1). Between the villages of Sevasto and Xirolophos the study area protrudes like an appendix towards the west all the way until the Karvounari redbeds. It covers altogether ca. seven km in a north to south direction and four km in a west to east direction, to which the ca. 2x3 km large appendix protruding towards Karvounari should be added. Most of the study area consists of the valley bottom. It falls slightly off from ca. 160 masl in the east at the foot of the Paramythia mountain range to ca. 90 masl to the hills in the west, next to which the Kokytos flows.

When the field work of the Thesprotia Expedition after seven years came to an end in 2010, a total of 72 sites, ranging in date from the Middle Palaeolithic until the Early Modern period, had been documented within the study area. Of these sites 27 were known from excavations conducted by the Greek Archaeological Service, whereas the other 45 had been studied by us through intensive surface survey as well as geophysical and geoarchaeological work.[7] Trial excavations were conducted at five sites: Goutsoura or PS 12 (Bronze Age), Mavromandilia or PS 36 (mainly Early Iron Age), Gouriza or PS 29 (Late Classical and Hellenistic), Agios Donatos of Zervochori or PS 25 (Hellenistic and Early Roman) and Kioteza or PS 34 (mainly Hellenistic, shortly resettled during the Late Roman period). Gouriza, Agios Donatos and Goutsoura were finally excavated for several years, resulting in a lot of new information.[8]

Our on-site and off-site work in the Kokytos valley brings back the highly topical notions of nomadism, transhumance and sedentism in the interpretation of the Thesprotian archaeological record. The raising and herding of animals, predominantly sheep and goats, was during the Early Modern period a characteristic feature of Epirus, where the herds were moved between winter and summer, sometimes only between hills and the neighbouring valleys, sometimes, as by the Vlachs and Sarakatsani, over longer distances (Fig. 2), e.g. from the Thesprotian lowlands in the winter up to the mountains around

Fig. 2. Vlach family in 1913 on their way to summer pastures. In the background the Liminari hill and the Bronze Age site of Goutsoura (arrow).

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[7] For a catalogue of the 72 sites, see Forsén *et al.* 2011.
[8] For Gouriza, see Forsén *et al.* 2011, 79-82 and the contributions in this volume; for Mavromandilia, see Forsén *et al.* 2011, 99-100, with further references; for Agios Donatos, see Forsén *et al*. 2011, 109-113, with further references; for Gouriza, see Forsén *et al.* 2011, 116-119 and Turmo, this volume; for Kioteza, see Forsén *et al.* 2011, 114, with further references. Goutsoura was excavated over 2007-2010, Agios Donatos 2006-2009 and Gouriza 2007-2008 and finally again 2015.

Metsovo or Pogoni.[9] Many scholars have used the seasonal movements of the Vlachs and the Sarakatsani as a model for interpreting prehistoric and ancient societies in Epirus,[10] seemingly assuming that this way of living was dependent on the local geomorphology and thus remained constant throughout time.

The view according to which transhumant or nomadic pastoralism would always have prevailed in Epirus has been challenged on the basis of the danger in interpreting prehistoric occupation of mountainous areas as an indication of long-distance transhumance.[11] Recent research has on the other hand observed that prehistoric artefact scatters in the mountainous Grevena region to the northeast of Epirus correspond to the location of modern transhumant pastoralist's summer huts and probably indicate that high altitudes were used by pastoralists from the turn of the Neolithic period to the Bronze Age.[12] It is also well documented by Bronze Age ceramic finds and radiocarbon dating.[13] This is as a matter of fact in line with recent zooarchaeological data which suggest that transhumant pastoralism developed in the Central Balkans at the advent of the Eneolithic or Early Bronze Age.[14] There are also plenty of written sources proving the existence of transhumance over shorter distances with smaller flocks in Classical and Hellenistic Greece.[15]

Nomads are people who live without a fixed dwelling place subsisting either by means of hunting and gathering, agriculture, or animal husbandry. Transhumance is a mode of subsistence based on pastoralism combined with agriculture, where a sedentary group moves its livestock seasonally to another region. In the context of nomadism the whole population unit moves to hunt or collect the seasonally available wild resources or moves together with herds of domesticated animals, whereas in the context of transhumance only part of the population moves together with the flocks, the rest of the population being permanently settled in order to tend to the crops or those animals not being moved.[16] Many authors claim that nomadism leaves only faint imprints in the landscape,[17] whereas the imprints of transhumant societies do not necessarily differ profoundly from those

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[9] In general, see, e.g., van der Leeuw 2004 or also Halstead 1990, 62-64.

[10] Wace and Thompson 1914; Higgs and Vita-Finzi 1966; Hammond 1967; Vokotopoulou 1986.

[11] E.g. Bailey *et al.* 1983; Bailey 1997; Cherry 1988; Green 1997; Halstead 1987; Halstead 1990, Halstead 1996, arguing that long-distance transhumance requires certain ecological, political and economic conditions which did not exist during prehistory, nor Antiquity. However, this does not rule out the existence of local, specialized pastoralism. For a criticism of analogical reasoning in archaeology, see also Murray and Walker 1988.

[12] Chang and Tourtellotte 1992; Chang 1992; Chang 1993. See more recently also Eftstratiou *et al.* 2006.

[13] Efstratiou 2008.

[14] Arnold and Greenfield 2006. It has also been suggested that the famous Chalcolithic South Tyrolean Iceman Ötzi (late fourth millennium BC), found mummified at the highest point of an Alpine pass together with e.g. an axe, bow and arrows, and birch-bark containers instead of pottery, would have been involved in local vertical transhumance (Oeggl *et al.* 2000). However, according to recent research, palaeobotanical evidence for transhumance does not occur in the region until the Middle Bronze Age (ca. 1700-1350 BC). Before that, i.e., also at Ötzi's time, humans were attracted to the high alpine landscape mainly by the availability of faunal species for hunting (Putzer *et al.* 2016)

[15] E.g. Georgoudi 1974; Skydsgaard 1988 or the excellent overview of all epigraphical evidence by Chandezon 2003. Isager and Skydsgaard 1992, 100, summarize the state of research well, thus: "The question is not whether transhumance existed in ancient Greece; the question is, exclusively, of its extent and importance."

[16] E.g. Wainwright and Thornes 2004, 268-269.

[17] See Rosen 1987; Finkelstein and Pervolotsky 1990; Rosen 1992; Finkelstein 1992 for a debate on nomad invisibility in the landscape. See Rosen 2008 and references therein for patterns of transhumant pastoralism around the world.

of early farmers. This all makes it challenging to distinguish nomadism on the basis of archaeological remains;[18] some general conclusions can be drawn on the basis of settlement locations, finds categories and zooarchaeological data (if such is available).

The mosaic of different prehistoric communities, Palaeolithic and Mesolithic hunter/gatherers and Neolithic, Bronze Age or later agropastoralists, whose material culture is present on the same geographic locale, the Kokytos valley, raises the issue of the particular attraction of the valley to the different groups in the passage of time. We assume that the attractions were not the same to all of them but relate to their economy, territorial extension and habitual use of the landscape. The archaeological picture obtained is also a response to the changes this landscape has undergone through time. Climatic oscillations[19] and tectonic activity[20] from the Upper Pleistocene to the Late Holocene set the big picture in western Greece. The essentials of this picture can be further considered in terms of four palaeogeographical categories: the position of coastline and of winter and summer snowlines, edaphic conditions based on nutrient properties of bedrock and soils, terrain, and water retentiveness of land surfaces.[21] These four categories, originally proposed to map wild animal distributions and seasonal movements over the Epirotic landscape, also offer a frame for considering domesticated animal movements. The archaeology of the prehistoric groups of Epirus cannot be discussed only within the geographical limits of the area surveyed by the Thesprotia Expedition but also needs to take into account the resources available in the broader landscape of Thesprotia, both in the mountainous uplands and in the now submerged, yet available to many Palaeolithic groups, coastal lowlands.[22]

Prehistoric hunter-gatherers in landscapes of habit

The earliest archaeological evidence at Kokytos dates to the Middle Palaeolithic and its greatest sample originates from Mikro Karvounari (PS 23) and Megalo Karvounari (PS 24) (Fig. 3).[23] These twin *terra rossa* sites are situated in the western part of our study area at higher elevations (between 140 and 220 masl) compared to other later prehistoric sites which are clustered in the valley bottom. In southern Greece Middle Palaeolithic archaeology is associated with palaeoanthropological remains of *Homo neanderthalensis*[24] and to date there is no reason to assume that this would not have been the case also for western Greece.[25] Neanderthal presence is also attested in the third major redbed site near Kokytos, Morphi,[26] in PS 43 and PS 4 in the valley bottom,[27] and throughout the valley by a smaller number of stray finds identified in tracts.[28]

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[18] Ingold 1980; Khazanov 1984; Cribb 1991.
[19] Tzedakis 2007; Tzedakis *et al.* 2003.
[20] Bailey *et al.* 1993; King *et al.* 1994.
[21] Sturdy *et al.* 1997, 591-598.
[22] Sakellariou and Galanidou 2014.
[23] Ligkovanlis 2011; Papoulia 2011.
[24] Darlas 2007; Harvati *et al.* 2003; Harvati *et al.* 2010; Harvati *et al.* 2013.
[25] Galanidou and Efstratiou 2014.
[26] This is a raised dissected polje discovered by Higgs *et al.* 1967; Papaconstantinou and Vassilopoulou 1997; Papagianni 2000.
[27] Galanidou and Papoulia, this volume.
[28] Forsén *et al.*, this volume.

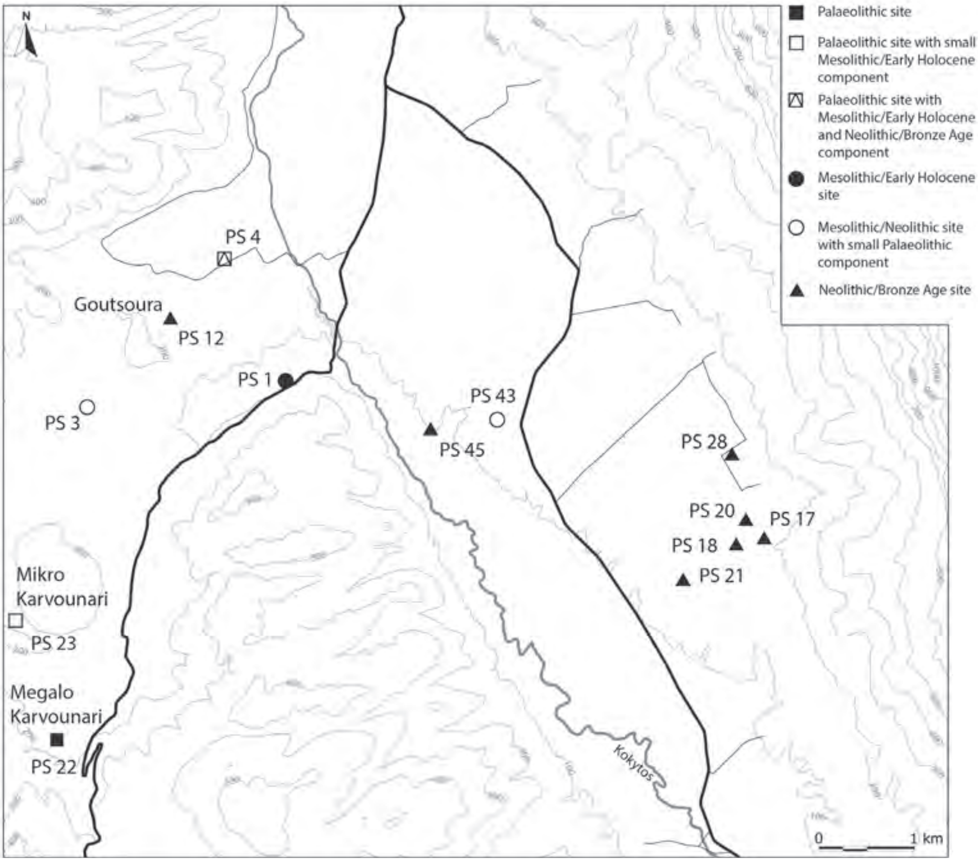

Fig. 3. Map with prehistoric sites of the Kokytos valley.

If Neanderthals were the first people to live in the Kokytos valley, at some point during the early Upper Palaeolithic *Homo sapiens*, our species, took over from them. Megalo Karvounari, a polje deeply dissected by recent erosional gullies,[29] is the only site at Kokytos which returned evidence for a presence of hunter-gatherers using Aurignacian tools.[30] It clusters with two more terra rossa sites from Thesprotia, Eleftherochori (Site 7) and Molondra,[31] with the open-air site at Spilaion near Preveza[32] and with surface finds collected west of Narta Lagoon in the Albanian coastal plain,[33] in yielding Aurignacian archaeology. All five sites make a strong case for early penetration of anatomically modern human groups in western Greece and southern Albania whose chronological details cannot yet be established.

After the Aurignacian follows a hiatus in the Upper Palaeolithic record of Thesprotia which may reflect a shift of foraging activity to other parts of Epirus or

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[29] Papagianni 2000, 47.
[30] Ligkovanlis 2011.
[31] Ligkovanlis 2014.
[32] Runnels *et al.* 2003.
[33] Ruka *et al.* 2014.

Albania. To judge by the wealth of evidence and dates reported from the rockshelter sites of Klithi, Megalakkos and Boila in the Voidomatis river valley, Kastritsa on the shore of the Lake Ioannina (Pamvotis), and Asprochaliko by the Louros river, it was the complex topography of the hinterland of Epirus that attracted the attention of the Upper Palaeolithic groups from approx. 26 kyr onwards.[34] Their sites are strategically placed in the margins of a large inland basin, produced by uplift and subsidence, within which animals could be circumscribed and hunted.[35] Back in the region of the Kokytos, Mikro Karvounari hosts some late Upper Palaeolithic to early Mesolithic hunter-gatherer activity,[36] as does PS 43 likewise, in the valley bottom.[37] Beyond these two sites where the transition to the Holocene does not leave an archaeologically clear mark – very much like other parts of Epirus and mainland Greece[38] – the presence of Mesolithic groups has been claimed at PS 3 and possibly also at PS 1 (Fig. 3).[39] Overall, the Mesolithic evidence from the Kokytos is sparse and inconclusive and may be contrasted with the increasing number of Mesolithic sites that have been reported from Albania in recent years.[40]

Mikro and Megalo Karvounari are undoubtedly the key sources of Palaeolithic finds in our study area. Their discovery by E. Higgs and his team[41] over half a century ago was only the beginning of a still on-going study and debate about their origin, formation and chronology by four generations of archaeologists and earth scientists.[42] The lithic assemblages recovered from the redbeds provide one of the two major foundations upon which the Palaeolithic archaeology of western Greece stands today – the second being the archaeology of caves and rockshelters, as we have already seen. The karstic wetlands of the coastal zone of Epirus distributed to the west of the Ioannina tectonic trough[43] have yielded a wealth of lithic evidence and the longest chronological span covering the archaeology of the Lower, the Middle and the Upper Palaeolithic in Epirus. This is something that the second foundation of Palaeolithic archaeology in the region has not as yet provided, though it is the source of more diverse archaeological inventories comprising organic artefacts, faunal remains and habitation structures (e.g. hearths and post-holes).

In this volume we complete the array of studies dedicated to the new material recovered by our team at Mikro[44] and Megalo Karvounari[45] by a study of the bifacially worked elements and other Middle Palaeolithic tools recovered from Megalo Karvounari.[46] Two new elements thereby emerge: the presence of *Keilmesser* and *Quina* tools in the Palaeolithic record of the Kokytos. Though the sample is small, these observations lead to a number of possible links – with finds discovered at Kokkinopilos and at sites to the north

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34 Bailey 1997.
35 Bailey *et al.* 1993.
36 Papoulia 2011.
37 Galanidou and Papoulia, this volume.
38 Galanidou 2011; a similar picture is also reported from the highland zone of Pindus around Samarina by Biagi *et al.* 2015a.
39 Tourloukis and Palli 2009 (PS 3); Forsén *et al.* 2011, 85-86 (PS 1).
40 Gjipali 2006; Runnels *et al.* 2009.
41 Dakaris *et al.* 1964, Higgs and Vita Finzi 1966.
42 Galanidou 2014 with further references.
43 van Andel and Runnels 2005, fig. 1.
44 Papoulia 2011.
45 Ligkovanlis 2011.
46 Galanidou *et al.*, this volume.

of Thesprotia – and renew the research agenda on tool variability and networks of sites employed by Neanderthals.

The distribution of Middle Palaeolithic sites in west Epirus is "governed by the geography of poljes, loutses and to a lesser degree, redeposited terra rossas or paleosols in other locations such as alluvial fans".[47] During the earliest phase of settlement the archaeology of the Kokytos area is in tune with the record of other parts of Epirus, the Ionian Sea islands and southern Albania where the strongest signal comes from open-air sites associated with seasonal or perennial water bodies in semi-enclosed karstic basins or smaller depressions. This type of early site, today visible in the landscape of western Greece as eroding badlands of notoriously low agricultural fertility, has produced the most diverse tool types, ranging from large or smaller bifaces[48] to classic Levallois products of debitage and tools, as well as industries of transitional character. Neanderthal groups were frequenting their margins to stalk and hunt at points where birds, larger and smaller mammals would come to drink, as well as to provision turtles, snakes, reeds, aquatic plants and water for themselves. The three studies published in *Thesprotia Expedition* II and here[49] confirm such a hypothesis, with the large numbers of Levallois points, parts of hunting tools, reported at Mikro and Megalo Karvounari being archaeological testimony of this activity.

Over time these wetlands and their environs around the Kokytos became a context of interaction, a node in the 'landscape of habit' of the Middle Palaeolithic groups. This is a term proposed by Chris Gosden[50] and adapted to Palaeolithic archaeology by Clive Gamble[51] in his *Palaeolithic Societies of Europe* to describe the spatial network for the negotiation and reproduction of hominid social life that occurs at the locales of a wider region where Palaeolithic activity occurrs. According to Gamble, "The wider region, traversed by the individual and all those with whom he or she interacts, forms a spatial network of intersecting paths. …a local hominid network encompasses both subsistence and social behaviour. The network contains other hominids, non-hominid competitors and resources. It is centred on the individual and the decision he or she must make."[52]

The spatial association of surface collections of Palaeolithic artifacts with a good number of, yet not all, redbeds has been a robust pattern, of western Greece's regional settlement. It is thus no surprise that an array of approaches – from purely cultural historical, to economic, chronological or geoarchaeological – have been employed in their study. We interpret these sites as nodes in the Neanderthal landscapes of habit repeatedly attracting the groups of western Greece. Our work in the Kokytos area has shown that Middle Palaeolithic finds were also present in smaller or larger numbers in other parts of the valley, yet were always associated with commanding views of the landscape, passageways, sources of fresh water, or flint to make tools.[53] This brings us to the second notion that our research on the Kokytos opens windows to: the archaeology of nomadism.

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47 van Andel and Runnels 2005, 375.
48 Papagianni 2000; see also Galanidou *et al.*, this volume, for an overview of the bifaces recovered from such sites.
49 Papoulia 2011; Ligkovanlis 2011; Galanidou *et al.*, this volume.
50 Gosden 1994, 118-119.
51 Gamble 1999, 87.
52 Gamble 1997, 87.
53 A pattern that is also seen in the high altitudes of Pindus in western Macedonia by Efstratiou *et al.* 2011; Biagi *et al.* 2015b.

The Concise Oxford Dictionary defines a nomad as "(a member of a tribe) roaming from place to place for pasture; wanderer; wandering".[54] As we saw earlier, nomadism is a concept that refers to the physical impermanence of settlement. Yet as Ingold suggests an analytical distinction needs to be made between "residential flux and the physical impermanence of settlement; between changing company and changing places. The concept of nomadism of most hunter-gatherers is of fairly restricted kind, very often tied to sites that are more or less continually occupied, even though the list of inhabitants of each may change almost from day to day."[55] By drawing our attention to this distinction Ingold highlights a widespread and striking feature of hunter-gatherer social arrangements, namely the flux in the composition of co-residential groups. Our working hypothesis for the Middle Palaeolithic settlement in the Thesprotia wetlands is that different Neanderthal groups came together around them and separated in an annual cycle of aggregation and dispersal in different combinations and probably under different leadership.

Fig. 4. Flint nodule from the quarry site PS 4 (Sternari).

This dynamic and repetitive pattern of presence of the Middle Palaeolithic groups by the karstic basins of internal drainage, the poljes, along with the upper parts of the network of streams associated with the Paramythia drainage system, does not continue with the same intensity in the later Upper Palaeolithic and the Mesolithic. The archaeology from these periods is rather scarce and discontinuous in the Kokytos area, with the odd surface find probably in secondary deposition and a couple of Mesolithic sites that send a weak signal. Occasional visits to this area are still centred around Karvounari but also focus at other resources, mainly at PS 4 (Fig. 3), when looking for lithic raw materials (Fig. 4).[56] Further work in the field is needed to test the Upper Palaeolithic landscapes of habit. Two areas emerge as the most promising: the resource-rich coastal plains of the Ionian Sea which are now submerged and the Paramythia uplands.

Early pastoralists and farmers

The detailed studies published in this volume on the tract finds, the multi-period stone age site PS 43 and the Bronze Age site of Goutsoura (PS 12) improve our understanding of the Neolithic and Bronze Age life with respect to the views published in *Thesprotia Expedition* II in 2011. First of all, we have now clear evidence for human occupation also for the Early and Middle Neolithic period, above all from site PS 43, but also to some degree from sites PS 20, PS 18 and possibly also PS 28 (Fig. 3).[57] These sites are part of the two richest concentrations of lithic finds we have detected, i.e., PS 43 of Concentration III and the three other sites of Concentration I, both located on the valley bottom close to rich springs.[58] PS 43 is of special interest as it produced no pottery and

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54 *COD*, 7th ed., s.v. nomadism.
55 Ingold 1999, 403.
56 Forsén *et al.* 2011, 84-85.
57 Galanidou and Papoulia, this volume, for PS 43, and Forsén *et al.*, this volume, for PS 20, PS 18 and PS 28.
58 Forsén *et al.*, this volume.

also no finds from the Bronze Age. PS 18, PS 20 and PS 28 on the other hand all include a Bronze Age component, although they all produced very little prehistoric pottery.[59]

Neolithic pottery is absent from the Thesprotia Expedition find category, whereas the only two sites that produced Bronze Age pottery to any large extent during the survey were PS 12 and PS 17 (Fig. 3).[60] PS 12 was later extensively excavated and an Early Bronze Age settlement along with a Middle to Late Bronze Age cemetery were unveiled. PS 17 belongs to the same concentration of lithic finds as the predominantly Neolithic sites PS 18 and PS 20 and is actually located so close to them (distance ca. 140-200 m) that we cannot exclude a certain mixture of finds.[61] The only Middle Neolithic find from PS 17, an arrowhead of orthogonal triangular shape,[62] could, for example, be equally connected to either one of the neighbouring sites PS 18 or PS 20 and in the same way some of the Bronze Age finds from PS 18 and PS 20 could in reality be connected to the Bronze Age site PS 17.

A comparison of the find categories from PS 43, PS 18 and PS 20 on the one hand and Goutsoura (PS 12) and PS 17 on the other hand reveals interesting patterns (Fig. 5),

Find context	Description	Date	Reference
PS 43	5 transverse a.	MNeo	Galanidou and Papoulia, Fig. 25
PS 20	2 lunates with abrupt retouch	ENeo	Forsén *et al.* Figs. 6d-e
B 44 (PS 20)	1 transverse a.	MNeo	Forsén *et al.* Fig. 6i
PS 20	1 tanged a.	Neo	Forsén *et al.* Fig. 6l
PS 20	3 fragmentary a. – either transverse a. or unfinished hollow-based a.	MNeo or EBA/MBA	Forsén *et al.* Figs. 7g, i and j
PS 20	1 unfinished bifacially worked a.	BA	Forsén *et al.* Fig. 7k
PS 20	1 hollow-based a.	EBA/MBA	Forsén *et al.* Fig. 7h
PS 18	1 transverse a.	MNeo	Forsén *et al.* Fig. 6j
PS 18	1 tanged a.	Neo	Forsén *et al.* Fig. 6k
PS 18	1 poss. a. with bifacial, invasive, pressure retouch	Neo	Forsén *et al.* Fig. 7a
PS 28	3 transverse a.	MNeo or EBA	Forsén *et al.* Figs. 7b, d-e
B 22 (PS 17)	1 transverse a.	MNeo	Forsén *et al.* Fig. 6g
B 34 (Conc. I)	1 transverse a.	MNeo	Forsén *et al.* Fig. 6h
PS 32	2 transverse a., one of which fragmentary	MNeo	Not ill., Forsén *et al.* p. 76
B 41 (Conc. I)	1 broken transverse a.	MNeo	Forsén *et al.* Fig. 9a
C 23	1 broken transverse a.	MNeo	Forsén *et al.* Fig. 9b
D 74 (Conc. I)	1 amygdaloid p.	BA	Forsén *et al.* Fig. 10a
D 61 (PS 45)	1 unfinished leaf-shaped p.	BA	Forsén *et al.* Fig. 10b
A 108 (Conc. V)	1 hollow-based a.	EBA/MBA	Forsén *et al.* Fig. 23c

Fig. 5. Neolithic and Bronze Age arrowheads (a.) and points (p.) found during the intensive field survey in the Kokytos valley, with references to the illustrations in Galanidou and Papoulia, this volume, and Forsén *et al.*, this volume.

59 PS 18 produced one possible BA sherd, PS 20 a handful of prehistoric sherds, including one of MBA date, and PS 28 three possible MBA sherds (Forsén *et al.* 2011, 106-108).

60 For PS 12, see the contributions by Forsén, Lavento and Kouki, Lima, J. Forsén, Doulkeridou, Papayiannis, Niskanen, Deckwirth and Macheridis in this volume; for PS 17, see Forsén *et al.* 2011, 108-109. Single Bronze Age sherds were also collected at PS 18, PS 20, PS 21, PS 28, PS 36 and PS 46 (Forsén *et al.* 2011, 99-100, 102-103, 106-108).

61 Cf. the map published as Forsén *et al.*, this volume, Fig. 3.

62 Forsén *et al.*, this volume, Fig. 6g.

although we cannot make a full comparison of the lithic finds, as those originating from PS 12 and PS 17 have not yet been fully studied. First, we have the arrowheads, which above all point towards hunting. PS 43 produced five transverse arrowheads, PS 18 three Neolithic arrowheads and PS 20 a total of nine arrowheads (of which four clearly are Neolithic and two Bronze Age, whereas three could be either Middle Neolithic or Early to Middle Bronze Age in date). Goutsoura and PS 17 here differ completely in that the former produced no arrowheads, whereas the latter only one, which was of Middle Neolithic date, thus not fitting into the site context.

Fig. 6. Some sickle elements from Goutsoura.

During the survey far fewer sickle elements (six) than arrowheads (27) and points (2) were collected. Here an interesting pattern is revealed, which is even further enhanced if we include the finds from the Goutsoura excavation: sickle elements with silica gloss do occur both in Goutsoura (Fig. 5)[63] and PS 17, but not at all in PS 43, PS 18 or PS 20 (Figs. 5, 7). Discussions about this tool type are centred around its potential to signal the transition from the mere grass reaping activities of Mesolithic or early Neolithic groups to the harvesting activities of fully fledged agricultural groups.[64] The presence of sickles in a lithic assemblage does not automatically point to cultivation. There is a wide consensus

Find context	Description	Date	Reference
PS 17	2 s.e. on backed laminar flakes, with silica gloss	BA	Forsén *et al.* Figs. 8a-b
B 31 Conc. I	1 geometric s.e. of quadrilateral shape	MBA/LBA	Forsén *et al.* Fig. 7l
D 74	1 s.e. on blade, with silica gloss	BA	Forsén *et al.* Fig. 7m
PS 35	1 broken s.e. on flake, with silica gloss	Neo *terminus post quem*	Forsén *et al.* Fig. 16b
D 41 (PS 45)	1 geometric s.e. (?)	EBA/MBA	Forsén *et al.* Fig. 16e

Fig. 7. Sickle elements (s.e.) found during the intensive field survey in the Kokytos valley, with references to the illustrations in Forsén *et al.,* this volume.

63 For sickle elements from Goustoura, see Doulkeridou, this volume (only including part of the sickle elements).
64 Unger-Hamilton 1989; Unger-Hamilton 1991.

that sickle gloss also may arise from the reaping of grasses, from the cutting of canes and reeds, from woodworking and occasionally from hoeing or digging.[65]

There is no indication of any sickle element predating the Bronze Age whereas the majority of the arrowheads and points date to the Neolithic period (only five could with certainty be dated to the Bronze Age) (Figs. 5, 7).[66] The clear difference regarding arrowheads and sickle elements between PS 43, PS 18 and PS 20 on the one hand and Goutsoura and PS 17 on the other hand may indicate a difference in function between the sites. The first of these were more focused on hunting whereas agricultural activity (cereal harvesting) or merely provisioning of wild plants (such as grasses or reeds) played a more important role for the second group. Could this difference be due to a wider change in life style from the Neolithic period to the Bronze Age?

The lower Acheron valley, located only about 10 km to the south of our study area, was surveyed by the Nikopolis Project between 1991 and 1995. A total of 26 late prehistoric sites were discovered, out of which only one dates to the late Neolithic and the rest to the Bronze Age and above all to the Late Bronze Age.[67] Especially interesting is the fact that the Nikopolis project reached a result concerning arrowheads and sickle elements that closely resembles what we have recorded in the Kokytos valley. Out of a total of seven arrowheads four seem to date to the Late to Final Neolithic period and only one is a Bronze Age hollow-based arrowhead, whereas all except one of the eight sickle elements date to the Bronze Age (the eighth one dating to between the Late Neolithic and EBA II).[68]

Our knowledge of the Neolithic period in Thesprotia is in general extremely poor, with the only known sites being located in caves, such as the caves of Sideri or Psaka, both probably representing the later part of the Neolithic.[69] A similar picture is also reported in other parts of Epirus and in the Albanian coastal plains. Neolithic sites here are few and typically located in caves, something which strongly differs from the rich Neolithic archaeology with typical mound settlements that is found in Macedonia,[70] or settlements centred around the large inland lakes of Ohrid, Prespa and Orestias (Kastoria).[71]

The situation in eastern Epirus is rather similar to that in Thesprotia, with a surprisingly poor Neolithic record, although influences from the east are easier to identify here. Only three sites have been systematically explored. The most important is the Final Neolithic or Chalcolithic Doliana, which in many ways resembles the Early Bronze Age site of Goutsoura. Here a wattle-and-daub hut with two different phases of floors and

65 Rosen 1997, 55-58 and references therein.
66 See Staikou 2013 for an overview of the chipped stone point typology and technology in prehistoric Greece.
67 Tartaron 2004, 189-197.
68 Tartaron 2004, 118-126. Tartaron dates the hollow-based arrowhead to the MBA-LBA, thus following a slightly different chronology than ours.
69 The finds from these caves have unfortunately never been published in detail. See e.g. Dakaris 1972, 46-47; Douzougli and Zachos 2002, 142-143; Palli 2006, 32-33. Douzougli and Zachos date Sideri to the Chalcolithic, i.e., to the Final Neolithic period.
70 Kotsakis 2014 and references therein.
71 The general picture given by Andreou *et al.* 1996 is still to a large degree correct. For the rich lakeside settlement of Dispilio at Kastoria which belongs to the Macedonian Neolithic tradition, see contributions to Hourmouziadis 2002 and studies in the online journal *Ανάσκαμμα* https://anaskamma.wordpress.com/. For its chronology see Facorellis *et al.* 2014. For the general picture in Albania, see the e.g. Korkuti 1995 or more recently Bunguri 2014, with further references.

hearths was found. The majority of the faunal remains represent domesticated species. There are also some rare carbonized grains of einkorn wheat and a sickle element on a blade with silica gloss.[72] The sites of Gouves and the cave of Kastritsa have by Douzougli and Zachos been explained as a small seasonal pastoralist site (Gouves) and a storage place for food products (Kastritsa) respectively, belonging to a still not found main settlement located in a more advantageous location. Gouves and the cave of Kastritsa both date to the Late and Final Neolithic period, although Early Neolithic pottery also was found near the entrance to the cave of Kastritsa.[73]

The paucity of Neolithic finds and sites from Epirus may of course partly be due to poor archaeological visibility associated with geomorphological changes, where strong later erosional processes would have covered sites located on the plains and valley bottoms. Even if taking such possibilities into account,[74] we still cannot ignore the fact that the evidence in the Kokytos valley for most of the Neolithic period indicates a surprisingly low population density and a mobile economy mainly based on hunting and pastoralism performed by mobile, probably transhumant groups. These groups visited Kokytos either during special-hunting expeditions, or hunting was embedded in the longer course of other activities such as animal tending. The Kokytos valley appears to have been peripheral to the Neolithic settlement whose nodes perhaps are to be found elsewhere in the plains and lakes to the north and east of Thesprotia. Because of the special needs emerging from such a mobile lifestyle during Neolithic times, carrying pottery would have been a burden to the groups visiting the valley. Containers may well have been either organic or then totally redundant since the locales of fresh water sources must have been known to these mobile groups on their expeditions to the Kokytos.

We have to move all the way to Final Neolithic/Chalcolithic Doliana and Early Bronze Age Goutsoura to find evidence for a more sedentary lifestyle where farming played a role next to pastoralism. Indeed Goutsoura is a source of important information in the overall poor Bronze Age record of Epirus.[75] Palynological studies made in Lake Kalodiki (ca. 15 km to the west of the Kokytos valley) indicate a degradation of the natural vegetation combined with a probable increase of open ground vegetation and cultivated plants beginning ca. 3250 cal. BC, whereas the forest vegetation on the basis of a similar study from Lake Ioannina can be shown to decrease between ca. 4500 and 2400 cal. BC.[76] These changes indicate an increased human presence and agricultural practices not until the later stages of the Neolithic period. Another factor that may speak for the late arrival of farming to Thesprotia is the extremely rare appearance of polished stone-axes: except for the example collected by the survey team of Thesprotia Expedition, similar ones have only been recorded in Psaka and Paramythia.[77]

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[72] Douzougli and Zachos 2002, 124-142.
[73] Douzougli and Zachos 2002, 117-124.
[74] Cf., e.g., the settlement of Asphaka at the margins of the now dried up Lake Lapsista (radiocarbon dated to 7380±240 BP) in the northeastern part of the plain of Ioannina, an Early Neolithic site totally covered by later deposits and only found by chance (Douzougli and Zachos 2002, 116). Pottery dating from the Early and the Middle Neolithic was also recovered from a drainage trench opened near the Kastritsa hill, on the shore of Lake Ioannina (Giouni 2010 with further references).
[75] Vasileiou 2010.
[76] Lelivelt 2011; Gerasimidis *et al.* 2009.
[77] Forsén *et al.*, this volume, Fig. 16; Douzougli and Zachos 2002, 138-142, figs. 14-15 (for Psaka and Paramythia).

The Early Bronze Age site of Goutsoura was settled between ca. 2900 and 2400 cal. BC, with the inhabitants living in huts made of wattle and daub. The economy was mainly based on domesticated species, with pigs being the most common, followed by ovicaprids. Hunting and fishing supplied extra food as evidenced by a fish-hook and the fact that ca. 10% of the animal bones belonged to wild species.[78] Sickle elements with silica gloss, as well as a few carbonized seeds of *Lathyrus sativus*/grass pea are indications for farming activity.[79] Terracotta spindle-whorls and spools as well as bone needles do also occur.[80] On the basis of the find composition the way of life must have been very similar to that of the inhabitants of Final Neolithic/Chalcolithic Doliana, radiocarbon dated to between 3770 and 2925 cal. BC.[81]

From the late Middle Bronze Age until the end of the Late Bronze Age Goutsoura was used as a cemetery. The grave constructions together with a retaining wall, probably built in order to create a thoroughfare, indicate intensified modification of the landscape and a community participating in a joint enterprise.[82] This points towards a settlement of a certain size, perhaps a village, whose location unfortunately remains unknown. There are also other indications of an intensification of human activity in the Kokytos valley towards the end of the Bronze Age. First of all, another Late Bronze Age cist grave was recently found in connection with a rescue excavation inside our survey area at Kyra Panagia.[83] Secondly, whereas Early Bronze Age pottery during the field survey was only found at one site (Goutsoura), Middle Bronze Age (PS 17, PS 20 and PS 28) and Late Bronze Age pottery (PS 17, PS 36 and PS 46) was found at three sites each.[84]

Tartaron documented a very strong Late Bronze Age presence at the neighbouring lower Acheron and explained it as the result of the establishment of a Mycenaean trade colony at Ephyra, which lead to intensification of production in the hinterland and an influx of population from elsewhere. Tartaron suggests a four-tier hierarchy of Late Bronze Age settlements in the lower Acheron valley, consisting of major settlements (only Ephyra), villages, farmsteads and rural, non-residential sites.[85] This same increase of wealth also reached further inland as witnessed not only by the grave constructions at Goutsoura and the site E 16 in the Kokytos valley, but also by the rich graves found a little further to the north in Tsardakia Paramythias and Stenes.[86] These graves included, for example, spear heads and a sword, all made of bronze, and even faunal remains of a horse, together indicating the existence of clear social stratification.

However, the settlement finds from the Kokytos valley do not give the same signs of population increase we find in the lower Acheron valley. It is difficult to say whether this difference is real or rather the result of different surveying strategies, with

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78 For the stratigraphy and pottery of the site, see Forsén, this volume and J. Forsén, this volume; for the faunal remains, see Deckwirth, this volume; for the fish-hook, see Papayiannis, this volume, No. 7.

79 Cf. M. Lempiäinen, *Thesprotia Expedition 2009-2010. Macrofossil analysis report*, unpubl. A few *Triticum dicoccum* (emmer wheat) seeds were also found, but from Late Bronze Age layers of the site.

80 Papayiannis, this volume.

81 Douzougli and Zachos 2002, 126.

82 Lima, this volume.

83 Forsén *et al.* 2011, 84, no. E 16.

84 Forsén *et al.* 2011, 99-100, 102-103, 106-108.

85 Tartaron 2004, 189-212.

86 Dakaris 1972, 64-65; Soueref 1986, 57-58, 95-96, 164-165; Lazari 2006, 48-49 (for Tsardakia Paramythias) and Lazari 2006, 46-48; *HGAtlas* 2008, figs. 47-49 (for Stenes).

the Nikopolis Project more actively focusing on the foothills and hills than the Thesprotia Expedition did. The meagre settlement finds from the Middle and Late Bronze Age give little information concerning the degree of sedentism and agriculture, although the higher level of wealth and social stratification were probably built on a clear sedentary mixed farming with associated herding, where the near-by mountain slopes were used on a seasonal basis.[87]

From dispersed villages to fortified settlements

On the basis of the survey work conducted in the central Kokytos valley, we envisaged in *Thesprotia Expedition* II a rather stable settlement pattern originating during the Early Iron Age or the Archaic period and continuing at least until the Early Hellenistic period.[88] This settlement pattern was based upon clusters of small sites, which in the field were interpreted as farmsteads, hamlets, small villages, graves or, in one case, even a small rural sanctuary (Fig. 8). The average distance between the different clusters in the valley was estimated to be ca. 1.5-2 km. Each cluster covers an area of ca. 400-500x600-800 m, however with sterile soil between the single sites. The same pattern repeats itself within the villages, which consisted of several find concentrations interspersed from each other by zones with less finds. Farmsteads usually occur as part of the clusters and could perhaps be described as satellite farmsteads, whereas the, elsewhere in Greece common, isolated farmstead hardly seems to be prevalent.

The clusters we identified were interpreted as non-nucleated villages or dispersed villages inhabited by kinship groups who lived at the same spots of the valley over centuries. A similar settlement pattern, with a large part of the population of a *polis* living in second-order, politically subordinated villages/hamlets, seems to be typical also elsewhere in Greece, although these could be classified as nucleated villages.[89] This settlement pattern usually developed during the Geometric and Archaic periods and continued throughout the Hellenistic period, although some of the centres meanwhile developed into urban centres. This also seems to be the case in Thesprotia, where Elea, for example, clearly was settled before it developed into a fortified town during the second half of the fourth century BC. This clearly was not the result of a synoikism, with people moving from the other settlement centres of the valley to Elea, but rather a result of a strong population increase, as the other dispersed villages of the valley continued to thrive, concurrently with the process of urbanisation.

This volume contains two chapters dealing with the urbanisation phase during the second half of the fourth century BC. The population of the region grew strongly at this time and probably peaked during the third century BC.[90] This is also the period

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[87] Cf., e.g., Tartaron 2004, 13-14, who believes that short-distance, vertical transhumant pastoralism characterised all of Epirus because the environmentally diverse and vertically differentiated region provided mountain pasturage at a close distance from the plains.

[88] Forsén 2011, 8-15.

[89] Cf., e.g., Bintliff 1999a; Bintliff 1999b (Boiotia); Forsén and Forsén (Arcadia); Mee and Forbes 1997 (the Argolid); Hoepfner 1999, 132-133 (the Cyclades).

[90] This goes for both Epirus and Illyria. For a general overview, see Bintliff 1997; for more detailed studies, see, apart from Forsén 2011, also Stocker 2009, 866-867 (Apollonia), Pliakou 2007, 231-234, 250-258 (Molossia), or Giorgi and Bogdani 2012, 374-395 (Phoinike, probably continuing into the second century BC).

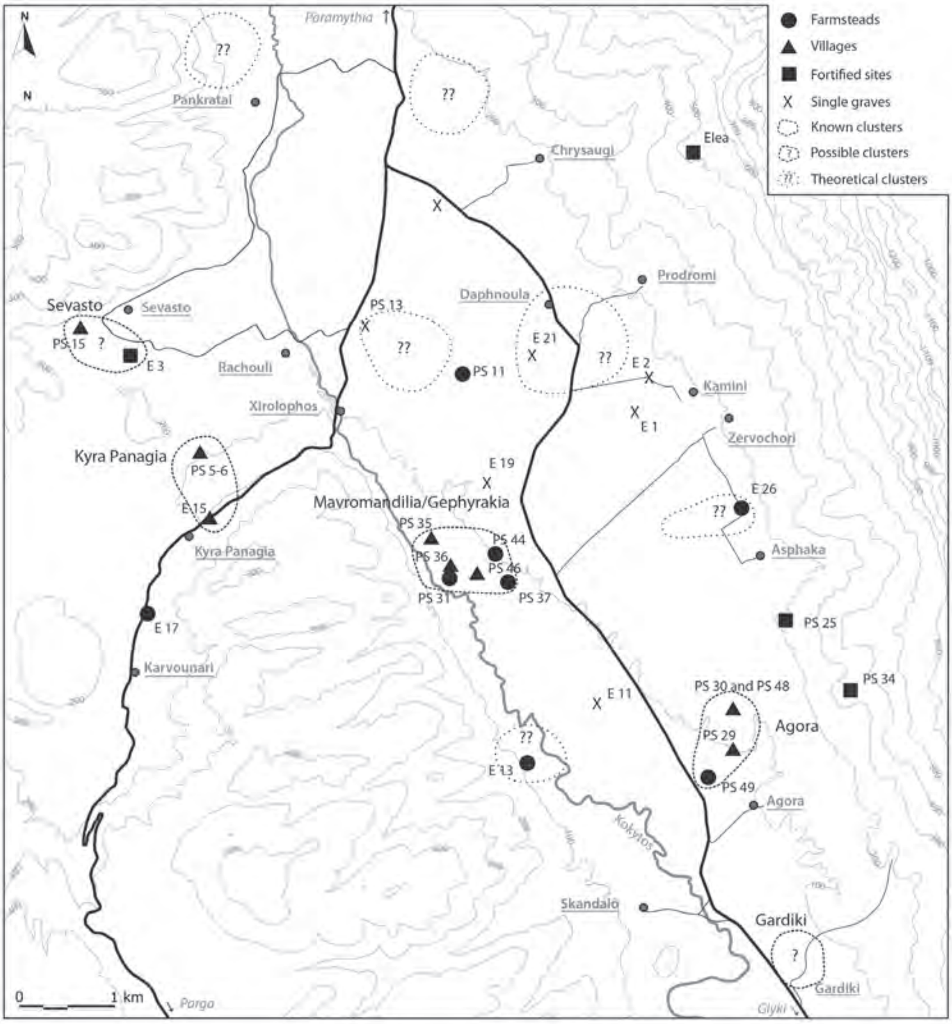

Fig. 8. Location of Late Archaic/Classical to Early Hellenistic sites and site clusters. Sites with only smaller components of Late Classical to Early Hellenistic finds are not included

when most of the fortified settlements of Epirus were constructed. The majority of these were refugee places or perhaps political centres or aristocratic seats, whereas only a few of them, all located close to the coast, developed into towns.[91] Of the fortified settlements in the Kokytos valley only Elea can be described as a town. We now know that its strong walls were built over a longer period of time during the second half of the fourth century and were apparently still modified towards the end of the third century BC.[92] Elea, together with the Early Hellenistic fortifications of Paramythia, Agios Donatos and Kioteza and a series of contemporaneous monumental

[91] Pliakou 2007, 250-258 with further discussion concerning Epirus.
[92] Suha, this volume.

graves,[93] not only witness a strong population increase, but also increased wealth, a developed political system and social stratification.

An increase of wealth can also be seen during the fourth and third centuries in the rural sites, i.e. in the dispersed villages. We now have the first evidence for manufacture, with the ceramic kiln in Gouriza (PS 29) as an example.[94] The first buildings with stone foundation also appear and tile roofs become more common.[95] In Gephyrakia (PS 35) there is even a building with a bathtub, to which water was brought along a channel from the nearby ravine,[96] something indicating social stratification also among the settlers of the dispersed villages. Earlier rural buildings were poorer and probably without stone foundations, something which could even be the case for buildings with tile roofs.[97]

The picture of the settlement pattern of the Kokytos valley that was drawn up in *Thesprotia Expedition* II can now be compared to recent studies concerning Molossia,[98] which is the next neighbour to the east of Thesprotia. First of all, we have the plain of Ioannina, where Georgia Pliakou in her important doctoral dissertation has noted a relatively stable settlement pattern established during the Early Iron Age and continuing into the Hellenistic period. This settlement pattern is characterised by villages located at a distance of ca. 2-3 km from each other. The buildings of the villages were typically constructed with plentiful free space between the single buildings, thus forming what could be described as dispersed villages. Building remains consisting of stone foundations do not generally appear until the fourth century BC (in some instances these occur already during the last decades of the fifth century BC).[99]

According to Pliakou the early villagers in the Ioannina basin would have lived on mixed agriculture with a large portion of pastoralism, including the movement of flocks over long distances, thereby not needing stable buildings. This all changed during the fourth century BC when the inhabitants shifted to an economy based mainly on agriculture and a sedentary lifestyle.[100] The peak of population was reached during the third century BC when a large number of sites were also fortified. However, it is notable that the unfortified villages continue to thrive, thus clearly contradicting the statement by Dakaris and Hammond according to which society would have developed from a stage based on villages to a higher level, characterised by fortified urban sites. Pliakou here adds that only very few of the fortified settlements can be described as towns and most probably were only places of refugee or political centres.[101]

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93 Of these, the Prodromi grave (Choremis 1980) and the Marmara grave (Riginos 1999, 172-174; Pietilä-Castrén 2008) have been excavated. During the intensive field survey we found remains of another two possible monumental graves (PS 13 and PS 25, see Forsén *et al.* 2011, 86 and Tikkala 2009).

94 The excavation of this kiln was begun by the Greek Archaeological Service 2007-2008 and was finished by the Thesprotia Expedition in 2015. The results will be published by Tommi Turmo in *Thesprotia Expedition* IV.

95 The earliest datable rural buildings with stone foundation appear in Pano Pigadi of Sevasto (PS 15), Agia Paraskevi of Kyra Panagia (PS 5-6), Kyra Panagia (E 15), Gephyrakia (PS 35) and Gouriza (PS 29). Cf. Forsén *et al.* 2011, 77-78, 82-84, 97-99 and 116-119.

96 Forsén *et al.* 2011, 97-99. The finds from this site will be studied by Tommi Turmo for his doctoral dissertation.

97 Turmo, this volume.

98 Pliakou 2007 and Douzougli and Papadopoulos 2010.

99 Pliakou 2007, 226-235, 297-300.

100 Pliakou 2007, 199-206, 297-300.

101 Pliakou 2007, 231-234, 250-258, 297-300.

The publication of the Late Bronze Age to Classical village and cemetery of Liatovouni in the Konitsa valley, next to the Albanian border, appeared in 2010.[102] Apart from a thorough publication of the remains from Liatovouni, Angelika Douzougli and John K. Papadopoulos here also give a good overview of the general development in the Konitsa valley, comparing Liatovouni with, for example, Pogoni and Vitsa Zagoriou. They stress the fact that villages of this type characterised Molossia, beginning from the Late Bronze Age/Early Iron Age and continuing into the fourth century BC. The buildings, or perhaps rather huts, in Liatovouni were constructed on top of a stone foundation, the walls being made of mud-bricks held in place by a wooden framework. Remains of hearths, a water drainage channel and a more substantial wall, which appears to delimit the extent of the settlement and may have served as a retaining wall, were also found.

Liatovouni and Vitsa Zagoriou are according to Douzougli and Papadopoulos good examples of a stable settlement pattern based on small villages, whose inhabitants made their living on sedentary mixed farming and associated localized herding. This settlement pattern also included sites of special use that were connected to the localized herding and thus not occupied all year around. Douzougli and Papadopoulos believe that this settlement pattern came to an end in connection with the abandonment of Liatovouni and Vitsa Zagoriou during the fourth century BC, "at which time the previously scattered population was centralized within and around new fortified acropoleis". Pliakou, on the other hand, explains the abandonment of Liatovouni and Vitsa as a result of the Molossian movement from the north into the plain of Ioannina that originally had been controlled by the Thesprotians.[103]

On the basis of our present knowledge there is no sign in the Kokytos valley or the Ioannina plain that the settlement pattern based on villages would have come to an end in connection with the establishment of fortified acropoleis. The stable settlement pattern with sites being seemingly continuously settled from the Early Iron Age until the Hellenistic period does not, on the other hand, fit well together with Pliakou's suggestion that there would have been a change in the economy during the fourth century BC, from a more mobile one based mainly on pastoralism to a more sedentary one mainly based on agriculture. Without excavations of several sites and detailed osteological analyses it is difficult to tell whether part of the population was mobile, following the herds over longer distances, or not. The dispersed character of the villages, with long distances between single houses, do on the other hand point towards an economy in which pastoralism played an important role.[104]

The strong population increase which led to the urbanisation of Elea during the fourth century BC had without doubt a tremendous effect on the whole Kokytos valley. It brought with it an increase of wealth. The surrounding dispersed villages probably began to produce not only food, but also different products, such as roof tiles, pottery and iron objects, for the inhabitants of the town. There must also have been an increased demand for meat, cheese and other products from animals which probably encouraged

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102 Douzougli and Papadopoulos 2010.

103 Pliakou 2007, 277-282.

104 Spinei 2009, 203 concerning the Medieval Balkans, with parallels drawn from ethnographic studies, according to which "villages with houses placed at a small distance from each other are typical for communities involved in mixed farming (intensive agriculture and stock breeding), while villages with dispersed houses set up at a greater distance from each other are of communities specializing in stock breeding."

some to specialize on pastoralism. Faunal material from sites excavated by the Thesprotia Expedition show a marked shift in subsistence practices between the Early Iron Age and the Hellenistic/Early Roman period. This shift from a society where cattle was the main supply of meat to a society dominated by ovicaprids may be the result of a strong population increase forcing the inhabitants to make use of ever more marginal grazing lands in the mountains that were suitable only for ovicaprids.[105] It most likely also brought along with it an increase of short-distance, vertical transhumant pastoralism.

Concluding remarks

Our knowledge of the early history of human presence in the Kokytos valley stretching from the Middle Palaeolithic period until the fourth century BC has, through the specific and more detailed studies of sites and find groups in this volume, taken a step forward, thereby adding new evidence and nuances to the broad overview of settlement patterns and regional history published in *Thesprotia Expedition* I and II. While summarising and contextualising the results of the single chapters in this volume we have put special emphasis on the notions of nomadism and sedentism, an important topic for understanding the past of the region which we had only touched upon in the previous volumes of the Thesprotia Expedition.

The conclusions drawn concerning the human imprint on the landscape in societies without written sources are based on our ability to identify, date and interpret the material remains. Our work stresses the need to incorporate into surface survey work small-scale excavations, a claim with repercussions for both field methodology and the Greek archaeological legislation. It also emphasizes the need for the detailed publication of specific find groups, not only from excavations and surveyed sites, but also from tracts (especially in societies experiencing a high degree of mobility).

Despite our close scrutiny much uncertainty still remains regarding the chronological and cultural affinities of a major part of the lithic finds, which by far outnumber other archaeological objects. The prehistoric archaeology of Epirus counts only a few stratified and well-dated sites that would offer comparanda for the surface finds examined. There is, finally, a clear need for more research into the traits of knapped stone deriving from historical periods. Although our knowledge of the Thesprotian past has moved tremendously forwards since the days of Hammond and Dakaris, more work is thus still needed.

[105] Niskanen 2009; Deckwirth 2011.

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The Middle Palaeolithic Bifacial Tools from Megalo Karvounari

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Introduction

The *terra rossa* formation of Megalo Karvounari[1] has repeatedly been the focus of Palaeolithic investigations, from its discovery by Eric Higgs' survey team in 1962[2] to the most recent work conducted by Björn Forsén's survey team in the course of the Thesprotia Expedition in 2005.[3] The site is one of numerous stone-tool bearing red-beds present in the coastal karst of western Epirus. They have been the subject of a long-standing debate on the subject of their geomorphological history and archaeological significance.[4] There is now a wide consensus that these open-air sites are associated with Pleistocene 'perennially spring-fed poljes', that is enclosed basins and depressions, and 'seasonally rain-fed loutses', that is smaller and shallower depressions on limestone plateaus.[5] Coupled with the region's caves and rockshelters, they make up the two pillars upon which interpretations of the Epirotic Palaeolithic settlement pattern have been founded for precisely half a century.

Today's badlands have been vividly envisioned in the past as the remains of Pleistocene oases 'comprising streams, swamps, and lakes, and attracting animal populations as well as lake-dweller hominins' in an otherwise rather bare karstic region.[6] Glimpses of such a potential can still be seen after rainfall, when parts of the Megalo Karvounari basin retain water in pockets that temporarily transform what is otherwise a semi-desert landscape covered with patches of pine trees, prickly oak and hawthorn bushes, and ferns (Fig. 1).[7]

[1] This research was made possible due to the financial support received from the Thesprotia Expedition which is gratefully acknowledged by all three authors. John McNabb has kindly offered valuable comments on an earlier version of this manuscript. We are also grateful to Karen Ruebens who shared her views regarding the *Keilmesser* tools and provided useful references, Andreas Darlas who communicated with us his views upon the Mousterian of Greece, Vicky Elefanti who shared information on the Lakonis lithic assemblage and Vivian Staikou who contributed to our literature review. All lithic artefacts were drawn by Christina Papoulia and inked by Nikoletta Dolia. Fig. 2 is by Esko Tikkala, whereas Figs. 6, 8, 10 and 14 were made by Sarianna Silvonen in the field. All other photographs are by Christina Papoulia.

[2] Dakaris *et al*. 1964.

[3] Forsén *et al*. 2011, 76; Ligkovanlis 2011.

[4] Bailey *et al*. 1992; Dakaris *et al*. 1964; Higgs and Vita-Finzi 1966; Papagianni 2000; Runnels and van Andel 2003; van Andel and Runnels 2005; Tourloukis 2009; Zhou *et al*. 2000; Papaconstantinou and Vassilopoulou 1997; Papagianni 2000.

[5] van Andel and Runnels 2005, 369 and 379; Ligkovanlis 2014.

[6] van Andel and Runnels 2005, 371.

[7] Until recently Megalo Karvounari functioned as the waste disposal area of the wider Paramythia region; no doubt it will offer a wealth of twentieth-century material culture for the archaeologist of the future to study along with prehistoric artefacts.

Fig. 1. Southwestern part of Megalo Karvounari after a rainstorm in September 2009, looking northeast. In the background the Paramythia mountain range.

Megalo Karvounari is a palimpsest site encompassing multiple episodes of lithic artefact deposition belonging to at least three components: a rich Middle Palaeolithic one,[8] a distinctive early Upper Palaeolithic (i.e. Aurignacian) one[9] and one that we suggest dates to the Holocene and has not been described in any detail as yet. In this study we contribute to the discussion of the Epirotic *terra rossa* sites by presenting the Middle Palaeolithic bifacially worked tools that came to light through the surface collection activity in the southwestern sector of Megalo Karvounari (Fig. 2). We shall examine the typological and technological attributes of these tools and place them in the context of the site, the region and the Greek Palaeolithic.

We shall then review the archaeological and chronological attributes of the limited record of bifacially worked tools in the Greek peninsula, including handaxes and bifacially retouched points on elongated flakes. Whereas the latter group of tools is part of a 'Mousterian with foliates and bifaces' that is known to have spread across northern Europe through the northern Caucasus,[10] the handaxes, larger or smaller, have been ascribed to a variety of taxonomic entities such as the 'Acheulean', the 'Mousterian', the 'Micoquian', and the 'Mousterian of Acheulean Tradition' (MTA). In Greece, these terms are loosely defined by individual scholars, if they are defined at all. This has led to confusion over their application. These cultural labels are important as they carry implicit assumptions about the hominin species who produced the stone tool assemblages. Here, we shall disentangle the cloud of terminology and spell out the emerging properties of the biface industries present in the Greek record.

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[8] Papaconstantinou and Vasilopoulou 1997; Papagianni 2000; Ligkovanlis 2011.
[9] Forsén *et al*. 2011, 76; Ligkovanlis 2011.
[10] Bar-Yosef 2006, 469, fig. 1

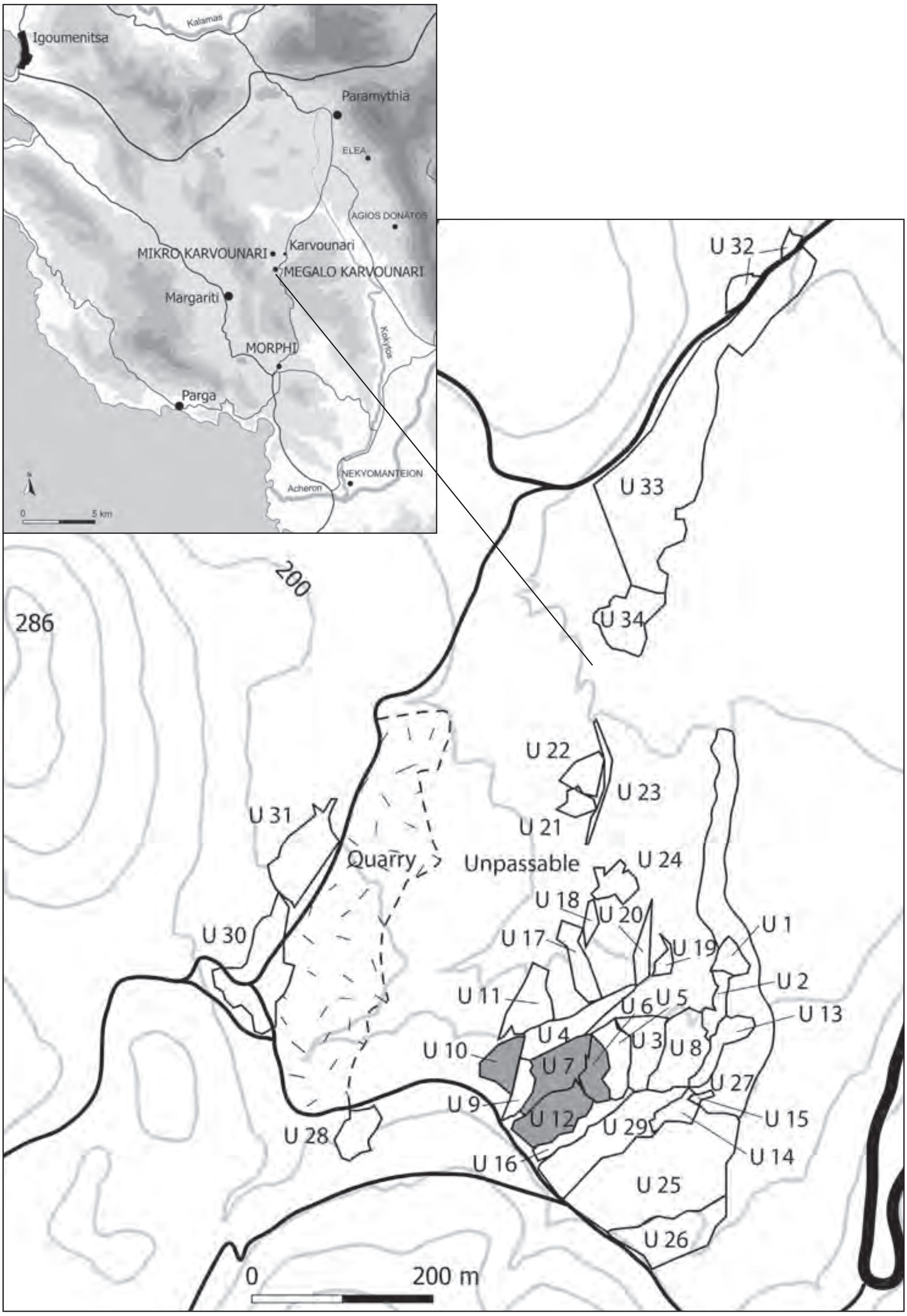


Fig. 2. Plan of Megalo Karvounari with Units 6, 7, 10 and 12 shaded.

The Megalo Karvounari bifaces in their site context

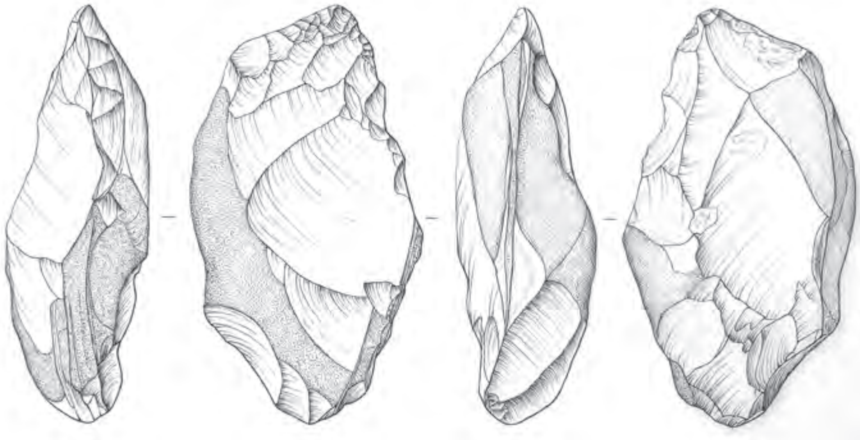
Recovery and study methods

Most of the sites identified during the survey conducted by the Thesprotia Expedition were intensively searched in 10x10 m or 20x20 m squares.[11] At Megalo Karvounari, PS 22, (and its twin site Mikro Karvounari, PS 23), the very undulating and uneven terrain prompted a somewhat different strategy to the one used at other sites in the Kokytos valley located in flat areas with a smoother relief. The two *terra rossa* sites were instead subdivided into units of variable spatial extent, each defined and delimited by the presence of landscape features such as gullies or ridges. Within each spatial unit, all flint pieces which seemed to be probable artefacts were collected, as well as a few samples of different types of raw material nodules. Artefacts were bagged with reference to their specific spatial unit which provides the minimum provenance unit for the majority of Megalo Karvounari finds except for the finds of Unit 24; this was further subdivided into 10x10 m squares.

The bifacially worked tools and the diagnostic tools, cores and debitage recovered from the site in summer 2005 are presented and illustrated. In order to contextualize these surface finds and given that the PS 22 stratigraphy is poorly researched, greater emphasis was placed on the horizontal scale of reference, that is on units in close spatial association with Units 6 and 12, where the backed bifaces were found (Fig. 3). In particular, the lithic assemblage from Units 4, 5, 7, 8, 9, 10 and 16, those surrounding the biface-bearing units, was examined in terms of artefact technology, typology, surface alterations and metrical attributes. Measurements of artefacts were taken at their longest point parallel to

Fig. 3. Part of Megalo Karvounari, Unit 6, view towards the north.

[11] Forsén *et al*. 2011, 76; Forsén *et al*., this volume.



Figs. 4-5. Backed biface of Keilmesser type, MK6.1, from Unit 6.

their flaking axis (length), at their widest point perpendicular to their flaking axis (width) and at their thickest point (thickness). Additionally, each bag from the rest of the units of the entire site was opened and, through a judgemental sampling strategy, a number of diagnostic tools of the earliest component were also included in this study.

The two Keilmesser (asymmetric backed bifaces)

The Megalo Karvounari tool inventory contains two bifacially worked tools that fall within the definition of backed bifaces or *Keilmesser* types, a group of bifacially worked tools that dominate the Micoquian or *Keilmessergruppe* techno-complexes of northwestern, central and eastern Europe.[12] Bifaces of this type are characterised by natural backing, assymetric, non-covering retouch and a rectangular cutting edge. To the east of the Rhine *Keilmesser* dominate the Micoquian assemblages, although they occasionally occur in different Middle Palaeolithic assemblages to the west of the Rhine.[13]

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[12] Jöris 2006.
[13] Ruebens 2013; Ruebens 2006, 69.

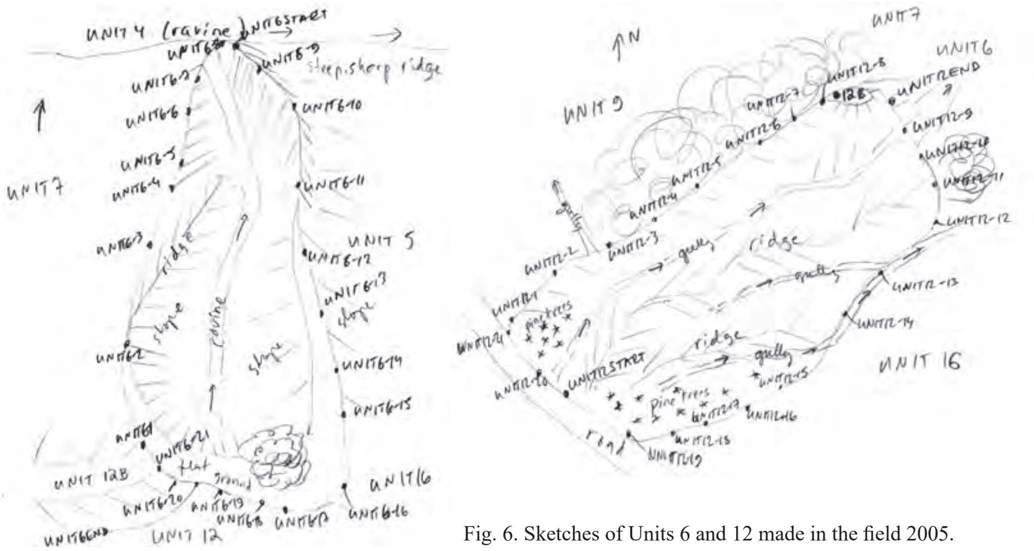


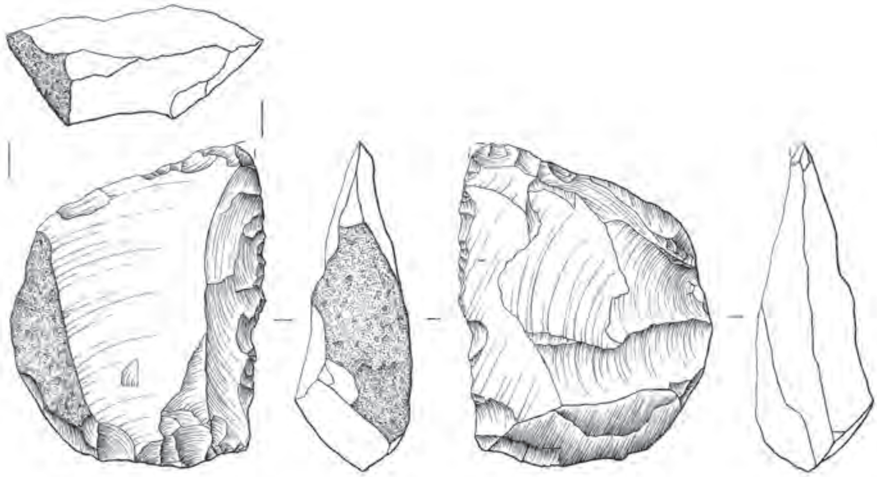
Fig. 6. Sketches of Units 6 and 12 made in the field 2005.

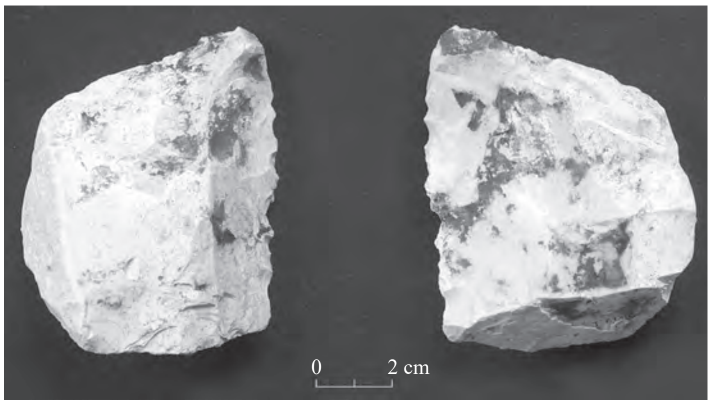
MK6.1 (Figs. 4-5), from Unit 6, which is an elongated unit situated in the southern part of the site comprising a ravine to the north of the dirt road (Fig. 6), was produced on a relatively flat, fine-grained flint cobble. It has a heavy white patina and a chalky off-white cortex. It preserves about 25% of its cortex on each face and allows us to assume the initial shape of the flint nodule, which must not have differed much in size from the end-product. Its dimensions are 11×6.1×3.8 cm. The artefact's retouch is bifacial though not covering. Its upper face, in particular its distal end and its right lateral edge, have been more intensively retouched by means of shorter or longer, continuous, scaled removals, while the left lateral has only minor working and preserves most of its initial cortex, subsequently forming a natural back. The biface falls within the definition of the *Keilmesser* types discussed above.[14]

The second backed biface, MK12.1 (Figs. 7-8) comes from Unit 12, defined by the dirt road and just to the north of Unit 6 (Fig. 6). It is a large (8.2×6.5×2.7 cm) tool on a cortical cobble whose small part of preserved cortex forms a natural back. The edge opposite the cortical back has a convergent tip formed by denticulated and bifacial short retouch. The tip has been partially broken. In typological terms, this second bifacially worked tool also bears significant affinities with the backed bifaces of several Micoquian industries of northwestern, central and eastern Europe. This artefact is also made of flint and is highly patinated.

Judging by the type and colour of patination, it is possible, though not certain, that the raw material used in both cases was the fine-grained light blue/grey flint which is often encountered in the Middle Palaeolithic artefacts of Megalo and Mikro Karvounari. It is still abundant in the form of unworked, usually small, nodules at several sites in the Kokytos valley today.[15]

[14] See also Jöris 2012.
[15] Papoulia 2011.





Figs. 7-8. Backed biface of Keilmesser type, MK12.1, from Unit 12.

Although the stratigraphic correlation of the two backed bifaces from Megalo Karvounari cannot be established they were found in close spatial association in two bordering units characterised by gentle slopes and mini-gullies dissecting the surface. A Lower Palaeolithic, i.e. an Acheulean, presence cannot be proposed, based either on the biface from Unit 6 or on the second, backed biface from Unit 12. The bifacial elements belong to a Middle Palaeolithic assemblage associated with the earliest phase of hominin presence on site. Their very presence here could prove to be a starting-point for building up Greece's Recent Micoquian inventory and could guide further interpretations into finer industrial and perhaps geographical subdivisions of the Greek Middle Palaeolithic record. Before moving onto this discussion, however, we will first examine their accompanying finds.

The two Quina scrapers

Among the retouched tools from Unit 7, a rectangular unit which lies directly to the west of Unit 6 and to the south of Unit 4 (Figs. 2 and 9) and consists of a series of gullies interspersed with ridges and a forested area in its south (Figs. 10b, 11), there is a bifacially worked scraper with invasive, scaled and stepped retouch that preserves part of its cortex on the distal part of its dorsal face (5×3.8×1.2 cm, Fig. 10; Fig. 11b). This particular

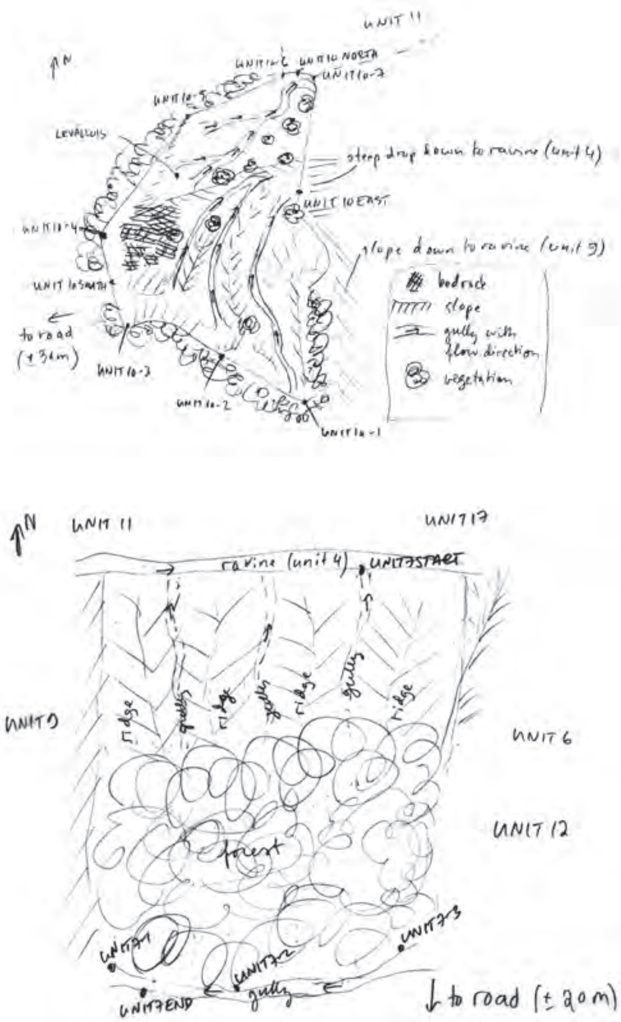


Fig. 9. Sketches of Units 7 and 10 made in the field 2005.

tool is classified as a *Quina* scraper. A similar, but larger, tool (9.1×4.8×22.3 cm, Fig. 10a, 11) was recovered from Unit 10, a little more to the west of the site (Fig. 14), but still in very close proximity to the previously mentioned *Quina* scraper and the biface. This tool, again, has been bifacially retouched in the same manner as the smaller one from Unit 7. It has less invasive yet still stepped retouch, especially on its right lateral, and preserves part of its cortex on the distal left part of its dorsal face. This artefact is a more 'text-book' example of a *Quina* scraper as described and illustrated by Bordes and Debénath and Dibble.[16]

As with the bifaces seen above, *Quina* scrapers are extremely rare finds in Greece. A few examples from the oldest Middle Palaeolithic layers of the Theopetra Cave have been reported,[17] though Darlas has disputed this.[18] A *Quina* scraper was also recovered from Sardinia in western Greece.[19] A few *Quina* scrapers were assigned to the oldest 'Classic Mousterian' industries recovered from the open-air sites of Elis in the western Peloponnese by the French surface survey.[20] *Quina* scrapers are also reported to derive from the enigmatic and industrially mixed Initial Upper Palaeolithic horizon of Lakonis I, a site with continuous occupation from 120 to 43ka.[21] Given the small number of the *Quina* scrapers and our inability to establish distinct stratigraphic associations between the Megalo Karvounari Middle Palaeolithic finds, it is not clear whether these two tools

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[16] Bordes 1961; Debénath and Dibble 1994.
[17] Panagopoulou 2000.
[18] Darlas 2007.
[19] Darlas and Papaconstantinou 2004.
[20] Chavaillon *et al*. 1969.
[21] Elefanti *et al*. 2009.

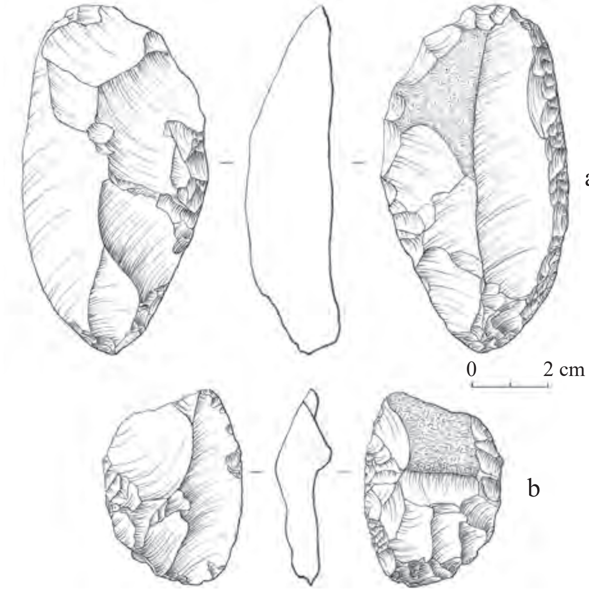

Fig. 10. *Quina* scrapers from Unit 10 (a) and Unit 7 (b).

Fig. 11. *Quina* scrapers from Unit 10 (above) and Unit 7 (below).

are suggestive of a discrete *Quina* Mousterian presence in northwestern Greece or are part of a different technocomplex. Recent Micoquian assemblages do include *Quina* elements.

Other Middle Palaeolithic finds from Megalo Karvounari

The two *Keilmesser* and the two *Quina* scrapers derive from four neighbouring Units, 6, 7, 10 and 12, that extend across an area of 9750 square meters in the southwestern sector of Megalo Karvounari. Units 6, 7 and 12 border each other and could be merged into a single larger unit bounded by the dirt-road to the southwest and sloping to the north (Fig. 2). They are separated from Unit 10 by Unit 9, which produced only two artefacts.

Unit 6 has also yielded six flakes, a broken laminar flake, a couple of core fragments and four retouched flake tools (Fig. 12). In particular, two out of the three whole flakes

Units	Cores	Flakes	Levallois flakes	Laminar flakes	Tools	Other	Core fragments	Total
4	-	8	-	3	5	-	-	16
5	1	21	-	7	4	-	6	39
6	-	6	-	1	5	-	2	14
7	4	16	2	9	9	-	6	46
8	6	19	2	4	12	-	9	52
9	1	1	-	-	-	-	-	2
10	6	59	4	13	23	-	10	115
12	3	17	1	6	22	-	9	58
12b	3	8	-	7	4	2	1	25
16	3	12	-	-	3	-	2	20
Total	27	167	9	50	87	2	45	387

Fig. 12. Megalo Karvounari: lithics inventory of Units 4-10, 12, 12b and 16.

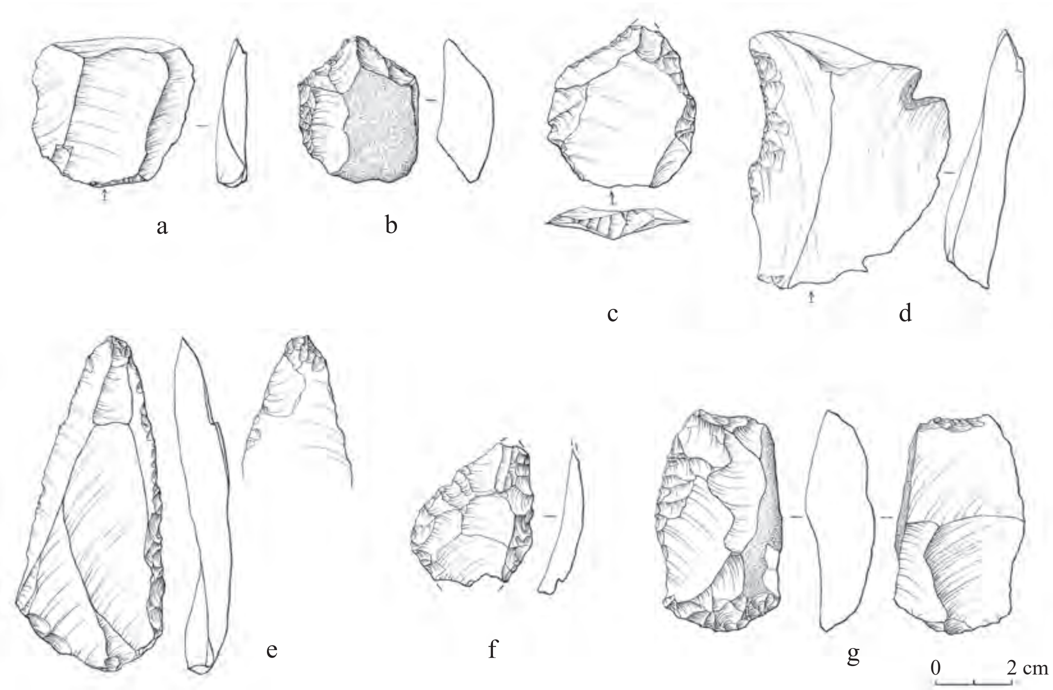

Fig. 13. Flake and tools from Units 6 (a-d) and 7 (e-g). a) Flake, b) nosed endscraper, c) retouched Levallois flake, d) single concave scraper, e) retouched Levallois point, f) dejeté scraper, g) bifacially worked proximal endscraper.

Tool types / Units	4	5	6	7	8	9	10	12	12b	16	Total
Naturally backed knife	1	-	-	-	1	-	4	5	2	-	13
Backed knife	-	1	-	-	-	-	-	-	-	-	1
Backed biface (*Keilmesser*)	-	-	1	-	-	-	-	1	-	-	2
Levallois Point	-	-	-	-	1	-	2	-	-	-	3
Retouched Levallois point	-	-	-	1	1	-	-	-	-	-	3
Pseudo-Levallois point	-	1	-	-	-	-	1	-	-	-	2
Retouched pseudo-Levallois point	-	-	-	-	1	-	1	-	-	-	3
Denticulate	1	1	-	-	2	-	1	3	-	-	8
Notch	-	-	-	1	-	-	-	-	-	-	1
Retouched flake	2	1	1	2	3	-	7	8	-	3	27
Retouched Levallois flake	-	-	1	1	-	-	-	-	-	-	2
Quina scraper	-	-	-	1	-	-	1	-	-	-	2
Single scraper	-	-	1	-	-	-	3	1	-	-	5
Transverse scraper	-	-	-	-	2	-	-	3	-	-	4
Dejeté scraper	-	-	-	1	-	-	2	1	-	-	3
Endscraper	-	-	-	-	-	-	-	-	1	-	1
Proximal endscraper	-	-	-	1	-	-	-	-	-	-	1
Nosed endscraper	1	-	1	-	-	-	-	-	-	-	2
Piercer	-	-	-	-	-	-	1	-	1	-	2
Truncation	-	-	-	-	1	-	-	-	-	-	1
Composite tool (side-scraper & partial truncation)	-	-	-	1	-	-	-	-	-	-	1
Total	5	4	5	9	12	-	23	22	4	3	87

Fig. 14. Megalo Karvounari: Middle Palaeolithic tool repertoire.

have a flat platform (7.2×4.4×2.1 and 2.1×2.7×0.6 cm), the smaller of which also has a step fracture, while the third (Fig. 13c) has a facetted platform and a hinge fracture (3.8×4.2×0.9 cm, Fig. 13a). The tools are a nosed endscraper made on a thick cortical flake (3.8×3.1×1.4 cm, Fig. 13b), a retouched Levallois flake with a facetted platform (4.2×3.8×0.8 cm, Fig. 13c), a concave lateral scraper on a large flake with a flat platform and a hinge fracture (6.5×5.6×1.5 cm, Fig. 13d) and a broken retouched flake with a punctiform platform (7.4×5.9×1.2 cm) (Fig. 14).

The neighbouring units of Unit 6 have yielded a large number of Middle Palaeolithic artefacts such as Levallois points and *Quina* scrapers. In particular, Unit 7 has yielded, among others, a notched piece (3.3×1×0.8 cm), four marginally retouched flakes, a side-scraper with a partial truncation and a facetted platform (4.4×2.2×0.6 cm), an elongated retouched Levallois point with a facetted platform and inverse distal thinning (8.7×4×1 cm, Fig. 13e), a *dejeté* scraper (4.1×3.2×0.7 cm, Fig. 13f) and a bifacially worked proximal endscraper which preserves part of its cortex on its right lateral (forming a natural back) and has a relatively lighter degree of patination (5.8×3.3×1.7 cm, Fig. 13g). Since the retouch removals are of a scaled rather than stepped morphology, this scraper has not been classified as *Quina*, although the overall shape and the type of inverse flat thinning does not differ much in principle from the two *Quina* scrapers encountered at the site (Figs. 10-11). Unit 7 is a part of the site where signs of rapid and extreme erosion were present.

Unit 10 has a large number of artefacts and is dominated by Middle Palaeolithic cores, tools and debitage, with just a few post-Middle Palaeolithic elements (i.e. three bladelet cores, a couple of scrapers and a few debitage fragments). Among the most characteristic Middle Palaeolithic tools is a retouched Levallois point (4.6×2.7×0.6 cm, Fig. 15a) and a *dejeté* scraper (4.4×3.3×1 cm, Fig. 15b). There is also a small borer with a facetted platform (2.8×2.1×0.7 cm), a broken pseudo-Levallois point with a facetted platform (5.3×3.5×0.9 cm), a single-scraper with a dihedral platform (2.9×3.4×0.9 cm), a denticulate (3×2×0.7 cm), several naturally backed knives, and retouched flakes with

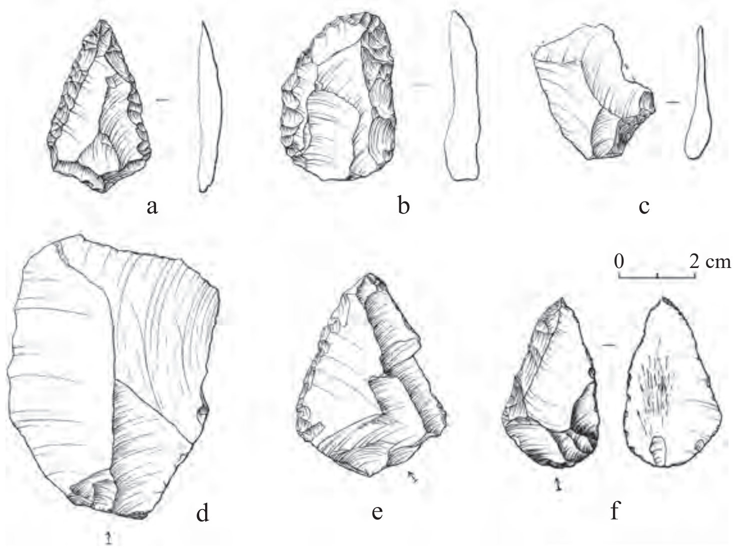

Fig. 15. Flakes and tools from Units 8 (d-f) and 10 (a-c). a) Retouched Levallois point, b) *dejeté* scraper, c-d) flakes, e) transverse scraper, f) retouched flake or atypical point.

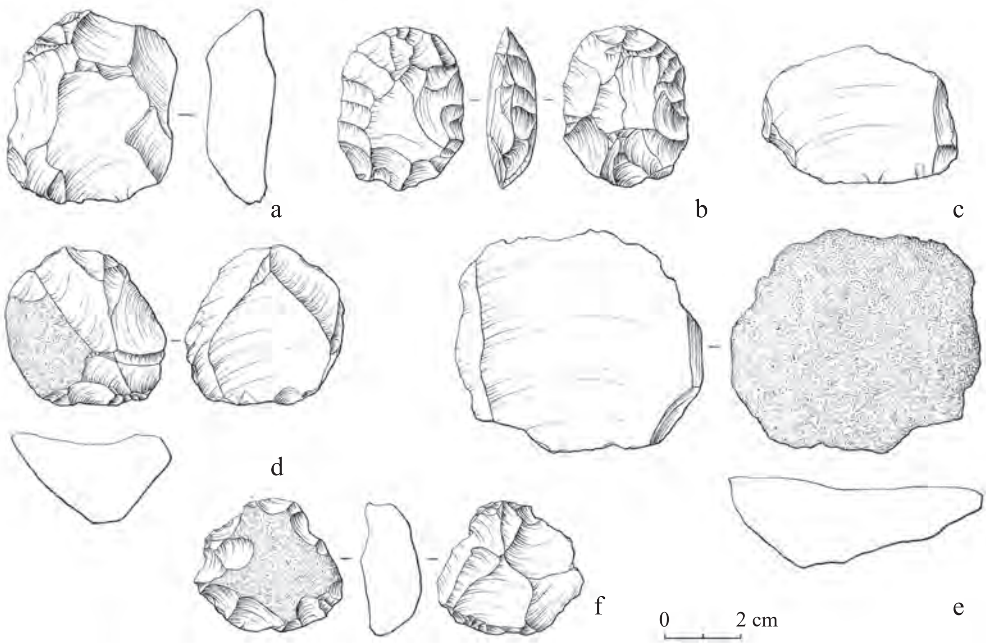

Fig. 16. Levallois cores (a, b: Unit 10, c, e: Unit 20, d, f: Unit 8).

centripetal or convergent negative scars. Among the debitage there are several Levallois flakes like the one with a dihedral platform in Fig. 15c (3.6×2.8×0.7 cm). The majority of the platforms both on the retouched pieces and the unretouched whole flakes are either facetted or dihedral. There are also a few cortical or flat, and only a couple of punctiform ones. Among the cores there are two recurrent centripetal Levallois cores measuring 5.2x4.5x1.8 cm and 4.3x3.4x1.5 cm respectively (Figs. 16a-b).

Units 12 and 16, on the southern borders of Unit 6, provide the same picture of a predominant Middle Palaeolithic component with a high degree of Levallois products and the typical Mousterian tools such as single, *dejeté* and transverse scrapers, denticulates, naturally backed knives and retouched flakes. Apart from the abundant Levallois flakes and retouched flake blanks (e.g. Fig. 17d), there are also blade-like (i.e. laminar flake) blanks and tools which in the Middle Palaeolithic contexts of the Epirotic sites are usually classified as elongated or 'laminar' blanks and are the products of either recurrent parallel Levallois or Middle Palaeolithic cores aimed to production of laminar blanks (Fig. 17e).[22]

The 13 retouched tools from Unit 8 include a transverse scraper on a pseudo-Levallois point with a facetted platform (Fig. 15e, 4.1×5.1×0.9 cm), two more 'atypical' points with a facetted and a dihedral platform (e.g. Fig. 15f, 4.5×4.1×0.9 and 4.3×2.9×0.9 cm), a transverse scraper (2.8×4×1.1 cm), a denticulate (4.4×2.8×0.8 cm) and a few retouched blanks. Among the 23 debitage products there are several Levallois flakes, such as the large one with a dihedral platform in Fig. 15d (7.4×5.5×0.9 cm). A few more cores from Unit 8 demonstrate the presence of hominins using Middle Palaeolithic technology. In particular, a lineal Levallois core (4.2×4.2×2.1 cm, Fig. 16d) with a fixed perimeter,

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[22] For discussion, see Papagianni 2000; Ligkovanlis 2011; Papoulia 2011.

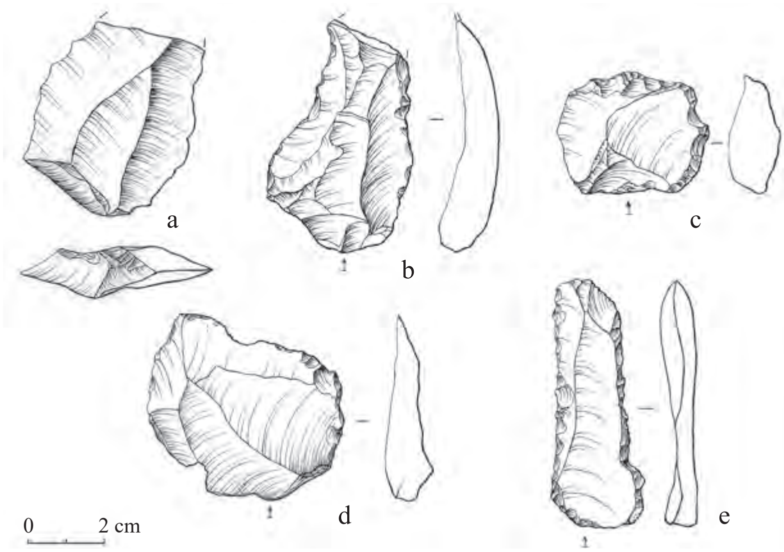

Fig. 17. Flake and tools from Units 5 (a-c), 12 (d) and 16 (e). a) Flake, b) retouched laminar flake, c) denticulated scraper, d) retouched Levallois flake, e) retouched laminar flake.

preserving 25% of the cortex on its lower face, and a recurrent centripetal Levallois core (4×3.9×1.5 cm, Fig. 16f) preserving just under 50% of the cortex on its lower face, are among the most characteristic examples.

Unit 5, situated between Units 6 and 8, has yielded just a few finds; they include, however, a number of Middle Palaeolithic artefacts such as a broken Levallois flake with a dihedral platform (4.9×4.1×1.4 cm, Fig. 17a), a marginally retouched laminar flake with a dihedral platform (6×3.7×1.3 cm, Fig. 17b) and a denticulated scraper with a flat platform (3.3×3.9×1.4 cm, Fig. 17c). The intense Middle Palaeolithic presence of the site continues further to the north in Units 2, 18, 24[23] and 21, which have yielded some of the most elaborate examples of Mousterian scrapers with unifacial scaled and stepped retouch (Fig.18).

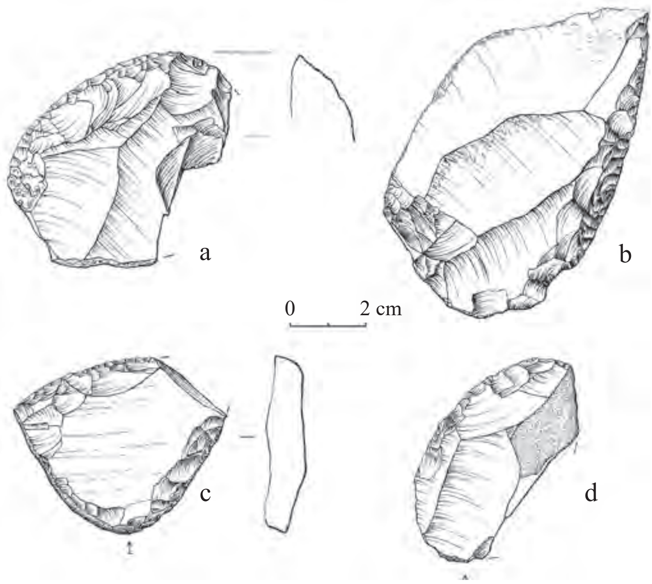

Fig. 18. Scrapers from Units 2 (c), 18 (a) and 21 (b, d). a, d) Transverse scrapers, b) single scraper, c) dejete scraper.

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[23] For the lithic assemblages of Unit 24 in particular, see Ligkovanlis 2011.

Interpreting the Middle Palaeolithic component of Megalo Karvounari

The publications of the older[24] and the recent[25] collections from the red-bed sites just to the west of the Kokytos valley, namely Mikro Karvounari, Megalo Karvounari and Morphi, have suggested the presence of Middle Palaeolithic hominins in the region, though later industrial components left behind by anatomically modern humans are also present. The archaeological context of the bifacially worked tools from Megalo Karvounari offers evidence for significant techno-typological associations with the *Quina* Mousterian assemblages and the *Keilmessergruppe* (KMG) assemblages of the central and eastern European Micoquian.

In the absence of any chrono-stratigraphic information, the Middle Palaeolithic of Megalo Karvounari cannot be subdivided into further variants in terms of technological, metrical or typological characteristics of the lithic finds. The industrial variability exhibited and large number of artefacts present do imply either an intensive presence or repeated visits by several groups of Middle Palaeolithic hominins. The rarity of backed bifaces, and the dissimilarity in comparison between the two found, requires some explanation. A parsimonious explanation would be that the backed bifaces from Megalo Karvounari were part of a tool repertoire which depended more on Levallois and Mousterian points for the hunt, and on several types of scrapers for the processing of meat and hides. Such tools might have served as handy tools (also known as expedient tools[26]) in a more opportunistic manner, for the Middle Palaeolithic hominins of the Kokytos valley sites. We clearly need a larger and more representative sample of Middle Palaeolithic artefacts from a primary deposition at Megalo Karvounari in order to understand what was in play here. If such an explanation, that they are *ad hoc* responses possibly to the form of the original blank, were proved to be true, then their link to the KMG would effectively be weakened.

The significant production and/or use of points at the Kokytos valley has been implied by some of the Levallois and Mousterian points, bearing macroscopically visible impact fractures, which are concentrated at the three sites of Mikro Karvounari, Megalo Karvounari and Morphi. Most probably hafted on wooden shafts and used as spears, these tools allowed Middle Palaeolithic people to hunt large mammals efficiently, not only at close quarters but also from a 'safer' distance by throwing the hunting tool.[27] Thus, the use of bifaces might perhaps not have been as essential – at least for the hunt – to the Middle Palaeolithic hominin groups who made use of the Epirotic resources. Lastly, it is worth noting that none of the assemblages from the Kokytos valley include any indications of any pre-Middle Palaeolithic presence in these three multicomponent sites, nor can the MK6.1 biface indicate such a presence.

The Kokkinopilos bifaces

The eroding *terra rossa* deposits of Kokkinopilos, situated near the sources of the River Louros in south Epirus, are in terms of context homologous to the Megalo Karvounari

[24] Papaconstantinou and Vassilopoulou 1997; Papagianni 2000.
[25] Ligkovanlis 2011; Papoulia 2011.
[26] Binford 1979; Binford 1980.
[27] Papoulia 2011.

ones and have to date yielded the most complete biface record in Greece. It consists of ten published and illustrated tools from the Lower and the Middle Palaeolithic. Higgs' survey team[28] was the first to discover a handaxe tip from the site. This was studied by Mellars and published in the 1964 report as being from a rather thick handaxe, heavily patinated and recently broken. It is made on a nodule of dark, blue-grey flint.[29] In 1991, an elongated 'Micoquian handaxe' was recovered: measuring 21.5×11.4×6.5 cm, it is the largest one yet to come from the Greek sites.[30] Runnels and van Andel have supported an argument that the artefact was found in situ and, based on geological observations of the red-bed formations, they have dated it to 250±50ka (U/Th).[31]

Two more bifaces have been found at Kokkinopilos by Vangelis Tourloukis, one of which is described as an 'amygdaloid à talon with a cortical base made of fine-grained bluish/grey flint […] typologically, it can be described as a typical Acheulean biface'.[32] This particular handaxe is a surface find associated with reworked deposits. The second biface or 'bifacial core' has been described as a 'thick biface with a cordiform aspect'[33] made on a flake-blank with a partial, flat bifacial retouch; it measures 13.02×10×4.9 cm. This second one was found embedded in a 'non-reworked' deposit which has returned a minimum age of 207-220ka (post-IR/IRSL).[34] Based on the published photograph, the retouch extends unifacially on the right lateral and bifacially on its distal. It forms a rounded and thin distal end, opposite to a thick, blunt back. This second bifacially worked tool has typological affinities with the *Keilmesser* group already discussed above, and could possibly be part of the Middle Palaeolithic at Kokkinopilos.

Kokkinopilos is also one of the few sites in Greece with leaf points (Appendix II). The corpus consists of six leaf points recovered from the surface plus three more recovered from the excavated sediments of Site β.[35] Similar finds are encountered in other Epirotic sites (e.g. Morphi). Beyond Epirus, the occasional leaf point is present in various sites of Greece, mostly open-air ones, and they date to a late Middle Palaeolithic (40ka BP) and/or what is perhaps a transitional phase to the Early Upper Palaeolithic.[36] Assemblages with leaf points are not very common in the Greek record, but seem to be a significant component of the Middle Palaeolithic industries of the northern Balkans and the Crimea.[37]

On terms and semantics

As can be seen in Appendices I and II the bifaces in the southern part of the Balkan peninsula largely derive from the surface rather than closed stratified contexts and their

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[28] Dakaris *et al*. 1964, 134.
[29] Dakaris *et al*. 1964, 134.
[30] Runnels and van Andel 1993.
[31] Runnels and van Andel 1993; Zhou *et al*. 2000; Runnels and van Andel 2003.
[32] Tourloukis 2010, 71.
[33] Tourloukis 2010, 72.
[34] Tourloukis 2009; Tourloukis 2010; Tourloukis and Karkanas 2012; Tourloukis *et al*. 2015.
[35] Higgs 1963; Dakaris *et al*. 1964; Higgs and Vita-Finzi 1966; Papagianni 2000.
[36] Darlas 2007.
[37] Monigal 2006.

presence is rather sparse and discontinuous, a fact that does not come as a surprise given the corresponding record in its northern part. Bifaces and, in particular, handaxes are rarely found in Palaeolithic sites of the Balkans, south and north, whereas a variety of other types of bifacially worked implements and leaf points have been excavated from Middle Palaeolithic sites of the region.[38] A few small bifaces, possibly deriving from Middle Palaeolithic contexts, have also been found at Punikve in Croatia.[39]

Beyond adding points to the map, it is important to agree upon the semantics of the taxonomic entities used to identify and interpret bifaces. There are no excavated Lower Palaeolithic sites in continental Greece, and out of a total of five excavated and radiometrically dated Middle Palaeolithic cave sites, only the lithic assemblage from Asprochaliko has been thoroughly published, whereas for the most recently excavated sites, Kalamakia, Theopetra, Lakonis 1 and Klisoura Cave 1, we are forced to rely on preliminary site reports.[40] Given the absence of any excavated Lower Palaeolithic record, and with only a Middle Palaeolithic record which is still 'under construction' to refer to, such a discussion would benefit from the wisdom garnered in other parts of Europe [by Marie Soressi (southwest France), Olaf Jöris (Germany), Karen Ruebens (Netherlands, Belgium, west and north France) and Katherine Monigal (Crimea)], where longer traditions of research and more complete records have resulted in a better command of regional techno-complexes and their variants.

As can be seen in Appendix I, four discrete taxonomic entities, the "Acheulean", the "Mousterian", the "Micoquian" and the "Mousterian of Acheulean Tradition" (MTA), have been identified in continental Greece. The adjectives accompanying the entities, e.g. "advanced", "developed", "late", "later", "latest", "earliest", "*sensu lato*", capture the difficulty in positioning the bifaces with any greater degree of chrono-stratigraphic precision and thereby placing them in an orderly sequence with interpretative value. In the few instances of certainty, this is expressed using the word "typical", which almost invariably refers to the Acheulean.[41]

The earliest hominin known to have inhabited continental Greece is *Homo heidelbergensis*, represented by the Petralona Cave cranium in central Macedonia, dated to the late Middle Pleistocene.[42] Judging by archaeological finds in other parts of Europe, the stone industries associated with this hominin generally fall within the Acheulean techno-complex.

From at least the onset of the Upper Pleistocene onwards, continental Greece was inhabited by human groups that used Middle Palaeolithic industries. The oldest stratified evidence of these comes from the Theopetra Cave, TL-dated on burnt flints to the transition between MIS 6 and MIS 5 (Fig. 19). It is not known whether a single hominin species produced all the Middle Palaeolithic industries. Sites such as Kalamakia and Lakonis 1, where Middle Palaeolithic artefacts have been found in contexts containing Neanderthal bones and teeth,[43] offer an empirical basis for the hypothesis that it was *Homo neanderthalensis* who created the Middle Palaeolithic material culture. Neanderthals were

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38 Kozlowski 1998; Kozlowski 2003.
39 Malez 1979.
40 Darlas 2007.
41 Dakaris 1964; Kopaka and Matzanas 2009; Tourloukis 2010.
42 Grün 1996; Hennig *et al.* 1982; Latham and Schwarcz 1992.
43 Darlas and de Lumley 1999; Darlas 2007; Harvati *et al*. 2003; Harvati *et al*. 2013.

Site	Layer or Unit	Date (ka)	Method	Reference
Asprochaliko	18	a) 102,000±14,000 b) 96,000±11,000	a-b) TL	Huxtable *et al.* 1992
	14	>39,900	^{14}C- Conv.	Bailey *et al.* 1983
Theopetra	II2	124,000±16,000 (mean age deduced from 2 samples)	TL	Valladas *et al.* 2007
	II4	129,000±13,000 (mean age deduced from 7 samples)	TL	Valladas *et al.* 2007
	II11	a) 57,000±6000 b) 45,750±750	a) TL b) ^{14}C-AMS (A-BOX)	a)Valladas *et al.* 2007 b) Facorellis *et al.* 2013
Klisoura Cave 1	XXc	60,250±2700	^{14}C-AMS (A-BOX)	Kuhn *et al.* 2010
	XVII	a) 62,290±3930 b) 56,140±1450	a-b) ^{14}C-AMS (A-BOX)	Kuhn *et al.* 2010
	VII	48,990±1770	^{14}C-AMS (ABOX)	Kuhn *et al.* 2010
Kalamakia	II (beach rock underlying the cultural sequence)	109,000+14,000/-13,000	U/Th	de Lumley *et al.* 1994
	IV	>39,000	^{14}C-AMS	Harvati *et al.* 2013
Lakonis I	IV (beach rock underlying the cultural sequence)	120,000-130,000	TL, U-Series	Panagopoulou *et al.* 2002-2004
	Ib	a) 39,640±1000 b) 43,335±1800 c) 43,150±1790	a) ^{14}C- Conv. b-c) ^{14}C-AMS	Elefanti *et al.* 2009

Fig. 19. Dates of Greek Palaeolithic sites. All ^{14}C dates are uncalibrated.

thus well established in continental Greece from the Last Interglacial (MIS 5e) and we have a good reason to associate the "Mousterian" and the "MTA" industries with them.

The "Micoquian" is a fluid term describing dissimilar assemblages from both western Europe and the central and eastern part of the continent.[44] To the west of the Rhine the term can refer to assemblages of handaxes which include long pointed handaxes often with concave sides such as are found at the type site of La Micoque dated to MIS 9 and probably made by *Homo heidelbergensis*. To the east of the Rhine it refers to Neanderthal industries spanning the Last Interglacial and both climatic phases of the early glacial (130-40 ka BP), although backed bifaces from this age range do occur west of the Rhine river. Karen Ruebens has provided a historiographic overview of this taxonomic entity in its eastern/Neanderthal usage from its first definition by Otto Hauser in 1916.[45] The Micoquian, unless explicitly divided into "Early" and "Recent",

[44] Otte 2010.
[45] Ruebens 2012; Ruebens 2013.

has thus become a source of confusion.[46] However, Katherine Monigal, working further east on the Crimean Peninsula, has convincingly argued that the Recent Micoquian or *Keilmessergruppe* (KMG) was present in eastern Europe earlier than in central Europe, refuting the long-held assumption[47] that the latter was the core region for the Micoquian. In her own words: "The Micoquian was in the Crimea during the Last Interglacial, when the Crimea was an island. It must therefore have arrived at an earlier time – from where, however, is ambiguous".[48]

"Recent Micoquian" or *Keilmessergruppe* (KMG) that are found mainly in northwestern Europe (e.g. the Netherlands, Belgium – an important MTA/KMG transitional zone),[49] but also in central and eastern Europe (e.g. Germany, Poland, Czech Republic), are dominated by bifacial tools, though not always "handaxes",[50] while "Mousterian" assemblages in general tend to lack bifaces. They reappear in Middle Palaeolithic contexts of western Europe at about 115ka years before present. Since these industries seemed to follow an older tradition (i.e. the Lower Palaeolithic use of handaxes), Denis Peyrony named them "Mousterian of Acheulean Tradition" (MTA) in the 1920s.[51] Handaxes are the hallmark of the MTA and have been classified in several categories by François Bordes.[52] They are usually small, retouched all around their perimeter, and display significant regional variability. The most common sub-categories according to shape are the cordiform and triangular.[53]

The KMG, on the other hand, is dominated by backed bifaces with asymmetric retouch, the type fossil of which is the *Keilmesser* (i.e. the bifacially worked backed knife). Bosinski has provided a detailed typelist for the KMG of central Europe.[54] A different category of bifacially worked tool comprises the foliates or leaf points that are encountered at several European and Greek Middle Palaeolithic sites. The earliest evidence comes from eastern Europe.[55] Sporadically present in the KMG but almost totally absent from the MTA of western Europe, they form the dominant type of several supposed transitional industries. There are, however, some assemblages in northwestern Europe, such as the Belgian sites of Oosthoven, Grotte du Docteur and Ramioulle, which contain both MTA and KMG bifacial elements.[56] The industrial differences in these cases certainly imply behavioural and cultural differentiations among late Neanderthal groups.[57] A number of microscopic use-wear studies have proved that such tools had been used in wood or bone modification, meat butchering, hide scraping and procurement of both faunal and floral resources. In some cases they could also have been hafted.[58]

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[46] Conard and Fischer 2000. See also: Mania 1990; Veil *et al*. 1994; Jöris 2004
[47] E.g. Bosinski 1967.
[48] Monigal 2006, 196.
[49] Ruebens 2006; Ruebens and van Peer 2011.
[50] Jöris 2004; Jöris 2006; Richter 1997; Richter 2004.
[51] Peyrony 1920.
[52] Bordes 1961.
[53] Sorressi 2002.
[54] Bosinski 1967.
[55] Bordes 1961; Kozlowski 2003.
[56] Ruebens 2006; Ruebens 2007; Ruebens 2012.
[57] Ruebens 2012.
[58] E.g. Rots 2009; Soressi 2002.

Small-sized bifaces form part of the Greek Middle Palaeolithic, as do a number of leaf points made on large elongated flakes by means of direct percussion.[59] The bifacially worked leaf points from Epirus, Thessaly and the Peloponnese present significant affinities with those of the Danubian sites of Central Europe[60] and can perhaps more accurately be attributed to Late Middle Palaeolithic and transitional industries of the region. The elongated and pointed "Micoquian" handaxe from Kokkinopilos is a good example of the type encountered in La Micoque, France, and in many respects could be regarded as fully Acheulean, relating to the MIS 9 handaxes from the French type site. Runnels has assigned it Late Acheulean affinities, though he has also argued that such types were "not unknown" in the early Middle Palaeolithic.[61] The stratified biface from Theopetra Cave has been associated with a Micoquian techno-complex; however, a southern extension of the central European Micoquian industries was regarded as "ill-advised" in 1999 due to the state of research and the controversial definitions of the "Micoquian".[62] An MTA, rather than a Micoquian, association has been preferred for a small triangular *Faustkeil* from Gavdos, which has been reported though not yet fully published.[63] In our view, the significantly small presence of highly symmetrical handaxes with covering bifacial retouch eliminates any possibility of associating the Greek Middle Palaeolithic with the MTA.

Discussion

The two backed bifaces from Megalo Karvounari are the first of their kind to have been identified in the Greek Palaeolithic record. They appear to be part of a techno-complex that contains bifaces, though without being dominated by them. Because the backed bifaces derive from an open, unstratified context with poor chronological control, it is impossible to place them with higher precision within a taxonomic entity and seek affinities with the corresponding industries excavated in territories to the north, northeast and northwest of the Balkans. Despite this, their existence enriches the Greek Middle Palaeolithic record, pointing to a greater variability than that previously reported in the latest synthesis of the Greek Middle Palaeolithic by Darlas, who correctly identified two variants, a typical Mousterian and a more problematic as to its chronostratigraphic position Mousterian with bifacial foliates.[64]

The bifaces from Megalo Karvounari may indeed constitute evidence for the presence of a Recent Micoquian (KMG), which continues further south than previously thought, or some kind of a mixed industry in the southern Balkan Peninsula (or both). Alternatively, they could be regarded as an *ad hoc* response to raw material availability to fulfil the immediate needs of the Middle Palaeolithic people. The fundamental question that remains unanswered is whether Megalo Karvounari is merely a palimpsest of temporally separate events of use, by hominins equipped with an all-inclusive Mousterian industry

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59 Runnels 1995, 711.
60 Chavaillon *et al*. 1969, 149.
61 Runnels 1995.
62 Panagopoulou 1999.
63 Kopaka and Matzanas 2009.
64 Darlas 2007.

containing the odd *Quina* scraper and *Keilmesser* or, whether the four tools published here offer evidence of different variants coexisting at a single site. In Moravia, Micoquian tool inventories contain high percentages of sidescrapers, some of them shaped by means of flat or *Quina* retouch.[65] It is thus not impossible that at Megalo Karvounari we are beginning to see fragments of an emerging Recent Micoquian techno-complex.

In the light of the new evidence from Megalo Karvounari and our review of published data, a marked scarcity of bifacially worked elements in the Lower Palaeolithic tool inventory from continental Greece, reflecting the scarcity of early sites,[66] is becoming apparent. The majority of bifaces in continental Greece come from Middle Palaeolithic contexts and date to after the Last Interglacial. Their metrical characteristics, in most cases, agree with such a pattern (Appendix I). In general, they seem to correspond with Middle Palaeolithic assemblages from central and eastern Europe, and differ significantly from the Acheulean assemblages of insular Greece.[67] Continental Greece has not yet yielded a robust signal of biface association with pre-Middle Palaeolithic populations other than Palaeokastro at western Macedonia, where a large handaxe was found by Higgs, and Kokkinopilos a little further to the south, whose handaxe-bearing layers are dated to the late Middle Pleistocene. The Early Micoquian handaxe,[68] the broken handaxe tip[69] and the amygdaloid à talon[70] fall within the Acheulean definition. The fourth large backed biface from Kokkinopilos in terms of morphology and technology is better placed in the Recent Micoquian though its layer has been dated to the late Middle Pleistocene.[71]

The questions that naturally arise from discussions of bifaces in Middle Palaeolithic contexts, focus on when bifaces first appear in the Greek record; which hominins made them; and whether they represent the survival of old technological traditions into a later period, or the re-invention of this tool form during the Upper Pleistocene by Neanderthals. None of these possibilities can be excluded, since the Greek data are sparse and inconclusive. The issue is further complicated by the existence of lithic assemblages that contain elements of more than one variant, and the absence of reference records from the Middle Pleistocene and the Early part of the Upper Pleistocene.[72]

Conclusions

In this paper we have presented a series of bifacially worked tools and related artefacts recovered from the *terra rossa* site of Megalo Karvounari, located in the Kokytos valley. We have suggested that the bifacial elements belong to a Middle Palaeolithic assemblage associated with the earliest phase of hominin presence on-site. Our review of the Middle Palaeolithic component from the site suggests that this is an industry whose Middle Palaeolithic tool-kit also contains *Quina* scrapers and backed bifaces of the *Keilmesser*

65 Svoboda *et al*. 1996, 85.
66 Galanidou 2004; Galanidou 2014.
67 Galanidou 2013; Galanidou *et al.* 2013.
68 Runnels and van Andel 1993.
69 Dakaris *et al*. 1964.
70 Tourloukis 2009.
71 Tourloukis *et al* 2015.
72 Galanidou 2014.

type. Both are amongst the first handful of indisputable cases reported on the Greek Peninsula,[73] and we have no reason to suggest that they were produced and utilised by any species other than the Neanderthals, who were well established in most parts of continental Greece from MIS 5e onwards. The fact that these tools are surface finds from an artefact-rich *terra rossa* site whose stratigraphy is poorly researched leaves open the issue of a finer chronological association of the site's early component. These finds may be linked to a Recent Micoquian technocomplex that is beginning to be identified in the lake-side sites of south Epirus, and whose closest comparanda are recovered from sites to the north of the Balkans. Since there are less than a handful makes it equally plausible that these finds do not carry any techno-cultural significance and were instead isolated tools meeting an immediate need for production guided by the raw material availability in what was otherwise a Middle Palaeolithic industry containing a few *Quina* scrapers.

This chapter began by addressing the multiple problems *terra rossa* deposits present to the Palaeolithic interpretation, due to their being multi-component sites with poor stratigraphic and chronological control. Megalo Karvounari is one such case where dating prospects are limited, preservation of organic remains is non-existent, and elements of earlier technological traditions (e.g. backed bifaces and *Quina* scrapers) are unearthed side-by-side with elements of later ones (e.g. Aurignacian tools). Our picture of this open-air site suffers from interference, yet, as we have seen, out of the blurred picture some individual high-definition snapshots spring into focus in instances of highly identifiable finds, such as the ones presented here. These finds hint at the site's potential and at the same time beg to be placed in a finer context. More on-site work to identify and isolate datable stratigraphic units is the way forward in order to address the issues raised in this chapter. At Kokkinopilos, well-focused geo-archaeological work has produced positive results and a basis for building a chronology of the Epirotic *terra rossa* formations. This pioneering work leads us to believe that it would be well worth attempting a similar geo-archaeological approach to the southwestern sector of Megalo Karvounari. For over twenty years, the Kokkinopilos red-beds have time and again gifted the Palaeolithic archaeologists working in them with yet another biface. It appears that Megalo Karvounari is equally generous.

73 See Darlas and Papaconstantinou 2004.

Appendix I. The published bifaces recovered from Greek Palaeolithic sites

Site and Region	Description	Raw material and dimensions (cm.)	Chronometric/Stratigraphic dating (ka)	Cultural dating	References [Re-evaluated by]
1. Petrota (Krovili, Θ. 10), Thrace	Biface on primary flake	6.55 x 3.9 x 1.6	-	Middle Palaeolithic - 50ka BP	Efstratiou and Ammerman 1996; Ammerman *et al.* 1999
2. Palaiokastro, western Macedonia	Typical Acheulian handaxe	Trachyte, not published	-	Acheulean [Early Middle Palaeolithic]	Higgs 1964 [Matzanas 2004, 126]
3. Kokkinopilos SS91-3, Epirus	Micoquian handaxe	Flint, 21.5×11.4×6.5	250±50 (U/Th)	Micoquian/ late or developed Acheulean/ early Middle Palaeolithic?	Runnels and van Andel 1993; Runnels 1995; Runnels and van Andel 2003
4. Kokkinopilos, Epirus	Amygdaloid à talon with a cortical base	Bluish-grey fine-grained flint, not published	-	Acheulean	Tourloukis 2009; Tourloukis 2010; Tourloukis and Karkanas 2012
5. Kokkinopilos, Zone C, Epirus	Biface with a cordiform aspect and a partial, flat bifacial retouch made on a flake-blank (or a “bifacial core”)	Fine-grained flint, 13.02×10×4.9	207-220 minimum (post-IR IRSL)	Lower Palaeolithic [(Late?) Lower Palaeolithic or (early?) Middle Palaeolithic]	Tourloukis 2009; Tourloukis and Karkanas 2012 [Tourloukis 2010, 73]
6. Ormos Odysseos, Epirus	Small biface - (handaxe)	Not published	-	Early Palaeolithic (i.e Middle and Lower Palaeolithic)	Runnels and van Andel 2003
7. Ziros Lake, Epirus	Bifacial implement	Not published	-	Middle Palaeolithic	Papaconstantinou and Vassilopoulou 1997
8. Astakos, west Greece	Lanceolate biface	Not published	-	-	Darlas 1994
9. Sardinia, west Greece	Small handaxe	Not published	-	Middle Palaeolithic	Darlas and Papaconstantinou 2004
10. Theopetra, Thessaly	Cordiform biface whose lateral edge was re-juvenated by the ‘tranchet blow’ technique	Not published	-	Middle Palaeolithic	Panagopoulou 1999

Site and Region	Description	Raw material and dimensions (cm.)	Chronometric/Stratigraphic dating (ka)	Cultural dating	References [Re-evaluated by]
11 Nea Artaki, Evia	A series of small amygdaloid and sub-cordiform handaxes	Flint, not published	-	Palaeolithic [Between the end of the Lower Palaeolithic to 50 ka BP]	Sarantea-Micha 1986; Sarantea-Micha 1996 [Matzanas 2004]
12. Megalopolis, Peloponnese	Amygdaloid handaxe	Not published	-	-	Lenormant 1867
13. Vasilaki, Peloponnese	Small and flat, almost ovate, limande-like handaxe	Not published, 8.5x4.6x1.5	-	Middle Palaeolithic [Late Acheulean or the early Mousterian]	Reisch 1984 [Matzanas 1998]
14. Lakonis I (Ia), Peloponnese	Bifacial tool	Not published	Initial Upper Palaeolithic – 48-42 ka BP (^{14}C-AMS)	Affinities to the Bohunician of Central Europe which is dated to between 43-35 ka ^{14}C BP	Elefanti *et al.* 2009
15. Preveli 2, Preveli 3, Preveli 7, Preveli 8, Kotsifos 1, Timeos Stavros 1, Timeos Stavros 4, Gianniou 1, Crete	39 triangular, sub-triangular, cordiform or ovate bifaces and biface á gibbosité form	Quartz, not published	72-107ka, 120ka minimum	Acheulean *sensu lato*	Strasser *et al.* 2010; Strasser *et al.* 2011
16. Sarakiniko (Θ. 64A), Gavdos, Crete	Sub-cordiform handaxe	Limestone, 13.3×9.4×2.8	-	Typical tool of advanced Acheulean industries (200-120 ka BP)	Kopaka and Matzanas 2009; Kopaka and Matzanas 2011
17. Kopanelos (Θ. 62A), Gavdos, Crete	Handaxe-cleaver	Granodiorite(?), 11.2×7.8x5.2	-	Acheulean (200-120 ka BP)	Kopaka and Matzanas 2011
18. Ayios Pavlos (Θ. 26E), Gavdos, Crete	Part of a small triangular *Faustelkeil*	Quartz, not published	-	Middle Palaeolithic (75-35 ka BP)	Kopaka and Matzanas 2009; Kopaka and Matzanas 2011
19. Rodafnidia, Lesvos	18 handaxes	Fossiliferous flint and andesite, not published	-	Acheulean	Galanidou *et al.* 2013

Appendix II. Middle Palaeolithic leaf points from Greece

Site and Region	Raw Material	Number of leaf points	References
Palaeokastro / Siatista, w. Macedonia	Not published	1	Dakaris *et al.* 1964
Kokkinopilos, Epirus	Flint	9 (6 are surface finds and 3 fragments from the test trench of site b)	Higgs 1963; Dakaris *et al.* 1964; Higgs and Vita-Finzi 1966; Papagianni 2000
Kouklioi / Ioannina, Epirus	Flint	1	Papaconstantinou and Vassilopoulou 1997
Galatas / Louros Valley, Epirus	Flint	1	Runnels 1995; Papagianni 2000
Ayia / Louros Valley, Epirus	Flint	2	Papagianni 2000
Morphi, Epirus	Flint	1	Higgs and Vita-Finzi 1966; Papagianni 2000
Sardinia, Amphilochia	Flint	2	Darlas and Papaconstantinou 2004
Theopetra Cave, Thessaly	Not published	"A small number of leaf points including mainly bifacial but also unifacial specimens"	Panagopoulou 1999
Plastiras Lake / Karditsa, Thessaly	Flint	2	(http://www.dimoskarditsas.gov.gr/wp-content/uploads/2013/10/ArxaiologikoMouseioKarditsas.pdf)
Peneios river banks, Thessaly	Not published	6	Theocharis 1967; Runnels 1988
Southern Argolid, Peloponnese	Not published	3	Pope *et al.* 1984; Runnels 1988; Kardulias and Runnels 1995
Amalias no. 17 / Elis, Peloponnese	Not published	1	Chavaillon *et al.* 1967; Runnels 1988
Corfu site 18, Ionian Sea	Not published	1	Sordinas 1969; Runnels 1988

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Beyond Sites: Tract Finds and Hidden Landscapes

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Everyone conducting an intensive field survey has at some stage been faced with the question of how to identify a site.[1] Decisions are often taken at short notice in the field and the results cannot necessarily be checked by revisits. Especially difficult to comprehend are large sites stretching over several fields, of which part may be totally overgrown with zero visibility, or sites that partly are covered by later sterile depositions.[2] In northwestern Greece, as in other regions, pottery produced during certain prehistoric periods is less likely to be preserved on the surface ('low-visibility phases', according to Rutter).[3] It has been suggested that some prehistoric sites are not noted at all in field surveys, thus creating a 'hidden landscape' that can be visualized only by increased attention at a stage of research following initial work in the field.[4]

Taking into account that 'archaeological sites do not exist *sui generis*, but must be defined via an act of archaeological interpretation',[5] the Thesprotia Expedition from the early stages of designing its surface survey strategy employed an array of criteria for site definition. Special emphasis was laid on lithics, as the survey was concentrated on the Kokytos valley, which, like other regions in northwestern Greece and the Ionian islands, is known as a countryside where flint abounds.[6] During the 1960s Dakaris even marked the whole valley from Neochori in the north up to Skandalo and Gardiki in the south on his site distribution maps as a ca. 60-65 km^2 large continuous carpet of dispersed lithic finds.[7] This trait of the regional archaeological record clearly made it more difficult to recognize prehistoric sites and to define their borders. Nonetheless, some clearly visible lithic concentrations were during the field work identified as sites on the basis of high density and diagnostic artefacts, sometimes together with pottery and/or tiles, and subsequently published as individual sites in *Thesprotia Expedition* I and II.[8]

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[1] E.g. Bailey *et al.* 1997; Bintliff and Snodgrass 1988; Cherry *et al.* 1991; Gallant 1986; Mee and Forbes 1997. The drawings of the lithics in this chapter were made by Christina Papoulia and inked by Nikoletta Dolia. All maps were made by Esko Tikkala.

[2] For this latter phenomenon in the Kokytos valley, see e.g. Lavento 2009 or Forsén and Forsén 2012.

[3] Rutter 1983, 138-139.

[4] Bintliff, Howard and Snodgrass 1999, 139-168. However, Davis 2004, 22-34, believes that this explanation may be applicable only to certain regions of Greece, such as Boeotia.

[5] Mee and Forbes 1997, 36.

[6] Dakaris *et al.* 1964; Higgs and Vita-Finzi 1966. For northwestern Grecee and the Ionian islands, see e.g. Bailey *et al.* 1997; Wiseman and Zachos 2003; Tartaron 2004; Wijngaarden *et al.* 2008; Galanidou 2014a.

[7] Dakaris 1972, 44-70, figs. 12-20, mentions that a total of 14 sites and 10 flint "quarries" dating from the Palaeolithic period until the Bronze Age have been identified inside the area of dispersed lithic finds, but never gives any information on their exact location, which thus can no longer be confirmed.

[8] Forsén *et al.* 2011 with all further references.

In this chapter we shall focus on the tract data collected by the Thesprotia Expedition in order to investigate their potential to reveal information about hidden landscapes. Our meta-analysis aims to explore the latent patterns of human presence in the Kokytos valley beyond the sites that were identified during our original work in the field. By so doing we divert from the canon of our publication practice, and the majority of Mediterranean surface artefact survey reports, to publish selectively those lithics associated either with discrete sites[9] or periods.[10] We use lithic technology and typology, qualitative and quantitative criteria to describe the knapped-stone component deriving from the Thesprotia Expedition tracts. We address: i) the presence of additional sites or other human activity that were not identified as such in the earlier stages of research and publication, ii) the level of background noise of finds, i.e. lithics and pottery/tiles, in the Kokytos valley, and iii) whether part of the valley really is covered by a 'continuous carpet of lithic finds', or not.

Survey methodology

During an intensive survey artefacts are usually collected, processed and spatially referenced either as parts of tracts or sites. These two contexts of recovery are critical for the interpretation of past human activity in the area under study across the space, the geographical frame of consideration, and their subsequent dating for their assessment across time, the temporal frame of consideration. During the field survey of the Thesprotia Expedition the landscape was divided into arbitrary areas or tracts with an average size of 1.22 ha which were walked across in parallel alignments by team members spaced 10-15 m apart. The total number of lithic finds versus pottery and tile fragments was recorded for each tract, thus giving information of the density and distribution of finds. Our main aim of walking tracts was to localise sites, which were defined according to the following three criteria set up some 20 years ago by the Keos survey.[11] Firstly, the *artefact density* of a site should be anomalously high in relation to the levels of the background noise. Furthermore the site should stand out through *discreteness*, which implies that it has edges where the density falls off markedly; and *continuity*, meaning that it consists of a contiguous area with higher density (otherwise the registered artefacts should be interpreted as stray or fortuitous finds).

Once identified in the field, sites were searched more intensively than tracts, usually with team members returning to walk as close as 1-3 m apart and collect all diagnostic artefacts. The site density was calculated in circular sampling units of 5 m^2. Within them all artefacts were counted, thus creating a new set of densities that is not comparable with the tract densities. 22 out of a total of 45 sites were gridded into 10x10 m or 20x20 m large squares.[12] For the gridded sites the density was calculated at each

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[9] E.g. Foss 2002a; Foss 2002b; Runnels *et al.* 2003; Parkinson and Cherry 2010.

[10] E.g. Runnels and van Andel 2003; Carter and Ydo 1996; Carter 2003.

[11] Cherry *et al.* 1991, 28. Cf. also Gallant 1986.

[12] The sole exception to this practice was at the sites Mikro Karvounari and Megalo Karvounari (PS 22 and PS 23) that bear witness to intense Palaeolithic presence and activity. These sites were subdivided into areas on the basis of the topography of the highly undulating terra rossa landscape. Cf. Forsén *et al.* 2011.

square's centre in a 5 m^2 circle, thereby revealing differences in find density inside the site itself. These differences could indicate centres of past human activity or perhaps even the existence of architectural remains below surface, or could be merely the result of natural formation processes.[13]

In those cases when we came upon an obvious site we would initially try to find its boundaries, without counting or collecting anything. Once found, it would be treated as a site and thus named PS, followed by a consecutive number. However, in most cases we would first walk over the putative site as one or several tracts, thus obtaining also tract density sets for several of the sites. Such tracts, which in the Appendix are marked as being part of a site, should according to the definition of a site have clearly anomalous densities, compared with the normal background noise. Other tracts that have higher than normal densities are tracts located very close to the actual sites, so-called associated tracts, where the densities normally increase due to a *halo effect*.[14] Close to a third of the tracts, 114 out of the total number of 318, were interpreted as being either part of a site or associated with a site. On the basis of these 114 tracts, the parameters for what may be considered an anomalous level of artefact density have been defined as being 40 or more finds/ha with respect to pottery and tile fragments.

Calculating the tract density of lithic finds proved more complex due to the very rich occurrence of unworked flint in the tracts covered at the beginning of the first field season (in the area between modern villages of Xirolophos and Rachouli and the Liminari and Agios Georgios hills).[15] This trait, combined with a survey team with restricted experience of knapped-stone essentials, made it difficult to decide on the spot which flints were indeed artefacts and should be counted. Therefore the tract densities of lithic finds during the first year were calculated only on the basis of the number of lithics actually brought back to the stores. For the tracts covered in the following years the densities were calculated on the basis of all lithics that were considered possibly worked and thus counted, but out of which only a part was collected. This difference in counting obviously has led to somewhat higher densities of lithic finds for all B, C, D and E tracts than what the case was for the A tracts. In an attempt to take this difference into account the level for anomalous densities of lithic finds has been put slightly lower for the A tracts (15 or more finds/ha) than for the B, C, D and E tracts (20 or more finds/ha). Densities of lithic finds above 10 per ha are considered symptomatic, although not anomalous.

The numbers and sizes of the tracts, the densities of lithic finds versus pottery and tile fragments, and the ground visibility, expressed in a 4-point scale with I = 80-100%, II = 60-80%, III = 30-60% and IV = 0-30%, are presented in the Appendix. Anomalous densities of lithic finds and/or pottery and tile fragments are there marked by shaded areas. Most of those tracts can either be described as part of, or associated with sites. However, the Appendix includes another 37 tracts with densities of lithic finds[16] and 10 with densities of pottery and tile fragments that can be described as anomalous[17] (two

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[13] Schiffer 1983.

[14] Cf. e.g. Alcock *et al.* 1994, 141-170.

[15] Cf. Concentration VI below.

[16] These are the tracts A 10, A 11, A 12, A 13, A 15, A 19, A 20, A 25, A 27, A 28, A 29, A 34, A 108, A 109, A 110, A 111, A 113, B 30, B 31, B 32, B 33, B 34, B 35, B 36, B 38, B 39, B 40, B 43, C 5, C 14, C 25, C 41, C 44, D 24, D 29, D 30 and D 69.

[17] These are tracts A 48, A 49, A 55, A 71, A 72, A 78, A 92, C 14, C 25 and C 40.

of these tracts, i.e., C 14 and C 25, have anomalous levels of lithic finds, as well as of pottery and tile fragments). The rather high number of these tracts, which neither are part of, or associated with sites, indicates that part of the signatures of past human activity in the Kokytos valley has not been adequately dealt with in terms of our sites. There are many reasons why these tracts were not treated as sites. Because of the absence of easily recognisable or datable finds they were not immediately treated as sites but rather put aside as tracts that needed to be revisited and re-evaluated, something that then could not be done because of time restrictions, cultivation or hostile land owners.

On the basis of their geographical location the tracts with anomalous densities of lithic finds are discussed here in terms of five concentrations (Concentration I-V), i.e., areas with contiguous high density of lithics in the tracts, in between which much fewer finds were recorded (Fig. 1). These concentrations are not necessarily sites per se, though they all include some sites dating to prehistoric or historical times. As only a small part of the valley could be intensively surveyed the division into concentrations is suggestive rather than conclusive and ought to be further explored working with the archaeological evidence from a larger regional unit in the future.[18]

The tract lithic finds

We have employed observations of chipped stone artefact technology and typology to decipher out of a general palimpsest of tract finds those ones that could be attributed to distinctive chronological units. Observations of raw material type (i.e. flint, chert, obsidian) and properties (i.e. grain and colour), surface alterations (i.e. patina, weathering, abrasion etc.) as well as macroscopically visible use-wear traces (such as silica gloss) are also used. Particular tool types and debitage pieces associated with distinctive reduction sequences are discussed. Assigning flaked stone to temporal components is best achieved on the basis of morphological and technological attributes as well as contextual association with datable items such as pottery, architecture etc. Due to the scarcity of reference lithic collections deriving from closed and securely dated contexts in northwest Greece and taking into account that there exists no clear-cut chronology for the local handmade, coarse pottery which has a tendency to be very poorly preserved in surface assemblages,[19] our interpretation draws its *comparanda* from published evidence originating from Greek, Albanian and Anatolian sites.

A total of 2568 artefacts of knapped stone were collected from the surface of tracts A, B, C, D, E and PS 5, 7, 8, 10, 14, 17, 18, 20, 21, 25, 27, 28, 29, 31, 32, 34, 35, 36, 46. Of these, 2417 finds were part of different concentrations. Most of the concentrations identified include artefacts from different periods of the past, are thus multicomponent, and only in a few cases temporal patterns emerge. A high degree of uncertainty is noted for the majority of the debitage pieces and cores. Only 3.5% (n=84) of the 2417 artefacts is

[18] A handful of the tracts with high density of lithics (C 17-C 18, D 29-D 30) could not be attributed to any of our five concentrations. C 17-C 18 could constitute part of a sixth concentration, although this is difficult to state, as so little of the surrounding landscape could be walked there.

[19] For an overview of the difficulties in dating Epirote prehistoric pottery, see e.g. Tartaron 2004, 29-30. The situation will slowly improve when more stratified pottery sequences are published. Cf. e.g. J. Forsén, this volume.

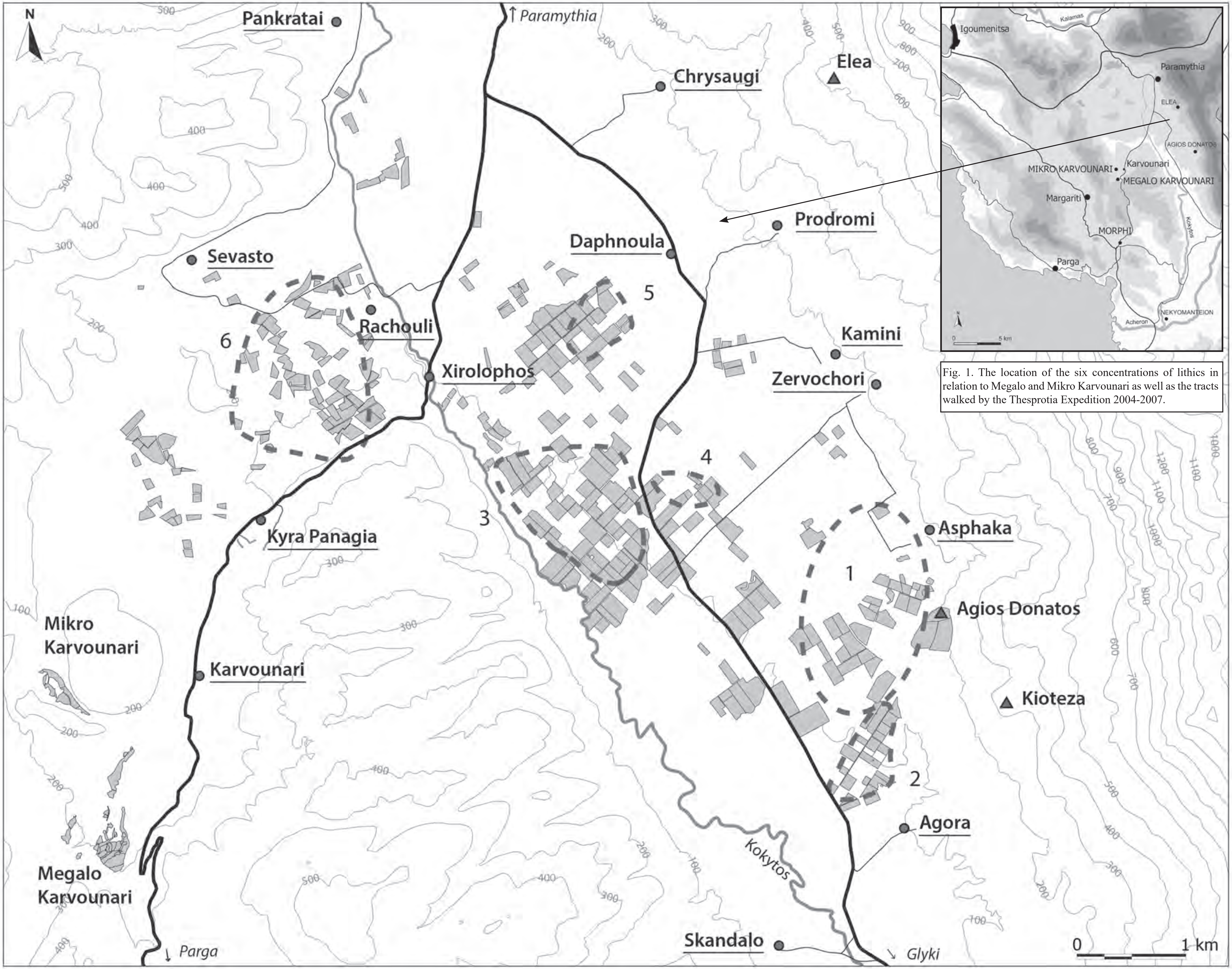

Fig. 1. The location of the six concentrations of lithics in relation to Megalo and Mikro Karvounari as well as the tracts walked by the Thesprotia Expedition 2004-2007.

attributable to a specific period in terms of typology, technology and preservation[20] (Fig. 2). Apart from a single Levallois core and a couple of pressure bladelet cores, the majority of the cores recovered are ones for small flakes, of uncertain industrial and chronological attribution. Similarly, some of the tools collected (e.g. piercers, truncations etc.) might exist as early as the Upper Palaeolithic but continue to being utilised throughout the Holocene until the end of the Bronze Age. On the other hand, the arrowheads and the sickle elements can be set in more strict temporal categories.

Concentration	I		II		III		IV		V		VI		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
MPal	3	0.3	2	4.2	6	0.6	1	0.9	-	0	1	0.5	13	0.6
UPal	5	0.6	-	0	2	0.2	1	0.9	-	0	-	0	8	0.3
Mes	-	0	-	0	3	0.3	-	0	-	0	-	0	3	0.1
Neo	18	2.0	-	0	11	1.1	-	0	-	0	-	0	29	1.2
BA	10	1.1	-	0	2	0.2	5	4.7	4	3.6	-	0	21	0.9
Late BA and / or Historical	-	0	-	0	-	0	-	0	-	0	10	5.2	10	0.4
Total Datable	36	4.0	2	4.2	24	2.3	7	6.5	4	3.6	11	5.7	84	3.5
Total Undatable	875	96.0	46	95.8	1021	97.7	100	93.5	108	96.4	183	94.3	2333	96.5
Total	911	100	48	100	1045	100	107	100	112	100	194	100	2417	100

Fig. 2. Number and percentage of the chipped-stone artefacts from each concentration. MPal – Middle Palaeolithic; UPal – Upper Palaeolithic; Mes – Mesolithic; Neo – Neolithic; BA – Bronze Age.

Concentration I

Concentration I is located on the alluvial fan at the lowermost foothills of the Paramythia mountain and to the west of Agios Donatos of Zervochori. Tracts B 22-B 24, B 26, B 28-B 40, B 43-44, B 48, B 59-60, D 74, as well as B 47 are part of the concentration.[21] Five Neolithic to Bronze Age sites were identified on the alluvial fan, PS 17, PS 18, PS 20, PS 21 and PS 28,[22] of which PS 21 is located at the border between the fan and the plain (Fig. 3). The four uppermost sites are located at an altitude between 142 and 162 masl, whereas PS 21 lie between 120 and 121 masl. The total size of the concentration is at most ca. 1500×1000 m. No clear borders could be found, as the lower slopes of the Paramythia mountain range, as well as also several fields in the valley, were badly overgrown. However, the density of lithic finds clearly falls off in tracts located towards the southwest (cf. D 81 and D 82) and the west (cf. B 1-B 9) of Concentration I. It should be noted that the distance in the south between Concentration I and Concentration II is at most some 50-100 m (Fig. 1).

Concentration I is dissected by two large and deep ravines flowing from the lowermost slopes of the Paramythia mountain range towards the southwest and the

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20 Surface alteration due to patina was taken into account, though this was neither the first nor the only criterion for chronological attributions.

21 B 47 was in geographical terms clearly part of the concentration, in addition to which the level of its density of lithics was symptomatic.

22 Forsén *et al.* 2011, 106-109, where the following dates were suggested for the prehistoric sites. PS 17: BA to EIA, also some LC to EHl finds; PS 18: BA, also some EIA and LC to EHl finds; PS 20: FN to MBA, also some LC to EHl finds; PS 21: BA (?); PS 28: Neo to BA. On the basis of the reexamination of all tract finds these sites could now be somewhat differently dated. PS 17, BA to EIA, also some Neo and LC to EHl finds; PS 18: Neo to BA, also some EIA and LC to EHl, PS 20: Neo to MBA, also some LC to EHl finds; PS 21 and PS 28: Neo to BA.

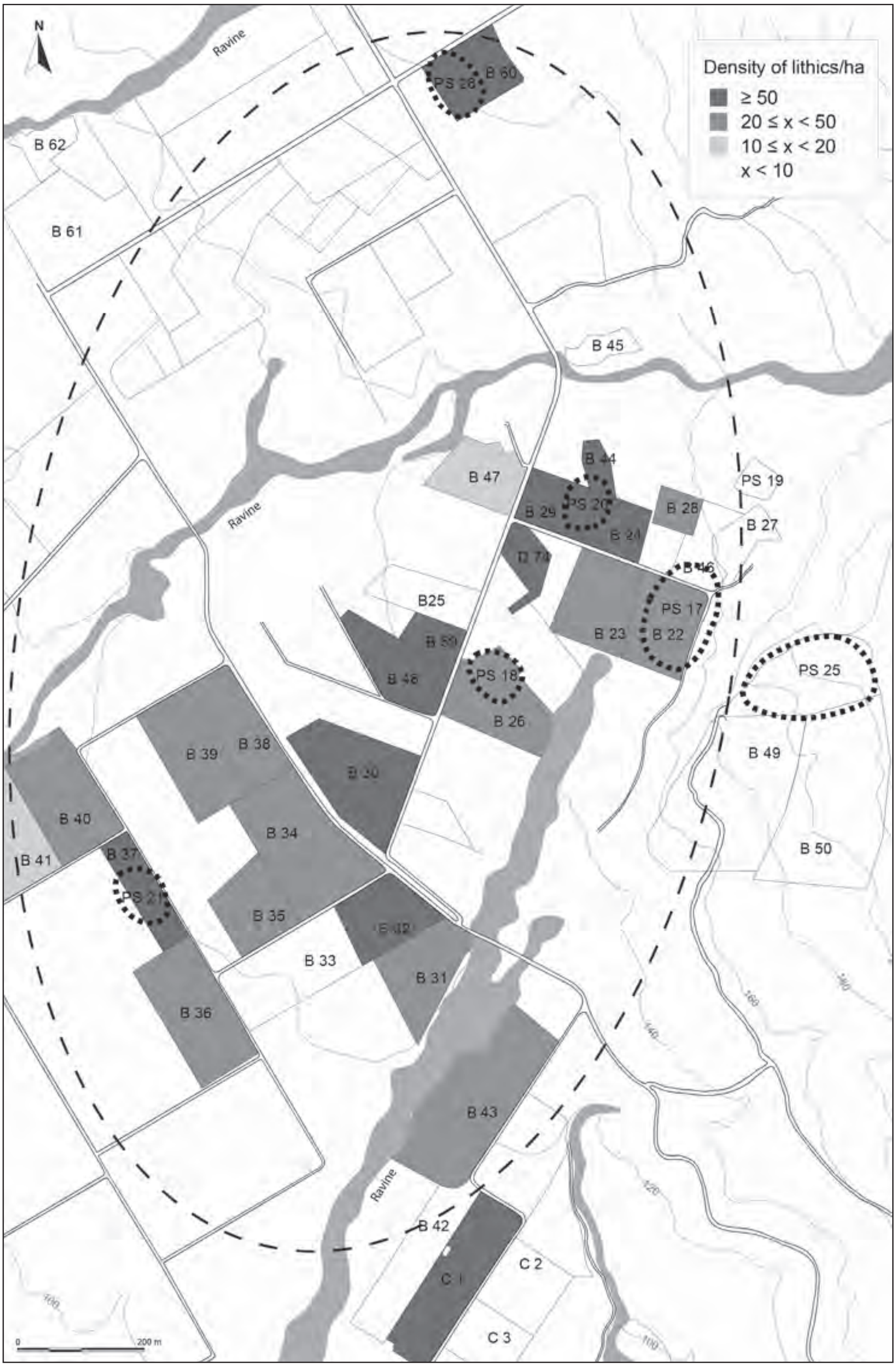

Fig. 3. Tracts and sites of Concentration I.

Kokytos. The northernmost ravine originates at rich springs and nowadays is filled with water even in the middle of the summer. It separates PS 28 from PS 17, PS 18 and PS 20 that are located further towards the south in a semicircular arrangement around a half-dried up spring, from where the second ravine originates.

The density of lithics in the tracts of Concentration I is typically ca. 25-100 finds/ha and in some cases even higher (cf. Appendix). The tracts associated with, or part of PS 17 and PS 20 also produced anomalous densities of pottery and tiles (B 22-24, B 28 and B 40). Elsewhere the density of pottery and tiles is very low. All prehistoric sites in this concentration, namely PS 17, PS 18, PS 20, PS 21 and PS 28, yielded some prehistoric pottery. Most pottery was found in PS 17, which produced one medium-coarse body sherd of possible Early Bronze Age date, seven sherds dating to the Middle Bronze Age, 10 to the Late Bronze Age and 27 to the Early Iron Age. There are also a handful of Late Classical and Early Hellenistic sherds.[23] This is apart from Goutsoura (PS 12), the only site which during the survey produced larger amounts of prehistoric pottery.[24] PS 18 in its turn had one possible Bronze Age body sherd, some possible EIA sherds and a Late Classical to Early Hellenistic ring base, and PS 20 a handful of prehistoric sherds, including a body sherd with painted lines (Matt-painted MBA) and a horizontal handle, a few Early Iron Age sherds, as well as a fine ware ring-base and a hydria/jug handle of Late Classical to Early Hellenistic date. PS 21 produced a fragment of a possible spindle whorl and five sherds, one of which is a red-slipped body sherd of Bronze Age date,[25] whereas PS 28 finally three ‘pseudo’ Grey Minyan (MBA?) sherds.[26]

The location of Concentration I on the alluvial fan at the lowermost foothills resembles very much the location of Goutsoura (PS 12) on the northwestern side of the valley, the prehistoric site that was excavated by the Thesprotia Expedition between 2007 and 2010.[27] Concentration I is a rich concentration (n=911) with a predominant lithic component attributed to the Neolithic period and the Bronze Age (Fig. 4). There

Site/tracts	Cores	Core fr	Tools	Flakes	Blades	Bladelets	Chips	Tech.	Unworked	Other	Total
C. I Tracts	25	3	103	66	9	1	4	3	1	4	219
PS 17	0	0	13	3	1	1	0	1	1	0	20
PS 18	3	0	42	20	7	1	0	0	0	1	74
PS 20	36	6	256	165	5	6	3	10	0	10	497
PS 21	9	1	22	30	0	1	0	1	0	1	65
PS 28	5	3	15	12	0	0	0	0	0	1	36
Total	78	13	451	296	22	10	7	15	2	17	911

Fig. 4. Lithic finds from Concentration I.[28]

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[23] Forsén *et al.* 2011, 108-109.

[24] For Goutsoura see Forsén *et al.* 2011, 79-82; Forsén, this volume and J. Forsén, this volume.

[25] For PS 19 see Forsén *et al.* 2011, 109, for PS 20 Forsén *et al.* 2011, 107-108 and for PS 21, Forsén *et al.* 2011, 106.

[26] Forsén *et al*. 2011, 106.

[27] See apart from Forsén *et al*. 2011, 79-82 also the contributions by Forsén, J. Forsén, Lima and Doulkeridou, in this volume.

[28] PS 17 consists of B 22 and B 23, PS 28 of B 60, whereas PS 20 also includes B 44 and PS 21 in its turn B 37. PS 18, PS 20 and PS 21 were later studied in more detail: lithics were collected in connection with a grid system and these are included in fig. 1. PS 17 was also gridded and sampled in a total of 57 squares of 20x20 m. However, the lithics collected from the PS 17 grid system, due to practical constrains during the study season, were not included in fig. 1.

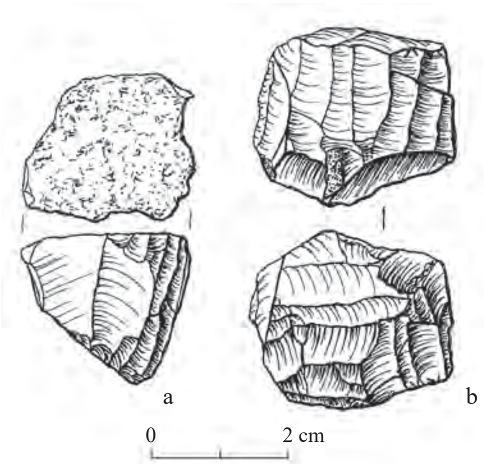

Fig. 5. Small bladelet cores from Concentration I (a from B 35, b from D 74).

is a predominance of retouched tools (49%), followed by flakes (32.3%), cores (8.6%) and blades (2.5%). The cores are mainly flake cores but there is a significant presence of small bladelet cores as well (Figs. 5a-b).

The presence of a Middle Palaeolithic component in Concentration I is indicated by only a few specimens. These comprise a heavily patinated flake with centripetal scars, a naturally-backed knife and perhaps a few more flakes/flake tools. A pseudo-Levallois point (Fig. 6a) with facetted butt, having a notch and possible impact scars on the proximal and distal parts perhaps associated with hafting and use as a hunting tool, also belongs to this group.

The Late Upper Palaeolithic / Mesolithic period as a terminus post quem can be proposed for a small group of artefacts (n=5) with pink patina which consists of retouched and unretouched blades and bladelets and a small nosed endscraper.

An Early Neolithic component is perhaps suggested by an asymmetric trapeze formed on a double truncation (Fig. 6b)[29] which could, however, together with a borer made on a backed blade (Fig. 6c), indicate even earlier dates (Late UPal/Mes). Two lunates with abrupt retouch having almost the same dimensions (20×16×5 mm, 19×16×5 mm) have also been found at the concentration and were probably used as parts of projectile points (Figs. 6d-e). A denticulate from the same site bears resemblance to a couple of artefacts from PS 43 in terms of raw material, size and typological characteristics (Fig. 6f). The particular tool together with the lunates mentioned above most probably provides Early Neolithic dates.[30]

A Middle Neolithic component is represented by the bifacially worked transverse arrowhead group. In particular, there is an arrowhead of an orthogonal triangular shape (Fig. 6g)[31] and two more, one of which is semi-worked, made of beige, slightly translucent flint (Figs. 6h-i)[32] At PS 18, one more transverse arrowhead with bifacial, low-angle, invasive retouch (25×19×5 mm, Fig. 6j) can be even more securely dated to the Middle Neolithic period.[33]

A Neolithic date can perhaps be proposed for four more artefacts. These are a tanged point with possible hafting modification (Fig. 6k), a proximal part of a tanged point made of reddish/brown flint (25×19×6 mm, Fig. 6l),[34] a trapeze (23×19×4 mm) and a proximal part of a semi-worked elongated tool, possibly an arrowhead, with bifacial,

[29] Perlès 2004, fig. 6.3.6; Perlès 1990, fig. 16.21.
[30] Perlès 1990, fig. 17.3.
[31] Perlès 2004, fig. 8.4.3.
[32] Perlès 2004, fig. 8.4.4.
[33] Perlès 2004, fig. 8.7.6. But see also Forsén *et al.* 2011, 107.
[34] Papathanasopoulos 1996, fig. 61; Forsén *et al.* 2011, 108, fig. 28.

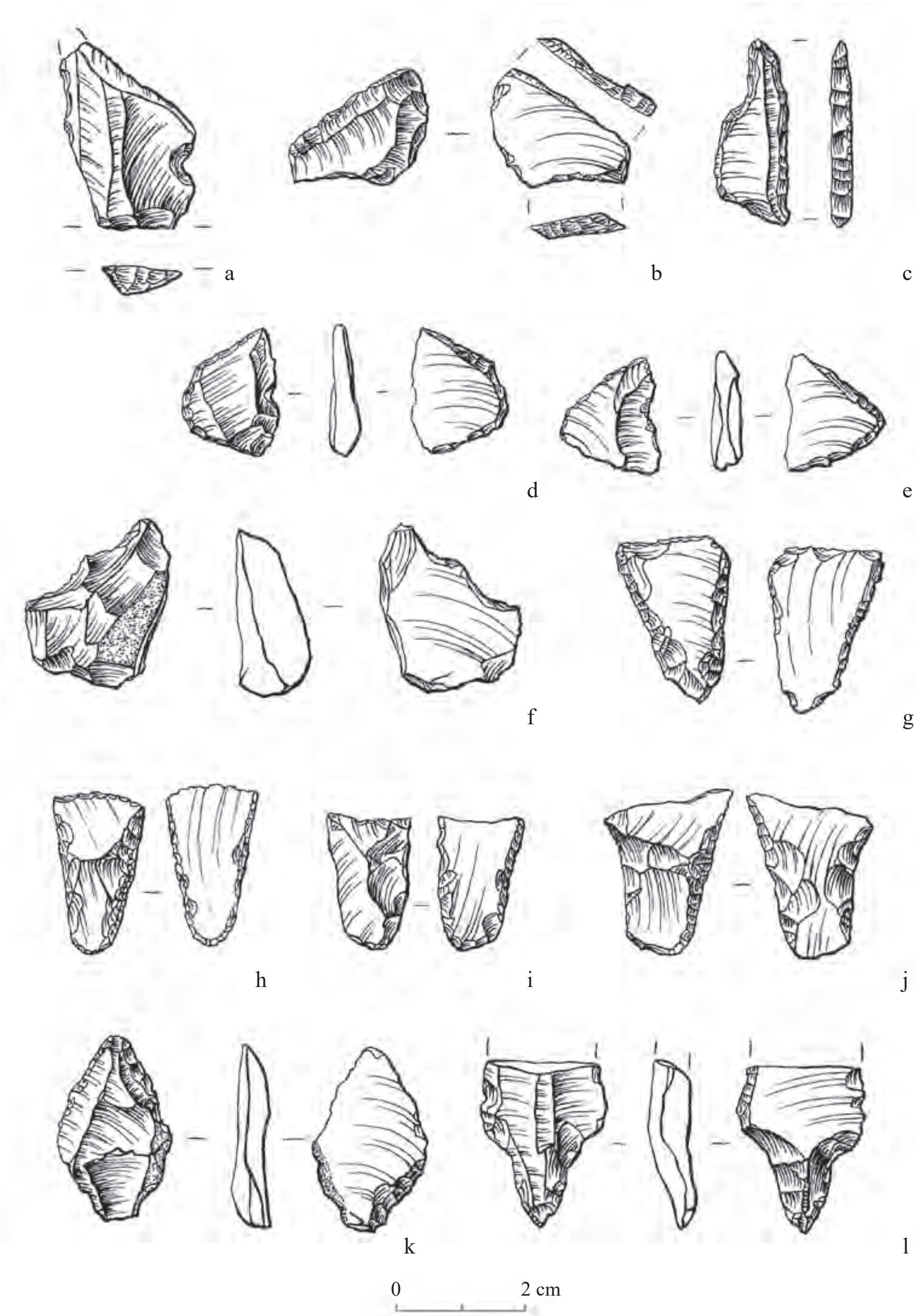

Fig. 6. Retouched artefacts from Concentration I: retouched pseudo-Levallois point (a from B 28), truncation (b from PS 18/1), backed blade (c from PS 18/6), microlithic lunates (d from PS 20/26, e from PS 20/2), denticulate (f from PS 20/10), transverse arrowheads (g from B 22; h from B 34; i from B 44, j from PS 18), tanged points (k from PS 18, l from PS 20/15).

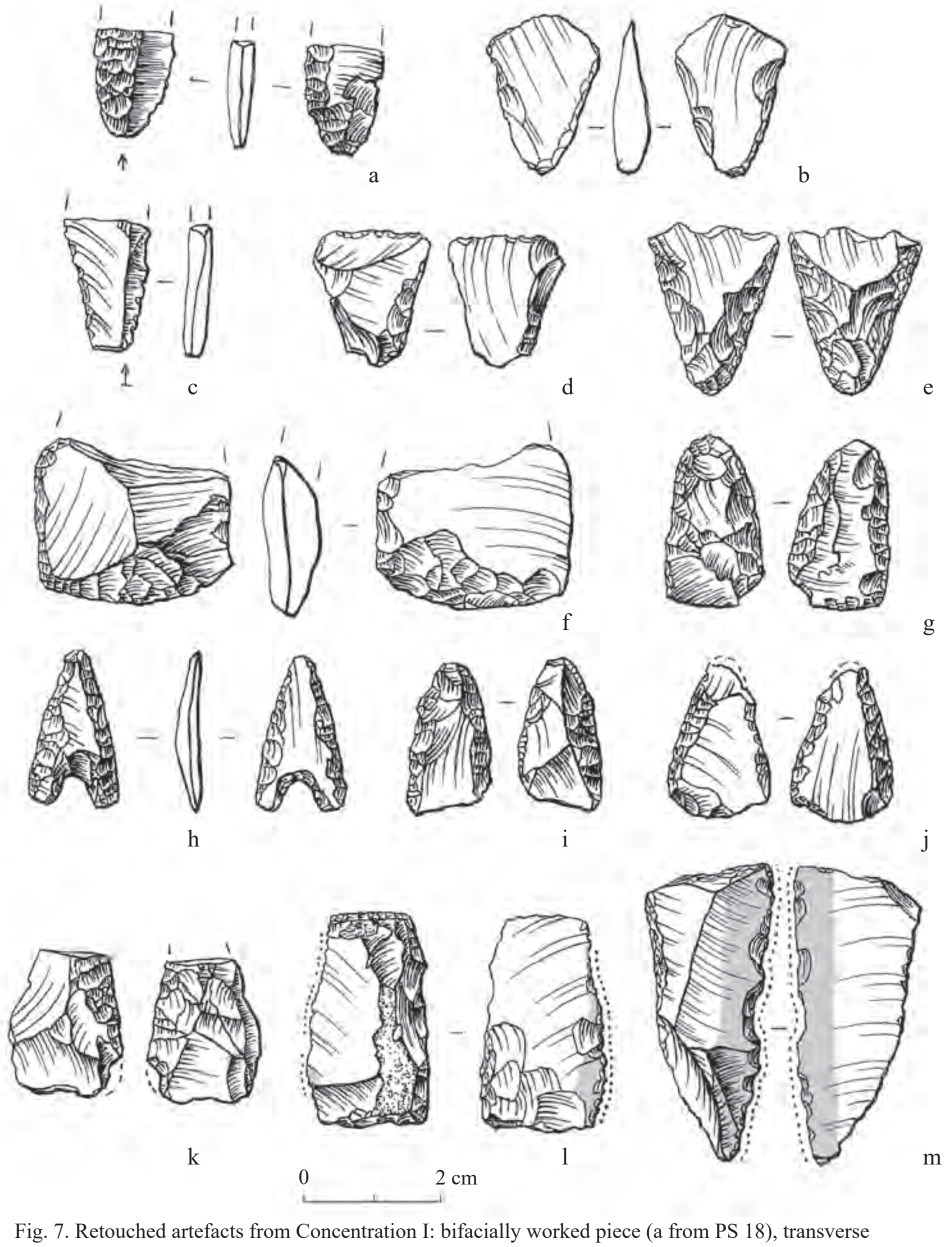

Fig. 7. Retouched artefacts from Concentration I: bifacially worked piece (a from PS 18), transverse arrowheads (b, d-e, all from B 60), obsidian blade (c from PS 21), geometric tool (f from PS 28), unfinished arrowheads (g, i-k, all from PS 20), hollow-based arrowhead (h from PS 20), sickle elements (l from B 31, m from D 74).

invasive, pressure retouch (Fig. 7a). At PS 21 there was a broken, marginally retouched and/or used blade made of black obsidian with translucent stripes (19×13×3 mm, Fig. 7c) which may also be attributed to the Neolithic period. This is the only obsidian artefact found both from the survey and the excavations conducted by the Thesprotia Expedition, and macroscopically appears to be of Melian origin.

Finally, PS 28 (B 60) has yielded three transverse arrowheads (Figs. 7b, d-e), a microlith and a large broken geometric tool (Fig. 7f), artefacts that could be attributed either to the Middle Neolithic period or the Early Bronze Age, as well as a few Holocene flake cores.[35]

An Early/Middle Bronze Age component is manifested by a hollow-based arrowhead from PS 20 (Fig. 7h).[36] It is made of fine-grained white/beige flint and measures 22×15×3 mm. Three more arrowheads made of the same raw material and of similar dimensions (22×14×4 mm, 25×14×5 mm, 22×13×5 mm) could perhaps be regarded as either unfinished hollow-based arrowheads dated to the Early/Middle Bronze Age,[37] or as used/further retouched transverse arrowheads of a Middle Neolithic date (Figs. 7g, i-j).[38] A broken bifacially worked piece made on a thicker flake might also be interpreted as an unfinished arrowhead (Fig. 7k) similar to a Bronze Age one from Psari in the Peloponnese.[39] Lastly, an artefact which may have been a discoid core turned into a leafshaped point, bears reasonable affinities with the amygdaloid points from Nydri, Lefkas (Fig. 10a).[40]

A large geometric sickle element of quadrilateral shape is made of a medium-grained greenish flint with inclusions (Fig. 7l) and may date to the Middle/Late Bronze Age.[41] Another large geometric tool of rectangular shape has been inversely retouched in an identical manner although, in this case, there are no macroscopically observable traces of silica gloss. There is one more sickle element having as blank a coarse-grained flint blade with macroscopically visible gloss on both faces (43×28×6 mm, Fig. 7m), which should also be attributed to the Bronze Age.[42] Two additional sickle elements with silica gloss on both faces have been found at PS 17. Their blanks are backed laminar flakes and these may also be dated to the Bronze Age (Figs. 8a-b).[43] While the aforementioned

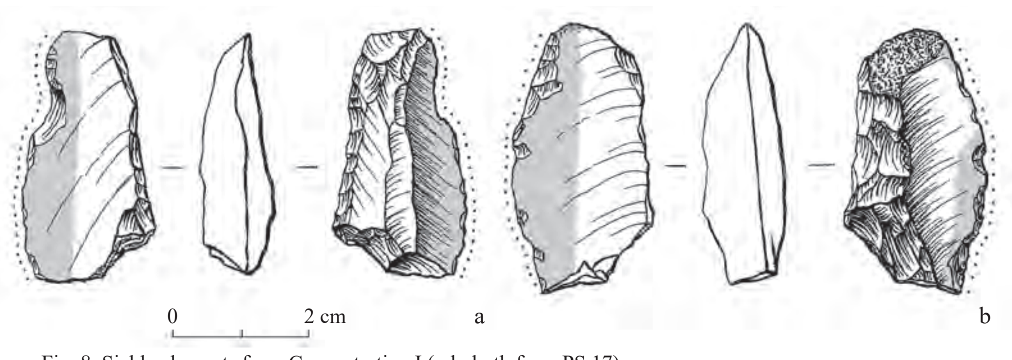

Fig. 8. Sickle elements from Concentration I (a-b, both from PS 17).

35 For the arrowheads see: Perlès 2004, fig. 8.4.3, 8.4.4; Forsén *et al*. 2011, p. 106; fig. 26. But similar types exist at the EBA layers of Demircihuyuk (Baykal Seeher 1997 as cited in Blitzer 1998, fig. 262). See also Dakaris *et al*. 1964, fig. 9a.

36 Dakaris *et al.* 1964, fig. 9.a; Runnels 1985, fig. 6.B Blitzer 1998, fig. 84.B; 82.H; Forsén *et al*. 2011, p. 108; fig. 28.

37 Matzanas 2010, fig. 2.Δ4068, 5.Λ6193β; Forsén *et al*. 2011, p. 108; fig. 28.

38 Perlès 2004, figs. 8.4.3, 8.4.4, 8.4.5, 8.4.12.

39 Matzanas 2010, fig. 2.Δ4065.

40 Kilian-Dirlmeier 2005; Kourtessi-Philippakis 2008.

41 Kourtessi-Philippakis 2010, fig. 4.4; Rosen 1997, fig. 3.15.6; Karimali 2010, 162.

42 Rosen and Vardi 2014, fig. 26.3e.

43 Forsén *et al*. 2011, 109.

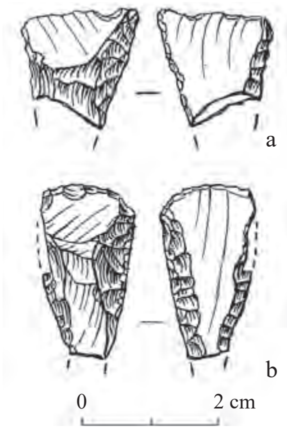

Fig. 9. Broken transverse arrowheads (a from B 41, b from C 23).

sickle elements have thick blades, sometimes also backed, as blanks, the type of blank used at the excavated site of Goutsoura (PS 12)[44] is a thin, less than 20 mm wide blade. Also, the retouch and/or use scars on the sickle elements from Goutsoura are either inverse or alternate, of very short extent and continuous. These differences, however, are less surprising than the total absence of arrowheads from Goutsoura. Behavioural, rather than chronological differences are our proposed interpretation for such an absence. Lastly, it should be mentioned that two more Middle Neolithic arrowheads come from tracts B 41 and C 23, which are not included in the concentration (B 41 is situated at its border and C 23 ca. 800 m to the southwest of it, Figs. 9a-b). Both artefacts are broken.

In sum, the area of Concentration I is an extensive distribution of relatively homogenous chipped-stone artefacts. Its archaeology derives mainly from activity conducted by Neolithic and Bronze Age groups. The odd earlier artefact present must have been recovered in secondary deposition or is the remains of eroded surfaces.

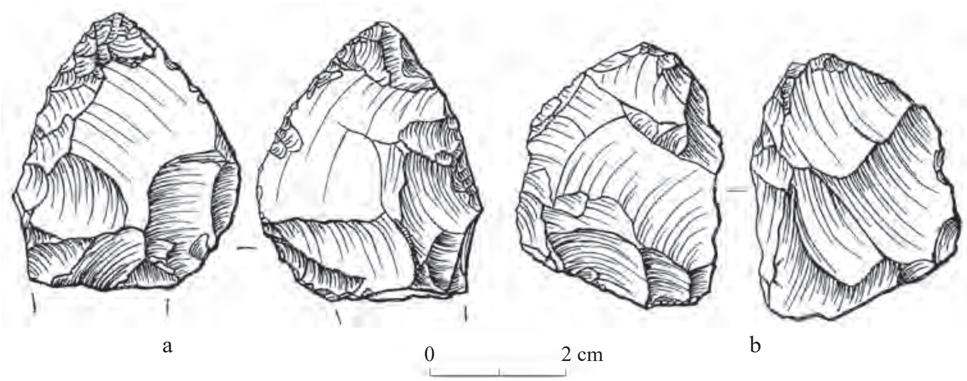

Fig. 10. Bifacially worked cores/points (a from D 74 of Concentration I, b from D 61/PS 45 of Concentration III).

Concentration II

Concentration II is located on the alluvial valley bottom between two deep ravines, only some 50-100 m to the south of Concentration I. Tracts C 1, C 5, C 8, C 14, C 44, as well as C 4, C 7, C 9, C 12-C 13 and D 76 are part of this concentration.[45] Three sites of Late Classical to Early Hellenistic date, PS 30 and PS 38, PS 29, PS 49, are also part of it (Fig. 11).[46] The total size of the concentration is at most ca. 900×300 m and its altitude varies between 85 and 114 masl. It is bordered to the west and east by the two ravines.

[44] Doulkeridou this volume.

[45] C 4, C 7, C 9, C 12-C 13 and D 76 were all in geographic terms clearly part of the concentration, in addition to which they had symptomatic densities of lithics (C 9 just below 10 finds/ha).

[46] Forsén *et al*. 2011, 116-119.

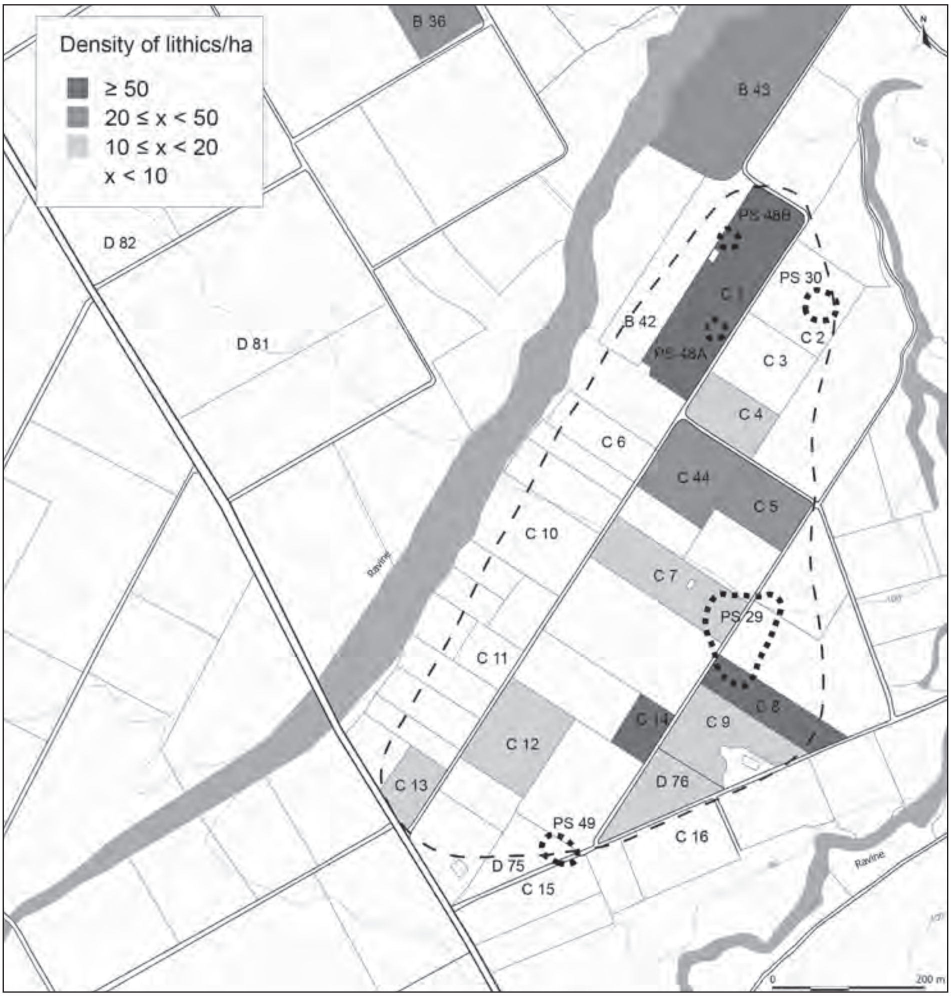

Fig. 11. Tracts and sites of Concentration II.

The density of lithics in the tracts seems to be highest along the highest point of the ridge between the ravines and to fall off closer to the ravine (e.g. C 6, C 10-C 11, C 15-C 16). The border of the concentration towards southwest is unclear, as that part of the valley was never surveyed.

Tracts C 1, C 5, C 8, C 14 and C 44 exhibit very high lithic densities, varying between ca. 35 and 105 finds/ha, whereas D 76 has a density of only 16.87 finds/ha and C 4, C 7, C 9, C 12 and C 13 one varying between ca. 10 and 15 finds/ha (cf. Appendix). Some of the tracts also have a high density of pottery and tile fragments due to the closeness to PS 29, PS 49 as well as PS 30 and PS 48 (C 1, C 4, C 7-C 9, C 14, D 75 and D 76). However, no prehistoric pottery was found in Concentration II, its earliest sherd dating to the Late Archaic to Early Classical period.[47]

[47] A Laconian pithos or crater rim, dated by Forsén *et al.* 2011, 119, fig. 39 to between 550 and 500 BC, whereas by Turmo, this volume, to between 525 and 450 BC.

Site/Tracts	Cores	Core fr	Tools	Flakes	Blades	Bladelets	Chips	Tech.	Unworked	Other	Total
C. II Tracts	5	1	23	12	0	1	0	0	1	4	48

Fig. 12. Lithic finds from Concentration II.[48]

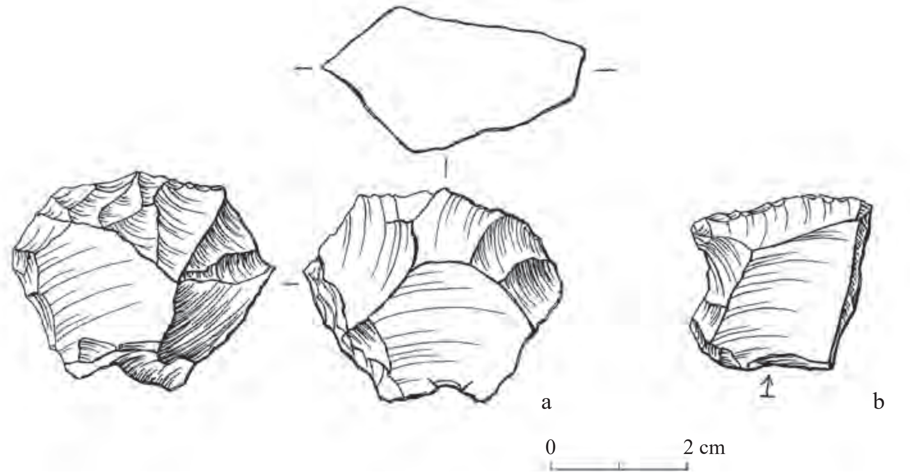

Fig. 13. Levallois core (a) and pseudo-Levallois point (b) from Concentration I (both from C 5).

Concentration II produced a total of 48 lithic artefacts (Fig. 12). A Middle Palaeolithic component is suggested by a small Levallois core (Fig. 13a) with a very high degree of patination and rounded edges due to trampling, and a retouched flake resembling the pseudo-Levallois points (Fig. 13b), which could have been used as a hafted point. The rest of the artefacts are either undiagnostic or of a Holocene age, including a non-geometric microlith and a small scraper made of mauve flint.

Concentration III

Concentration III is located at the westernmost edge of the alluvial valley bottom at a distance of only some 100-200 m from the Kokytos. Tracts C 24-C 26, C 28, C 33, C 41, D 1-D 2, D 7-D 9, D 22, D 24-D 28, D 33-D 35, D 38-D 42, D 61, D 80, as well as C 27, C 29-C 32, D 3, D 5 and D 23 are part of this concentration (Fig. 14).[49] The concentration includes several sites, among which there are four with a prehistoric (PS 36, PS 43, PS 45 and PS 46),[50] four with a Late Classical to Hellenistic (PS 35, PS 37, PS 44, PS 46/E

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[48] A handful of lithics sampled as part of PS 29 have been included among the overall count of lithics from the tracts of Concentration II.

[49] C 27 contained large numbers of lithics, but no density was calculated. C 30-C 32, D 3, D 5 and D 23 were all in geographic terms clearly part of the concentration, in addition to which they all had symptomatic densities of lithics (C 29 just below 10 finds/ha). The low density of D 22 is explained by the fact that lithics were not counted in the southeast part of the tract, which we first considered as the core of the prehistoric site PS 43.

[50] Forsén *et al*. 2011, 90-91, 99-100 and 102-103. For PS 43, see also Galanidou and Papoulia, this volume. PS 45, which in the site catalogue (Forsén *et al.* 2011, 90) was preliminarily dated as Upper Palaeolithic (?), can now be more precisely dated. Although an Upper Palaeolithic component might be hidden in a few (patinated) truncations and a burin, these types can also be part of Neolithic (and perhaps even Bronze Age) assemblages. Taking into account the presence of a very characteristic (unpatinated) sickle element and the overall absence of other diagnostic tools it is difficult to agree with the characterization of the site catalogue solely on the basis of these few possible Upper Palaeolithic types. Thus, we are rather dealing with a Neolithic site with some possible earlier intrusions.

Fig. 14. Tracts and sites of Concentration III.

9),[51] and six with a Roman or Late Roman component (PS 32, PS 33, PS 38, PS 39, E 22 and E 23),[52] one with a Hellenistic and Roman component (E 8) and one of unclear historical date (E 24).[53] The total size of the concentration is at most some 1500×1000 m and its altitude varies between ca. 90 and 108 masl. The concentration is bordered to the southwest by the Kokytos. The densities of lithics fall off clearly towards the south (D 10, D 12-D15, D 31), the southeast (D 11, D 16-D 18), the east (B 14, B 16, B 56, C 43, D 20, D 43) and the north (D 32, D 36-D 37, D 54, D 56-D 59).

Concentration III is partly located around Mavromandilia, characterised by its very fertile soil fed by several abundant springs where the water surfaces in the middle of the alluvial plain through the soil.[54] The northern part of the concentration is intersected by a deep ravine originating at the lowermost slopes of the Paramythia mountain range

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[51] Forsén *et al*. 2011, 97-99 and 101-103.
[52] Forsén *et al.* 2011, 91 and 95.
[53] Forsén *et al.* 2011, 99.
[54] For a more detailed description of the geomorphology, etc., of the Mavromandilia area, see Lavento and Lahtinen 2009; Forsén and Forsén 2012, 301-305.

on the other side of the valley, from where it leads water down to the Kokytos. The landscape within the concentration is lightly undulating, with identified sites being located at somewhat more elevated points with good visibility towards the south and the Kokytos itself.

The density of lithics in the tracts belonging to Concentration III is typically between 25-100 finds/ha. The tracts associated with, or part of PS 32 (C 31), PS 33 (C 33), PS 35 (C 24, D 26), PS 37 (D 1-D 2, D 9), PS 44 (D 27), PS 46 (C 25, D 7, D 25) and E 24 (C 28 and C 29) also produced anomalous densities of pottery and tiles (cf. Appendix). Elsewhere the density of pottery and tiles is very low, with the exception of D 24 which is located around one of the local springs which the farmers have tried to dry out by filling it up with stones and tile fragments. The only sites that produced prehistoric pottery during the survey were PS 46 and PS 36. PS 46 had a total of six prehistoric sherds, including one flaring rim of coarse ware with a *taenia* band (Bronze Age) and two wishbone handles (LBA or EIA in date).[55] PS 36, which was excavated later, dates mainly to the Early Iron Age, although it also includes some Late Bronze Age, Archaic, Classical and Hellenistic finds.[56]

A total of 1045 lithic tract finds belong to Concentration III, 429 of which are presented in this chapter.[57] The most striking element of Concentration III is the overrepresentation of tools (75%) and the small number of cores or core fragments and debitage products (Fig. 15). Assuming that our random sample of tract lithics is representative of a true pattern, such an overrepresentation should most probably be interpreted in terms of behavioural preferences and be linked with particular activities in the vicinity of the fresh water springs and at landscape locales with good visibility.

Site/Tracts	Cores	Core fr	Tools	Flakes	Blades	Bladelets	Chips	Tech.	Unworked	Other	Total
C. III tracts	12	0	78	32	3	0	0	0	0	2	127
PS 35	4	1	50	6	1	0	0	0	0	0	62
PS 36	2	0	35	7	0	0	0	0	3	0	47
PS 43	34	2	235	299	23	7	19	2	0	30	651
PS 45	4	1	101	7	1	0	0	0	0	1	115
PS 46	2	1	28	8	1	2	0	0	1	0	43
Total	58	5	527	359	29	9	19	2	4	33	1045

Fig. 15. Lithic finds from Concentration III.[58]

Although the majority of the blanks are retouched, only a few are diagnostic in terms of dating. The majority of cores are globular flake cores of relatively small dimensions having light degrees of patina; there are also a couple of blade/bladelet cores.

With the exception of a bec manufactured in coarse-grained flint, having a heavy degree of patina, as well as a naturally backed knife which might be broadly attributed to

[55] Forsén *et al.* 2011, 102-103.

[56] For PS 36, see apart from Forsén *et al*. 2011, 99-100, also J. Forsén 2009, 56-87; Tzortzatou and Fatsiou 2009, 39-43 and Forsén and Forsén 2012.

[57] The remaining 616 have been studied separately and their detailed analysis can be found in Galanidou and Papoulia, this volume.

[58] PS 35 includes also lithics from tracts C 27 and D 26 and PS 46 lithics from tract D 7. PS 43 also includes D 22 and D 28. PS 45 consists of lithics collected in tracts D33-35, D 38-42 and D 61. A handful of single lithics collected in the sites PS 32 and PS 33 have been included among the total count from the tracts of Concentration III.

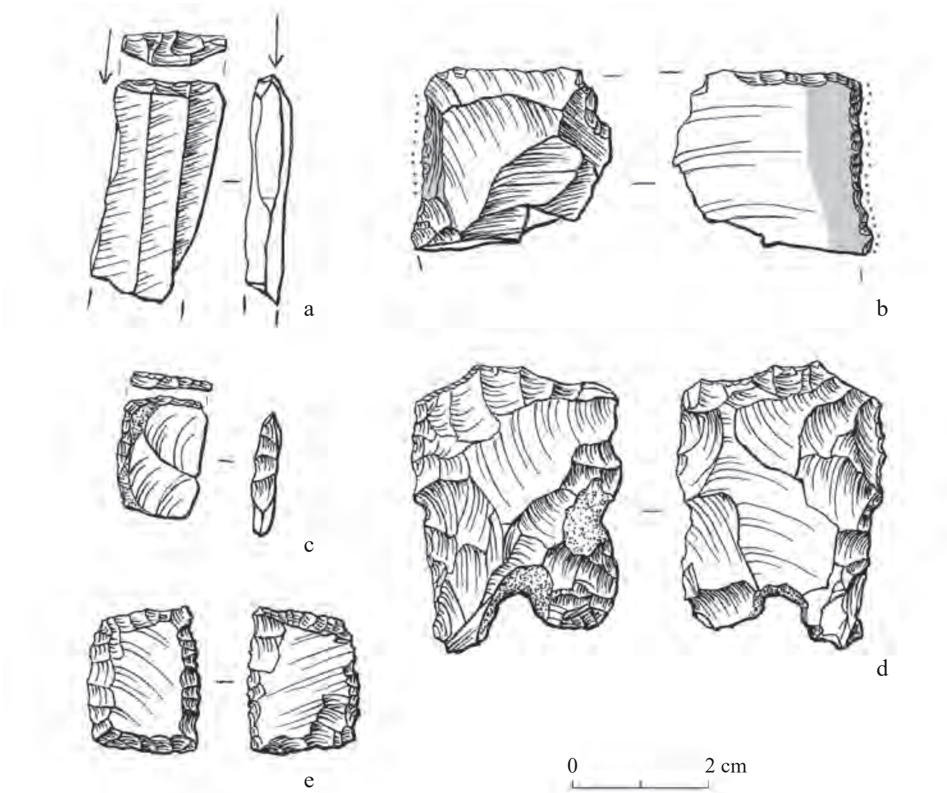

Fig. 16. Retouched artefacts from Concentration III: burin on a truncation (a from D 33/PS 45), sickle blade (b from PS 35/47B), backed truncation (c from D 38/PS 45), bifacially worked piece (d from D 42/PS 45), geometric piece – possible sickle element (e from D 41/PS 45).

the Pleistocene, all the lithic artefacts of Concentration III are of Holocene age. A possible Upper Palaeolithic component may be indicated by two artefacts: a dihedral burin on a distal truncation made of coarse-grained white patinated flint or chert (Fig. 16a) and a truncation made of beige/white flint. Other than these, the majority of the artefacts seem to derive from Neolithic and/or Bronze Age activity. Most of the artefacts have medium degrees of patina. The raw material of these specimens is the light blue/grey fine-grained flint, commonly used in the Kokytos valley since the Pleistocene.[59] A borer having a large triangular cortical flake of reddish colour as blank bears resemblance to the lithics from PS 4 in terms of raw material, preservation and technology.

The majority of the finds seem to be of Neolithic date, although a Mesolithic component should not be excluded, since a distinct microlithic element is present. Among the many retouched tools, there are seven microliths, one of which can be related to finds from Sidari level D.[60] There are also three cores of roughly the same size (e.g. 39×42×30 mm) that have produced both flakes and bladelets, five small, yet not microlithic tools, two small retouched blades, and a burin.

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[59] See Papoulia 2011; Galanidou *et al*., this volume.
[60] Sordinas 1970, fig. 4.33.

Fig. 17. Polished stone axe from Concentration III (from PS 32).

The *Neolithic* component includes an unpatinated geometric tool and a retouched fragment made of yellow flint with limited degree of patina, perhaps part of an original transverse arrowhead. PS 32, apart from a ground-stone tool, a polished axe (Fig. 17), has also yielded a Neolithic transverse arrowhead. A Neolithic *terminus post quem* can also be proposed for the broken sickle element from PS 35 (Fig. 16b). It is made from a fine-grained flint flake of dark red colour and has macroscopically visible gloss on both faces.

Geometric tools, micro-lithic and larger, are the best examples of tools with elaborate retouch, such as the geometric microlith (18×12×4 mm), which is abruptly backed and distally truncated (Fig. 16c). Due to preservation and context the particular microlith is quite unlikely to be dated to the Mesolithic. It could be of a Neolithic/Early Bronze Age age, as may other retouched tools, including a nosed endscraper on a blade, a composite tool (piercer and scraper made by means of bifacial pressure retouch on the left lateral) and a number of piercers. Lastly, there is a large bifacially worked tool (Fig. 16d) which has a naturally hollowed, cortical proximal part. Perhaps such a tool could have been hafted on a wooden shaft and used as an axe.

An Early/Middle Bronze Age component is testified mainly by two artefacts. The first is a geometric tool (21×17×5 mm) of a trapezoidal shape, which has been bifacially retouched by means of abrupt and semi-abrupt retouch of relatively short extent and regular delineation. The tool has also been thinned on its ventral face by means of partial, low angle removals (Fig. 16e) comparanda for which can be found at Sovjan and Messenia.[61] It is not impossible that the aforementioned piece was part of a sickle, despite the absence of macroscopically visible gloss on it. The second piece is a large (30×19×4 mm) denticulated sickle element which has been bifacially worked and preserves silica gloss on both faces.[62] Interestingly, in contrast to the majority of the artefacts from the concentration which have lesser or greater degrees of patina, this one is almost totally unpatinated, and the translucency of the grey raw material is still observable. Lastly, a relatively flat, bifacially-worked core made on a flake bears resemblance to the leaf-shaped point also found in Concentration I and might perhaps be interpreted as an unfinished point, and thus may also be attributed to the Bronze Age (Fig. 10b).

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[61] Kourtessi-Philippakis, 2010, fig. 4.1, 4.3; Blitzer 1998, fig. 48.A, 71.E, 166.B, 166C.
[62] Blitzer 1998, fig. 47.E, 70.B.

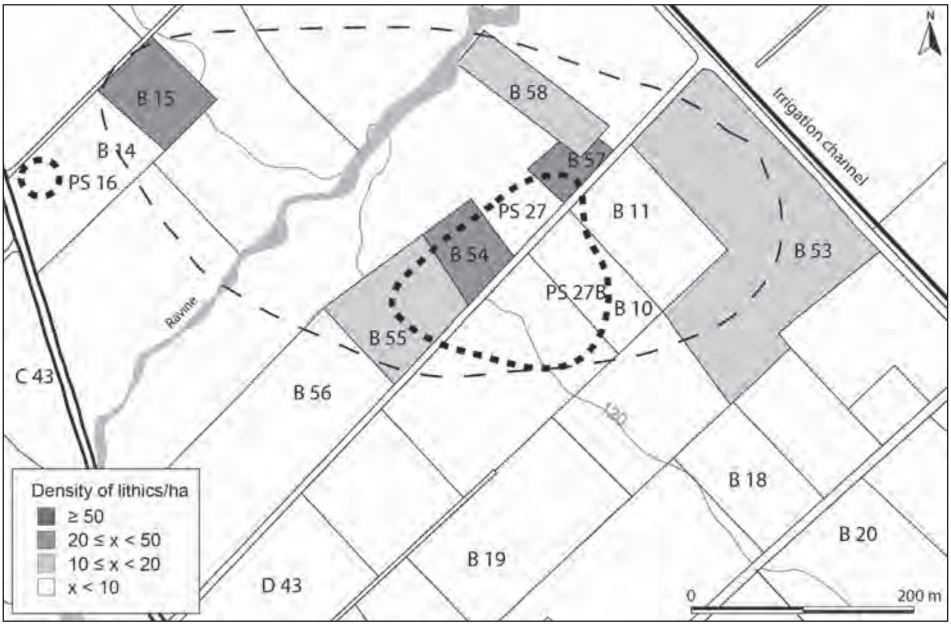

Fig. 18. Tracts and sites of Concentration IV.

Concentration IV

Concentration IV is located in the middle of the fertile alluvial valley bottom, on both sides of a small ravine bringing water from Kamini in the Paramythia mountain range down to the Kokytos, further towards the west. There are no modern springs within the concentration, which is located around the Late Roman village and basilica at Palioklissi of Zervochori (PS 27). It includes at least the tracts B 15, B 54 and B 57, as well as B 53, B 55 and B 58 (Fig. 18).[63] The total size of the concentration is ca. 600x300 m and it is located at an altitude between 118 and 126 masl. Concentration IV is separated from Concentration III further towards the southwest by a ca. 250-300 m wide corridor consisting of tracts with low densities of lithics, such as B 14, B 16, B 19, B 56, C 43 and D 43 (Fig. 1). The density of lithics clearly falls off towards the southeast and east in D 17-D 18, B 12, B 16 and B 18-B 21. The borders of Concentration IV to the north and northeast are unclear, although B 17 has a low density of lithics.

The density of lithics is in B 15, B 54 and B 57 between 40 and 50 finds/ha. B 53, B 55 and B 58 have a density between ca. 15 and 20 finds/ha (cf. Appendix). Lithics were also collected from the gridded area PS 27B in B 56. Strangely enough, no lithics were recorded in B 10 and B 11 although, to judge by their location geographically, they are part of Concentration IV. Neither were any lithics collected when B 10 was gridded as part of PS 27. All the tracts belonging to Concentration IV have high densities of pottery and tiles (presumably connected with the LR activity in the same area). However, no prehistoric or Early Iron Age pottery was noted.

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[63] B 53, B 55 and B 58 were all in geographic terms clearly part of the concentration, in addition to which they had symptomatic densities of lithics.

Site/Tracts	Cores	Core fr	Tools	Flakes	Blades	Bladelets	Chips	Tech.	Unworked	Other	Total
C. IV Tracts	8	2	41	44	2	1	1	1	0	7	107

Fig. 19. Lithic finds from Concentration IV.[64]

Concentration IV comprises a total of 107 (Fig. 19) artefacts. In terms of dating, 16 artefacts from B 54, B 55 and B 56 could be Palaeolithic, however none is diagnostic. Likewise, the presence of sub-centripetal scars and high degrees of patina on some of the B 57 and B 58 flakes hints at a Middle Palaeolithic component. Out of an overall inconclusive industrial palimpsest, a broken transverse scraper (Fig. 20a) and a carinated endscraper (Fig. 20b) suggest a Middle Palaeolithic and an Early Upper Palaeolithic / Aurignacian component,[65] respectively. Among the finds there are also 3 flake cores, a bec made of light grey/blue flint with light patina and a small carinated endscraper with a flat butt made of reddish brown flint, which should date to the Holocene, perhaps the Bronze Age.

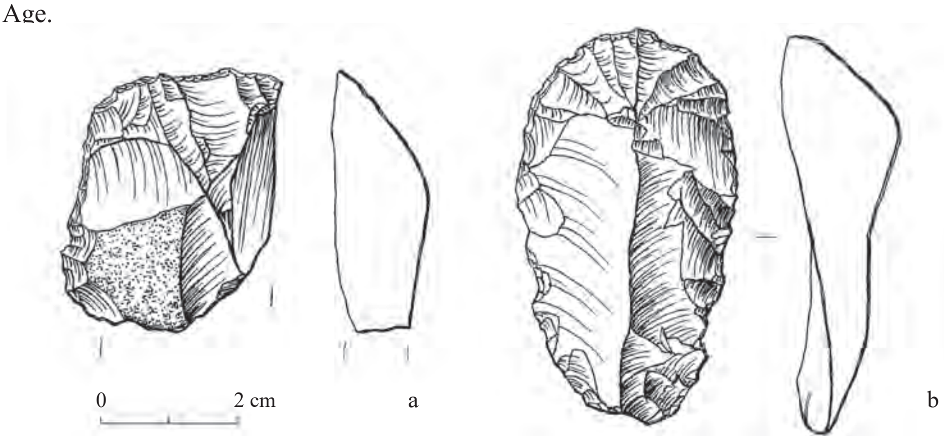

Fig. 20. A transverse scraper (a) and a carinated endscraper (b) from Concentration IV (both from B 15).

Concentration V

Concentration V is located in the middle of the fertile alluvial valley bottom, ca. 500 m to the southwest of the modern village Daphnoula in the region known as Chersa or Aerodromio. The landscape slopes towards the northeast and a ravine some 200 m away, but also towards the southwest and the Kokytos located at a distance of ca. 1.2 km to the southwest. There are no natural springs inside the concentration today. It consists of a thin scatter of lithics covering at least the tracts A 108-A 111, A 113, D 69, but perhaps also A 101, A 112, A 103-A 104 and A 97.[66] It also includes a small site, PS 11, which has provisionally been dated to the Early Hellenistic period (Fig. 21).[67] The total size of the concentration is at most ca. 500x500 m and it is located at an altitude of ca. 120-125

[64] Concentration IV includes PS 27.

[65] See Galanidou 1997, fig. 26.4.2 for a similar carinated endsraper recovered from the lowermost stratum 9 of Kastritsa Cave, on the Pamvotis Lake shore near Ioannina. A large number of carinated endscrapers is also reported in the Aurignacian layers of Klissoura Cave 1 in the Argolid by Kaczanowska *et al.* 2010.

[66] The five last tracts are geographically located in connection with Concentration IV and all have higher densities of lithics than the surrounding tracts, although only A 97 (rewalk) and A 101 produced symptomatic density values.

[67] Forsén *et al*. 2011, 88.

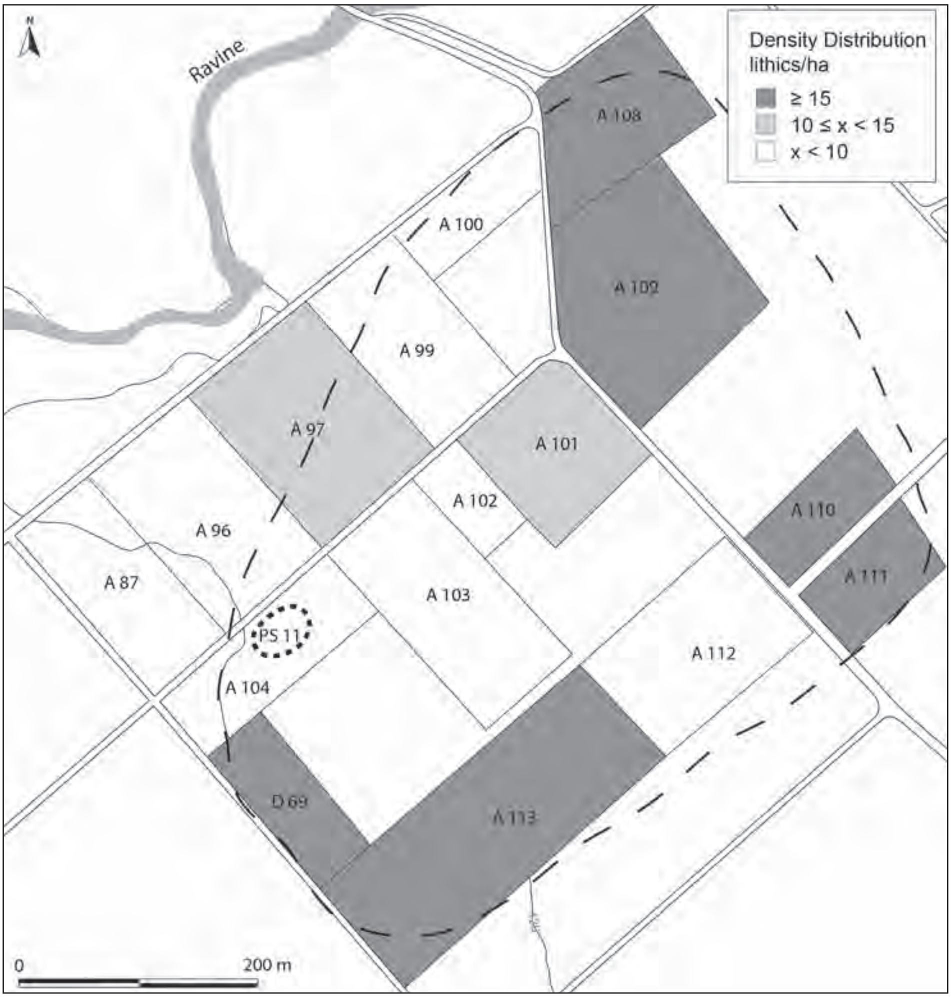

Fig. 21. Tracts and sites of Concentration V.

masl. The density of lithics clearly falls off towards the south (cf. D 65, D 68, D 71-D 72, D 62) and towards the west and northwest (cf. A 85-A 87, A 96, A 98, A 82). The borders towards the northeast and the modern village of Daphnoula are unclear. The concentration may well continue further in that direction.

The density of lithics in Concentration V tracts varies between 15 and 25 finds/ha, with A 101 having an only slightly lower density (12.42) (cf. Appendix). This is only a somewhat higher than normal density of lithics in the Kokytos landscape.[68] Characteristic for all these tracts is a very low density of pottery and tiles, except for A 104 (part of PS 11). One prehistoric body sherd of "orange ware", probably dating to the LBA was found in A 111.[69]

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68 The way of calculating lithics in 2004 is not comparable to that of the other years: see above, under survey methodology.

69 Jeannette Forsén, pers. comm. May 2012.

Site/Tracts	Cores	Core fr	Tools	Flakes	Blades	Bladelets	Chips	Tech.	Unworked	Other	Total
C. V Tracts	8	5	33	52	6	1	2	1	1	3	112

Fig. 22. Lithic finds from Concentration IV.[70]

Concentration V has yielded 112 lithic artefacts dating mainly to the Neolithic and Bronze Age periods (Fig. 22). A pre-Neolithic component should not be excluded, though diagnostic artefacts are absent. Among the 6 blade fragments there are a couple of medial parts of blades with parallel ridges attributed more securely to the Neolithic period and/or the Bronze Age due to their probable manufacture by means of pressure flaking (Figs. 23a-b). Also the majority of the cores seem to be of a Holocene age.

An Early/Middle Bronze Age component is suggested by a broken arrowhead (18×12×4 mm) retouched by means of bifacial pressure flaking, comparanda for which can be found in Bronze Age sites of the Peloponnese (Fig. 23c),[71] while a larger example has also been found at Sidari, level A.[72] Pressure retouch is also observed on the left lateral of a proximal part of a blade (Fig. 23d), a possible comparandum for which might be traced at Bronze Age Psari, in the southwestern Peloponnese.[73]

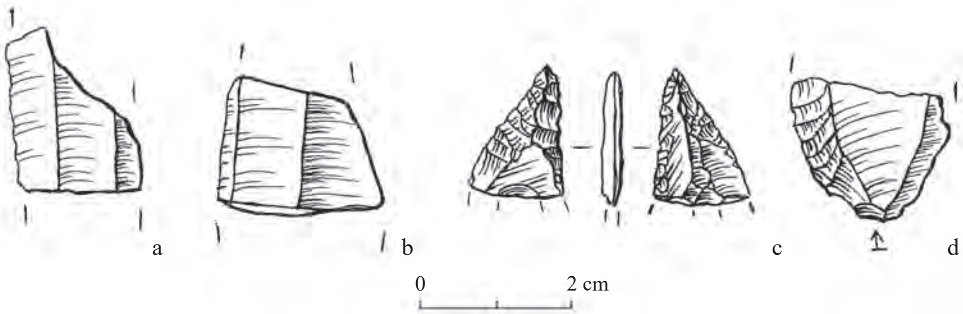

Fig. 23. Two medial parts of blades (a-b from D 69), a broken hollow-based arrowhead (c from A 97) and a proximal part of a retouched blade (d from A 108) from Concentration V.

Concentration VI

Concentration VI (Fig. 24) is located along the lowermost slopes opening towards a flat and watery, and during winter, even marshy flat plain which in the east is bordered by the Kokytos. The plain is in the south bordered by the Xirolophos hill, in the west by the Liminari hill and in the north by the Agios Georgios hillock. In the northeast, in the middle of the plain and next to the Kokytos there is a small limestone hillock on top of which the modern village Rachouli is located. This concentration consists of tracts A 7-A 13, A 15-A 16, A 18-A 20, A 25, A 27-29, A 34, A 39, A 42, A 121, as well as A 4, A 21, A 24, A 30, A 33, A 37-A 38 and A 105.[74] There are four prehistoric sites within or close to the concentration. PS 1 and E 16 are situated on the northernmost slopes of

[70] Concentration V includes PS 11.
[71] Kardulias 1992, 429, fig. 2e; Runnels 1985, 387, fig. 17B; Hartenberger and Runnels 2001, 360, fig. 4i; Matzanas 2010, fig. 2. Λ5494.
[72] Sordinas 1970; fig. 6.15.
[73] Matzanas 2010, fig. 3.6054.
[74] A 4, A 21, A 24, A 30, A 33, A 37-A 38 and A 105 were in geographical terms clearly part of the concentration, in addition to which they all had symptomatic densities of lithics (A 33 just below 10 finds/ha).

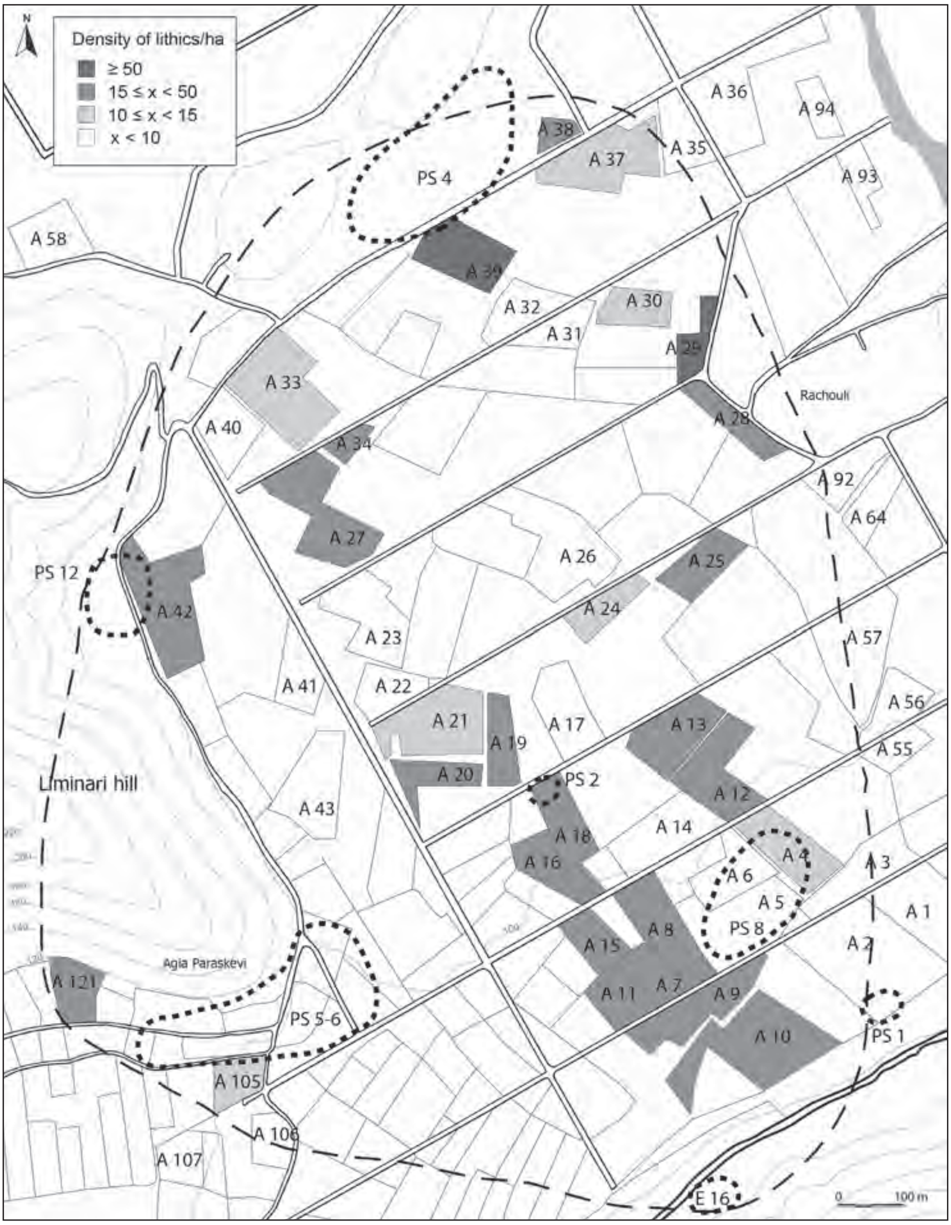

Fig. 24. Tracts and sites of Concentration VI.

the Xirolophos hill. PS 12 is on the lowermost eastern slope of the Liminari hill and PS 4 on the southernmost slope of the Agios Georgios hill.[75] At the southeasternmost tip of the Liminari hill there is also PS 5-6, a Late Archaic to Early Roman village with a

[75] Forsén *et al.* 2011, 79-82, 84-86. For PS 12, see also the contributions by Forsén, J. Forsén, Lima and Doulkeridou in this volume.

sanctuary and graves.[76] Two Early Modern pottery or tile manufacture sites (PS 2 and PS 8) on the flat marshy plain complete the picture.[77] The total size of the concentration is ca. 1500x1500 m and covers an area located at an altitude between 98 and 116 masl. The density of lithics in the tracts clearly falls off towards the southwest (A 106-A 107) and the east (A 1, A 3, A 35- A 36, A 55-A 57, A 64, A 69-A 70, A 92-A 94).

The lithics of Concentration VI were mainly found along on the slopes on the southern, western and northern side of the flat marshy plain, although lithics also were recovered from the very flat plain, especially its southwestern part. There are no springs within the concentration itself, but the water level is very high in the plain today. During the winter months the area turns clayish and nearly marshy, whereas during the summer it can be used as grazing ground. The plain drains towards the east and the Kokytos, mainly along a ravine leading from the west through the southern parts of the plain to the Kokytos in the east. All the slopes surrounding the plain are rich in natural flint, especially the Xirolophos hill and the Agios Georgios hillock. On the lower slopes of the latter there is even a multi-period prehistoric flint quarry site, PS 4.

The density of lithics in the tracts belonging to Concentration VI is typically between 15 and 60 finds/ha (cf. Appendix). Tract A 39, which is associated with PS 4, had the highest density of flint (81.64 finds/ha). High densities of pottery and tiles were only recorded in the tracts that were either part of or associated with the Early Modern manufacture sites PS 2 (A 16) and PS 8 (A 7, A 9) or with the Late Archaic to Early Roman site PS 5-6 (A 105). The only prehistoric pottery was found in tract A 42, which is associated with the Bronze Age site PS 12.

Concentration VI consists of a total of 194 lithic finds (Fig. 25). This concentration contains material of little diagnostic value, including a number of red/brown flint artefacts, similar to the finds encountered at PS 4. The special feature of most of the finds recovered from this concentration is the close to total absence of patina. There is, also, a significant occurrence (9.8%) of randomly worked or totally unworked pieces.

Site/Tracts	Cores	Core fr	Tools	Flakes	Blades	Bladelets	Chips	Tech.	Unworked	Other	Total
C. VI Tracts	8	1	77	36	3	1	9	12	19	5	171
PS 12	2	0	8	11	2	0	0	0	0	0	23
Total	10	1	85	47	5	1	9	12	19	5	194

Fig. 25. Lithic finds from Concentration VI.[78]

Apart from a retouched Levallois flake with a facetted butt (Fig. 26a) that can be dated to the Middle Palaeolithic, and a dihedral burin made on a backed bladelet (Fig. 26c) that might be of an Upper Palaeolithic date, there is no other indication of Palaeolithic or Mesolithic presence. Among the debitage pieces there is a translucent grey flint flake with a platform produced by soft hammer percussion (13×26×5 mm), two cortical flakes, and a broken blade made of dark red/brown flint with a cortical butt and a few cresting scars (50×21×9 mm, Fig. 26b). Among the few formal tools there are a couple of scrapers made of yellow flint (32×25×13 mm, 34×35×11 mm), a bifacially worked flake with a soft

[76] Forsén *et al*. 2011, 82-83.
[77] Forsén *et al*. 2011, 85 and Forsén 2009, 6-7 and 16-17.
[78] Concentration VI includes PS 5 and PS 8. PS 12 here includes only the lithics collected during the surface survey in A 42. The lithics collected during the excavation of Goutsoura (PS 12) are discussed by Doulkeridou, this volume.

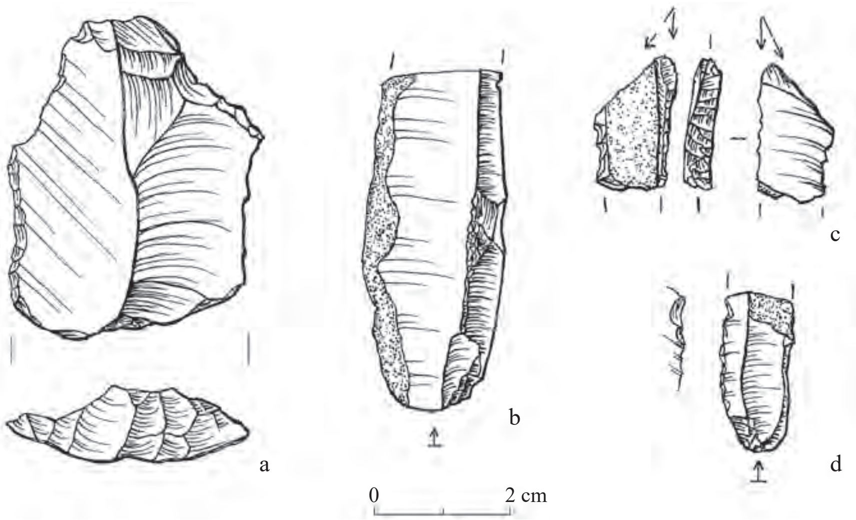

Fig. 26. A retouched Levallois flake (a from A 121), a partially crested blade (b from A 15), a dihedral burin on a backed bladelet (c from A 39) and a retouched bladelet with alternating marginal retouch (d from A 9) from Concentration VI.

hammer platform, a retouched bladelet with alternating marginal retouch (Fig. 26d) and a couple of splintered pieces. All flake cores imply Holocene dates. The raw material in the majority of the blanks and tools from tracts A 25 and A 29 is very similar in colour and surface alterations to the fine-grained flint used at PS 12. This might speak for a Bronze Age date for certain of the artefacts from Concentration VI. Nonetheless, the majority of the specimens might equally be part of a later, *Historical* component.

Discussion

The first issue that emerges from our study is the remarkable low proportion of artefacts that can be attributed with confidence to a period of human activity compared to the proportion of undatable artefacts that make up the lion's share. Out of 2568 artefacts studied[79] only a small number of tools, debitage and technical pieces has been illustrated and received special treatment here, for it lends itself to chronological assignments, coarse as they may be, to the various periods of the Kokytos prehistory. Beyond 'high definition dating' which cannot be addressed through the tract record, tract lithic finds do shed light on some aspects of the long history of human presence at Kokytos.

The artefacts presented here are prehistoric, yet knapped-stone tools are found in and around almost every historical period site in the surveyed area. Two possible explanations may account for this. The first is that a good number of the undatable lithic finds are manifestations of flint knapping activity and usage that took place during historical times and perhaps also extending to modern times, though we have not recorded any strike-a-light, tribulum or gun-flint in the collection. The fact, that we are unable to

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[79] These include the 616 artefacts from PS 43 that are presented in Galanidou and Papoulia, this volume.

pinpoint any ancient or medieval lithics as such, has more to do with our training and the compartmentalization of modern archaeology. The limited research on the ways flint was knapped and used by societies of the ancient and the medieval world, that would offer comparanda, makes our study biased towards the prehistoric component of the Kokytos lithics. We can only describe and elaborate on the portion of the archaeological record that we are familiar with.

An alternative but not mutually exclusive explanation is that the undatable lithics may be described as normal background noise related to the local flint-rich geology.[80] We have lithics in practically every walked field or tract and thereby hardly surprising also in close to every site. But we have no ancient or medieval site that would have shown a clearly higher occurrence of lithics than what could be described as normal background noise. There is thus no clear indication of flint having been used to any larger degree in any ancient or medieval site, the only exception being ancient and medieval sites that clearly have a prehistoric component.

More research is clearly needed on the ancient and medieval sources that refer to knapped-stone tool use and more lithic data ought to be collected in systematic excavations. These two combined will help us build a corpus of evidence on the ancient and medieval knapped-stone tool usage. This may be the only path to discovering hitherto unknown phases of human presence in the Kokytos valley and elsewhere. Archaeological surface surveys with a diachronic research agenda would benefit enormously from the output of such a study initiative.

The second issue that emerges from our examination is the overall smaller Palaeolithic component compared to those of the Neolithic period and Bronze Age. With the exception of the sites at Mikro Karvounari[81] and Megalo Karvounari,[82] with their rich Palaeolithic record, and the quarry site PS 4,[83] only Concentrations I and III had less than a dozen Palaeolithic finds. In the rest of the surveyed area the Palaeolithic record has been scant and discontinuous. Of importance in this context is tract B 52, which is not part of any of the concentrations. It is located just below the modern village of Zervochori, on the lower foothills of the Paramythia mountain range, ca. 700 m to the northwest of Concentration I at an altitude of approximately 150 masl. It has yielded a broken pointy flake with a double bulb and a broken Levallois flake with a facetted platform (Figs. 27a-b). Both artefacts exhibit high degrees of patination and oxidized stains on their surfaces, implying long-term contact with the *terra rossa* deposits of the valley. It is not impossible that such stray finds originate from the open-air Middle Palaeolithic sites of the Paramythia foothills. This Levallois flake is the best Middle Palaeolithic example coming from the area covered by the Thesprotia Expedition, apart from the lithics recovered from the two sites at Karvounari.

The larger yields of Middle Palaeolithic artefacts from Mikro and Megalo Karvounari compared to the smaller yields from the rest of the valley make a case for a preference to, or repeated activity of the Neanderthal groups in the karstic basins with seasonal or perennial water.[84] The fresh-water springs in the area of Concentration

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[80] For background noise, cf. e.g. Gallant 1986.
[81] Papagianni 2000; Papoulia 2011.
[82] Galanidou *et al.*, this volume; Ligkovanlis 2011; Ligkovanlis 2014.
[83] Forsén *et al*. 2011, 84-85.
[84] Cf. van Andel and Runnels 2005.

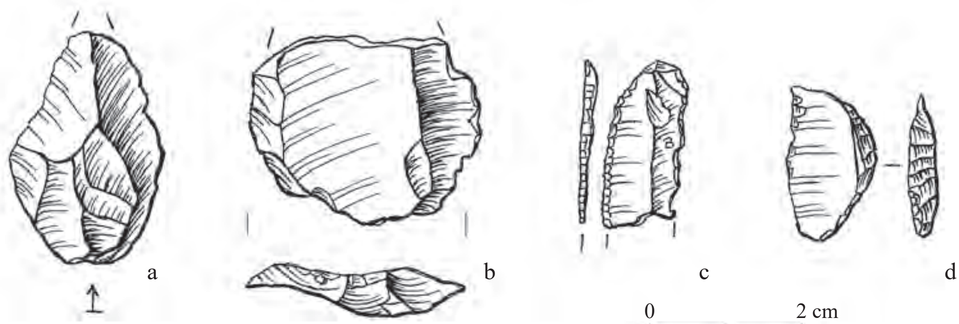

Fig. 27. A distally broken pointy flake (a) and a Levallois flake (b) from B 52 and a backed bladelet (c) and a microlithic lunate (d) from A 76.

III and the overall excellent landscape visibility obtained at most locales of the same Concentration and Concentration I at the Paramythia foothills may in part explain the larger numbers of Middle Palaeolithic artefacts present on their surfaces. Likewise the abundant flint at PS 4 in Concentration VI was another resource that attracted Middle Palaeolithic groups in the area.

The Early Upper Palaeolithic – Aurignacian has a good example of a carinated endscraper in Concentration I. There is only a small number of truncations, microliths and piercers which might be attributed to the late Upper Palaeolithic and/or the Mesolithic period and an overall absence of backed bladelets from the concentrations. Only tract A 76, which is not part of the concentrations, has returned a broken backed bladelet (Fig. 27c) and a microlithic lunate of the type encountered at Ouriakos, the open-air final Upper Palaeolithic site of Lemnos island (Fig. 27d).[85] The scanty Upper Palaeolithic component is of little help in the identification of Upper Palaeolithic areas of activity at the Kokytos and might be interpreted as stray finds, belonging to the same broader technological tradition encountered in cave and open air sites of southeast Europe.

Neolithic and Bronze age finds are more commonly distributed in the Kokytos landscape compared to Palaeolithic and Mesolithic finds. Is this quantitative difference between Pleistocene and Holocene assemblages associated with true differences in the settlement pattern and demography that became denser and more intense over time? Alternatively, does it merely reflect differences in preservation, visibility and site formation conditions, with the odd Palaeolithic find recovered from the surface in secondary deposition due to erosion or tectonic activity? None of these explanations can be excluded with the data to hand. The question can profitably be addressed once we introduce the landscape history, altitude and geomorphology in our discussion. Out of the three major geographic divisions of the surveyed area – the alluvial fan in the western flanks of the Paramythia mountain range, the valley lowlands and bottom, and the western part, where the Karvounari complex is situated – the last has returned a robust Palaeolithic signal whereas the rest present the odd Pleistocene find, typically in association with lithic or water resources and high visibility locales.

The areas that were surveyed were mostly below the 200 m contour and the concentrations identified above lie between 90 and 162 masl. With the passage of time,

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[85] Efstratiou *et al.* 2014.

and as the Kokytos incised deeper the Epirotic landscape, new opportunities for activity on the river and ravine banks were made available to Neolithic and Bronze Age groups. It is thus not unexpected that late prehistoric activity is attested in the Kokytos valley bottom and the lowermost foothills of the Paramythia mountain range. The concentrations located in the valley bottom (e.g. II, IV, V) produced none or very few early prehistoric finds. Although mountains have for long remained marginal to Palaeolithic research, recent work in the Pindus mountain, the Alps and the Caucasus has radically changed the picture. It shows them to offer multiple attractions to Middle and Late Upper Palaeolithic groups.[86] Beyond the karstic basins around Karvounari and the springs of Concentration III it is probable that focal areas of intense and recurrent Palaeolithic activity may have also been up in the Paramythia mountain range. The largest portion of the surveyed area lies between the two areas, and this might account for the overall low numbers of early finds recovered.

An important observation is that the Palaeolithic finds from the various concentrations bear little resemblance to the characteristic Middle Palaeolithic tools recovered both at Megalo Karvounari and Mikro Karvounari.[87] Situated to the west of the surveyed region, at 140-220 masl and 140-184 masl respectively, in the upper limit and higher up compared to the altitude of any concentration, these twin *terra rossa* sites must have not been alone in the landscape. Our working hypothesis is that Pleistocene finds and sites with greater resemblance to the Karvounari finds remain to be discovered higher up in the Paramythia mountain range. This could be tested by future research.

The third issue that emerges from the study of tract finds is that a dominant and recurrent type of artefact from most prehistoric periods is the point or pointed flake. These must be associated with Middle Palaeolithic, Upper Palaeolithic, Neolithic and Bronze Age hunting activity taking place around the Kokytos valley. Human groups of each period were employing their own particular technological principles to produce specific hunting equipment (e.g. Levallois or pseudo-Levallois points in the Middle Palaeolithic, backed bladelets that could be inserted to Upper Palaeolithic hunting tools, tanged points and transverse arrowheads in the Neolithic period, projectile points retouched by means of pressure during the Bronze Age), yet the common denominator of the record is the very activity that the finds point to, irrespective of the period and the technology of production.

A first reading of the predominant point presence and attaching to them a functional significance as inserts to hunting equipment suggests a landscape suitable for hunting activities. At the same time a landscape used by groups with residential mobility, since there is limited evidence for prehistoric settlement other than the Early Bronze Age Goutsoura. We can envision the ravines originating from the Paramythia mountain range and the Kokytos itself attracting smaller or larger mammal and bird game and likewise attracting prehistoric transhumant groups. This highly specialized activity is underlined by the smaller number of sickle elements that are regarded as tokens to agricultural or plant harvesting activity, and are present in a ratio of 2:9 compared to the Neolithic/ Bronze Age arrowheads (six sickle elements versus 27 arrowheads).

The excavated site of Goutsoura (PS 12) is also relevant to this discussion and offers a good example of the hidden prehistoric landscape, glimpses of which only can be

[86] Efstratiou *et al*. 2006; Galanidou and Efstratiou 2014 and references therein.
[87] See Ligkovanlis 2011; Papoulia 2011; Galanidou *et al*., this volume.

found on the surface. In the survey we had some minuscle, badly rolled prehistoric sherds that on first inspection were dated to the end of the Neolithic period or the Early Bronze Age. The excavation of the site revealed an Early Bronze Age settlement, on top of which a Middle to Late Bronze Age cemetery was placed. The site stands out totally from the finds collected during the surface survey in that it has not yielded a single arrowhead. It moreover shows the advantage of incorporating small-scale excavation during surface survey, a strategy that is usually not possible due to the archaeological legislation in Greece.

Conclusion

The study of the lithic finds from the tracts has refined the picture obtained already from the sites, though it has not led to identification of additional sites *sensu stricto*. It has revealed aspects of local archaeology that a 'site-focused' approach is inadequate to identify, for it masks the kind of variation manifested in the tract finds. Grouping individual tract finds into larger concentrations has proved here a viable way to identify broad patterns of human presence at Kokytos and reveal hidden elements of the archaeological landscape. Between the traditional units of archaeological reference, the site and the find, there is indeed much more space for archaeological interpretation. Agreeing upon and acknowledging this is the first step before it is solidified in field protocols and legislation.

The Palaeolithic tract record, despite its small sample size, is different from that recovered from Megalo and Mikro Karvounari. It thus enriches and diversifies the Pleistocene hunter/gatherer archaeology of Thesprotia. This difference must relate to hominin activity at different times of the Pleistocene and at different parts of a landscape with a complex topography and hydrology. Concentrations of Palaeolithic artefacts here typically feature at least one or a combination of elements that attracted Palaeolithic groups: presence of water, commanding views on the landscape, abundant flint. Presence of these should prove particularly useful in future field investigations in the Paramythia highlands and the mountainous transhumance routes and passageways.[88]

A robust signal of the Neolithic period and the Bronze Age, comes from the western flanks of the Paramythia mountain range (Concentration I), as well as from around the Mavromandilia springs close to the Kokytos (Concentration III) (Fig. 1). The excavated Bronze Age site of Goutsoura (PS 12, part of Concentration VI) is in its turn located further to the west, next to a flat marshy plain. The occurrence of different period ceramic and lithic finds under the Bronze Age umbrella, as well as a settlement and a cemetery at Goutsoura, is suggestive of a certain attraction of the Kokytos valley and small-scale change of site location with the passage of time. Taking into account that only Concentration VI had an Early Bronze Age settlement, Goutsoura, the location and character of the settlements of the Neolithic, the Middle and Late Bronze Age tool-using people must await future intrusive research in the field.

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[88] Galanidou 1996; Galanidou 2014b; Green 1997; Ligkovanlis 2014.

Appendix. Find densities and visibility of the tracts walked in 2004 - 2007

An r after a tract number implies that it has been re-walked. All find densities are given as finds/ha, visibility again according to a 4-point scale with I = 80-100%, II = 60-80%, III = 30-60%, IV = 0-30%. Anomalous densities are marked by shaded areas. The sites are dated according to Forsén *et al.* 2011, except for PS 17, PS 18, PS 20 and PS 28 which are dated according to n. 22 and PS 45 according to n. 50 in this chapter, as well as PS 43 which is dated according to Galanidou and Papoulia, this volume.

No. tract	Area in ha.	Density lithics	Density pott+tiles	Vis.	Comments
A 1	1.237	6.47	12.1	I	
A 2	2.262	4.86	6.63	I	Ass. w PS 1 (Mes?).
A 3	0.7552	2.65	3.97	I	
A 4	0.9594	12.50	315.82	I	Part of PS 8 (EMod).
A 5	1.294	6.18	276.66	I	Part of PS 8 (EMod).
A 6	0.8047	1.24	18.64	IV	Ass. w PS 8 (EMod).
A 7	0.5694	24.59	175.62	I	Ass. w PS 8 (EMod).
A 8	0.963	30.11	22.84	I	Ass. w PS 8 (EMod).
A 9	1.075	30.70	155.35	I	Ass. w PS 8 (EMod).
A 10	2.006	17.95	7.98	I	Not far from PS 1 (Mes?).
A 11	0.4748	48.84	4.21	IV	
A 12	1.115	23.32	4.48	II	
A 13	0.9818	25.46	10.19	I	
A 14	0.9818	1.02	2.04	I	
A 15	0.3735	40.16	24.10	I	In between of PS 2 (EMod) and PS 8 (EMod).
A 16	0.4665	36.44	40.73	I	Ass. w PS 2 (EMod).
A 17	0.9621	4.16	5.20	III-IV	
A 18	0.5972	36.84	28.47	I	Part of and ass. w PS 2 (EMod).
A 19	0.5612	26.72	7.13	I	
A 20	0.5117	19.54	5.86	I	
A 21	1.325	13.58	2.26	I	
A 22	0.5378	5.58	1.86	I	
A 23	1.014	8.88	3.94	I	
A 24	0.448	13.39	35.72	I	
A 25	0.6492	24.65	-	IV	
A 26	1.546	7.12	3.23	I	
A 27	1.382	27.50	16.64	I	
A 28	0.5364	41.04	24.23	I	
A 29	0.2558	58.64	27.37	I	
A 30	0.534	11.23	-	II	
A 31	0.4945	4.04	6.46	III	
A 32	0.5697	5.27	5.27	I-II	
A 33	1.472	9.51	4.76	I	
A 34	0.1887	31.80	10.60	IV	
A 35	0.6493	1.54	23.10	III	
A 36	1.63	8.59	1.84	III-IV	
A 37	1.249	11.21	24.82	I	Ass. w PS 4 (MPal-UPal, also some Mes, Neo and BA).
A 38	0.2096	14.31	-	I	Ass. w PS 4 (MPal-UPal, also some Mes, Neo and BA).
A 39	0.9677	81.64	6.20	I	Ass. w PS 4 (MPal-UPal, also some Mes, Neo and BA).
A 40	0.6574	7.61	3.04	I	
A 41	1.441	-	2.08	I	
A 42	1.36	18.38	31.62	I	Ass. w PS 12 (EBA-LBA, also some Neo and EIA).
A 43	1.203	1.66	8.31	I	
A 44	0.3673	13.61	5.45	I	
A 45	0.2822	10.63	240.96	I	Part of and ass. w PS 7 (LR).
A 46	0.3913	-	58.78	I	Ass. w PS 7 (LR).
A 47	0.4345	2.30	-	IV	
A 48	0.3422	5.84	64.29	I	R/LR? Ca. 100 m northwest of PS 7 (LR).
A 49	0.7519	9.31	87.78	I	R/LR? Ca. 100 m northwest of PS 7 (LR). Next to A 49.
A 50	0.6248	-	-	I	
A 51	2.697	0.37	1.11	I-IV	Part of and ass. w PS 3 (Mes).
A 52	0.4932	-	-	I	
A 53	1.735	3.42	1.15	I	
A 54	0.6739	-	-	I	
A 55	0.3184	-	65.95	III	Ca. 200 m northeast of PS 8 (EMod).

No. tract	Area in ha.	Density lithics	Density pott+tiles	Vis.	Comments
A 56	0.4659	-	21.46	III	Ca. 200 m northeast of PS 8 (EMod).
A 57	1.389	-	15.84	III	Ca. 200 m northeast of PS 8 (EMod).
A 58	0.7565	-	-	I-IV	
A 59	0.9148	-	-	I	
A 60	1.79	-	4.47	III-IV	
A 61	0.9766	7.17	3.07	I	
A 62	0.5432	77.32	-	I	Ass. w PS 3. Included also 2 whitish-grey flint nodules, not collected.
A 63	1.029	-	-	IV	
A 64	0.5564	-	21.57	IV	
A 65	0.1783	5.6	11.22	I	
A 66	0.2635	-	15.18	I	
A 67	0.5733	1.74	12.21	I	
A 68	0.6406	9.37	106.15	I	Part of PS 9 (EMod).
A 69	0.3916	-	2.55	I	
A 70	0.6135	-	1.63	III-IV	
A 71	0.5742	3.48	50.51	IV	Ca. 200 west of PS 10.
A 72	1.017	3.93	67.85	IV	Ca. 100 m to the west of and ass. w (?) PS 14 (LR).
A 73	0.3613	5.54	35.98	IV	Ca. 100 m to the west of and ass. w (?) PS 14 (LR).
A 74	0.8093	4.94	1.24	I-III	Ass. w PS 13 (EHl).
A 75	0.9078	1.10	4.41	III	Ass. w PS 13 (EHl).
A 76	1.68	12.50	1.19	I	
A 77	0.248	-	4.03	I	
A 78	1.473	1.36	49.56	II	
A 79	0.3564	-	-	I	
A 80	0.7346	-	9.53	II	
A 81	0.8208	-	115.74	II	Part of and ass. w PS 10 (LR).
A 82	2.273	1.76	3.52	IV	
A 83	2.306	12.58	5.64	III-IV	
A 84	1.21	13.22	147.11	II	Part of and ass. w PS 10 (LR).
A 85	1.205	6.64	9.13	II	Ass. w PS 10 (LR).
A 86	1.724	1.16	5.22	III-IV	
A 87	1.319	3.03	5.35	III	
A 88	0.5616	-	-	I	
A 89	0.4102	-	-	I	
A 90	0.5807	-	12.05	III	
A 91	0.5452	-	1.83	I	
A 92	0.607	-	60.96	I	Just to the south of Rachouli, finds probably originate from the village itself (mostly tile fragments).
A 93	0.4056	-	2.47	I	
A 94	0.3591	-	2.78	I	
A 95	0.5707	1.75	-	II	
A 96	1.62	3.09	5.56	II-III	
A 97	2.282	7.89	3.51	II	
A 97r		10.52	11.39	I	
A 98	1.777	5.06	5.06	II-III	
A 99	1.483	5.39	2.70	II	
A 100	0.6383	4.70	4.70	II	
A 101	1.288	12.42	-	I	
A 102	0.4351	4.6	-	I	
A 103	1.805	7.76	0.55	II	
A 104	1.191	8.40	21.83	III	Part of and ass. w PS 11 (EHl?).
A 105	0.3635	13.75	142.43	I	Ass. w PS 5-6 (LA-ER).
A 106	0.3651	-	-	I	
A 107	0.4711	-	-	I	
A 108	1.27	15.06	-	II-III	
A 109	1.929	22.81	0.52	I	
A 110	0.6887	17.46	1.45	III	
A 111	0.6302	15.87	1.59	III	
A 112	1.91	8.90	1.05	I-II	
A 113	3.102	16.44	-	I	
A 114	0.1341	-	-	II	
A 115	0.4633	-	4.32	II	
A 116	0.2956	6.77	-	I	
A 117	1.085	0.92	0.92	III	
A 118	1.812	-	-	IV	
A 119	1.27	0.79	2.36	III-IV	

No. tract	Area in ha.	Density lithics	Density pott+tiles	Vis.	Comments
A 120	0.6328	4.74	48.99	I	Part of and ass. w PS 14 (LR).
A 121	0.4745	35.83	10.54	II-III	Ass. w PS 5-6 (LA-ER).
A 122	0.9413	5.31	-	III-IV	
A 123	0.6268				Sheet missing. Ass. w PS 14 (LR).
A 124	0.9657				Sheet missing. Part of and ass. w PS 14 (LR).
A 125	1.364				Sheet missing
A 126	0.3706				Sheet missing
A 127	1.397	0.72	1.43	I	Ass. w PS 13 (EHl?).
B 1	2.78	2.16	4.32	I	
B 2	1.263	2.38	2.38	I	
B 3	2.047	1.47	2.44	I	
B 4	2.354	3.40	0.85	I	
B 5	1.243	0.80	-	I	
B 6	2.096	3.34	1.43	I	
B 7	1.953	1.54	0.51	I	
B 8	0.4725	-	-	I	
B 9	1.631	-	-	I	
B 10	0.707	-	267.32	I	Part of PS 27 (LR).
B 11	0.9183	-	13.07	I	
B 12	2.099	0.48	-	II	
B 13	1.866	5.90	3.22	I	
B 14	1.015	2.96	52.22	III	Part of PS 16 (LR).
B 15	0.5516	47.14	94.27	III	Ass. w PS 16 (LR). Also scatter of flints, marked as possible site on tract form, but never treated as site.
B 16	2.289	1.31	3.93	IV	
B 17	0.9813	1.02	4.08	I	
B 18	0.83	2.41	31.32	I	Ass. w PS 27 (LR).
B 19	1.75	2.29	23.43	I	Ass. w E 10 (Med).
B 20	2.691	4.09	1.11	I	
B 21	1.261	5.55	2.38	I	
B 22	1.28	41.40	439.84	II	Part of PS 17 (BA-EIA, some Neo and LC-EHl).
B 23	1.763	34.60	199.09	II	Part of PS 17 (BA-EIA, some Neo and LC-EHl).
B 24	0.6855	58.35	128.37	III	Ass. w PS 17 (BA-EIA, some LC-EHl) and PS 20 (Neo-MBA, some EIA, LC-EHl).
B 25	0.9606	4.16	-	I	
B 26	1.808	47.01	0.55	I-II	Part of PS 18 (Neo to BA, some EIA, LC-Hl). Sample tagged as PS 18.
B 27	0.5483	5.47	218.86	II	Part of PS 19 (R?).
B 28	0.4207	23.76	218.68	III	Ass. w PS 17 (BA-EIA, some Neo and LC-EHl), PS 20 (Neo-MBA, some EIA, LC-EHl) and PS 19 (R?).
B 29	1.011	83.09	15.83	III	Part of PS 20 (Neo-MBA, some EIA, LC-EHl).
B 30	2.251	54.20	3.55	I	
B 31	1.584	29.04	1.26	I	
B 32	1.271	86.55	3.93	I	
B 33	2.129	31.94	1.41	I	
B 34	2.741	27.36	0.73	III	
B 35	1.409	42.58	1.42	I	
B 36	2.212	25.31	4.07	I	
B 37	0.9585	92.85	2.09	I	Part of PS 21 (Neo-MBA).
B 38	1.471	25.15	2.04	III	
B 39	1.88	25.53	-	III	
B 40	1.476	25.07	0.68	I	
B 41	2.85	14.04	0.70	I	
B 42	2.985	7.71	20.77	II	
B 43	3.537	24.03	27.14	I-II	
B 44	0.3358	166.77	128.05	IV	Ass. w PS 20 (Neo-MBA, some EIA, LC-EHl).
B 45	0.4504	-	-	II	
B 46	0.7498	2.67	37.34	III	Ass. w PS 17 (BA-EIA, some Neo and LC-EHl).
B 47	1.262	15.06	3.96	IV	
B 48	1.199	80.90	0.83	II	Ass. w PS 18 (Neo-BA, some EIA, LC-EHl).
B 49	4.657	0.43	33.50	IV	Ass. w PS 25 (EHl, LHl, ER. Also some prehist., EIA, MR, LR).

No. tract	Area in ha.	Density lithics	Density pott+tiles	Vis.	Comments
B 50	4.638	-	24.80	IV	Ass. w PS 25 (EHl, LHl, ER. Also some prehist., EIA, MR, LR). Also ass. w and part of PS 26 (EMod/Mod).
B 51	1.071	-	0.93	IV	
B 52	0.8332	4.80	2.40	III-IV	
B 53	2.952	18.98	6.78	III-IV	
B 54	0.3475	43.17	339.57	III	Part of PS 27 (LR).
B 55	0.9197	16.31	205.50	III-IV	Part of PS 27 (LR).
B 56	2.544	4.72	25.55	IV	Ass. w PS 27 (LR).
B 57	0.1856	48.49	107.76	III	Part of PS 27 (LR).
B 58	0.4786	14.62	33.43	IV	Ass. w PS 27 (LR).
B 59	0.555	124.32	-	II	
B 60	1.276	108.93	26.65	I	Part of PS 28 (Neo-BA). Never finally allowed by farmer to walk as a site.
B 61	2.377	-	-	I	
B 62	0.633	-	-	I	
B 63	0.866	1.15	-	IV	
C 1	2.217	69.01	50.52	I	Part of and ass. w PS 48 (LC-EHl).
C 1r		8.57	92.92	II-III	
C 2	1.207	4.14	69.59	I	Part of and ass. w. PS 30 (LC-EHl).
C 3	1.035	7.13	43.48	I	Ass. w PS 30 and PS 48 (both LC-EHl).
C 4	0.6512	15.36	52.21	I	Ass. w. PS 48 (LC-EHl).
C 5	0.7463	44.22	25.46	II	
C 6	0.72	-	1.39	I	
C 7	1.293	11.60	54.91	II	Part of and ass. w. PS 29 (LC-EHl, also some LA).
C 8	0.9231	105.08	75.83	II	Part of and ass w. PS 29 (LC-EHl, also some LA).
C 9	0.9204	9.78	66.28	II	Ass. w. PS 29 (LC-EHl, also some LA).
C 10	1.421	-	0.70	I-II	
C 11	0.7595	-	1.32	I	
C 12	1.27	11.02	4.72	II	
C 13	0.4519	11.06	-	III	
C 14	0.361	80.33	66.48	II	
C 15	0.8871	6.76	19.16	II	Ass. w. PS 49 (LC-EHl).
C 16	1.101	4.54	10.90	II	
C 17	1.294	68.00	3.09	II	Ass. w E 11, EHl heroon at Marmara!
C 18	0.7742	34.87	-	II	Ass. w E 11, EHl heroon at Marmara!
C 19	1.957	16.86	-	II	
C 20	2.753	13.44	0.36	II	
C 21	2.842	0.70	26.39	II	Part of and ass. w PS 31 (C, also some EIA, A and Hl) and PS 36 (EIA-Hl).
C 22	3.578	8.94	0.56	II	
C 23	1.631	7.36	-	II	
C 24	1.204	39.87	55.65	II	Ass. w PS 35 (LC-EHl, also some LHl and R) and PS 36 (EIA-Hl). Includes dump from Ephorate excavation at PS 36.
C 25	1.984	20.16	73.08	I	Ass. w PS 46
C 26	0.7882	25.37	58.36	III	Ass. w PS 35 (LC-Ehl, also some LHl and R) and PS 36 (EIA-Hl).
C 27	1.604			I	No finds were counted
C 28	1.87	35.83	41.71	I	Ass. w E 24 (unclear date).
C 28r		17.65	16.58	II	Ass. w E 24 (unclear date).
C 29	0.7263	9.64	68.84	I	Ass. w E 24 (unclear date).
C 30	1.056	10.42	12.31	I	Ass. w E 24 (unclear date).
C 31	0.917	14.42	295.53	I	Part of PS 32 (MR-LR, also some Hl, ER).
C 32	0.8807	13.63	30.65	III	Ass. w PS 32 (MR-LR, also some Hl, ER).
C 33	2.51	34.66	43.82	II	Part of and ass. w PS 33 (R/LR?).
C 34	1.366	5.12	45.39	II	Ass. w PS 32 (MR-LR, also some Hl, ER),
C 35	1.176	3.40	105.44	II	PS 39 (LR) and E 23 (LR?).
C 36	2.043	4.89	9.79	II	Part of and ass. w PS 44 (LC-EHl).
C 37	1.664	0.60	22.24	I	Ass. w PS 31 (C, also some EIA, A and Hl) and E 9 (LHl-ER).
C 37r		-	61.30	nr	Ass. w PS 31 (C, also some EIA, A and Hl) and E 9 (LHl-ER).
C 38	0.3465	11.54	883.12	III-IV	Ass. w E 9 (LHl-ER).
C 39	0.6482	1.54	240.67	III-IV	Part of and ass. w PS 36 (EIA-Hl).
C 40	0.609	4.93	149.43	III	
C 41	1.185	93.67	32.07	III	
C 42	0.3879	7.73	-	III	

No. tract	Area in ha.	Density lithics	Density pott+tiles	Vis.	Comments
C 43	1.369	2.92	51.86	III-IV	Ass. w PS 32 (MR-LR, also some Hl, ER).
C 44	1.05	38.10	23.81	II-III	
D 1	1.349	174.20	94.14	II	Ass. w PS 37 (LC-EHl).
D 2	1.064	47.93	49.18	II	Part of and ass. w PS 37 (LC-EHl)-
D 3	0.924	17.30	30.28	II	
D 4	0.663	15.08	19.61	II	
D 5	2.52	17.85	91.67	II	Part of and ass. w PS 38 (LR, also some Hl, ER).
D 6	1.518	11.20	94.86	II	Part of and ass. w PS 39 (LR).
D 7	1.629	47.27	391.04	II	Part of PS 46 (LC-Hl, also some BA, LBA, EIA).
D 8	1.772	24.27	34.99	II	Ass. w PS 46 (LC-EHl, also some BA, LBA, EIA).
D 9	1.247	32.88	52.93	II	Ass. w PS 37 (LC-EHl).
D 10	1.568	13.39	28.06	II	
D 11	2.526	9.11	26.52	II	Part of and ass. w PS 40 (R?).
D 12	1.527	7.20	294.04	II	Part of and ass. w PS 41 (MR-LR, also Hl, ER).
D 13	3.247	19.09	199.88	III	Part of and ass. w PS 41 (MR-LR, also Hl, ER).
D 14	2.357	4.67	34.36	I	Ass. w PS 41 (MR-LR, also Hl, ER).
D 15	1.541	5.19	56.46	II	Ass. w PS 37 (LC-EHl) and PS 40 (R?).
D 16	2.197	2.73	117.43	III-IV	Ass. w PS 40 (R?). Could be part of site, no clear borders though.
D 16r		0.46	45.51	II	
D 17	1.355	-	3.69	II	
D 18	2.454	1.63	19.56	II	
D 19	3.32	1.51	20.78	II	
D 20	0.2775	-	3.60	I	
D 21	1.595	1.88	11.91	II	
D 22	2.527	6.33	15.43	II	Part of PS 43 (Mes/ENeo, also some MPal).
D 23	1.778	10.69	18.00	I	
D 24	0.8679	48.39	19.59	II	
D 25	1.68	27.38	158.33	II	Part of and ass. w PS 46 (LC-EHl, also some BA, LBA, EIA).
D 26	1.75	42.85	227.98	II	Part of PS 35 (LC-EHl, also some LHl and R).
D 27	0.9095	38.48	336.44	II-III	Part of PS 44 (LC-EHl).
D 28	1.314	38.05	37.29	II	Part of and ass. w PS 43 (Mes/ENeo, also some MPal).
D 29	0.5572	35.89	17.95	II	
D 30	2.328	20.62	9.88	II	
D 31	1.123	-	8.01	II	
D 32	1.99	1.00	15.08	II	
D 33	1.969	47.74	3.05	II	Part of PS 45 (Neo, also some UPal).
D 34	0.7767	99.14	3.86	II	Part of PS 45 (Neo, also some UPal).
D 35	0.708	96.05	9.89	II	Part of PS 45 (Neo, also some UPal).
D 36	1.652	4.84	16.34	II	Part of PS 45 (Neo, also some UPal).
D 37	0.9759	-	-	II	Part of PS 45 (Neo, also some UPal).
D 38	2.4	48.75	4.17	II	Part of PS 45 (Neo, also some UPal).
D 39	0.4732	65.51	6.34	II	Part of PS 45 (Neo, also some UPal).
D 40	0.316	60.12	-	II	Part of PS 45 (Neo, also some UPal).
D 41	2.831	31.08	7.42	II	Part of PS 45 (Neo, also some UPal).
D 42	1.167	27.42	4.28	II	Part of PS 45 (Neo, also some UPal).
D 43	1.517	3.30	11.21	II	
D 44	1.323	10.58	4.54	III	
D 45	0.8807	2.27	-	I	
D 46	0.3714	16.15	-	II	
D 47	0.7592	-	1.32	I	
D 48	0.4579	-	-	I	
D 49	0.535	-	3.74	III-IV	
D 50	0.6578	10.64	7.60	II-III	
D 51	3.863	2.59	-	II	
D 52	0.8063	-	-	I	
D 53	0.7025	1.42	-	I	
D 54	0.8158	12.26	1.23	I	
D 55	1.975	0.51	5.57	II	
D 56	1.082	12.01	21.26	I	
D 57	0.6981	-	-	I	
D 58	0.6682	2.99	34.42	I	

No. tract	Area in ha.	Density lithics	Density pott+tiles	Vis.	Comments
D 59	1.223	0.82	17.17	I	
D 60	1.015	-	8.87	I	
D 61	1.266	116.90	9.48	II	Part of PS 45 (Neo, also some UPal).
D 62	3.428	2.63	11.67	I	
D 63	0.8994	6.67	36.69	I	
D 64	0.7156	11.18	90.83	I	Part of and ass. w PS 47 (EMod or Mod).
D 65	1.312	1.52	0.76	I	
D 66	1.57	1.27	-	I	
D 67	1.383	-	-	I	
D 68	0.6074	4.94	1.65	I	
D 69	0.7741	20.67	-	I	
D 70	1.523	1.31	280.37	II	Part of and ass. w PS 10 (LR).
D 71	0.316	-	-	I	
D 72	2.212	0.45	15.37	I	
D 73	1.034	15.47	4.84	II	
D 74	0.5646	285.16	5.31	II	Ass. w PS 17 (BA-EIA, also some Neo and LC-EHl) and PS 20 (Neo-MBA, also some EIA, LC-EHl).
D 75	0.6612	-	240.47	II-III	Part of and ass. w PS 49 (LC-EHl).
D 76	0.6522	16.87	96.60	I	Ass. w PS 49 (LC-EHl).
D 77	1.977	1.01	102.18	II	Ass. w E 9 (LHl-ER).
D 78	1.261	-	348.93	II	Part of PS 46 (LC-EHl, also some BA, LBA, EIA).
D 78r		-	149.09	II	
D 79	0.7685	-	191.28	I	Part of and ass. w PS 44 (LC-EHl).
D 80	3.519	72.18	3.13	III	Part of PS 43 (Mes/ENeo, also some MPal).
D 81	6.245	5.12	0.65	III	
D 82	0.9956	4.02	-	III	
E 1	1.118	49.19	36.67	I	
E 2	0.388	10.31	5.15	III	

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PS 43: A Multi-period Stone Age Site on the Kokytos Valley Bottom

Nena Galanidou and Christina Papoulia

In the middle of the Kokytos valley bottom at an altitude of 106-108 masl lies PS 43, a site remarkably rich in knapped-stone artefacts but devoid of any pottery, built structures or organic remains.[1] It extends over a flat area of 200 by 100 m on a low rising fluvial hill on the southeast bank of a ravine which collects water from the Paramythia mountain range, flows close to Prodromi towards the southwest and joins the Kokytos at the western edge of the valley. The site is located on a ridge in the valley and commands views over the gently sloping lands to the south and the lower reaches of the ravine to the northwest (Figs. 1-2). The sediments of the site are mainly alluvial deposits, brown relatively loose ploughed earth, with a small quantity of stone, comprising mainly flint, knapped and unknapped. Small and medium-size river-rolled flint pebbles are also widely available in the ravine banks.

PS 43 was discovered in April 2007, immediately after tilling a corn-field, at a time of the year when visibility was excellent (Figs. 3-4). Corn crops are cultivated in these fields annually, bringing continually on the surface an ever-increasing number of lithic artefacts. Further exploration of the site's geographical extension took place in June the same year. PS 43 extends in three fields explored as tracts D 20, D 28 and D 80.[2] During both field seasons artefacts were recovered as grab samples using a random sampling technique. When the site was re-visited during the summer of 2008 the crops were fully grown, yet archaeological visibility was still high in the open patches of soil amongst them. During work in the field PS 43 was considered a site. Evaluation and analysis of the neighbouring tract data at a later stage suggest that PS 43 is part of a larger find concentration, Concentration III, located at the westernmost edge of the valley bottom. This is an area where fresh water coming from the numerous local springs abounds.[3]

In this chapter we examine the technological and morphological attributes of the PS 43 archaeological assemblage in an attempt to shed light on the nature and date of human activity that took place at the site. The surface material is considered within a wider context drawing comparisons from sites in Greece and the Balkans. Based on a small number of diagnostic specimens, three components are identified: a Middle Palaeolithic, a terminal Upper Paleolithic/Mesolithic and a Neolithic. We also report on the results of luminescence dating conducted on sediments deriving from the site's upper stratum. The two lines of evidence show that the PS 43 lithic finds are

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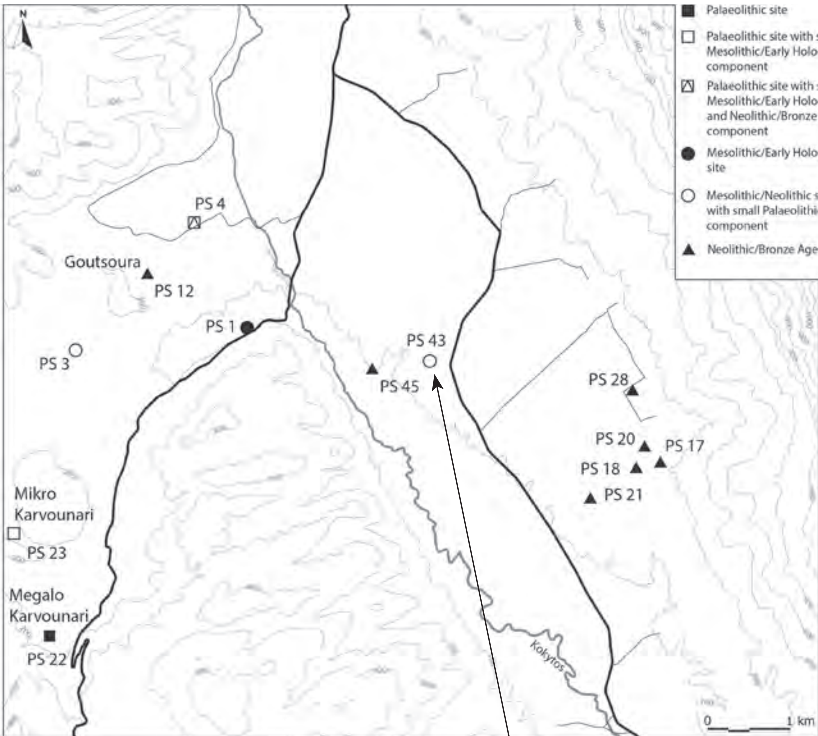
[1] We are grateful to Björn Forsén, Giorgos Hourmouziadis, Catherine Perlès and Curtis Runnels for their help. We also thank Yannis Bassiakos and Constantinos Athanassas for conducting in-situ radiometric measurements, soil-sampling and running the OSL analysis at the DEMOKRITOS laboratory of Luminescence Dating. The pencil drawings of the lithics were made by Christina Papoulia and inked by Nikoletta Dolia. Figs. 1-2 were drawn by Esko Tikkala, whereas Fig. 3 was taken by Mikko Suha and Fig. 4 by Nena Galanidou.

[2] Forsén *et al.* 2001, 90-91.

[3] Forsén *et al.*, this volume.



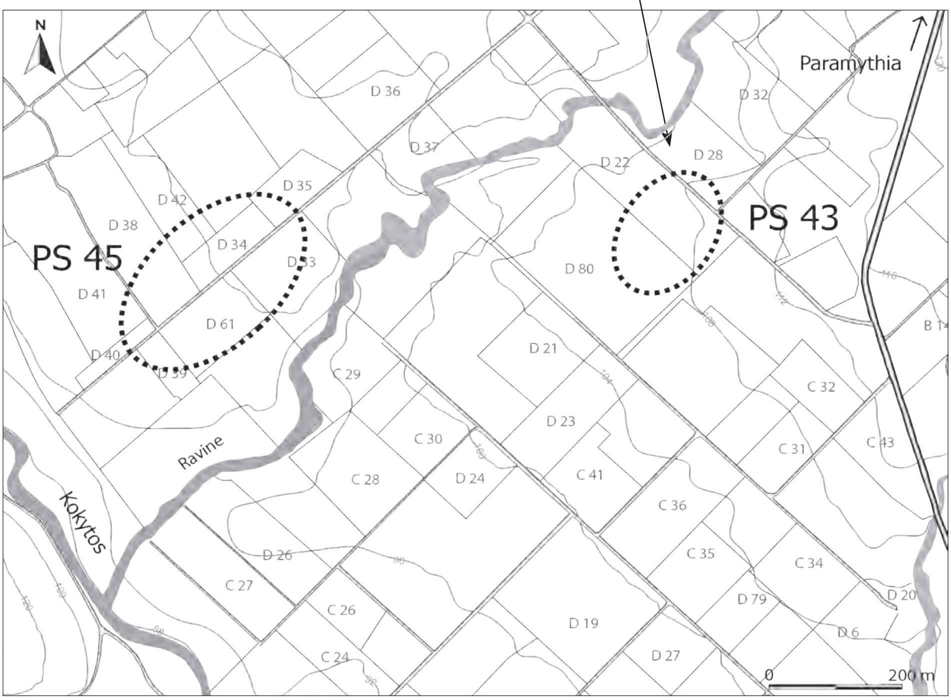


Fig. 1 (above). Location of prehistoric sites in the Kokytos valley.
Fig. 2 (below). Location of prehistoric sites PS 43 and PS 45 in relation to walked tracts.

Fig. 3. Tract D 22 in April 2007, looking northwest towards the ravine which is located below the tree line.

associated with time-averaged deposits.[4] In other words we are dealing with a site where the "palimpsest effect" of multiple superimposed events of artefact deposition at different periods and perhaps through different processes, anthropogenic and natural, is present. We close by discussing the degree to which surface lithics assemblages from sites of this sort may contribute to a Thesprotian prehistory narrative.

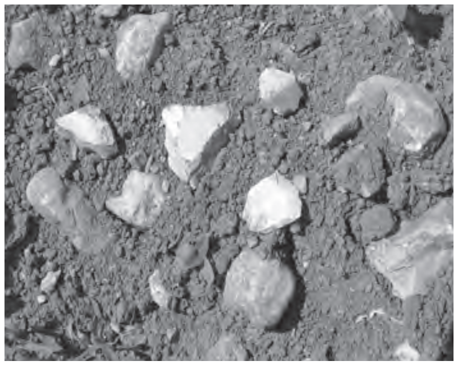


Fig. 4. Lithic artefacts in the ploughed field.

The Middle Palaeolithic component

Of the 616 knapped-stone artefacts collected from PS 43, a group of 108 objects has Middle Palaeolithic affinities. A flake-dominated assemblage, it comprises, amongst others, two cores and 18 tools. The tools are five Levallois points, one pseudo-Levallois point, three scrapers, two denticulates, two piercers, and five flakes with discontinuous, very brief retouch and/or use scars (Fig. 5).[5] The finds exhibit high degrees of patination, are on average of larger size compared to the rest and are typologically and technologically different from those classified in the Holocene group. The very location of PS 43 at the bottom of the valley and the edge damage present on a good number of these early artefacts suggest finds recovered in secondary deposition.[6]

[4] Bailey and Galanidou 2009; Holdaway and Wandsnider 2008.

[5] See also Forsén *et al.* 2011, 90. A comprehensive presentation of this component will be the subject of a separate study.

[6] The recovery of Palaeolithic finds from the bottom of the Kokytos valley is discussed further in Forsén *et al.*, this volume.

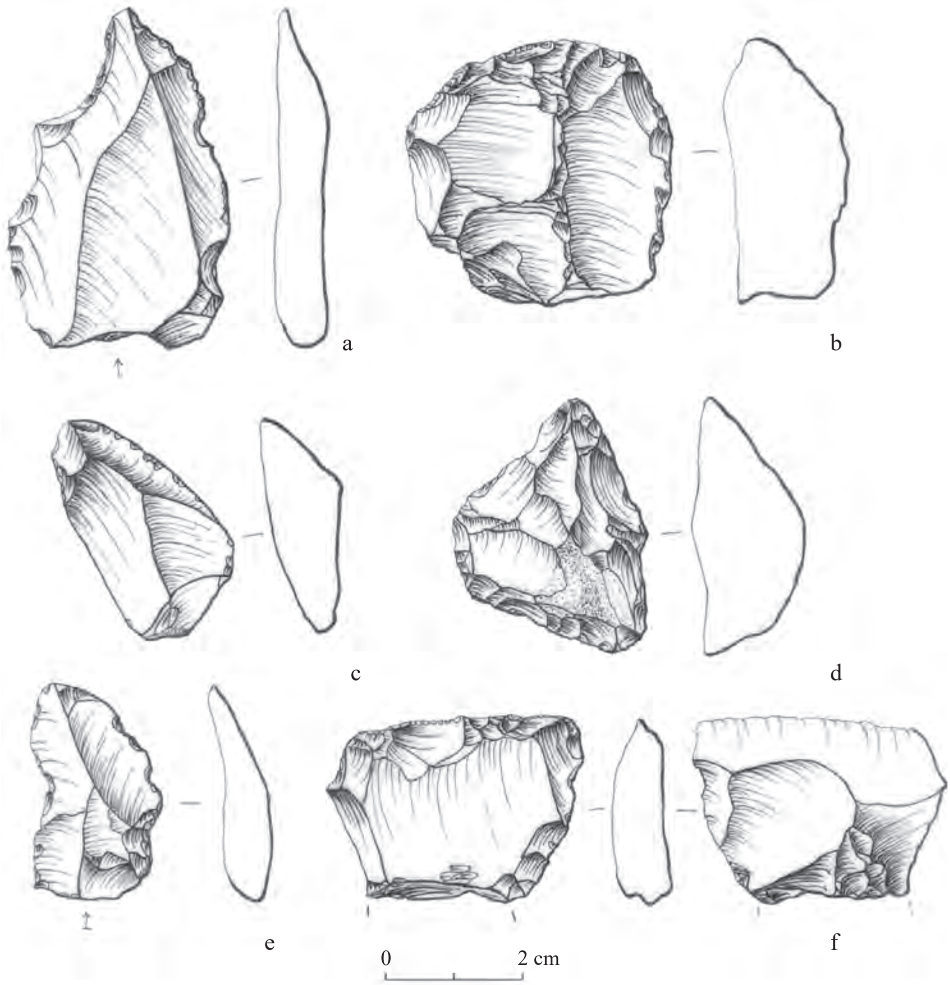


Fig. 5. Middle Palaeolithic tools: retouched Levallois point (a), scrapers (b, d and f), flakes with discontinuous, very short retouch and/or use scars (c and e).

The terminal Upper Pleistocene – Holocene component

The 508 artefacts of this group are distinguished from the Middle Palaeolithic component on the grounds of raw material preservation, size, tool morphology and technology of production. This distinction, notwithstanding, the group contained a small number of diagnostic tools associated with two major industrial traditions of the west Balkans: late Upper Palaeolithic – Mesolithic and Neolithic. A large number of artefacts, especially medium size flakes with no diagnostic features on the dorsal face or striking platform, could be dated to any period of the final Pleistocene or the Holocene (prehistoric and historic alike) and in fact may derive from more than one. Unretouched blanks make up a little less than a half of this group (46.9%), followed by retouched pieces that comprise 36.8%, cores (6.5%), chips (3.7%), debris (2.2%) and two crested blades (0.4%) (Fig. 6). The blade/bladelet to flake ratio is approximately 1:10.

Raw material economy and preservation

Small water-rolled pebbles of grey (light and dark), beige, brown, reddish-brown and off-white, usually fine-grained and occasionally medium-grained flint with chalky cortex were the raw materials used to manufacture the artefacts (Fig. 7). Their small size and surface condition suggest that they were collected from the banks and the beds of the streams in the site vicinity. The same lithology is encountered at all other prehistoric sites[8] and the majority of the tracts walked by the Thesprotia Expedition.[9]

Beyond these raw material categories, a wide variety of colour is seen in the assemblage as a result of surface alteration. 'Patina' is present on the majority (73.62%) of the artefacts (Fig. 8). Four different degrees of alteration have been recorded to denote: no patina (0), early stage of patination, when the original colour is still clearly visible and patina is in the form of a few barely visible dots (1), medium stage of patination, when the original colour has changed but is still close to the initial one (2), and advanced stage of patination with complete alteration of the original colour (3). This alteration effect relates to each specimen's taphonomic history or exposure to weathering and is very common for lithic finds collected by the Thesprotia Expedition. It has often been used as a 'rule of thumb', pointing to a relative chronology of finds. In most cases the more heavily patinated specimens identified proved on technological and typological grounds to be of older date too.[10]

In PS 43 only a quarter of the artefacts has no signs of patina, irrespective of the size or technology of production. When compared with PS 3, the Holocene site of the Kokytos valley whose majority of finds is attributed to the Mesolithic, a different pattern emerges, since only 7.3% of the artefacts were patinated and attributed by Tourloukis and Palli[11] to an earlier component. On the other hand, at the twin *terra rosa* sites of the Kokytos valley, Mikro Karvounari and Megalo Karvounari, the majority of the artefacts are heavily patinated and derive from the Pleistocene

Inventory	n	%
Cores	33	6.5
Flakes	193	38
Laminar flakes	24	4.7
Blades	14	2.8
Bladelets	7	1.4
Crested blades	2	0.4
Tools	187	36.8
Chips	19	3.7
Debris	11	2.2
Other[7]	18	3.5
Total	508	100

Fig. 6. PS 43 terminal Upper Pleistocene-Holocene lithic assemblage composition: Frequency and percentage.

Raw material colour type	n	%
Beige	2	6
Beige/grey	4	12
Brown	1	3
Brown fine-grained	2	6
Brown/beige	1	3
Dark grey	5	15
Grey	10	30
Light grey	4	12
Off-white	1	3
Indeterminate	3	9
Total	33	100

Fig. 7. Raw material composition: Frequency and percentage calculated on cores.

Patina	n	%
0	133	26.18
1	125	24.61
2	117	23.03
3	132	25.98
Indeterminate	1	0.20
Total	508	100

Fig. 8. Degrees of patina on the artefacts of PS 43: Frequency and percentage.

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7 Other = indeterminate pieces and burnt debris.

8 Galanidou *et al.*, this volume; Ligkovanlis 2011; Papoulia 2011; Tourloukis and Palli 2009.

9 Forsén *et al.*, this volume.

10 See Tourloukis and Palli 2009; Ligkovanlis 2011; Papoulia 2011.

11 Tourloukis and Palli 2009.

(Middle Palaeolithic), while a smaller number derive from the Holocene. Significantly, at Mikro Karvounari (PS 23), 16.77% of the artefacts have been attributed to the late Upper Palaeolithic and/or the Mesolithic.[12] A similar pattern emerges from Megalo Karvounari (PS 22).[13]

In addition to flint pebbles which were the main lithic source for blank production, debitage and cores discarded during early uses of the site offered to subsequent occupants an immediately accessible source of raw material or blanks. 9% (n=17) of the tools display short, irregular and often opportunistic retouch on patinated blanks and belong to an expedient organization of technology.[14] They are the following types: truncation (n=2), denticulate (n=2), notch (n=2), linear retouch (n=6) and irregular retouch (n=5). Two flake cores, whose last removals were made after the patination process had begun, bear additional evidence of a re-use practice. Judging from the wide availability of rocks suitable for knapping, this was not dictated by raw material shortage. Occasional re-cycling is also seen in the lithics originating from the Kokytos tracts, Mikro Karvounari and the Eleftherochori 1, 3 and 7 sites.[15] C. Levi-Strauss' concept of *bricoleur*[16] provides a conceptual frame to consider this practice.

Lithic reduction sequences

All 33 cores are small, having maximum dimensions 36.8x40.24x31.59 mm (Fig. 9). The majority was manufactured on very small pebbles, as their preserved chalky (48%) or thick skin (9%) cortex implies (Fig. 10). Flake cores by far predominate the assemblage

Cores (n=33)	length	width	thickness
Min	16	18.52	11.09
Median	26.12	28.71	22.08
Max	36.8	40.24	31.59

Fig. 9. Dimensions of PS 43 cores (measurements in mm).

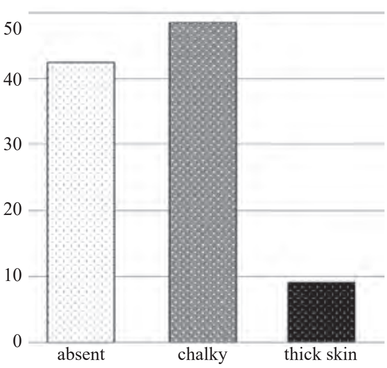

Fig. 10. Column chart with the percentages of the cortex types on the cores.

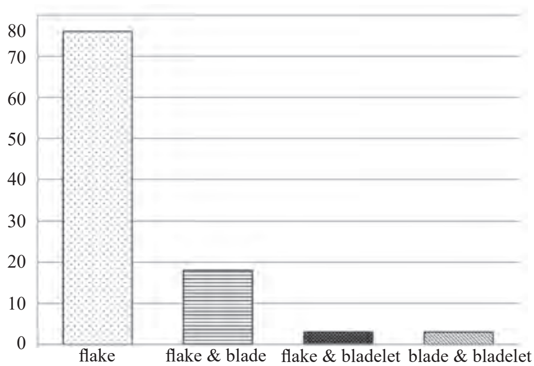

Fig. 11. Column chart with the percentages of the different core types classified by the negative scars on them.

12 Papoulia 2011.
13 Ligkovanlis 2011.
14 See Binford 1979; Binford 1980 for a discussion of curated and expedient technologies.
15 Forsén *et al.*, this volume; Ligkovanlis 2014; Papoulia 2011; Palli and Papadea 2004; Riginos 1998; Papadea pers. comm.
16 Lévi-Strauss 1962; Bailey and Galanidou 2009; Brody 1981.

(n=25, 76%), yet there are also a number of cores that produced both flakes and bladelets (n=6, 18%), one flake and blade core and one blade and bladelet core (Fig. 11). Cores comprise 5.5% of the total artefacts from Concentration III, the 3.2% of which belongs to PS 43.[17]

Core types include sub-conical (n=4), prismatic (n=4) and a discoid example with unifacial centripetal removals. In particular, the three sub-conical cores have produced flakes (e.g. Figs. 12a-b) and the fourth one both blades and bladelets (Fig. 13c). Of the four prismatic cores, one is a flake and bladelet core with a single prepared platform and four directions of removal, two of which are orthogonal. The other three are flake cores with two prepared platforms and multiple directions of removals (Figs. 13d-f). A small, exhausted disc core (24.56x26.10x11.09 mm) with four directions of removals has been manufactured on a core tablet (Fig. 13g). There are two more exhausted cores, one of which is made on a thick flake with opposed directions of removals and was probably transformed into a tool by means of informal retouch before it was abandoned (21.20x18.52x15.79 mm). The second one is the smallest core in the assemblage (19.32x22.05x22.15 mm); it has one prepared platform and three directions of removals, two of which are orthogonal. The latter was probably abandoned due to a natural inclusion of the raw material that did not allow any further removals.

Almost half of the cores (n=16) are amorphous, having multiple striking platforms. The majority (n=10) has either one or two prepared striking platforms (e.g.

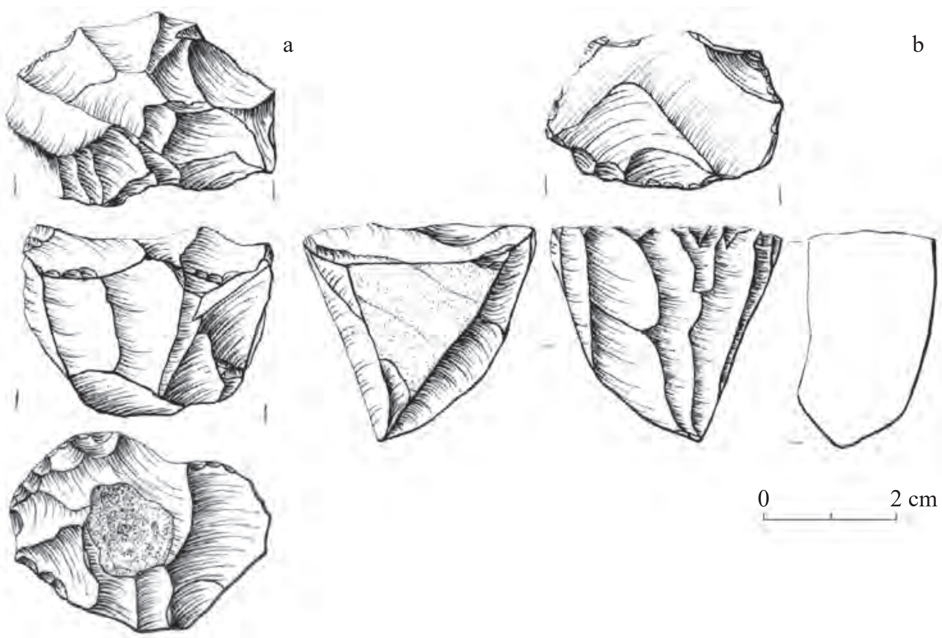

Fig. 12. PS 43 cores (a-b).

[17] Forsén *et al.*, this volume, Fig. 18.

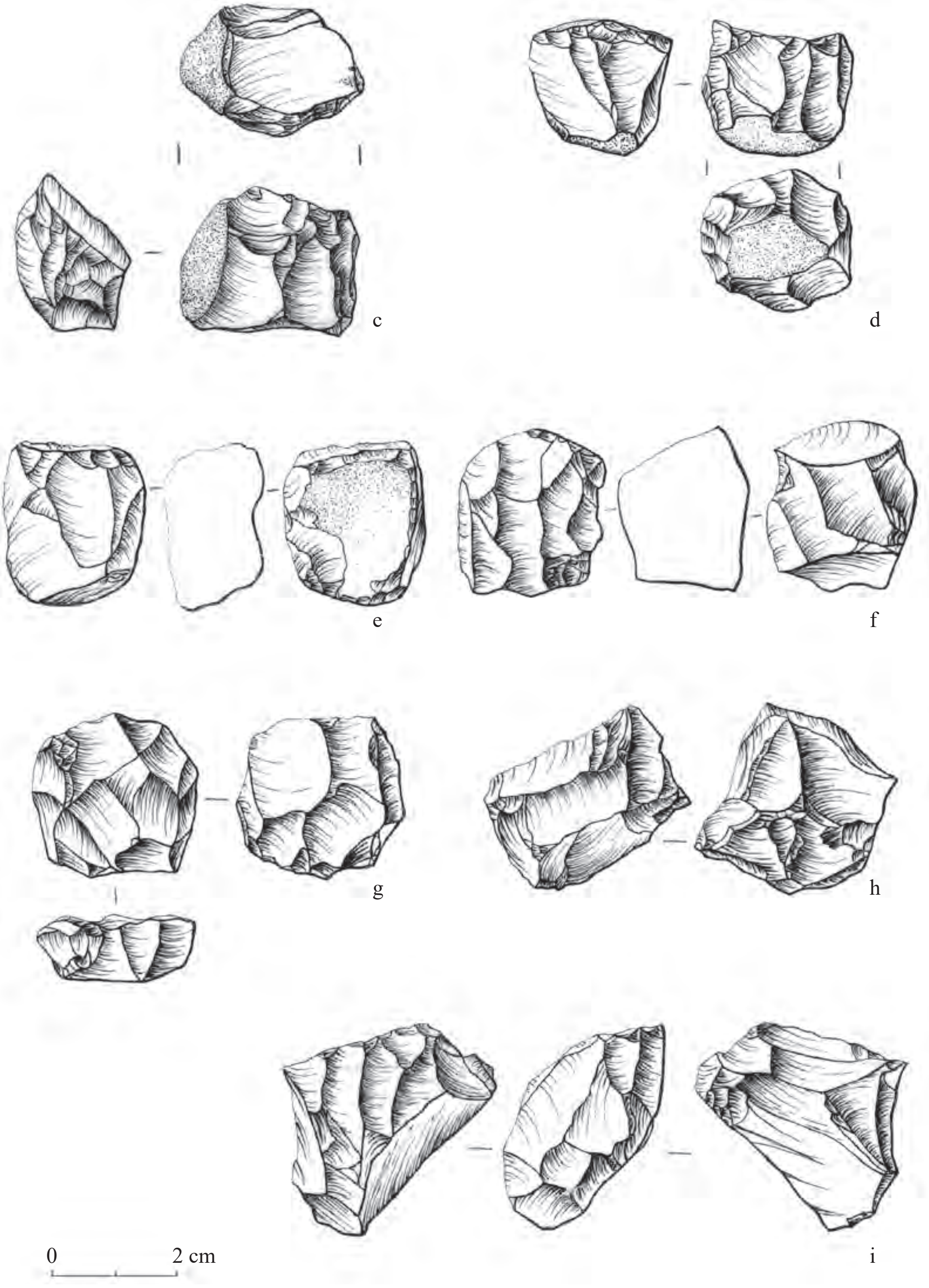

Fig. 13. PS 43 cores (c-i).

Fig. 13i), while five of the amorphous cores have multiple directions of removals but no signs of platform preparation (e.g. Fig. 13h). There is also a core fragment.

Four of the cores, were probably further retouched by means of abrupt retouch to be used as thick scrapers (Figs. 14a-c). All core-tools have been manufactured on thick flakes produced by the splitting of extremely small pebbles. The original size of the pebbles in two of these examples can be inferred by the preservation of their cortex (Figs. 14a-b).

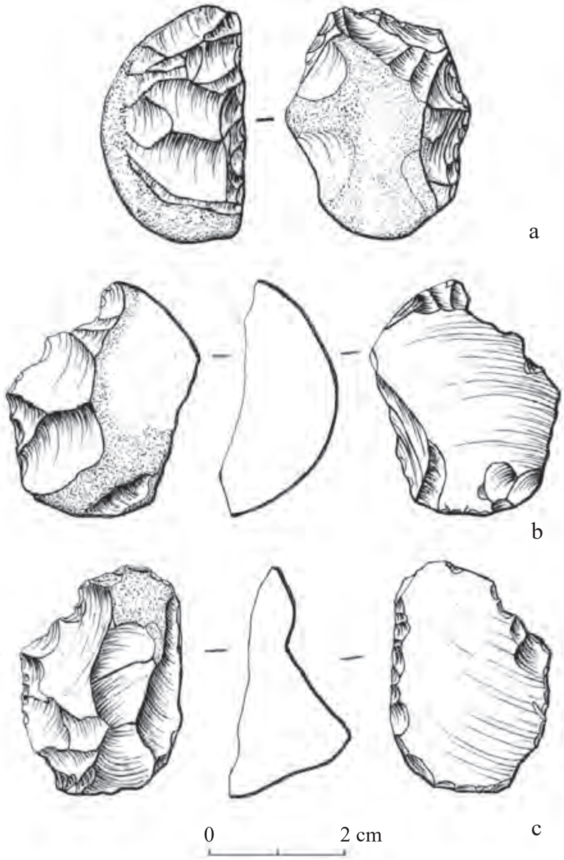

Fig. 14. Thick scrapers made on cores (a) or flake-cores (b-c).

The cores offer information for a variety of flaking methods, elaborate and simple. This ought to be attributed to the different technological traditions present and raw material management strategies employed by different groups merged together by time and archaeologically visible as a single entity, the core group. In many instances after cortex removal and the initial stages of shaping the flint nodule, the knapper proceeded to the preparation of a striking platform to facilitate the production of blanks. In other instances no attention was paid to angle or platform preparation and removal was largely ‘opportunistic’. Overall, the core group is poorly diagnostic in terms of temporal classification.

The debitage is of similar poor diagnostic potential. It consists of flakes, which by far outnumber (38%) the rest, laminar flakes (4.7%), blades (2.8%) and bladelets (1.4%).[18] Two technical pieces, i.e. crested blades, complete the unretouched artefact group. These are also small in size, with a median length of less than 30, median width of less than 20 and median thickness of less than 6 mm (Fig. 15).

The predominant type of striking platform (butt) present on both unretouched and retouched artefacts is flat (34%), followed by dihedral (6.6%) and winged (6.3%). Cortical, linear, retouched, spur, pointed and punctiform are other types of

[18] Percentages are calculated on the total number of specimens in this group (n=508). Bladelets in this industry are defined as the elongated specimens whose length is twice as much as its width, and the latter is smaller than 11 mm.

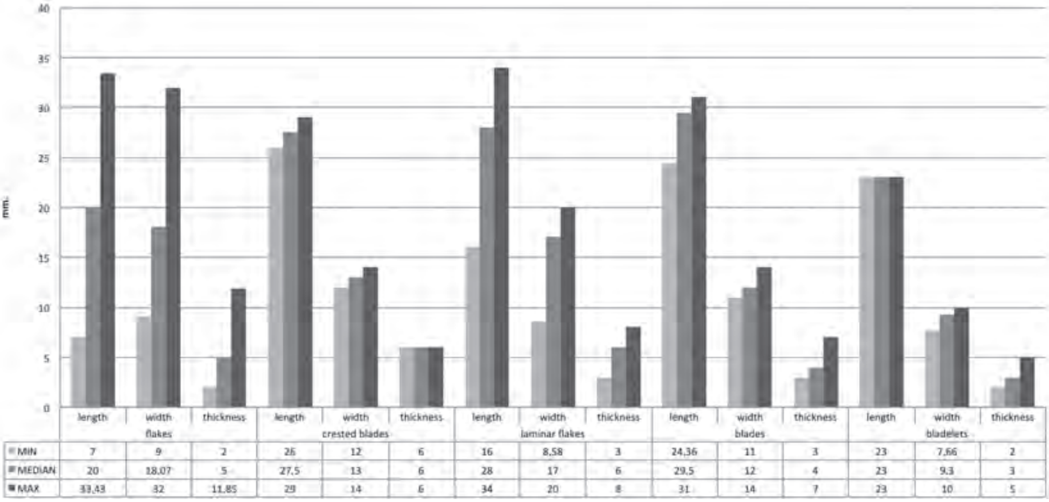

Fig. 15. The dimensions of the PS 43 debitage and the two technical pieces. Measurements of the debitage (i.e. 92 flakes and 17 laminar flakes) and the two crested blades are taken only on whole artefacts. Measurements of the blades and bladelets have been taken for the whole artefacts (i.e. four blades and one bladelet), while width and thickness has also been measured for the longitudinally broken specimens (i.e. eight blades and six bladelets).

Butt types	Blades		Bladelets		Laminar flakes		Flakes		Crested blades		Tools		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Broken	8	57	6	86	3	13	61	32	0	0	63	34	141	33.0
Cortical	2	14	0	0	2	8	5	3	0	0	16	9	25	5.9
Dihedral	0	0	0	0	3	13	14	7	0	0	11	6	28	6.6
Flat	4	28	1	14	9	38	78	40	1	50	53	28	146	34.2
Linear	0	0	0	0	1	4	5	3	0	0	12	6	18	4.2
Winged	0	0	0	0	3	13	17	9	0	0	7	4	27	6.3
Spur	0	0	0	0	0	0	2	1	0	0	2	1	4	0.9
Pointed	0	0	0	0	0	0	2	1	0	0	0	0	2	0.5
Punctiform	0	0	0	0	0	0	0	0	0	0	1	1	1	0.2
Retouched	0	0	0	0	0	0	0	0	0	0	6	3	6	1.4
Indeterminate	0	0	0	0	3	13	9	5	1	50	16	9	29	6.8
Total	14	100	7	100	24	100	193	100	2	100	187	100	427	100

Fig. 16. Striking platform types on unretouched and retouched blanks.

butts encountered on a few artefacts, mainly flakes and retouched blanks (Fig. 16). A significant number is, however, broken (33%).

Tool variation and morphology

The vast majority of tools have irregular or linear and short retouch that rarely extends along the entire edge of a blank. It is more of an expedient character than a curated one:[19] a kind of ad-hoc response to the need for a working edge for immediate use and discard. With the exception of burins, scrapers and transverse arrowheads, the retouch

[19] *Sensu* Binford 1979.

does not result in formal morphologies or 'tool types'. This observation is in tune with a reduction sequence that shows little investment in preparation and managing the raw material volume and the core. Technical pieces, such as platform rejuvenation flakes or core tablets, are not present whereas there are only two crested pieces. The small size of the original blanks may of course account in part for this.

The tool inventory consists of scrapers (8%), notches (12%), denticulates (6%), perforators (5%), burins (3%), truncations (4%), splintered pieces (3%), one backed flake (1%), a trapeze (1%) and two non-geometric microliths (1%). Of special interest are the transverse arrowheads that comprise the 3% of the total retouched tool types. The majority of the retouched artefacts are informal tools made by means of irregular (14%), linear (37%) or very short (nibbling) (2%) retouch (Fig. 17). It is worth noting that no sickle element was recovered from the site though they are present in other contexts in the Kokytos valley.[20] Concentration III, part of which is PS 43, is likewise characterised by a total absence of sickles. Yet concentration III totally lacks arrowheads, which are a distinctive entity in the PS 43 toolkit.

Tools	n	%
Burin	6	3
Denticulate	11	6
Notch	22	12
Transverse arrowhead	5	3
Truncation	8	4
Trapeze	1	1
Backed flake	1	1
Perforator	9	5
Endscraper	12	6
Sidescraper	4	2
Nibbling retouch	4	2
Irregular retouch	27	14
Linear retouch	70	37
Splintered piece	5	3
Non-geometric microlith	2	1
Total	187	100

Fig. 17. PS 43 late component tool repertoire. Percentages are calculated out of the total number of tools that belong to the later component of the site.

Notches (n=22) and *denticulates* (n=11) are produced on small and medium size flakes or broken blades (Figs. 18-19).

Burins (n=6) are made on large flakes, and are thick and rectangular in shape. They are either truncation burins (Figs. 19a, c) or burins on breakage (Figs. 20b, e),

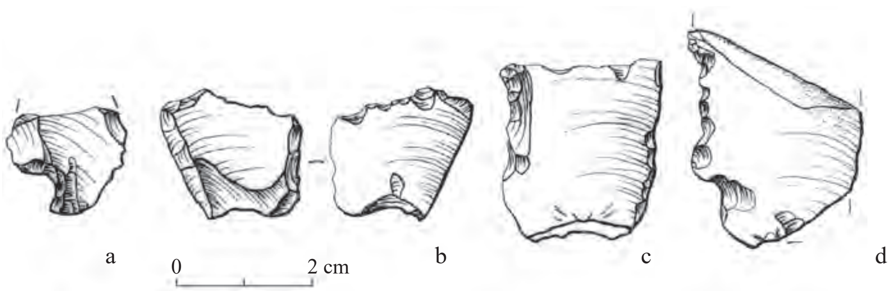

Fig. 18. Notch (a) and denticulates (b-d).

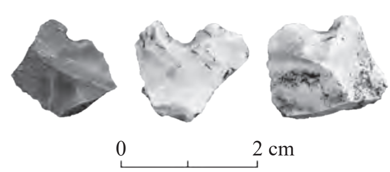

Fig. 19. Notches.

20 Forsén *et al.*, this volume, Figs. 10l-m and 11a-b; Doulkeridou, this volume, Figs. 12b, d and 14g.

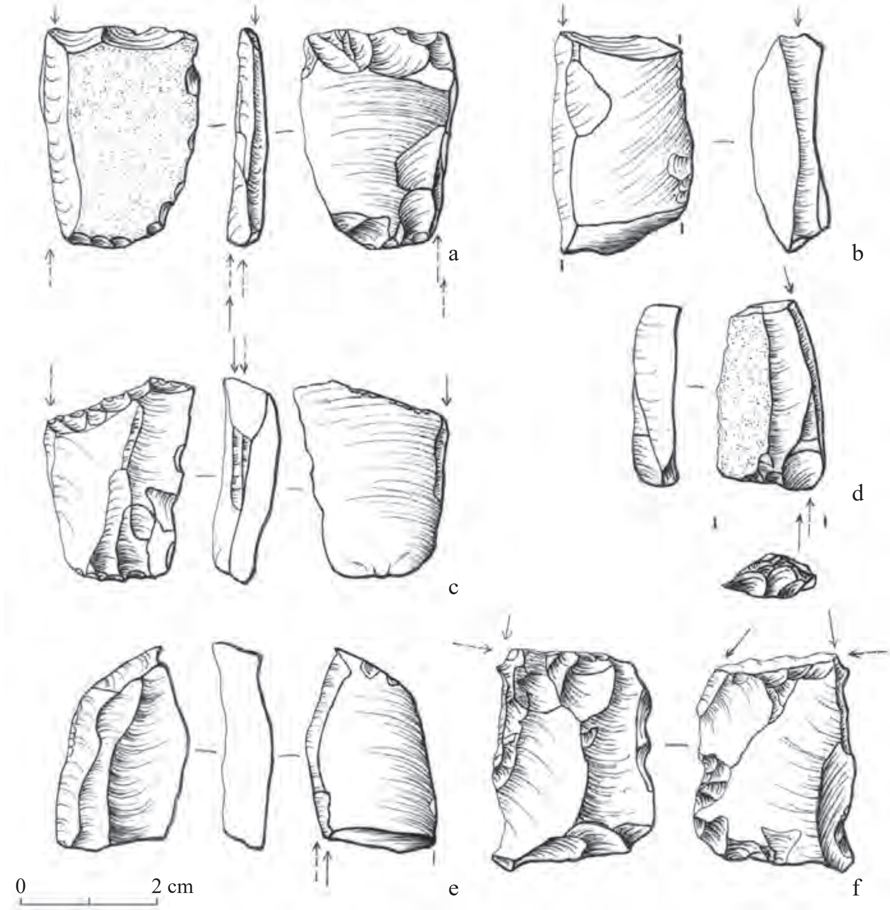

Fig. 20. Burins: truncation burins (a and c), burins on breakage (b and e), double burins on breakage and retouched surface (d) and on a burin facet (f).

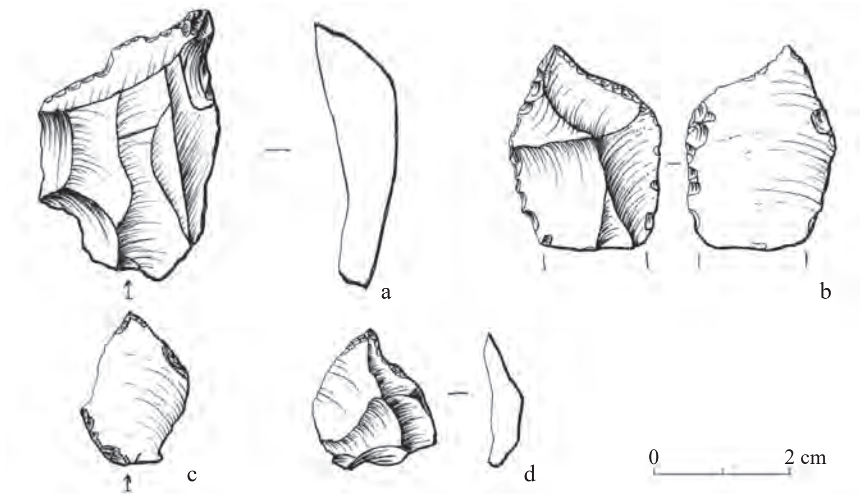

Fig. 21. Perforators (a-d).

a double burin on breakage and retouched surface (Fig. 20d) and a double burin on a burin facet (Fig. 19f). Burins, though a distinctive tool category, are hard to pin down chronologically. The particular PS 43 specimens could be part of either a Late Upper Palaeolithic or a later industry.

Perforators (n=9) include three piercers (Figs. 21b-d) and six becs (e.g. Fig. 21a). Piercers are characterized by thin projections made by means of very short, at times nibbling, retouch, either direct or inverse, while becs are here classified as having thicker, nosed projections. The use of the particular retouched tools as 'perforators' might or might not be proved by use-wear analysis. The particular tool-type is made only on flake blanks, some of which are at the same time the largest examples amongst the retouched artefacts.

Splintered pieces (n=5), the a posteriori tool type, is represented by five examples that are also made on small flakes (Figs. 22a-b) or blades (Fig. 22c).

Scrapers (n=16) include both sidescrapers (n=4) and endscrapers (n=12) and vary in size. The majority is made on flakes (e.g. Fig. 23a), sometimes thick, cortical ones (Fig. 23c), and only two are made on a blade (Fig. 23g) or a laminar flake (Fig. 23h). Two small pieces, a circular endscraper (Fig. 23d) and a denticulated sidescraper (Fig. 23f) with affinities to the thumbnail type, have been produced by long, semi-abrupt retouch. Thumbnail and circular endscrapers are integral elements of the west Balkan Epigravettian and Mesolithic assemblages.[21] A thumbnail endscraper very similar to Fig. 23d was collected at Mikro Karvounari.[22] Small denticulated endscrapers were discovered at Tsouknida, further south in the Preveza nomos, and a Mesolithic date is proposed for them.[23] Thumbnail endscrapers were also found at the Mesolithic layers of Kleisoura Cave.[24] The PS 43 scraper group exhibits variation in blank and retouch, thence we are inclined to think that it originates from more than one industrial entity dated to the Late Upper Pleistocene and the Holocene. Given the lack of a firm chronostratigraphic framework for the site, its treatment under the archaeologically meaningful category of a 'tool type' has a descriptive value that probably masks a more complex history.

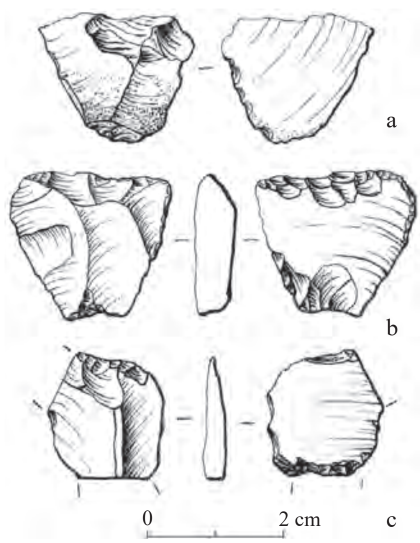

Fig. 22. Splintered pieces on flakes (a-b) and blades (c).

Non-geometric microliths (n=2) are small flakes (less than 22x22x22 mm) with retouched platforms produced by short, low angle bifacial rectilinear retouch in the first case and short, inverse retouch on the right lateral edge.

[21] Komso and Pellegatti 2007; Whallon 1999; Kotjabopoulou *et al.* 1999; Mihailović 1999; Miracle *et al.* 2000.
[22] Papoulia 2011, fig. 38d.
[23] Runnels and van Andel 2003, 117-124 and figs. 3.52.1-2.
[24] Kaczanowska and Kozlowski 2014, fig. 5.4.

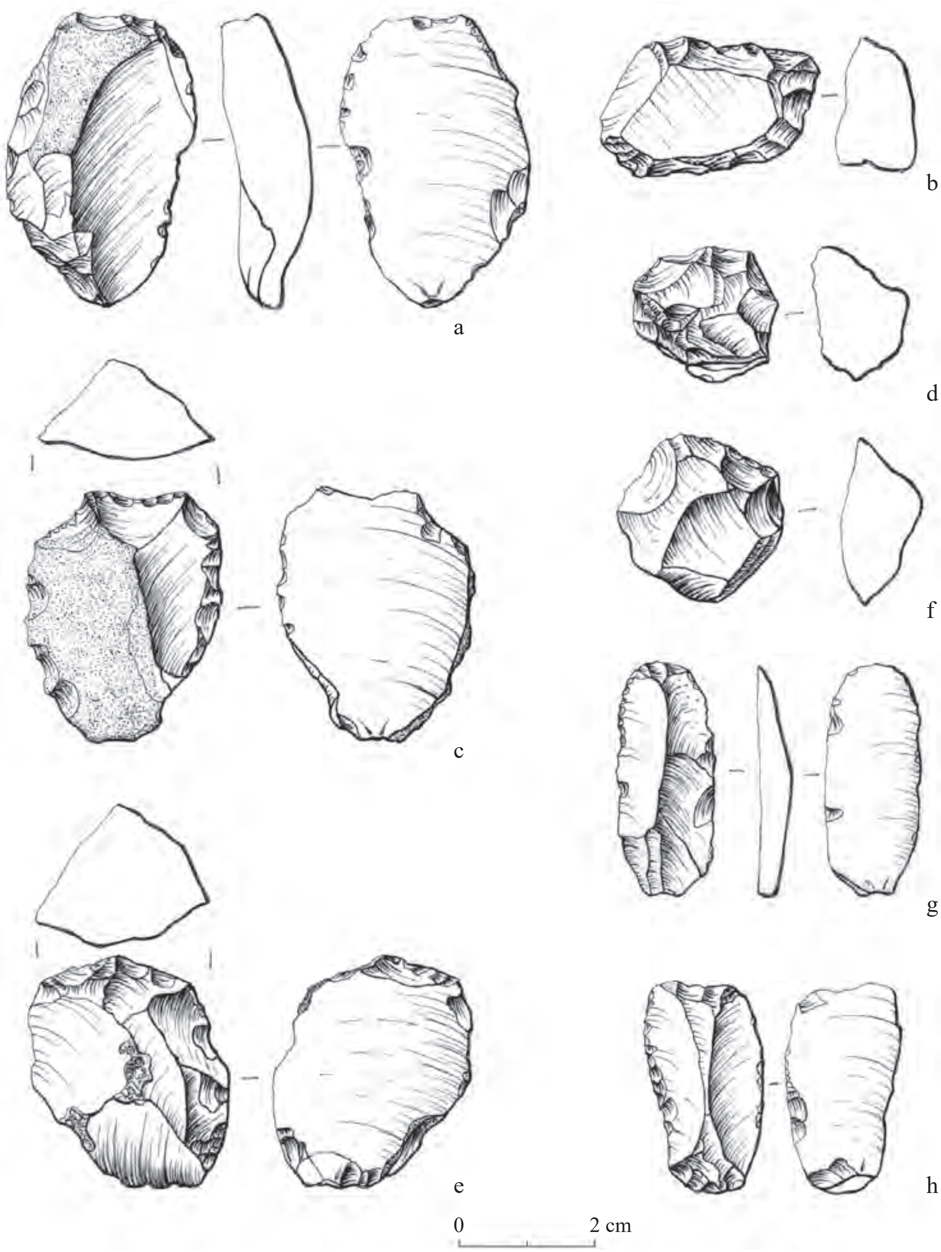

Fig. 23. Scrapers: endscrapers on thick flakes (a, c and e), circular and thumbnail endscrapers (b, d and f), endscraper on a blade (g), endscraper on a laminar flake (h).

Truncations (n=8) are often produced by means of very short, either oblique or abrupt retouch (e.g. Fig. 24). Most of them are made on flake blanks, and only one is made on a laminar flake. In two out of eight cases the retouch scars have no patina, while the blank of the tool exhibits some kind of patina. The only *trapeze* (n=1) is an asymmetric bi-truncated piece by means of brief, rectilinear retouch (Fig. 25) whose

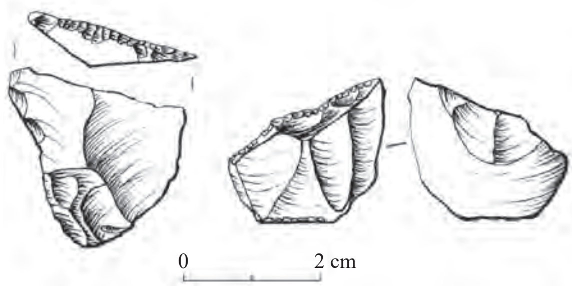

Fig. 24. Truncations.

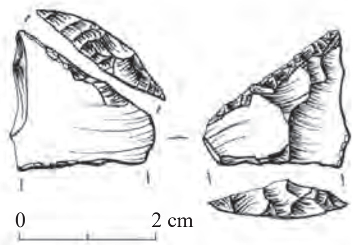

Fig. 25. Asymmetric trapeze.

closer affinities are identified in the Franchthi Cave Early Neolithic trapezes (Phase FLP N I) manufactured on jasper or blond flint.[25]

Transverse arrowheads (n=5) is a particularly homogeneous group of fairly small tools with bifacially shaped lateral edges (Fig. 26). The group recalls some of the Middle Neolithic (Phase FLP N II) transverse arrowheads made on jasper and blond flint from Franchthi Cave in the Argolid,[26] though the PS 43 tools are smaller (Fig. 27). The Franchthi specimens came from a narrow horizon dated between 6200/6000 and 5400 bc cal.[27] Similar examples were collected from other parts of the Kokytos valley as well,[28] and in both cases these were probably manufactured in order to be hafted in wooden hafts serving as the tips of composite hunting tools.[29] Curtis Runnels has kindly informed us that a similar piece was collected from a site in a fossil sand dune outcrop on the Preveza coast by the Nikopolis survey project.[30] Only one of the PS 43 transverse arrowheads (Fig. 26d) finds affinities in finds deriving from the Upper Mesolithic / Final Mesolithic Interphase layers (Phase VIII/IX) of Franchthi Cave.[31]

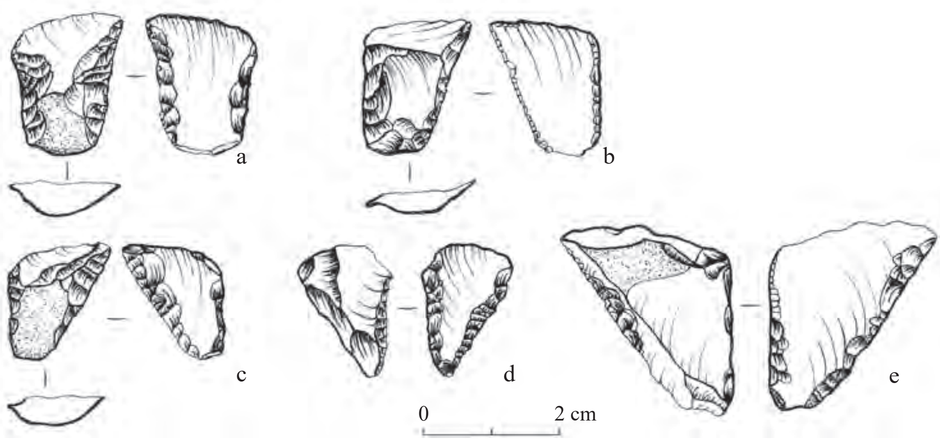

Fig. 26. Transverse arrowheads (a-e).

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[25] Perlès 2004, figs. 6.3.6 and 6.3.8.
[26] Perlès 2004, fig. 8.4.1-4, 8.4.9.
[27] Perlès 2004, 90.
[28] See Forsén *et al.*, this volume, Fig. 9.
[29] See Gibaja and Palomo 2004; Fischer 1990; Finlayson and Mithen 1997.
[30] Runnels pers. comm. 11.3.2011.
[31] Perlès 1990, figs. 22 and 27.

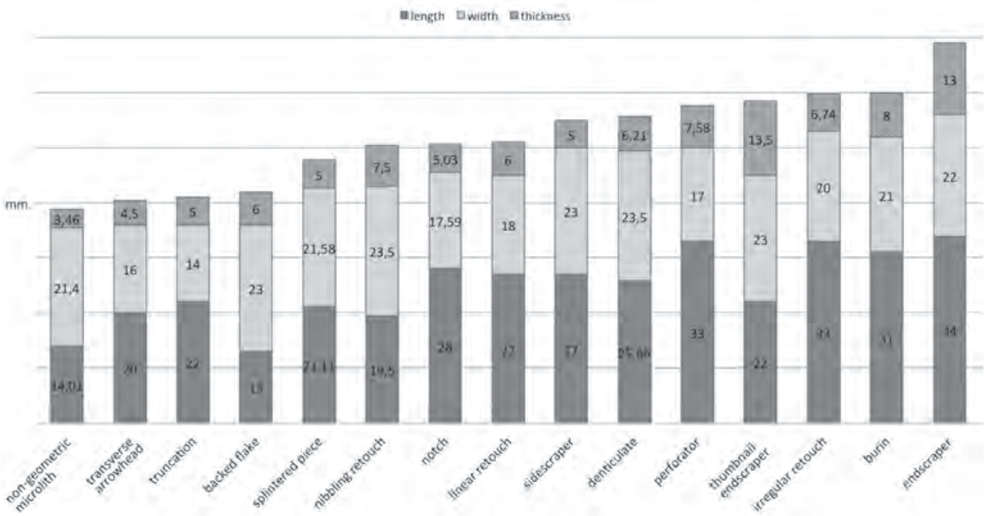

Fig. 27. The median dimensions (length, width, thickness) of all tool types. Measurements are in mm and have been calculated only for the whole blanks.

In the *assymetrical* point group specimen Fig. 26e finds its closest comparandum in the Chalcolithic points from Drakaina Cave in southeast Kephallonia.[32] The Late Neolithic and Chalcolithic deposits of this cave have yielded a large and impressive assemblage of projectile tips that were hafted and used as inserts to hunting weapons. The chronostratigraphic context of the Drakaina projectile tips shows that developments in morphology and technology of projectile points in western Greece followed its own independent course compared to that encountered in other areas of the Neolithic Aegean world.[33] The majority of the Drakaina projectile types is not seen in the PS 43 inventory.

Luminescence dating

Given the multiple uncertainties arising from the archaeological study of the surface lithic finds, we used Optically Stimulated Luminescence (OSL) in an attempt to place the artefact-bearing sediments in a firm chronostratigraphic context. Soil-sampling was conducted at PS 43 in the summer of 2011. Radiometric measurements were also taken on site with a calibrated portable scintillometer in order to calculate the local dose rate (D_R). PS 43 is a remarkably plane site with no natural section or trench exposed. Three soil-samples, PS 43A, PS 43B, PS 43C, were thus perforce obtained for the upper stratum lying immediately below the topsoil at depths ranging between 50 and 35 cm below the surface and at penetration angles ranging from vertical to ~300 sloped. The distances between the three samples were more than 40 m.

Analytical work was conducted at the laboratory of Luminescence Dating at the National Center for Scientific Research DEMOKRITOS in Athens. Initial sample

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[32] Stratouli and Metaxas 2008, fig. 12.a

[33] Stratouli and Metaxas 2008, 317-324.

preparation showed that one of the samples, PS 43A, did not have any luminescence-datable mineralogical ingredients. "Luminescence measurements were carried out on the remaining two samples using a RISØ-TL/OSL reader. Measurements included calculation of the paleodose (D_e) and estimation the dose rate (D_R). The equivalent dose was estimated by running the post -Infrared-Infrared Stimulated Luminescence (pIRIR) Single-Aliquot Regenerated (SAR) Dose protocol[34] on multiple aliquots from each sample, generating in this way a number of individual paleodoses per sample."[35]

The two dates obtained are 48.0+24.0 ka and 19.0+8.0 ka (Fig. 28). This broad spread of ages falls within the Upper Pleistocene, even reaching the onset of the Holocene. If taken at face value the age spread spans from the Middle Palaeolithic to the onset of the Mesolithic, but given the very large standard deviations that accompany the numeric estimates, caution is suggested with regards to their precision. Probably relating to the nature of sediment samples submitted to OSL that derived from a loose, ploughed and generally bioturbated soil, this absolute dating attempt has been of little value in placing the PS 43 finds in a firm chronological context.[36]

Sample	Depth below surface	Age (ka)	Error (standard deviation)
PS 43B	35 cm	48.0	24.0
PS 43C	35 cm	19.0	8.0

Fig. 28. OSL dates from PS 43. The two samples were taken in tract D 80 with a distance of 40 m between each other, both by ~35° sloped penetration from the surface.

Discussion

PS 43 is a multi-period site containing knapped-stone left behind by Middle Palaeolithic, Late Upper Palaeolithic or Mesolithic and Neolithic groups having a highly mobile lifestyle. In terms of content, it is similar to other open-air sites of the Ionian zone where flint artefact recovery combined with no pottery or architectural remains dominates the archaeological picture.[37]

At the early stages of research on the PS 43 material, the predominance of flakes produced by simple flaking methods, combined with a good number of tools with minute retouch and the absence of any ceramic finds, guided us to consider the late component of the site as predominantly Mesolithic. PS 43, then, would be the second Mesolithic site on Kokytos following PS 3 for which Mesolithic affinities were proposed on the basis of artefact technology and typology.[38] PS 3, which is located ca. 4 km to the west of PS 43, is a flake industry, producing debitage of comparable small size, manufactured on the same variety of raw materials that exhibit little or no patination. At PS 3 there are very few bladelets and laminar flakes and blades. Cores are of small overall size, and

[34] Thiel *et al.* 2011.
[35] Bassiakos and Athanassas 2012.
[36] They vividly show the need of a more flexible legislation that allows a strategy of surface survey combined with small-scale test-pit excavation to shed light on the context and chronology of sediment deposition. The Thesprotia Expedition research permit allowed trial excavations at a handful of sites, but PS 43 was not one of the sites included in the trial excavation programme.
[37] Runnels and van Andel 2003; Galanidou 2014; van Wijngaarden *et al.* 2013.
[38] Tourloukis and Palli 2009.

no specific form, with the occasional preparation of platforms and multiple directions of removal. In some cases irregular, occasional and marginal (nibbling) retouch is hard to distinguish from edge-damage from use rather than systematic retouch. At PS 3 there are numerous notches and denticulates, pieces with direct or inverse linear retouch, and numerous pieces with short irregular retouch as well as the occasional endscraper or sidescraper, yet no other formal tool types. The PS 3 industry points to an opportunistic use of tools. Possible Mesolithic material is also reported further south at six sites in the Preveza nomos and some of them are securely placed to the early Holocene by optically stimulated luminescence dates.[39] Mesolithic presence is radiocarbon dated north of the Kokytos in the deposits of Konispol Cave in south Albania[40] and in other open-air sites.[41]

At PS 43 the burins and two scrapers may be parts of either a terminal Pleistocene or an early Holocene tool repertoire. Their classification in the latter could be argued on the basis of an overall good preservation, lack of patina and the conspicuous absence of other late Upper Palaeolithic tools, such as backed bladelets or microgravettes.[42] Thus although a Mesolithic component is indeed present at PS 43 it cannot be distinguished from a terminal Upper Palaeolithic. Considering the record of northwestern Greece and Albania in terms of an Upper Palaeolithic to Mesolithic transition is not a productive approach, since a rupture from an old lifestyle to a new one is not supported by the archaeological evidence.[43] With the data to hand we envision that some late hunter/gatherers were present at the valley bottom and from a historical point of view it makes little difference whether they had crossed the Holocene threshold or not.

Beyond hunter/gatherer groups, the PS 43 assemblage contained a distinctive component associated with agropastoralist communities. A cluster of transverse arrowheads and a trapeze, made on flake blanks and showing standardization in production and morphology is a manifestation of later activity in the bottom of the valley. The comparanda for this group spread chronologically from the Early Neolithic to the Chalcolithic. The lack of opportunism in their retouch contrasts the group with other tools of an expedient character discussed above and encountered on site. It is not clear whether the tools with minute retouch ought to be solely attributed to the early Holocene or were indeed a trait of Neolithic assemblages recovered from open-air sites. The array of outdoor activities conducted outside a domestic setting (whatever that meant in the context of Thesprotia)[44]would require a different range of tools from those usually excavated within the confines of a Neolithic settlement. A good example of this dichotomy is seen in the archaeological evidence from the Orestias lake basin where one clearly sees the complementary nature of lithics from open-air sites in the environs of Dispilio recovered through surface survey with the lithics excavated in the settlement itself.[45] The contribution of off-site archaeology to offer a more complete picture of landscape use in a given region when combined with on-site settlement research is underlined.

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[39] Runnels and van Andel 2003, 118-123.
[40] Petruso *et al.* 2014.
[41] Ruka *et al.* 2014.
[42] This notwithstanding, it is possible that some late Upper Palaeolithic specimens are indeed lurking in the debitage and bladelet cores.
[43] Galanidou 2011.
[44] Forsén and Galanidou, this volume.
[45] Galanidou 2007; Doulkeridou 2009.

With regard to the prehistoric agropastoralist presence on PS 43, a question that emerges is, then, why are there so few sickle elements in the bottom of the Kokytos valley. Their total absence in PS 43 speaks for absence of agricultural or plant-harvesting activity. At the same time the presence of projectile points suggests hunting activity. In this respect PS 43 is in tune with the big picture obtained from the study of the Kokytos surface finds where sickles are very few compared to points and hunting implements, present in a ratio of 2:9.[46] In PS 43 as in other parts of the valley lowlands hunting activity, specialised and clearly focused or embedded within transhumance, is the one with the heavier imprint at Neolithic times.

The known Neolithic sites from Epirus and south Albania are typically associated with ceramic finds.[47] Seen from the same perspective of a site associated with outdoors Neolithic activity, the absence of pottery from PS 43 deserves our attention. What it shows us is that we can expect to discover Neolithic sites with no pottery without necessarily blaming the poor ceramic preservation, post-depositional attrition or taphonomy for this absence. When Neolithic people were involved in hunting or animal attending activity, in which high mobility in the landscape was essential, ceramic containers would be a burden. During hunting these could well be replaced by lighter containers, for instance flasks made out of animal skins. And even those organic containers may not have been necessary if distances from the permanent settlement were not great and deep knowledge and mapping of the landscape features would lead Neolithic hunters to the fresh-water springs to drink water when thirsty.

There are many archaeological questions that can be resolved without the walking stick of stratigraphy and date. PS 43 sends a strong Neolithic signal, a signal that relates to a mobile lifestyle rather than a sedentary one. A Neolithic site in the open-air, devoid of pottery and built structures which, like the one discovered by Nikos Pantazopoulos in the vicinity of Dispilio at the Orestias Lake Basin, speaks for Neolithic people in their landscape. It invites us to envision Neolithic life beyond the boundaries of a settlement or a cave.

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[46] Forsén *et al.*, this volume.
[47] Douzougli 1996; Dousougli and Zachos 2002; Youni 2010; Lera *et al.* 2015; Winjen 1981.

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The Bronze Age Site of Goutsoura: Location, Stratigraphy and Date

Björn Forsén

The Bronze Age site of Goutsoura (PS 12) was localized during the intensive survey phase of the Thesprotia Expedition in 2004 on the lowermost eastern slope of the Liminari hill, somewhat more than one km to the east of the Kokytos and the village Rachouli (Fig. 1).[1] The site was later chosen as one of those on which we focused during the second phase of the Thesprotia Expedition, which included magnetometer prospecting, soil sampling and trial excavations. There are several reasons why Goutsoura was chosen as one of the sites on which to focus. Firstly, the Bronze Age in general was very poorly known in Thesprotia as well as in all of northwestern Greece and we were specifically aiming at throwing light on less known parts of the Thesprotian past. Secondly the site seemed to be rather well preserved, as large parts of it were located in fields that had not been taken into modern cultivation.

The aim of this chapter is mainly to describe the progress of the work at the site as well as to give a general overview of its location, stratigraphy and date. The geoarchaeological setting, pottery, lithics, small finds, grave and terrace structures, human remains and animal bones are published in separate chapters.[2]

The surface scatter in relation to the location

While surveying fields in 2004 one of our survey teams directed by Jeannette Forsén came across a small concentration of poorly preserved prehistoric sherds in tract A 42, which corresponds to a field just to the east of the Liminari hill that was cultivated by small corn plants. Part of the field was divided into 10x10 m grids and sampled as a site, PS 12. The total density calculated in the 31 squares (as all finds collected per square) revealed, apart from a clear concentration of finds in the northwest part of A 42 (in squares 2B, 3, 4 and 6), also higher densities in the south and east parts of the tract (Fig. 2a). The finds collected consist, in addition to the prehistoric pottery, of lithic artefacts and some small roof tile fragments. The highly worn prehistoric pottery was in the field preliminarily dated to the later part of the Neolithic period or the Early Bronze Age, whereas the roof tiles seemed to be of Early Modern date. The lithic artefacts were prehistoric, but could not be assigned any more specific date.

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[1] For further short overviews of the site, see Forsén *et al.* 2011, 79-82; Forsén and Forsén 2012. The following description is based on my field diary and the reports made by the trench masters. The following persons functioned as trench masters: Rauno Vaara (2007), Christopher TenWolde (2008), Tommi Turmo and Otso Manninen (2009), Sarita Sandell, Johanna Stenberg, Rasmus Åkerblom, Niko Latvakoski and Jarkko Saipio (2010). Esko Tikkala produced the final versions of all drawings and illustrations in this chapter, partly on the basis of pencil illustrations made in the field by the trench masters.

[2] Cf. Lavento and Kouki, this volume; J. Forsén, this volume; Doulkeridou, this volume; J. Forsén, this volume; Papayiannis, this volume; Lima, this volume; Niskanen, this volume and Deckwirth, this volume.

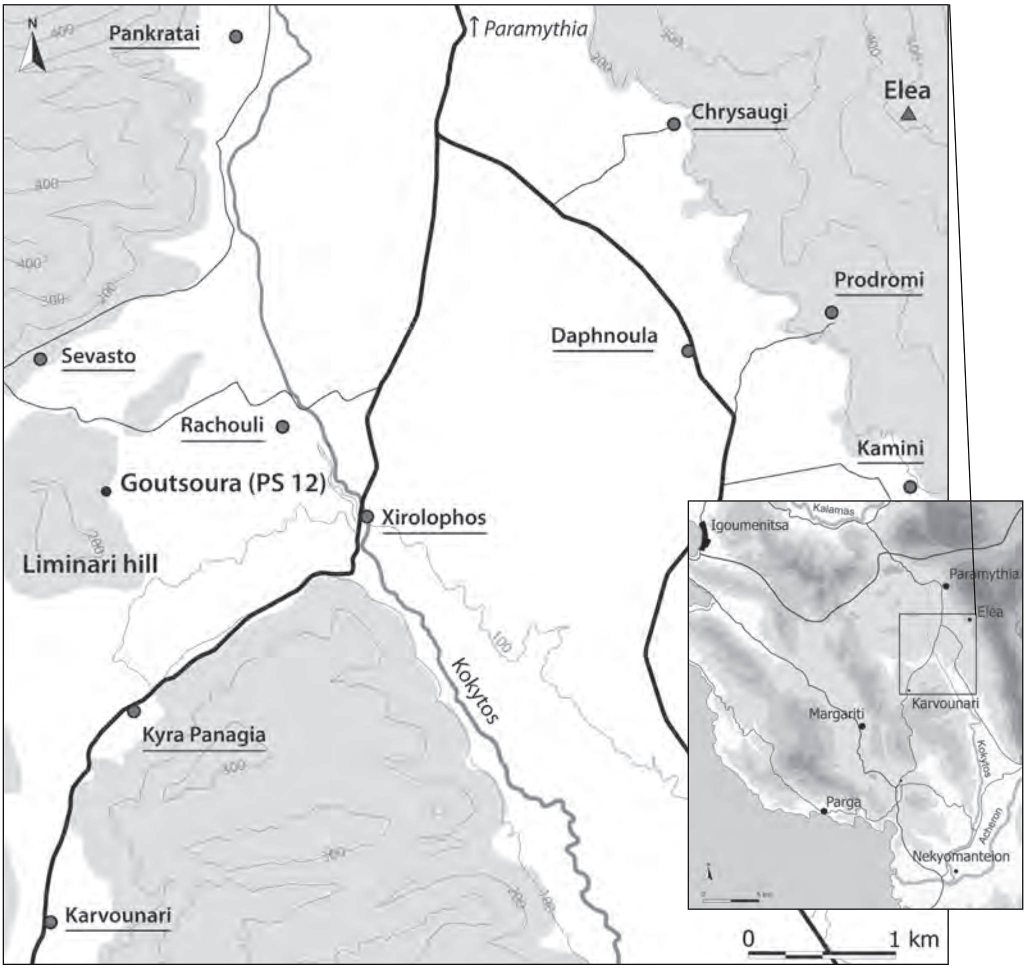
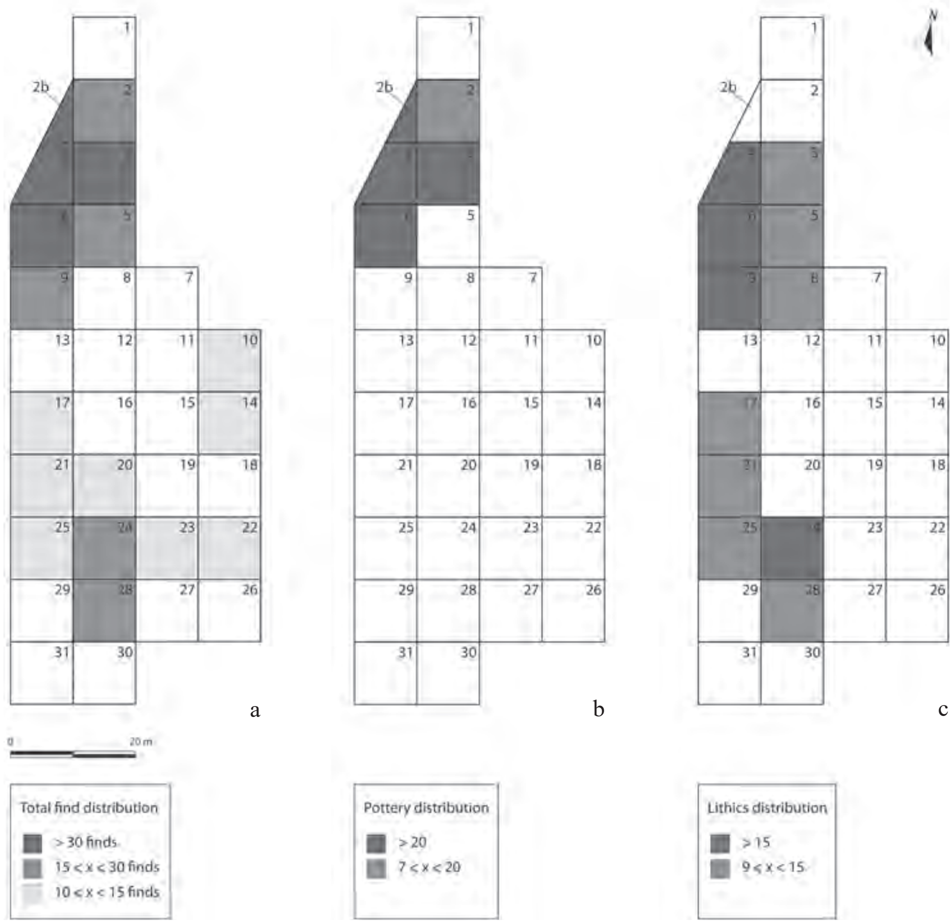


Fig. 1. General map showing the location of the site of Goutsoura and the hill of Liminari.

Some additional information concerning the gridded area could be gained when studying the distribution of the different categories of finds. The prehistoric sherds were clearly concentrated in the squares with highest total find density (squares 2, 2B, 3, 4 and 6, Fig. 2b). The lithic artefacts were spread all over A 42, with slight concentrations in the northwestern part of the field, roughly in the same general area as the prehistoric sherds, as well as in the southern part of the tract (Fig. 2c). This seems to support the assumption of a prehistoric site in the northwestern corner of A 42, to which not only the pottery but also the lithics would belong.[3] Finally, the roof tiles are concentrated in two squares in the east (squares 14 and 18), possibly indicating an Early Modern tile dump or perhaps even the location of some kind of small shed.

The fact that all the finds from the later part of the Neolithic period or the Early Bronze Age were concentrated in a small area along the western edge of tract A 42

[3] The lithics from A 42 are also of the same grey flint as later found during the excavation of Goutsoura (for which see below and Doulkeridou, this volume).



Figs. 2a-c. Distribution of survey finds in tract A 42.

seemed to indicate that the site might continue in that direction. A 42 is separated from the Liminari hill by a dirt road. On the other side of the road there is a sheltered nook which would have been a perfect setting for a prehistoric settlement (Fig. 3). The size of the nook is ca. 150-160 m in a north to south direction times 50-60 m in a west to east direction. Just to the northwest of the nook, slightly higher up on the hill slope, there is a separate terrace measuring at most 40x10 m.

The slopes of the Liminari hill consist of limestone totally denuded of all soil. Only some prickly oak bushes and mountain tea grow on the slopes today. It is unclear at which stage in the past the topsoil eroded away, creating the alluvial fan in the nook, but the erosion may have consisted of several phases, thus also covering the Neolithic and Bronze Age layers with more recent soil. Two small ravines leading down from the hill slope have brought water to the nook and the fertile, previously marshy, flat plain opening up towards the east of the Liminari hill has provided good grazing ground. The marshy plain has also offered good possibilities for drawing water from wells (Figs. 1 and 3).

During the late nineteenth and early twentieth century a local farmer used to keep his livestock in the nook. According to oral information the farmer had a small hut here

Fig. 3. The site of Goutsoura and its setting. Photograph from the southwest.

and the livestock was kept in place by a fence built of field stones. The fence climbed rather high up on the hill slope which at that time was totally nude. The nook and the stone fence are visible in the background of a photograph taken in 1913 by Fred Boissonas, but unfortunately not the hut, the location of which thus remains unclear.[4]

The southernmost third of the nook is today overgrown by impenetrable thorny bushes, whereas the northernmost two thirds only are covered partly by shrub and partly by grass. Some 30-40 beehives are kept in the clearings of the northernmost part of the nook, which otherwise is not cultivated in any way. The main part of the site which was clearly located in the nook could be due to the total lack of visibility not be studied by an intensive survey. Therefore we had to change our research strategy in order to learn more about the site. We began in 2007-2008 by trying to define the borders and character of the site with the help of trial trenches, phosphorous sampling and magnetometer prospecting. The trial excavations were then in 2009-2010 continued and enlarged.

The trial trenches and first indications of stratigraphy

Our first step after the intensive survey was in 2007-2008 to open a total of 10 trial trenches, most of them measuring 1x2 m and being called Trench A, B, C, D, E1-2, E6-7, E11-12, E21-22, F and H (Fig. 4). Trench A was located at the upper edge of tract A 42, where the first prehistoric pottery had been found, Trench H on the slightly higher small terrace of the Liminari hill, whereas the rest of the trenches were located in the sheltered small nook itself. Trenches E1-2, E6-7, E11-12 and E21-22 were made on a straight line, with the numbers marking the x-coordinate and E the y-coordinate. Trench E11-12 was

[4] See e.g. Thesprotia 2004, 89 or Forsén and Galanidou, this voume, Fig. 2.

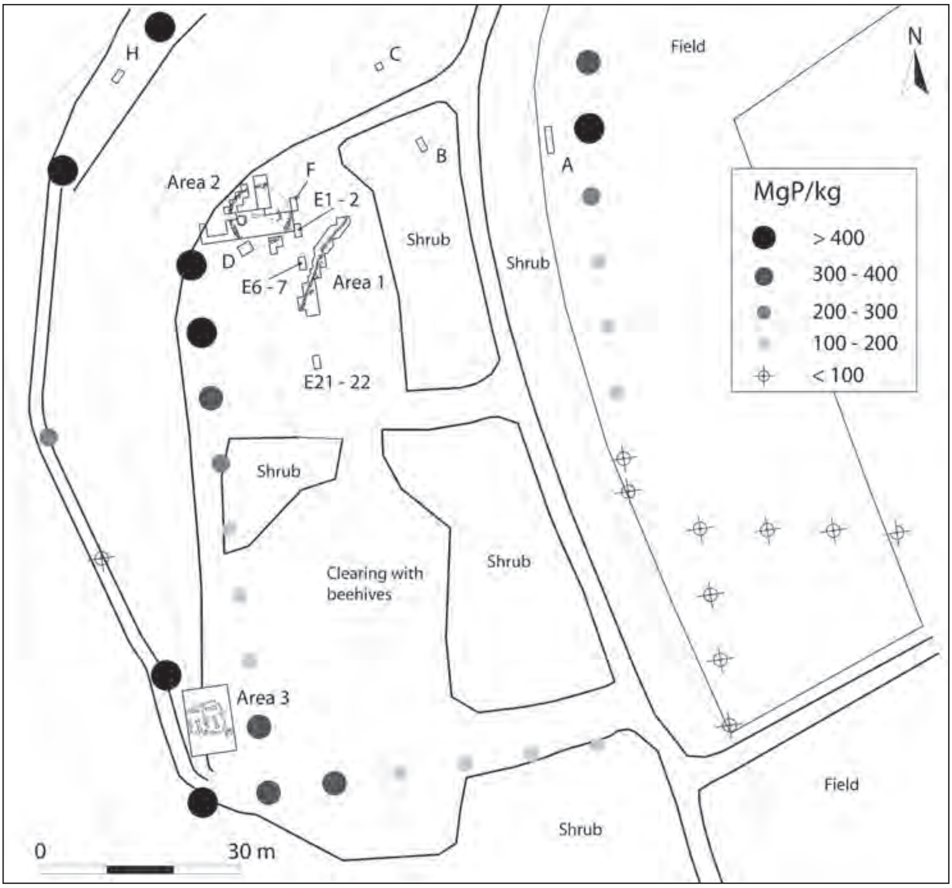


Fig. 4. Location of trial trenches and the two concentrations of phosphorous anomalies.

later enlarged into a 19 m^2 large area when the remains of a terrace wall were found. This area was excavated according to a coordinate system with K, J, G, E and I marking y-coordinates and running numbers the x-coordinates (Fig. 5).

The trial excavations revealed a thick and clear Early Bronze Age (EBA) cultural layer in Trenches A and D. In Trench A this layer (excavated as A1 and A2, Loc. 2-4) was found immediately below the topsoil layer at a depth of ca. 30 cm below surface and was at most some 40 cm thick, containing pottery, charcoal, burnt clay (possibly remains of a mudbrick construction?) and three spindle whorls mixed with stones and soil. In Trench D a clean EBA layer (called D, Loc. 3 and D2, Loc. 5) was encountered at a depth of ca. 95-98 cm below surface. This layer, which reminds of the one in Area A, although it contained much less burnt clay, was at most some 20 cm thick. The pottery collected and C-14 samples confirm the date of these layers to the EBA (more exactly 2700-2400 cal. BC).[5] However, whereas the EBA layer in Trench A was superseded immediately by the topsoil, the corresponding layer in Trench D was superseded by another ca. 35-40

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[5] Further, see Appendix and J. Forsén, this volume.

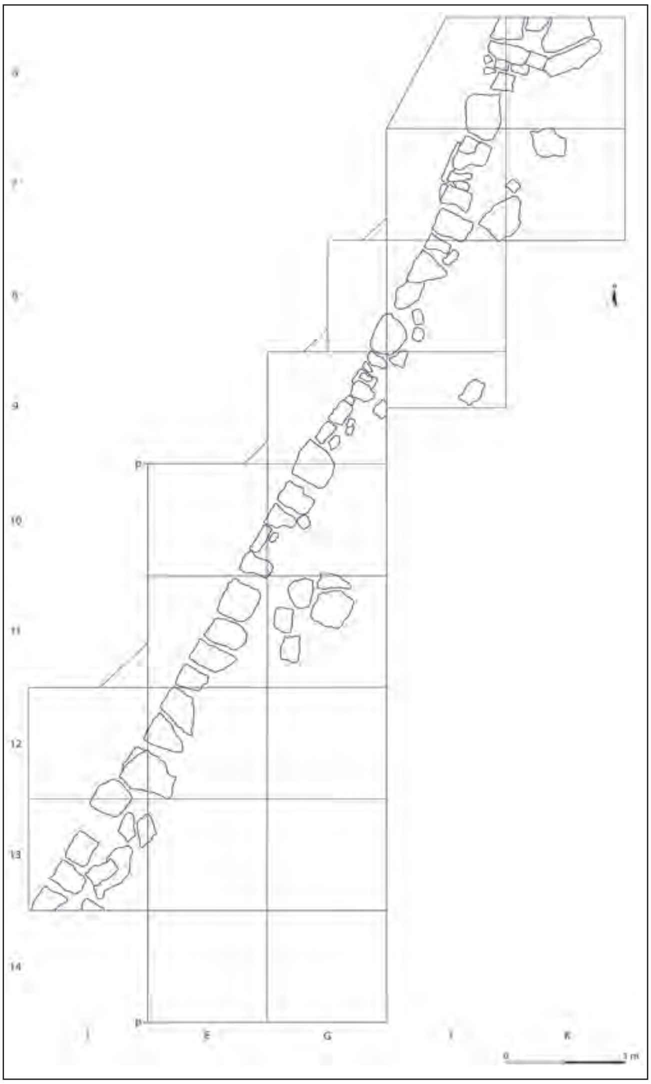


Fig. 5. The coordinate system of the large trial trench excavated in 2008. P - P marks the west section drawn in Fig. 6.

cm thick cultural layer (called D, Loc. 2 and D2, Loc. 3-4) containing a mixture of EBA and Late Bronze Age (possibly also some Middle Bronze Age) pottery, on top of which the ca. 60 cm thick topsoil followed.

Trenches B, C and H revealed remains of a massive rock tumble, which was mixed with Bronze Age pottery in Trenches B and C, whereas in Trench H with some worn pottery of historical date. The Liminari hill slopes are today totally denuded of all soil, which at some stage has eroded away creating the alluvial fan in the sheltered nook. The erosion probably took place during several different stages, the last ones partly covering the Bronze Age layers with the relatively thick sterile topsoil. The massive tumble in Trenches B, C and H probably belong to the final massive phase of erosion that seems to be confined to the parts closest to the very slopes of the hill.

The upper surface of the terrace wall, which first was encountered in Trench E11-12, is located ca. 70 cm below surface, whereas its foundation is at a depth of ca. 100 cm below surface (Fig. 6). The same stratigraphy was observed in the whole trench that finally was enlarged to a total of 19 m^2 around the wall. The uppermost ca. 40 cm layer consisted of topsoil mixed with white small stones and few finds (Loc. 1). Below this layer followed a first cultural layer, which was excavated as Loc. 2 until the upper part of the terrace wall, after which it was called Loc. 3 on the north side of the terrace wall and Loc. 4 on the south side of the wall (this distinction was not always followed). This first uppermost cultural layer was ca. 40-50 cm thick and continued some 10 cm below the

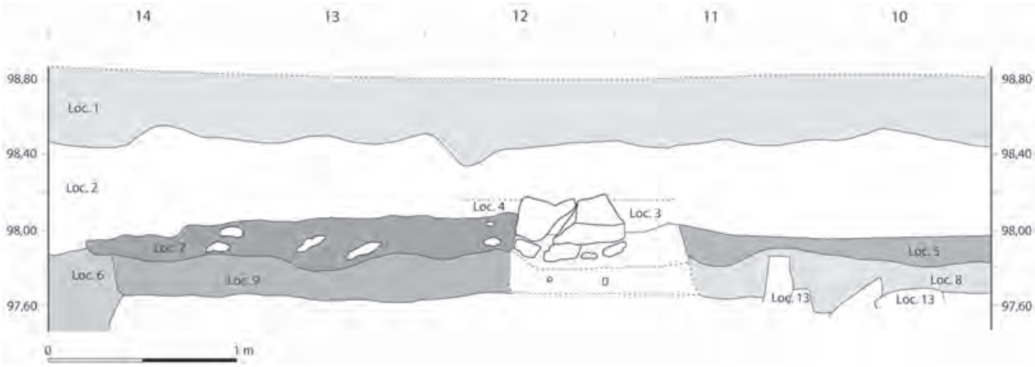


Fig. 6. Profile drawing of west section of the large trial trench excavated in 2008.

upper surface of the terrace wall. The first cultural layer was clearly distinguished from the topsoil by not containing any small stones, at the same time as the soil was denser and more fine grained and included pottery, lithics and charcoal. The largest amount of pottery and lithics came from the lowermost part of Loc. 2.

The first cultural layer in the large trial trench next to the terrace wall is followed by two further cultural layers, which were mostly called Loc. 5 and Loc. 8 on the northern side of the wall and Loc. 7 and Loc. 9 on the southern side of the wall. The second cultural layer consisting of Loc. 5 and Loc. 7 is located between ca. 80 and 100 cm below surface, whereas the third and final cultural layer consisting of Loc. 8 and Loc. 9 continues until a depth of ca. 120 cm below surface, i.e. is located below the wall itself, which is imbedded into the second cultural layer. The amount of pottery and lithics is smaller in the second and third cultural layers than in the uppermost one, but the number of bones is large. Charcoal is also common. Both the second and third cultural layers contain pebbles, although their number is smaller in the third cultural layer, the soil of which is more brownish stained.

What looked like sterile soil, being reddish-brown in colour and including small gravel, was clearly encountered in square E14, where it was partly excavated as E14, Loc. 6. In squares E10-11 natural bedrock, called E10-11, Loc. 13, followed below the third cultural layer E10-11, Loc. 9 (8). In square G11-12 no clear distinction between the second and third cultural layer could be observed and they were therefore excavated together as G11-12, Loc. 7+9.

The pottery and lithics from this largest trial trench was not studied in detail, as the two uppermost cultural layers on the basis of a first survey seemed to contain a mixture of Middle Bronze Age (MBA) and Late Bronze Age (LBA) finds, whereas the lowermost cultural layer produced rather little diagnostic finds. However, three C-14 samples taken from the area surrounding the terrace wall indicate the existence of a datable stratigraphy. Thus Hela-1807 which was taken in J8-9, Loc. 2 (first cultural layer) dates to 1320-1100 cal. BC, whereas Hela-1809 which was taken in K6-7, Loc. 8 (third cultural layer) dates to 1920-1730 cal. BC. Finally, the wall itself could, during large-scale excavations in 2009, by the help of a piece of bone found built into the wall itself, be given a terminus post quem of 1560-1410 cal. BC (Hela-2502).[6] Thus, the

[6] Further on the C-14 samples, see Appendix.

lowermost third cultural layer seems to date to the MBA. The wall itself was constructed on top of this layer at a time that corresponds roughly to LH II or the beginning of LH III. The second cultural layer is either slightly older or contemporaneous with the wall, i.e., dates to the early or mid-LBA, although it also contains earlier finds. Finally, the uppermost first cultural layer has accrued on top of the wall, i.e. during the mid- or late LH III, or possibly even later.

A somewhat similar stratigraphy as in the large trial trench was also found in Trenches F, E1-2, E6-7 and E21-22 (Fig. 7). In E21-22 the topsoil of some 45-50 cm was followed by a ca. 40 cm thick cultural layer called E21-22, Loc. 2 and which corresponds to Loc. 2 (i.e. the first cultural layer) in the squares excavated around the terrace wall. Due to time restrictions we never excavated deeper in Trench E21-22. In Trench E6-7 we also had three consecutive cultural layers below the topsoil layer, called E6-7, Loc. 2, E6-7, Loc. 3 and E6-7, Loc. 4. Below the lowermost layer, which probably dates to the MBA, there followed reddish-brown sterile soil, called E6-7, Loc. 5. Three consecutive cultural layers (Loc. 2, 3 and 4), the second one characterized by the large number of pebbles, were also found in Trench F and E1-2, probably following the same stratigraphy as in the large trial trench, although the lowermost third cultural layer here, due to the vicinity of the trenches to Area 2 (cf. below), may date to EBA. In E1-2 some pottery, lithics and bones were still found in the upper part of the lowermost Loc. 5, which however turned sterile deeper down, when it was renamed E1-2, Loc. 6.

Phosphorous sampling and magnetometer survey

Parallel to the trial excavations of 2008 we began to collect phosphorous samples along five lines intersecting the sheltered nook and continuing into the cultivated fields further towards the east. The purpose of these phosphorous samples, which were taken at a distance of 10 m between each other, was to define not only the borders of the site, but also any possible concentrations of high phosphorous anomalies which could indicate intensive human presence. The detailed results of this study will be explained in more detail in another chapter,[7] but I already here want to refer to the main results, i.e., the existence of two clear concentrations of phosphorous anomalies, one just to the south of Trench D and another one some 70 m to the south of Trench D (Fig. 4).

Encouraged by the results of the trial trenches and of the phosphorous sampling we decided to proceed by conducting a magnetometer survey in the nook. The largest trial trench had uncovered a 9 m long terrace wall and we hoped to be able to trace the continuation of this terrace wall as well as any other stone wall constructions in the area by the magnetometer.[8] Unfortunately, the central part of the nook was used as the setting of beehives. Due to the magnetic disturbances caused by the beehives, or rather by the car tyres on which they were standing, the magnetometer could be used only in the northern part of the site.

The magnetometer survey revealed that the terrace wall continued for at least another 15 m towards the north, thus making it at least 24 m long. Towards the south

[7] Lavento and Kouki, this volume.
[8] For the methodology and use of magnetometer in archaeological sites, see e.g. Smekalova 2009, 18-20.

	Large trial trench	Trench E1-2	Trench E6-7	Trench E21-22	Trench F	Area 1	Date
First cultural layer	E10, Loc. 2 and 3; E10-11, Loc. 3; E11-12, Loc. 2 and 3; E 12-13, Loc. 4; E 13, Loc. 2 and 3 (4); E14, Loc. 2 and Loc. 3 (4); G9, Loc. 2 and 3; G9-11, Loc. 4; G10-11, Loc.2 and 3; G12-13, Loc. 2 and 3 (4); G14, Loc. 2 and 3 (4); I12-13, Loc. 2, 3 and 4; J 7, Loc. 2, 3 and 4; J8-9, Loc. 2, 3 and 4; K6-7, Loc. 2	E1-2, Loc. 2	E6-7, Loc.2	E21-22, Loc. 2	F, Loc. 2	Loc. 1 in all excavated squares	Late LBA (Mid- or late LH III), or possibly even EIA
Second cultural layer	E10-11, Loc. 5; E12-13, Loc. 7; G9, Loc. 5; I12-13, Loc. 5 and 7; J7, Loc. 5 and 7; J8-9, Loc. 5 and 7; K6-7, Loc. 5 and 7	E1-2, Loc. 3	E6-7, Loc. 3	-	F, Loc. 3	Loc. 2 in all excavated squares. Also Trench 1 East, Loc. 5 and Trench 2 East, Loc. 7	Early or mid-LBA?
Terrace wall filling						Trench 2 East, Loc. 6	LH II or early LH III
Mixture of second and third cultural layer	G11-12, Loc. 7+9						
Third cultural layer	E10-11, Loc. 9; E12-13, Loc. 8, G9, Loc. 8; G9-11, Loc. 7; I12-13, Loc. 8; J7, Loc. 8 and 9; J8-9, Loc. 8; K6-7, Loc. 8	E1-2, Loc. 4	E6-7, Loc. 4	-	F, Loc. 4	Loc. 3 in all excavated squares	MBA
Poss. fourth cultural layer?		E1-2, Loc. 5					
Reddish-brown sterile soil	E14, Loc. 6	E1-2, Loc. 6	E6-7, Loc. 5	-	-	Loc. 4 in all excavated squares	
Bedrock	E10-11, Loc. 13						

Fig. 7. Table comparing the stratigraphy of Area 1, the large trial trench and trenches E1-2, E6-7, E21-22 and F.

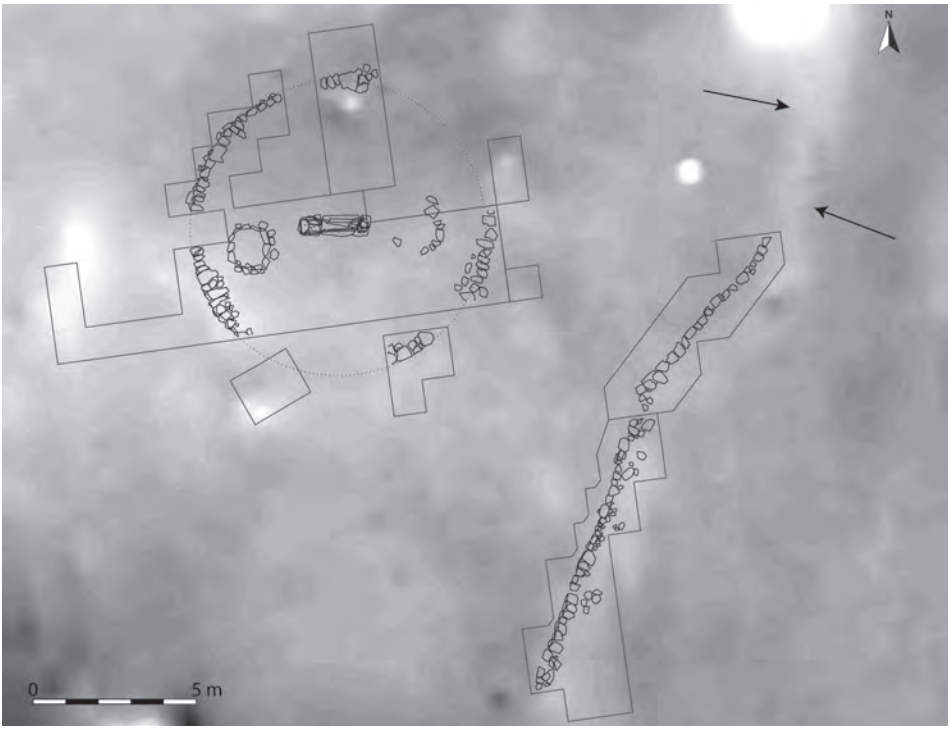


Fig. 8. Magnetometer map of the northern part of Goutsoura, on which the trial trenches, the terrace wall and the tumulus are marked. The approximative continuation of the terrace wall is marked with arrows.

its continuation could unfortunately not be followed due to the beehives. Indications of other walls were visible on the magnetometer map close to Trench D, where also one of the concentrations of phosphorous anomalies had been detected (Fig. 8). On the basis of these findings we decided to continue in 2009-2010 with more extensive excavations in three areas: Area 1 along the terrace wall to the north of the large trial trench of 2008, Area 2 next to Trench D, and Area 3 in the south part of the nook, close to the second concentration of phosphorous anomalies.

Stratigraphy of Area 1

At the beginning of the excavation season of 2009 a general coordinate system for the site was created in which the coordinates grow from east to west and from north to south. This coordinate system was from then onwards followed in all excavation areas, where excavated squares were named according to the coordinates of the square's northeastern corner. Area 1 was located along the continuation of the terrace wall towards the north of the part that had been exposed in 2008. The main aim of Area 1 was to clarify the stratigraphy around the terrace wall and to date the terrace wall. Area 1 covered a total of 13 m^2 and exposed another 7 m of the terrace wall. The size of the squares in Area 1 was 1x1 m, although some half squares also were excavated in order to facilitate the uncovering of the terrace wall (Fig. 9).

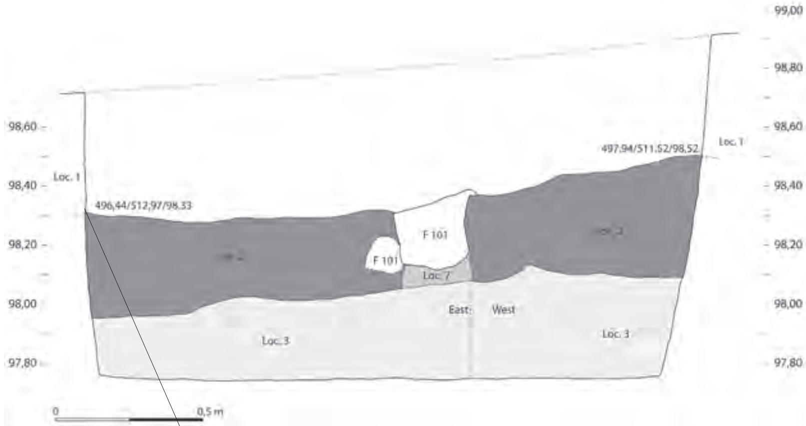
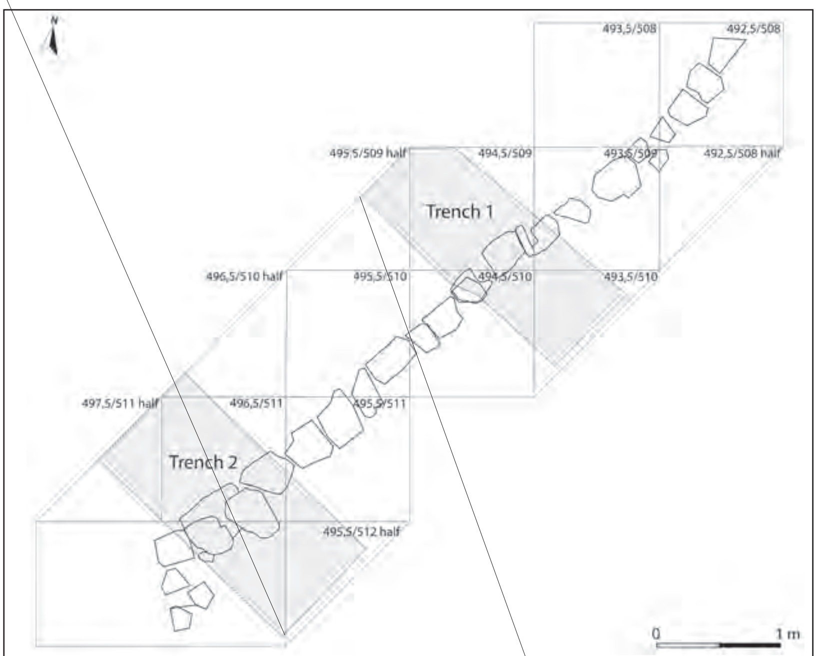
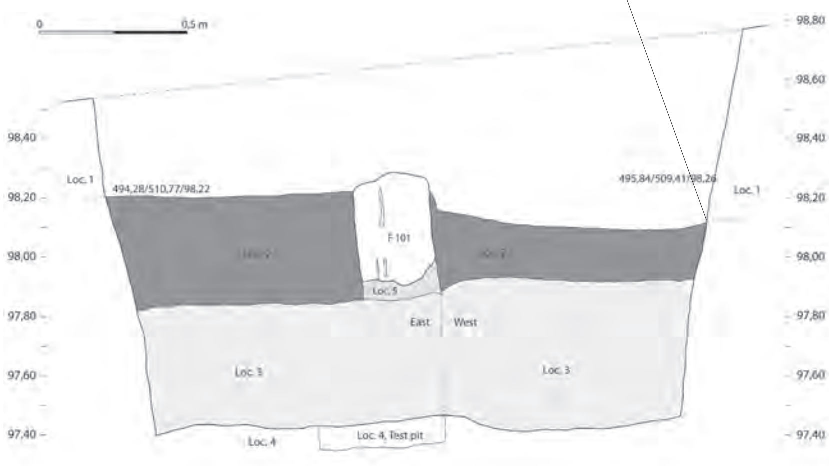


Fig. 9 (right). Excavated squares and trenches in Area 1.

Fig. 10a (above) and 10b (below). Profile drawings of Trench 1 and Trench 2 showing sections cut through the terrace wall.





The topsoil, which was called Loc. 0, was removed by a backhoe. Because the topsoil was thinner here than in the trial trench of 2008 the backhoe accidentally cut somewhat into the uppermost first cultural layer, which was called Loc. 1. The thickness of the part of Loc. 1 that was excavated was thus only ca. 15-30 cm. This layer was brown in colour and included close to no stones, but lots of pottery, although with few lithics and animal bones. The upper part of the wall was encountered already at a depth of some 25-50 cm below surface (closer to surface in the northern part). When the terrace wall became visible it was decided to dig two trenches through the wall. In these trenches, called Trench 1 and Trench 2, the finds were collected separately from the two sides of the terrace wall.

Loc. 2, which is the second cultural layer and begins somewhat below the uppermost part of the terrace wall, was thus excavated as Trench 1 West, Loc. 2 and Trench 1 East, Loc. 2, with the finds from the west of the wall collected separately from the finds originating on the east side of the wall (Fig. 10a-b). The wall itself was considered to belong to the east side of the trench. Loc. 2 is between 20 and 30 cm thick and was characterised by a large number of white pebbles, the number of which was larger on the east than on the west side. It was brown in colour and also included pottery, lithics, animal bones and charcoal. This second cultural layer actually continued slightly below the wall itself. The part of it excavated immediately below the wall was sampled separately as Loc. 5 in Trench 1 and as Loc. 7 in Trench 2. The terrace wall itself consists of only one layer of stones in Trench 1, whereas there are two layers of stones in Trench 2. The soil between the two layers of stones of the wall in Trench 2 was sampled separately as Trench 2 East, Loc. 6.

Below the second cultural layer followed a third cultural layer that was easily recognised through an obvious decrease in the number of white pebbles, although the soil otherwise remained similar to that of Loc. 2. The layer, which was ca. 30-40 cm thick, was homogenous all over Area 1 and was located in its entirety below the terrace wall, which it thus clearly predates. It was characterised by less pottery and lithics, but by an increasing number of animal bones. The number of finds decreased towards the bottom of Loc. 3, when inclusions of reddish soil also began to appear. Below the third cultural layer followed a hard, dry red soil with white gravel limestone and sand inclusions. A small test pit dug into Loc. 4 produced very few finds, seemingly indicating that this is the sterile bottom.

The stratigraphy recorded in Area 1 very much resembles that observed in the large trial trench and in trenches E1-2, E6-7 and F in 2008 (Cf. Fig. 6). Below the topsoil there were thus three consecutive cultural layers. The uppermost first layer clearly postdates the terrace wall whereas the lowermost or third layer antedates it. Two possible solutions can be suggested concerning the chronological relation between the terrace wall and the second cultural layer. Either the wall was dug into this layer at the time of its construction or the layer was formed contemporaneously with the construction of the wall in order to make it sturdier. The fact that this second layer also continued further away from the wall itself, e.g. in squares E1-2 and F, may support the first option, whereby the second cultural layer also would antedate the construction of the wall.

On the basis of the C-14 dates already mentioned above the lowermost or third cultural layer seems to date to the MBA, the wall itself being contemporaneous with LH II or early LH III, whereas the uppermost layer probably dates to the late LBA or possibly even later. The second cultural layer should be early or mid-LBA in date, if it existed before the construction of the terrace wall.

Stratigraphy of Area 2

Area 2 is located next to Trench D. Its main aim was to collect more information about the clean EBA layer that had been encountered in Trench D. Furthermore, we wanted to clarify whether there existed any remains of buildings here, as the faintly visible and possible walls seen on the magnetometer map and the high phosphorous anomalies obtained indicated. The aim of the excavation in this area changed somewhat when the perimeter wall of a tumulus was found during the first week of work. Henceforth we concentrated on uncovering as much as possible of the tumulus,[9] which had been constructed on top of the EBA cultural layer. Area 2 was excavated for two years in 2009-2010 and encompassed a total of ca. 62 m^2. The size of the excavated squares was mostly 2x1 m (Fig. 11).

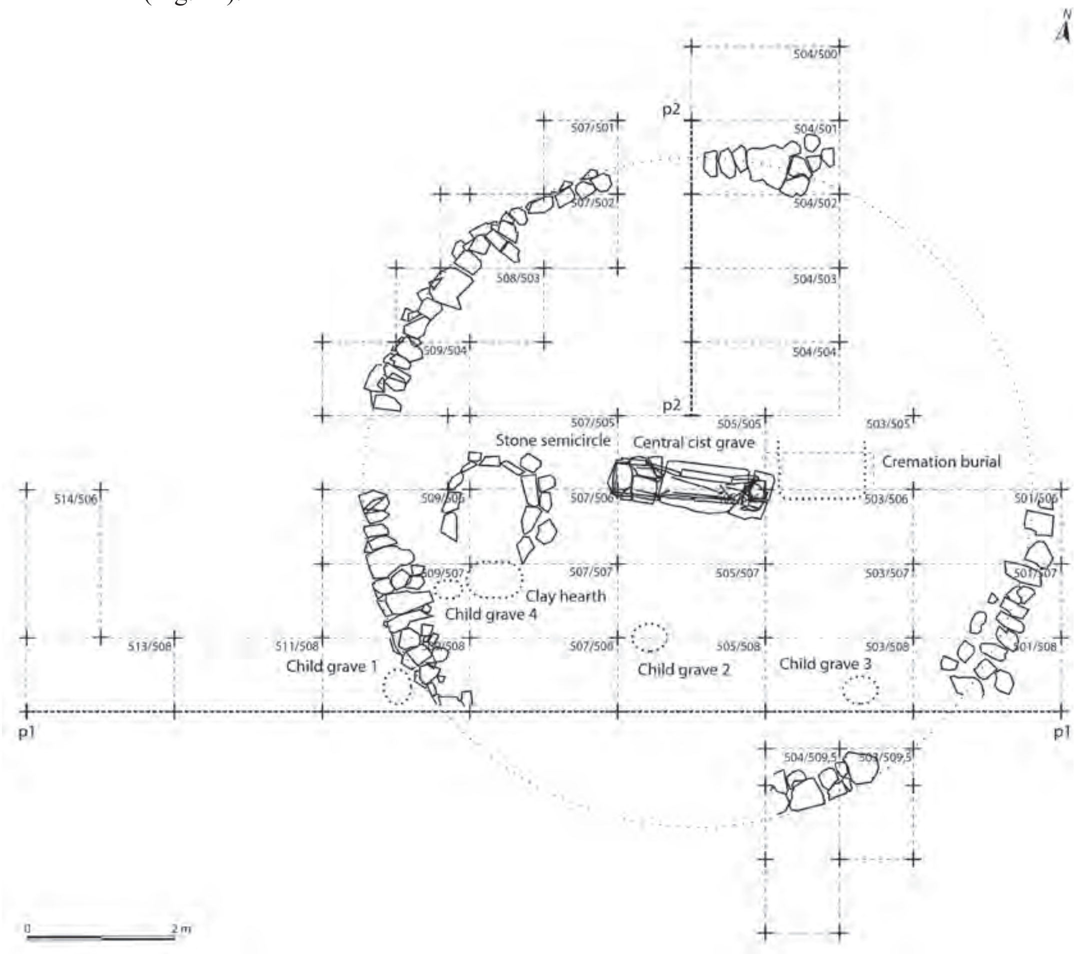


Fig. 11. Excavated squares and features in Area 2. p1 - p1 marks the long section drawn in Fig. 12 and p2 - p2 the shorter section drawn in Fig 13.

[9] For a detailed description of the tumulus and its construction, cf. Lima, this volume.

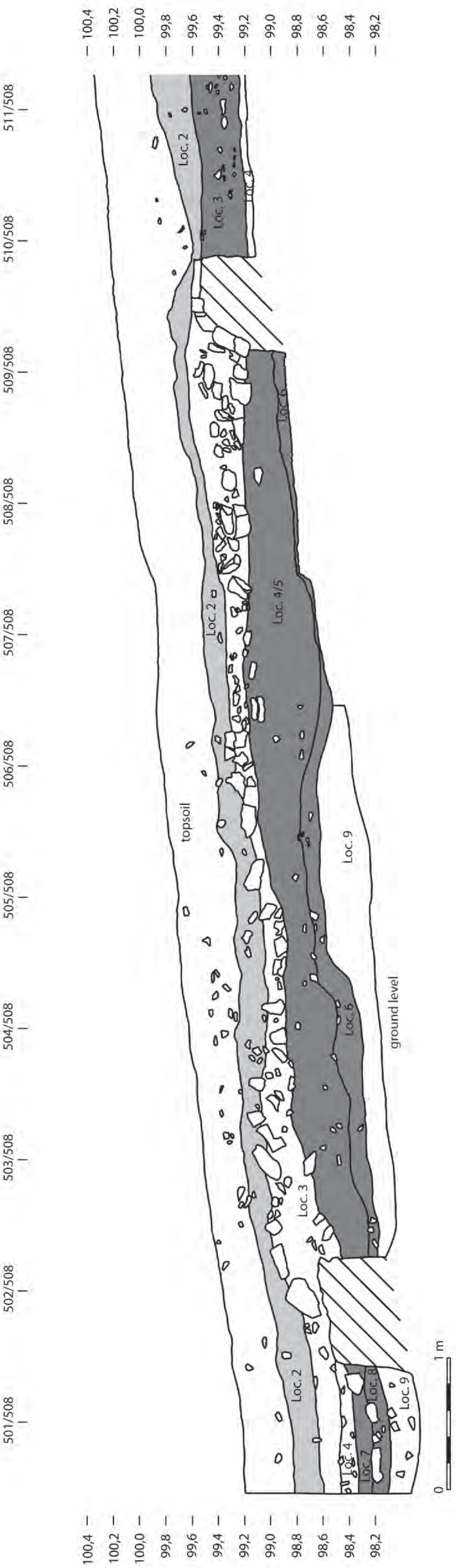


Fig. 12. Profile drawing of the long west to east running section, which cuts through the southern part of the tumulus in Area 2.

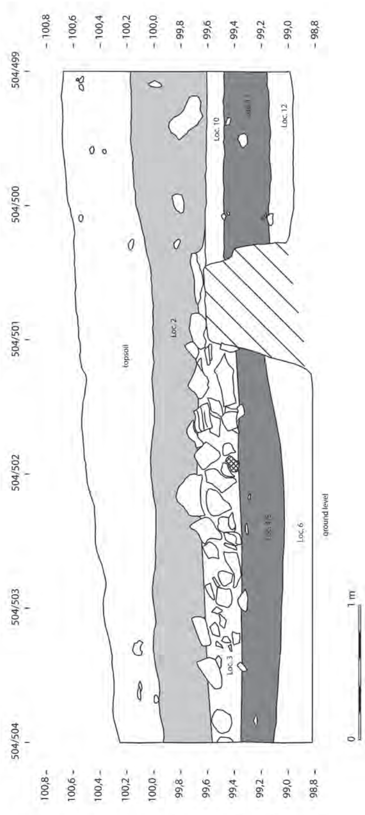


Fig. 13. Profile drawing of the south to north running secondary section, which begins close to the centre of the tumulus.

The stratigraphy of Area 2 is rather simple, although there are minor differences between the parts excavated in 2009 and 2010, depending on who functioned as trench master. A 14 m long west to east running section was created through the tumulus (Fig. 12). Another shorter, only 5 m long south to north running section was drawn roughly from the centre of the tumulus towards the north (Fig. 13). These profile drawings describe the stratigraphy rather well. Below the 20-40 cm thick topsoil (excavated as Loc. 0 and Loc. 1), which consisted of brown granular soil mixed with some stones, but only few finds, followed the first cultural layer that covered the tumulus itself. This uppermost or first cultural layer was throughout Area 2 excavated as Loc. 2, except for squares 503/509.5 and 504/509.5, where it was excavated as Loc. 2-5 and Loc. 2-4, respectively (Fig. 14). The first cultural layer consisted of dark brown clayish soil with plenty of pottery, lithics, bones and some charcoal, but very few stones. Its thickness varied between ca. 10-15 (above the tumulus) and 30-40 cm (outside the tumulus).

The border between the end of the topsoil and the first cultural layer was sometimes difficult to distinguish and in some squares the change from Loc. 1 into Loc. 2 may have been made somewhat too late. This at least seems to be the case in some squares where the number of finds towards the bottom of Loc. 1 increases. Another example is constituted by 503/508, Loc. 51, a child burial which, according to the trench master report, was found in the lowermost part of Loc. 1. This grave (Child grave 3) is clearly secondary to the tumulus, but could, due to its location close to the border of Loc. 1 and Loc. 2, perhaps also be part of the uppermost first cultural layer. It would then belong to the same uppermost cultural layer that covers the tumulus as also Child grave 4 in square 509/507).

Inside the perimeter wall the tumulus was filled with stones of fist- and head-size mixed with pottery, lithics, bones and dark brown soil. The fill of the tumulus was called Loc. 3 and was 20-40 cm thick. The central cist grave of the tumulus was inserted into Loc. 3 which also contained a child burial (Child grave 2) in square 505/508, sampled as C, with a possible cover slab close by in square 505/507. Part of the finds in Loc. 3, as well as inside the cist grave, has clearly come together with the soil and stones collected to cover the area inside the perimeter wall of the tumulus, and thus predate the tumulus itself. Loc. 3 and the filling of the central cist grave thus include quite a few finds from the EBA cultural layer on top of which the tumulus was constructed.

Below the stone filling of the tumulus followed a clear second cultural layer, which sometimes was excavated as two different loci, Loc. 4 and Loc. 5. Both loci were dark brown in colour and contained large amounts of finds, although there were somewhat more stones in Loc. 4 and the amount of charcoal increased from sporadic spots to wider areas in Loc. 5. Loc. 4 and Loc. 5 most likely belong to one and the same cultural layer, the thickness of which is ca. 30-40 cm. A third possible cultural layer, Loc. 6, with a thickness of 10-20 cm, occasionally followed below the second cultural layer. Loc. 6 was reddish dark brown in colour and contained more sand than Loc. 5, but was still clayey. There were some pieces of charcoal, but the number of finds clearly diminished when compared to Loc. 5. The composition of Loc. 6 slowly changed into reddish gravel when approaching the sterile layer Loc. 9. Loc. 6 has in Figs. 12-13 been separated as a possible third cultural layer of its own, but it may as well constitute the lowermost part of the second cultural layer, i.e., belong together with Loc. 4 and Loc. 5.

The second cultural layer contained large amounts of Corded Ware pottery, lithics (including some sickle elements on blades with silica gloss), spindle whorls, bobbins

	Above, inside and below tumulus	Outside the tumulus	Date of layer
Topsoil	501/507, Loc. 1; 501/508, Loc. 1; 503/506, Loc. 0-1; 503/507, Loc. 1; 503/508, Loc. 1; 503/509.5, Loc. 1; 504/509.5, Loc. 1; 505/505, Loc. 1; 505/506, Loc. 1; 505/507, Loc. 1; 505/508, Loc. 1; 507/501, Loc. 1; 507/502, Loc. 1; 507/505, Loc. 1; 507/506, Loc. 1; 507/507, Loc. 1; 507/508, Loc. 0-1; 508/503, Loc. 1; 509/504, Loc. 1; 509/506, Loc. 0-1; 509/507, Loc. 1;	511/508, Loc. 0-1; 513/508, Loc. 0-1; 514/506, Loc. 0-1	?
Child burial in lower topsoil/upper first cultural layer	503/508, Loc. 51		
Uppermost/first cultural layer	501/506, Loc. 2; 501/507, Loc. 2; 501/508, Loc. 2; 503/506, Loc. 2; 503/507, Loc. 2; 503/508, Loc. 2; 503/509.5, Loc. 2-5; 504/500-504, Loc. 2; 504/509.5, Loc. 2-4; 505/505, Loc. 2; 505/506, Loc. 2; 505/507, Loc. 2; 505/508, Loc. 2; 507/501, Loc. 2; 507/502, Loc. 2; 507/505, Loc. 2; 507/506, Loc. 2; 507/507, Loc. 2; 507/508, Loc. 2; 508/503, Loc. 2; 509/504, Loc. 2; 509/506, Loc. 2; 509/507, Loc. 2	504/500-501, Loc. 10 (?); 511/508, Loc. 2; 513/508, Loc. 2; 514-506, Loc. 2;	Late LBA and/or EIA
Stone filling of tumulus	501/506, Loc. 3; 501/507, Loc. 3; 503/506, Loc. 3; 503/507, Loc. 3; 503/508, Loc. 3; 504/502-504, Loc. 3; 505/505, Loc. 3; 505/506, Loc. 3; 505/507, Loc. 3; 505/508, Loc. 3; 507/505, Loc. 3; 507/507, Loc. 3; 507/508, Loc. 3; 509/507, Loc. 3	509/508, Loc. 3 (child burial below flat stone just outside of tumulus perimeter wall, same depth as stone filling)	Late MBA or early LBA
Cremation burial below tumulus	Upper part of 503/505, Loc. 5-6 (excavated as one entity), probably mainly p. 1.		MBA
Second cultural layer, partly below tumulus	501/506, Loc. 4-5; 501/507, Loc. 5; 501/508, Loc. 5; 503/506, Loc. 4-5; 503/507, Loc. 4-5; 503/508, Loc. 4-5; 504/502, Loc. 4-5; 504/503, Loc. 4-5; 504/504, Loc. 4-5; 505/507, Loc. 4-5; 506/507, Loc. 4; 505/508, Loc. 4-5; 507/505, Loc. 4-5; 507/507, Loc. 4-5; 507/508, Loc. 4-5; 509/507, Loc. 4	501/507, Loc. 7 (?); 501/508, Loc. 7 (?); 501/507-508, Loc. 8; 504/500-501, Loc. 11; 509/508, Loc. 4; 511/508, Loc. 3-4; 513/508, Loc. 3	EBA
Possible lowermost cultural layer below tumulus	501/506, Loc. 6; 501/507, Loc. 6; 501/508, Loc. 6; 503/506, Loc. 6; 503/507, Loc. 6; 503/508, Loc. 6; 504/502-504, Loc. 6; 504/504, Loc. 6; 505/507, Loc. 6; 505/508, Loc. 6		EBA
Sterile soil	501-505/508, Loc. 9	504/500-501, Loc. 12	

Fig. 14. Table summarising the stratigraphy of Area 2. Locus entities that could not be included into this table were: 503/505, Loc. 0-4 or Loc. 1-4 (removed as one entity in order to reveal cremation burial on last day of excavation 2010, lowermost part may belong to cremation burial itself); 501/507, Loc. 3 and 501/508, Loc. 3 (most of these entities belong to the stone filling inside the tumulus, but the entities were also extended outside the tumulus perimeter wall, where they probably belong to the uppermost cultural layer); 501/507, Loc. 4 and 501/508, Loc. 4 (most of these entities belong to the cultural layer following below the tumulus, but the entities were also extended outside the tumulus perimeter wall, where they probably belong to the uppermost cultural layer).

and some bone artefacts (including a bone needle). Large amounts of mostly unburnt animal bones were also collected. Pieces of daub and burnt clay indicate the existence of huts, although their exact location was not found. A burnt area was found in square 507/507, Loc. 4, where we in 2009 encountered a ca. 80x70 cm large and 10 cm thick area consisting of lots of charcoal, burnt clay, bones (including some burnt examples) and only few finds. This feature was interpreted as a possible hearth, as all the bones collected here were animal bones.

The clear-cut stratigraphy inside the perimeter wall of the tumulus was disturbed by the find on the last days of the excavation season in 2010 of an approximately 110 cm long and 5-6 cm thick charcoal layer which was spotted in the northern profile of 503/506 (cf. Fig. 6 in Lima, this volume). This layer is located ca. 95 cm below surface roughly along the border between Loc. 4 and Loc. 5. Part of this charcoal layer had been noted while digging the northernmost side of square 503/506, but had not been treated as an entity of its own. During the last day the trench was extended northwards by 0.5 m in the hope that we would be able to document this feature in its entirety, a hope that finally proved in vain, as the feature continued even further towards the north.

The soil above the charcoal layer in square 503/505 was removed in one entity as 503/505, Loc. 0-4. Some 20 cm above the charcoal layer almost half of a vessel was found together with the top of a bone needle. The charcoal layer itself was excavated together with the find-rich layer below it as one entity called 503/505, Loc. 5-6. The soil from the charcoal layer and just above it contained burned human bones. We are thus here dealing with a cremation burial, which took place in a shallow pit dug into the pre-existing second cultural layer. Due to the lack of time the stratigraphy of the cremation grave is unclear. The grave probably consisted of the charcoal layer connected with the soil covering it, whereas the soil below the charcoal layer belonged to the EBA cultural layer.

C-14 samples help us in dating the stratigraphical sequence observed next to the tumulus.[10] The second cultural layer can thus, together with rather homogenous pottery finds, be dated to the early or mid-EBA (2920-2615 cal. BC). The cremation burial in its turn can be dated to the early or mid-MBA (1955-1865 cal. BC). For the tumulus, which had been constructed on top of the EBA cultural layer and the MBA cremation burial, we have only one C-14 sample that was taken from a human bone from the central cist grave. The date of this sample (1780-1610 cal. BC), indicates that the tumulus itself was constructed at some stage during the late MBA or early LBA. The uppermost cultural layer that covers the tumulus postdates the tumulus. Here we have no C-14 samples, but it seems, on the basis of stratigraphy, pottery and a comparison with the similar-looking uppermost layer in Area 1 and Area 3, to date to the late LBA or EIA.

Finally, Area 2 was also extended somewhat outside the perimeter wall of the tumulus. On the west side of the tumulus the upper stratigraphy was simple (Fig. 12). The topsoil was ca. 40 cm thick. Below it followed the same uppermost cultural layer that was also observed above the tumulus. At a depth of ca. 80 cm below surface a thin layer of small stones was encountered, which indicated the beginning of the second cultural layer. It was excavated as two different loci, Loc. 3 and Loc. 4, together having a thickness of ca. 30-40 cm. Below this second cultural layer followed a sterile reddish gravel layer.

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[10] Further on the dates of the C-14 samples and the implication for the tumulus, see Appendix and Lima, this volume.

This stratigraphical sequence seems to be correct except for next to the perimeter wall of the tumulus, where part of Loc. 3 must belong to a phase contemporaneous with the tumulus. This is illustrated by the child burial (Child grave 1), which was found below a flat stone block in square 509/508, Loc. 3 just outside the perimeter wall.

Two different layers, Loc. 10 and Loc. 11 were noted below the first cultural layer on the north side of the tumulus (Fig. 13). The lower one, Loc. 11 is probably contemporaneous with the second cultural layer represented by Loc. 4-5 inside the tumulus, whereas Loc. 10, due to some possible iron slag, should more likely be interpreted as part of the uppermost cultural layer. Two loci, Loc. 7 and Loc. 8, on the south side of the tumulus, have also been interpreted as belonging to the second cultural layer (Fig. 12).

If the interpretation of the stratigraphical sequence outside the tumulus perimeter wall in Area 2 is correct, then the perimeter wall must, at the time of its construction, have been dug down into the EBA cultural layer. The soil thereby removed was probably partly used for the stone/soil filling inside the perimeter wall (Loc. 3), which would explain why so much EBA pottery also was found in that layer.

Stratigraphy of Area 3

Area 3 is located some 70 m to the south of Area 2. Our interest was turned to this part of the nook by the anomalous concentration of phosphorous recorded here. Some prehistoric pottery had also been noted here on the surface while taking the soil samples in 2008 (Fig. 4). Work in Area 3 was launched in 2009 by the opening of a small trial trench, called Trench L. The size of Trench L was originally 2x1 m, although it later was enlarged into 2x2 m. Trench L revealed a cist grave (Grave 1). In order to find out whether this cist grave possibly belonged to a second tumulus we opened up Area 3 around it in 2010. The total size of Area 3 (including Trench L) was 50 m^2. The size of the excavated squares in Area 3 was 2x2 m, although in some cases only half of a square was excavated (Fig. 15).

The stratigraphy recorded in Trench L above the cover slab of the cist grave consisted of three layers. The topsoil (Loc. 1) was a ca. 15-20 cm thick loose granular dark brown soil, including limestone blocks of different sizes, but only few finds. Below it followed a ca. 20 cm slightly less brown, loose soil layer (Loc. 2) with only a few small stones and some pottery, below which lay a ca. 20 cm thick brown soil layer (Loc. 3) with both small limestones and some larger ones. This layer, in which most of the pottery, lithics and bones was found, stopped at a depth of ca. 60 cm below surface when the cover slab of the cist grave was revealed.

The same stratigraphy observed in Trench L could in general be observed in all of Area 3, although the stratigraphical sequence was never pursued well enough due to all the time and effort the excavation of the cist graves required. The general stratigraphy was pretty simple and can be followed by comparing the profile drawing of the south to north running section (Fig. 16) with the table comparing the differing locus numbering in the excavated squares (Fig. 17). The topsoil, which had a depth of ca. 25-30 cm and a dark reddish brown colour, was entirely removed by backhoe. It included some single finds, but much less than the subsequent loci. Below the topsoil followed a cultural layer which was slightly redder than the topsoil and included more pottery, lithics, animal bones and some charcoal particles. This layer, the depth of which was 10-20 cm, covered all of Area 3 and thereby also all the graves.

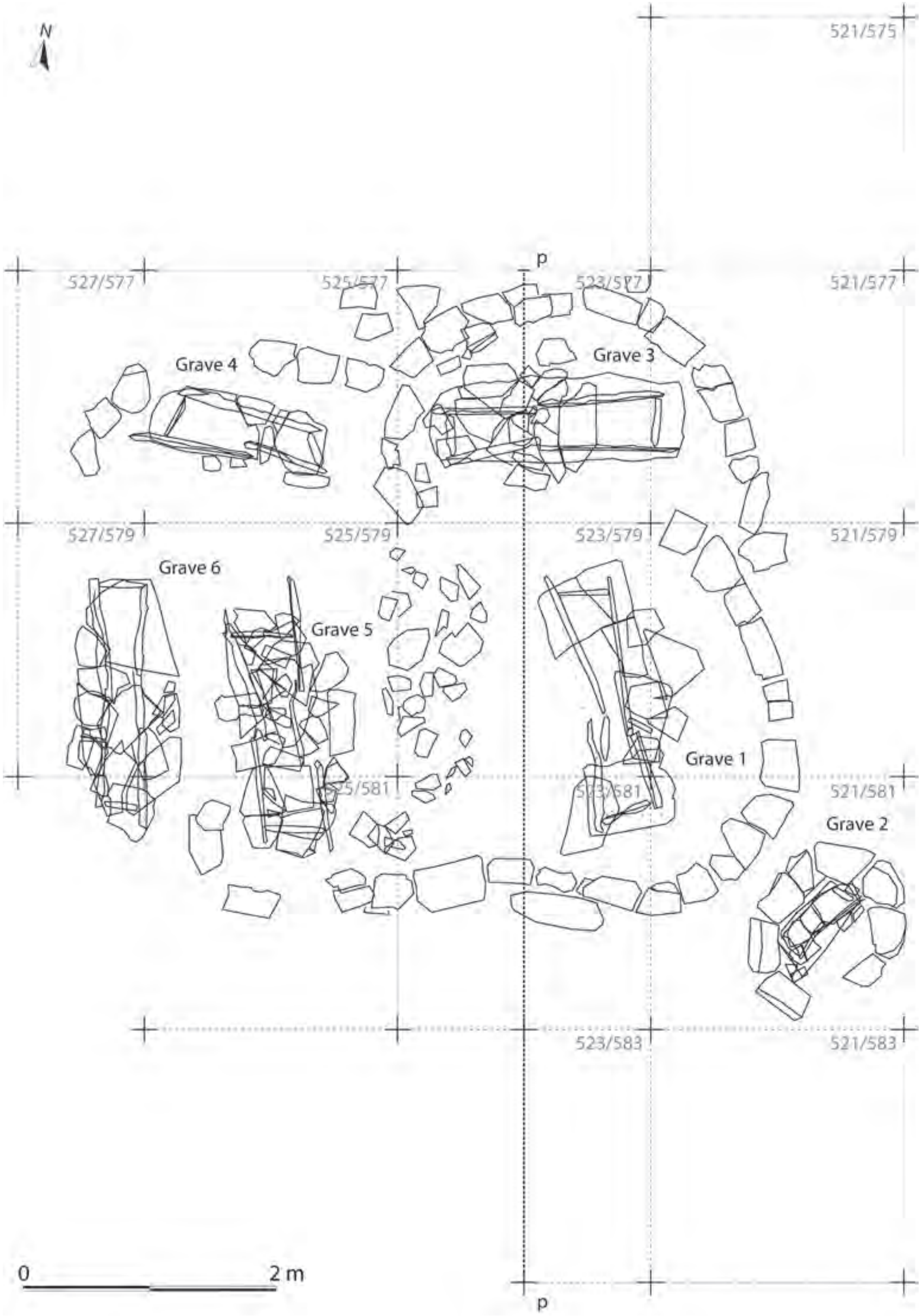

Fig. 15. Excavated squares and graves in Area 3. p - p marks the section drawn in Fig. 16.

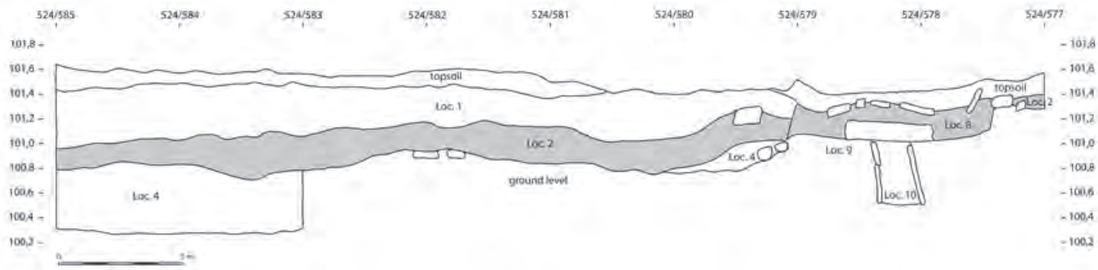

Fig. 16. Profile drawing of south to north running section, which cuts through Area 3.

	Trench L	Area 3	Date
Topsoil	Loc. 1	Removed by backhoe	
Uppermost cultural layer	Loc. 2	521/575, Loc. 0; 521/577, Loc. 0; 521/579, Loc. 0; 521/581, Loc. 0, p. 1; 521/583, Loc. 0, p. 1-2; 523/577, Loc. 0; 523/579, Loc. 1; 523/581, Loc. 1; 523/583, Loc. 1; 525/577, Loc. 1; 525/579, Loc. 1; 525/581, Loc. 1	Late LBA to EIA
Pebble layer above and on the outer side of stone circles	Loc. 3	521/575, Loc. 1; 521/577, Loc. 1; 521/579, Loc. 1; 521/577-579, Loc. 3; 521/581, Loc. 0, p. 2-3; 521/581, Loc. 1; 521/583, Loc. 0, p. 3-4 and Loc. 1; 523/579, Loc. 2; 523/581, Loc. 2; 523/583, Loc. 2; 525/579, Loc. 2; 525/581, Loc. 2	Late MBA to Early LBA
Soil layer above and on the outer side of stone circles		523/577, Loc. 2; 525/577, Loc. 2 and Loc. 11; 527/577, Loc. 2; 527/579, Loc. 2	
Soil layer inside stone circles		521/577, Loc. 8 (2); 521/581, Loc. 2E; 521/581, Loc. 7; 523/577, Loc. 8 and Loc. 9; 525/577, Loc. 12; 525/579, Loc. 12; 525/581, Loc. 12; 527/577, Loc. 12; 527/579, Loc. 4	Late MBA to Late LBA
Graves	Grave I	521/581, Loc. 5-6 (Grave 2, Loc. 5 between the two different cover slabs, Loc. 6 the actual cist filling); 523/577, Loc. 10 (Grave 3); 525/577, Loc. 13 (Grave 4); 525/579, Loc. 14 and 15 (Grave 5); 527/579, Loc. 16 (Grave 6)	Late MBA to Late LBA
Sterile bottom		523/583, Loc. 4 (only excavated in this square); 521/577, Loc. 9; 523/577, Loc. 9 (including a handful of pottery)	

Fig. 17. Table summarising the stratigraphy of Area 3.

Below the uppermost cultural layer followed a pebble layer, which consisted of similar soil as in the uppermost cultural layer, but here was mixed with a large amount of small white limestone pebbles. Most of the finds from Area 3 came from this layer which, especially in squares 521/577-579 and 523/581-583, produced large amounts of pottery, lithics, a biconical spindle whorl and animal bones. In 521/577-579 a darker spot was noted inside the pebble layer and was excavated separately (Loc. 3). The pebble layer covered the grave circles and cist graves of Grave 1, 2 and 5. The pebbles continued deeper below the uppermost stones of the grave circle, but only on the outer side of the circles. On the inner side of the grave circles the pebble layer, immediately after the uppermost stones, was followed by soil of similar colour, which was void of stones and comprised only a small number of finds.

It should be noted that the grave circles and blocks covering Grave 3 were revealed immediately below the uppermost cultural layer, i.e., they were obviously not covered by the pebble layer as was the case with the other graves. Between the uppermost cultural layer and the grave circles and blocks covering Grave 4 and 6 there was a layer of soil (525/577, Loc. 2 – above Grave 4, 527/579, Loc. 2 – above Grave 6) which was excavated as a separate entity. These loci may either be the lower part of the uppermost cultural layer covering the graves or they constitute a separate soil layer covering the graves before the uppermost cultural layer was formed. Which of these interpretations is correct cannot unfortunately be settled with certainty and these loci have therefore not been included as part of the uppermost cultural layer in Fig. 17.

The grave circles seem to have been constructed upon sterile soil and the cists also to have been cut into sterile soil. The pebble layer is probably contemporaneous with the older graves that it covered. It may originally have formed some kind of mound on top of the graves. The absence of this pebble layer on top of Graves 3, 4 and 6 may indicate that these were constructed at a somewhat later stage, whereby the pebble layer was removed. Such a difference in date may also be assumed on the base of C-14 samples taken from Graves 1, 2, 3 and 6, which seem to indicate that Graves 3 and 6 (mid- to late LBA) are somewhat later than Graves 1 and 2 (late MBA or early LBA).[11] Consequently, the pebble layer dates to the late MBA or early LBA, whereas the uppermost cultural layer dates to the late LBA or the EIA. The uppermost cultural layer in Area 3 thus seems to belong to the same phase as the uppermost cultural layer noted in Area 1 and Area 2.

Conclusion

The site Goutsoura was settled during the early and mid-EBA (ca. 2920 to 2400 cal. BC). Remains of this phase of activity were found in Area 2 and in Trench A and D. High levels of phosphorous recorded some 10 m to the east of Trench A probably indicate that the settled area continued somewhat further in that direction. The settlement was concentrated in the northernmost part of the nook and covered an area of ca. 60x20 m. The absence of diagnostic ceramics and C-14 samples dating between 2400 and 2000 cal. BC imply that Goutsoura was abandoned during the late EBA.

Human activity at Goutsoura was resumed at some stage after 2000 cal. BC, first with a cremation burial (1980-1755 cal. BC). After that the site functioned as a cemetery during the late MBA and most of the LBA (1780-1255 cal. BC). To this phase belongs the northern tumulus with a central cist grave and some child graves in Area 2, the southern cemetery in Area 3 and the terrace wall in Area 1, which altogether covered ca. 30x100 m. The cemetery phase was in Area 1 and Trench E, F, G, I, J and K preceded by an earlier cultural layer, which on the basis of one C-14 sample preliminarily has been dated to the MBA (1920-1730 cal. BC).

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[11] Further on the C-14 dates and their implication for the southern cemetery, cf. J. Forsén this volume and Lima, this volume.

All the remains of the cemetery phase are covered by what seems to be a homogenous uppermost cultural layer. This layer was documented across the whole site with exception of Trench A, B, C and H. The layer, on the basis of some diagnostic pottery (wishbone handles, kylix stems) and one C-14 sample (1320-1100 cal. BC), can be dated to the late LBA and/or EIA. This final cultural layer at Goutsoura does not contain any explicit signs indicating that the site would have been settled, although there are abundant remains of some kind of activity (pottery, animal bones and lithics). It thus remains uncertain whether the site anew was settled (perhaps on a seasonal basis?) or whether the uppermost cultural layer rather was created by people revisiting the cemetery as a place of communal memory and ongoing tradition.

Appendix. The AMS date sequence

During the excavations at Goutsoura a total of 16 accelerator mass spectrometry (AMS) samples were taken and analysed. Three samples are from Area 1 or the large trial trench, seven from Area 2 or Trench D, four from Area 3 and finally another two from the small trial trench A. The results of the analyses are summarized in Fig. 18 as calibrated BC at a 95.4 percent probability (± 1 σ).

Area 1 and the large trial trench of 2008 are both transected by a terrace wall. The three AMS samples from Area 1 were all taken next to the terrace wall: Hela-1807 from a piece of charcoal from the lowermost cultural layer (K6-7, Loc. 8), which predates the terrace wall, Hela-2105 from a small animal bone found built into the terrace wall (Trench 2East, Loc. 6), and Hela-1809 from a piece of charcoal from the uppermost cultural layer, which is accumulated on top of the terrace wall (J8-9, Loc. 2).

A total of seven AMS samples were taken from Area 2 or next to it, where we had a EBA cultural layer, superseded first by an MBA cremation burial and then by a tumulus. Four of these samples were taken from charcoal collected from the EBA cultural layer: Hela-1808 from Trench D2, Loc. 5, Hela-2103 from square 508/508, Loc. 5, Hela-2104 from the possible fireplace in square 507/507, Loc. 4, and finally Hela-2499 from square 504/503, Loc. 5). Two charcoal samples belong to the MBA cremation grave: Hela-2497 (503/505, Loc. 5) and Hela-2498 (503/506, Loc. 5), whereas a final one was taken from a piece of bone from the burial in the central cist grave of the tumulus: Hela-2102 (505/505, Loc. 3).

The main characteristic of Area 3 is a cemetery consisting of at least six cist graves surrounded by stone circles. Small pieces of human bones sampled from four of the cist graves were AMS dated. Hela-2101 is from Grave I, Hela-2501 from Grave II, Hela-2502 from Grave VI and Hela-2503 from Grave III. It has to be added that the detailed study of the human remains in the cist graves of Area 3 have proven that they belong to several different individuals, some of which are only represented by single bones. Unfortunately it is not possible to define with certainty from which of the individuals the AMS samples were taken.

	Lab. No.	Dat. BP	Dat. cal BC	Trench	Locus	
1.	Hela-1535	4050±40	2700 - 2470	A1	4	Trench A
2.	Hela-1536	3985±40	2620 - 2400	A2	1	
3.	Hela-1808	4050±35	2680 - 2470	D2	5	AREA 2
4.	Hela-2103	4230±37	2820 - 2670	505/508	5	
5.	Hela-2104	4234±37	2920 - 2840	507/507	4	
6.	Hela-2499	4139±34	2875 - 2615	504/503	5	
7.	Hela-2102	3415±36	1780 - 1610	505/505	3	
8.	Hela-2497	3535±31	1955 - 1755	503/506	5	
9.	Hela-2498	3560±30	1980 - 1865	503/506	5	
10.	Hela-1807	3495±35	1920 - 1730	K6-7	8	AREA 1
11.	Hela-1809	2980±35	1320 - 1110	J8-9	2	
12.	Hela-2105	3222±35	1560 - 1410	Trench 2East	6	
13.	Hela-2101	3295±36	1690 - 1490	Grave 1	2	AREA 3
14.	Hela-2501	3284±30	1755 - 1605	Grave 2	6	
15	Hela-2502	3236±30	1565 - 1430	Grave 6	16	
16.	Hela-2503	3055±30	1415 - 1255	Grave 3	10	

Fig. 18. AMS dates from Area 1, Area 2, Area 3 and Trench A of Goutsoura.

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A Geoarchaeological Study of the Goutsoura Sediments

Mika Lavento and Paula Kouki

The Bronze Age site of Goutsoura (PS 12) is one of the most many-sided of the sites that were found and excavated during the Thesprotia Expedition. It is located in a sheltered small nook on the lowermost eastern slope of the Liminari hill. Today, a small dirt road running at the foot of the hill divides the site into two parts, of which the larger part is located on the alluvial fan of the nook itself, whereas a smaller part is located to the east of the dirt road in the cultivated field. Just to the northwest of the nook, slightly higher up on the slope, there is a small terrace forming a third separate part of the site. Towards the east of the site a flat plain extending until the Kokytos opens up.

The archaeological excavation at the site was conducted mainly in the nook, in an area which has not been taken into modern cultivation and thus is better preserved as the part of the site which is located in the field to the east of the dirt road. Due to colluvial processes which have accumulated soil and gravel in the nook, several superimposed cultural layers and different structures could be detected. Some remains of the cultural layer were also observed on the uppermost terrace and at the westernmost edge of the field to the east of the dirt road.

The site was settled for the first time during the early and middle phases of the Early Bronze Age (ca. 2920-2400 cal. BC), after which it may have been abandoned for some 400 years before being used again as a cemetery during the late Middle Bronze Age and most of the Late Bronze Age (ca. 2000-1250 cal. BC). Finally, there is a late cultural layer that covers the graves and dates to between 1320 and 1100 cal. BC.[1]

After the site had been found during the field survey in 2004, it was investigated in 2005-2006 by coring and taking phosphorous samples in the field at the foot of the Liminari hill. Further samples were taken in the nook itself in 2007. The majority of these samples indicated highly anomalous phosphorous values. However, most of the geoarchaeological observations were made in 2008, when a magnetometer survey was also conducted at the site. This article will describe the results of the geoarchaeological research carried out at the site, with a special emphasis on the results of the soil cores and the phosphorous analysis.

Geological environment

Landscape archaeology is an essential part of reading the environment and its development during the Pleistocene and Holocene.[2] The northwestern part of Greece belongs to the

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[1] For the first preliminary descriptions of the site, see Forsén *et al.* 2011, 80-82; Forsén and Forsén 2012, 297-301. For a detailed description of the location and stratigraphy of the site, see Forsén, this volume. For pottery and its chronology from the site, see J. Forsén, this volume, for the preserved structures, see Lima, this volume. We owe thanks to Björn Forsén and Esko Tikkala for comments and help while preparing this chapter. All illustrations are by Paula Kouki, except for Fig. 3 which is by Esko Tikkala.
[2] Wiseman and Zachos 2003; Besonen *et al.* 2003.

area of the Alpine orogeny, which was active during the Triassic, Cretaceous and Eocene epochs as late as ca. 50-100 million years ago. The geological history itself is locally complex but the most essential local character is the ubiquitous presence of two main bedrock types: limestone has developed as an anticline and flysch as syncline in the bedrock formation.[3] The sedimentation of both limestone and flysch has taken place in deep marine environments during an early stage of the orogeny of the Pindos range, and the sedimentary rocks have later risen up through the processes of the tectonic history of the area.[4] Both of these bedrock types are primarily visible in the Kokytos valley.

Flysch is a relatively hard bedrock, consisting of coarse conglomerates or breccias. The parent rock is sandstone or mudstone, and the formations are directed upwards. They are dated from the Mesozoic era to the Eocene epoch. The flysch is a sediment rich in calcium carbonate, and both fossils and remains of chert are visible in the matrix. Typical for these formations are also greywacke-like sandstones, which are interbedded with flysch. Flysch gives the area its mountainous character, because the formations are still sharp in relief. It has been separated in the Alpine orogeny in particular, although sediments of the same kind are sometimes found also in other parts of the world.[5]

Limestone is the other main bedrock type in the region, and it is one of the most important bedrock types in the Pindos zone in general. The limestone of the area is dolomitic and its age is mainly Mesozoic, but there are also Eocene formations. Within the limestone it is possible to find fossils of, for example, calcareous algae, ammonite cephalopods and foraminifera. Despite being often heavily eroded, limestone is also present in parts of the research area and can be found in the mountain ranges.

Limestone or karst, which is the essential bedrock in the area, is particularly sensitive to weathering. The internal dynamics of the earth as well as other factors – climate, water, wind and vegetation – have influenced changes in the soil and bedrock.[6] Rain, runoff and groundwater have caused the development of dolines or sinkholes which transport water and produce subaqueous springs in the limestone bedrock.[7] It is an essential feature of these subterranean water channels that their locations have changed over time. This development results from the limestone being soft and easily soluble by groundwater. If a lot of groundwater is available, the subterranean streams and springs may change their places several times, even during a relatively short period. This characteristic of the local bedrock has influenced the location of prehistoric settlements and the possibilities for agriculture.

The large Kokytos valley, the bottom of which is more or less flat in relief, is a central element of the environment of Goutsoura. The Kokytos collects its waters from springs which are mainly located in its eastern part, on the lower slopes of the Paramythia mountain range, and in the plain itself. The water flow today is not very high during the summer in the upper course of the Kokytos.

However, the amount of water available in the area has varied during different climatic periods, which is indicated in the drillings and analyses done from the sediments

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[3] Willis 1992, 139.
[4] Runnels and van Andel 2003, 54-61.
[5] Pettijohn 1975, 571-572.
[6] Talbot and Allen 1996.
[7] Runnels and van Andel 2003, 57-68.

Fig. 1. The nook at Goutsoura in front of the horseshoe-shaped slopes of the Liminari hill, view towards the west.

Fig. 2. Part of the Bronze Age site of Goutsoura with the flat plain extending on its east side until the Kokytos and with the Paramythia mountain range in the background. View towards the southeast. The large trial trench next to Area 1 is visible to the right (arrow).

from contemporary small lakes. For example, in Lake Limnoula to the north of Goutsoura, it has been possible to separate fluvial and dry periods in the Paleocene and Holocene deposits.[8] This indicates that there has been more water available also in the Kokytos valley, which is relatively dry in our days. The drying of the environment is not only dependent on natural conditions. After the mid-twentieth century, the lowermost parts of the valley were drained by means of constructing a network of ditches, and the intensive cultivation in the valley uses considerable amounts of water for irrigation.

The average elevation of the flat plain opening up to the east of Goutsoura is ca. 101-104 masl, falling slowly off towards the southeast and the Kokytos (Fig. 1). The remains of the site are located at between 104-116 masl, i.e., just above the level of the plain.[9] With the help of the slope profile of the Liminari hill, the site can be divided into three separate areas, which can still be observed today (Fig. 2). The highest part of the site complex lies on a small terrace at an elevation of ca. 114-116 masl. Here the site is heavily eroded and no structures were observed. The main part of the site is located in the sheltered nook at an elevation of ca. 106-110 masl. The site is best preserved here due to the sheltered location at the foot of the Liminari hill. This is also where all observed structures are located. The lowermost part of the site is located to the east of the nook along the westernmost edge of the fields, on the plain itself, and is largely destroyed by modern land use.

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[8] Kluiving *et al.* 2011, 43-45.
[9] Forsén *et al.* 2011, 79.

It is important to keep in mind the central role that erosion and sedimentation have played at Goutsoura. Because the upper slope of the Liminari hill is relatively steep, erosion has led to considerable changes in environment, not only during its geological history, but also during the periods when the site was settled. Colluvial processes and cultivation have eroded a large part of soil and finds from the upper slopes and deposited them at the foot of the hill. There is even a small alluvial fan in the area of the settlement. This means that the original form of the slope has changed considerably, and the terraces which were originally used for habitation have at least partially been destroyed. It is also very probable that a large part of the archaeological material in the lowermost field does not represent the original deposition.

The site of Goutsoura has been the focus for human activity for most of the third and second millennia BC. The setting of the site must thus obviously have offered favourable living conditions for people with variable means of livelihood. Therefore it is reasonable to ask, where did the settlers get the water that is necessary for living? We know, for instance, that the Acheron plain has changed through the times because the river itself changed its course, and sedimentation took place in its alluvium.[10] Our own field observations indicate that similar phenomena have taken place also in the Kokytos valley. It is probable that in earlier times water was available in the immediate vicinity of Goutsoura, for example, due to sink holes and dwells in the limestone. At the moment, there are no functioning springs in the vicinity of the site, but a well in between the sheltered nook and the fields on its east side indicates the presence of rather rich and high groundwater within the limestone.

Soil sampling and analysis

The usability of soil phosphorus analysis for detecting archaeological sites was discovered by the Swedish scholar Olof Arrhenius as early as the 1930s.[11] Today, phosphorus analysis has developed into a standard tool in archaeology. In a large number of studies, phosphorus has been proven to be the most reliable and lasting chemical indicator of past human activity in soils.[12]

The samples at Goutsoura (Fig. 3) were mainly taken using a manually operated soil auger, although in some cases the soil was too stony for augering and a sampling pit had to be dug at first by spade. Phosphorus sampling was performed not at a fixed depth, but rather when evidence of human activity, such as tiny fragments of tile, pottery and charcoal, were noticed in the soil. Changes in grain size and soil composition were also noted from the cores.

The phosphorus samples were dried and analysed in the Archaeology Laboratory at the University of Helsinki. The analyses were carried out with a spectrophotometer using the method based on the colour intensity of the molybdenum blue complex. In this method, the soil samples are treated with 10% citric acid, which dissolves Fe and Al phosphates and easily soluble Ca phosphates, as well as some of hydroxylapatite

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[10] Runnels and van Andel 2003.
[11] Arrhenius 1935.
[12] See e.g. Holliday and Gartner 2007.

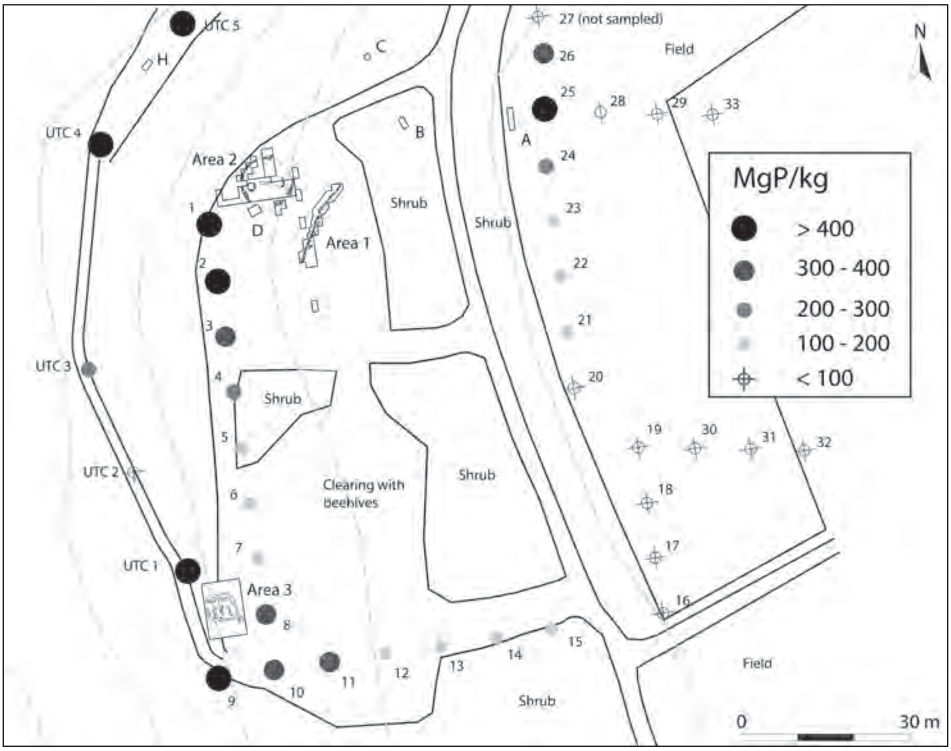

Fig. 3. Location of augering holes and distribution of phosphorous anomalies.

and soil organic phosphate compounds.[13] Although the treatment does not dissolve all the organic compounds of phosphorus, it has been shown to be adequate in recognising ancient human activity in a variety of environmental settings from the northern coniferous zone to the Mediterranean.[14] In areas, where the bedrock has a high calcium carbonate content, such as in the Kokytos valley, the soil pH tends to be alkaline or close to neutral, and organic phosphorus forms compounds mainly with the soil calcium carbonate. These compounds are dissolved by the treatment of the samples with citric acid, bringing the enriched phosphorus into solution. The samples are then sieved and reagents are added to the solution.[15]

The phosphorus content of the samples is determined by comparing the results with a calibration series prepared of samples with a known phosphorus content. The results are presented in the unit mgP/kg. Although the exact boundaries are not possible to give, in normal conditions the phosphorus values of natural soil remain below 50 mg/kg. Phosphorus contents of 50-100 mg/kg were treated as symptomatic, while phosphorus contents higher than 100 mg/kg were considered anomalous, indicating enrichment as a result of human activity.[16]

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[13] Jussila *et al.* 1989, 15.
[14] E.g. Arrhenius 1935; Lavento 2003.
[15] A full description of the method can be found in Jussila *et al.* 1989.
[16] Lavento 2003; Forsén *et. al.* 2011, 75.

Core no.	Cultural layer met at depth	Sampling depth upper/lower	P mg/kg cal.
1a	44	56-62	833
1b	44	80	783
2	30	37-46	480
3a	30	36-46	322
3b	30	49-61	284
3c	30	65-74	246
4	30	44-56	289
5	45	56-67	124
6	-	44-53	155
7	25	36-46	182
8	18	40-53	325
9	25	35	463
10	24	37-49	364
11	18	35-43	322
12	20	47-58	193
13	0	40-49	181
14	0	48-61	140
15	0	53-61	198
16	25	51-62	148
17	-	49-58	87
18	40	45-57	64
19	41	36-46	47
20	49	45-55	77
21	40	45-55	125
22	0	47-57	123
23	35	45-53	103
24	30	46-57	212
25	34	46-54	703
26	35	50-60	306
28	40	46-56	99
29	40	50-60	50
30	0	47-58	53
31	23	50-58	25
32	40	50-50	41
33	-	45-54	48
UTC1	-	54	482
UTC2	-	40-48	67
UTC3	-	45-50	260
UTC4	20	20-21	960
UTC5	-	53-60	490
PS12/01	-	50-60	25
PS12/02	-	54-64	28
PS12/03	-	50-60	35
2006/1			188
2006/2			171
2006/3			283
2007/1			408
2007/2			829
2007/3			825
2007/4			825

Fig. 4. Depth of cultural layers and phosphorous values observed in the augering holes. All depths in cm.

The first three phosphorus samples at Goutsoura were taken in 2005 in the cultivated field to the east of the dirt road (sample nos. PS 12/01-03), another three in 2006 along the westernmost edge of the same field (sample nos. 2006/1-3) and four in 2007 in the nook to the west of the dirt road (sample nos. 2007/1-4). The samples which were taken in the field showed natural levels of phosphorus (25-35 mgP/kg), whereas the samples taken along the upper edge of the field all had anomalous values (171-283 mgP/kg). However, the samples taken from the nook showed unusually high phosphorus values, ranging from 408 to 829 mgP/kg (Fig. 4).

On the basis of the results from the soil samples taken in 2005-2007, it was decided to focus further on Goutsoura, conducting trial excavations, a magnetometer survey and extensive soil sampling.[17] The purpose of the intensive soil sampling that was carried out in 2008 was to clarify the areal extent of human activity at the site by soil phosphorus analysis and to investigate erosional processes on the slopes of the Liminari hill.

Two roughly 80-100 m long, north to south running main phosphorus sampling lines were made, one in the nook, just at the foot of the slope of the Liminari hill (sample nos. 1-9), and the other one in the field below (sample nos. 16-27). A third, east to west running line connected these two main lines (sample nos. 9-16). In addition, two shorter lines oriented east to west were extended further towards the east into the field (sample nos. 19, 30-32, as well as 25, 28-29 and 33).[18] Samples were taken along these lines at intervals of 10 m. Furthermore, a series of five samples was

[17] For the progress of the work on the site, see Forsén, this volume.
[18] See Forsén *et al.* 2011, 80, fig. 3.

taken from the upper terrace on the lower slope of the Liminari hill (sample nos. UTC1-5) at intervals of 20 m (Fig. 3).

Discussion of results

The first main sampling line ran across the nook into which lead three dry ravines, bringing rainwater down from the Liminari hill. The stony topsoil, which was detected in cores 1-11, is ca. 28 cm thick in average (Figs. 5-6). The topsoil has probably been created as a result of hillslope erosion and later agricultural activities. The soil and pebbles transported

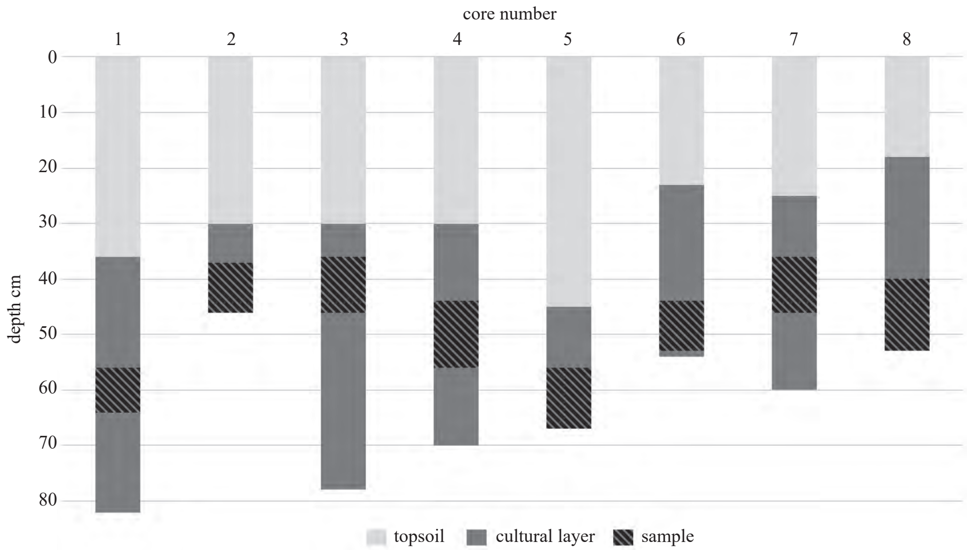

Fig. 5. The profiles of augering holes 1-8 in the nook.

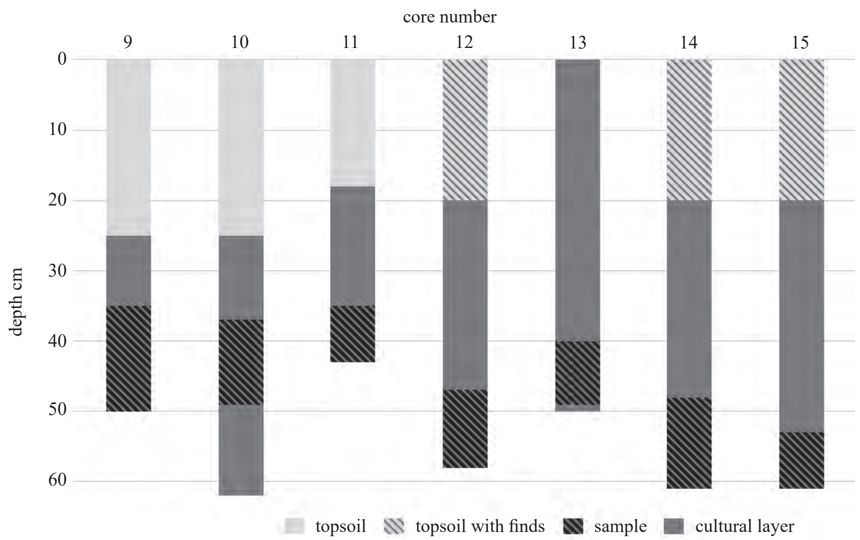

Fig. 6. The profiles of augering holes 9-15 in the nook.

by water and slope processes have buried the cultural layers of the Early to Late Bronze Age site. The upper limit of the cultural layer, indicated by the presence of pottery and tile fragments, was met at the depth of 20-45 cm. It tended to be less stony than the topsoil, consisting of fine sand mixed with gravel and pebbles. The cultural layer extended to the depth of at least 80 cm and in most cores its bottom was not met. The sampling depth for phosphorus was determined based on the presence of cultural debris in the soil, being 47-56 cm in average.

All the samples from the nook (sample nos. 1-15) have an anomalous phosphorus content, ranging from 124 to 833 mgP/kg (Fig. 4). However, in the lower part of the nook (sample nos. 12-15), there are finds mixed with the soil already beginning from the surface at the same time as the phosphate enrichment below the surface is only moderate (178 mgP/kg in average at the depth of ca. 47-57 cm). This suggests that the material on the surface may be dislocated as a result of erosional processes from higher up on the slope (Fig. 6).

The samples from the upper terrace (sample nos. UTC1-5, Fig. 7) support the idea that part of the human activity originally took place on the lower slope of the Liminari hill. There, significant concentrations of phosphorus were detected in the soil (the highest content of the site, 960 mgP/kg was measured in UTC4), even though evidence of a cultural layer was detected only in auger hole UTC4 (Figs. 4 and 7). A sterile layer of stones and pebbles, probably representing later erosional processes, extended in augering holes UTC1-4 down to a depth of 20-35 cm below the surface.

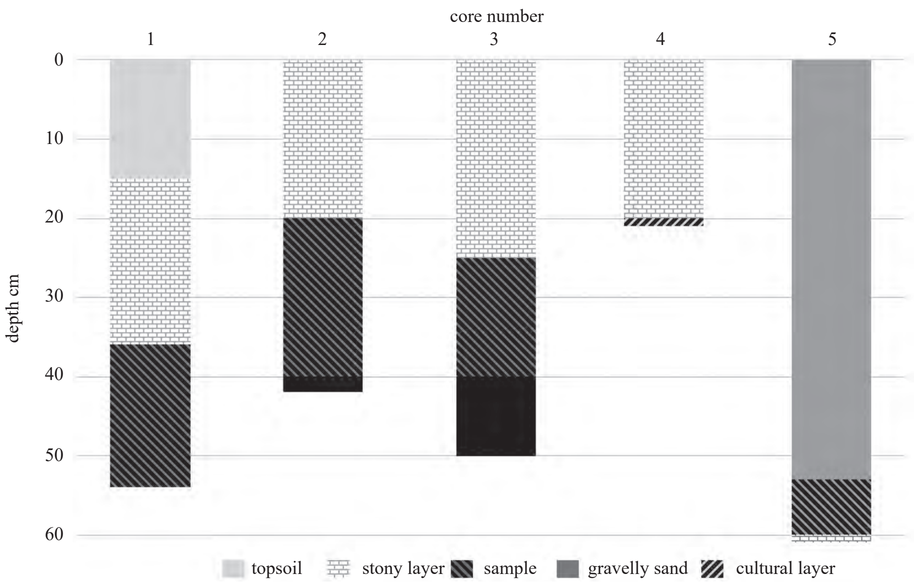

Fig. 7. The profiles of the augering holes on the upper terrace.

High phosphorus contents (212-703 mgP/kg) were only detected in the northwestern corner of the field (sample nos. 24-26), roughly at the same spot where prehistoric finds were previously collected on the surface and an EBA settlement layer was found in a trial trench at a depth of ca. 30-70 cm below the surface.[19] In the rest of the field to the east

[19] For Trench A and Area 2, see Forsén, this volume.

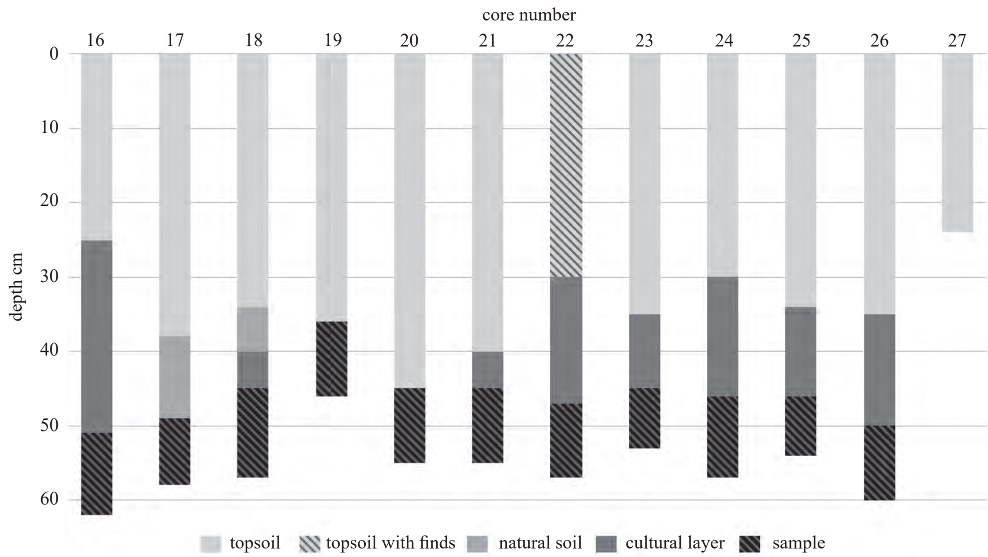

Fig. 8. The profiles of augering holes 16-27 in the field to the east of the dirt road.

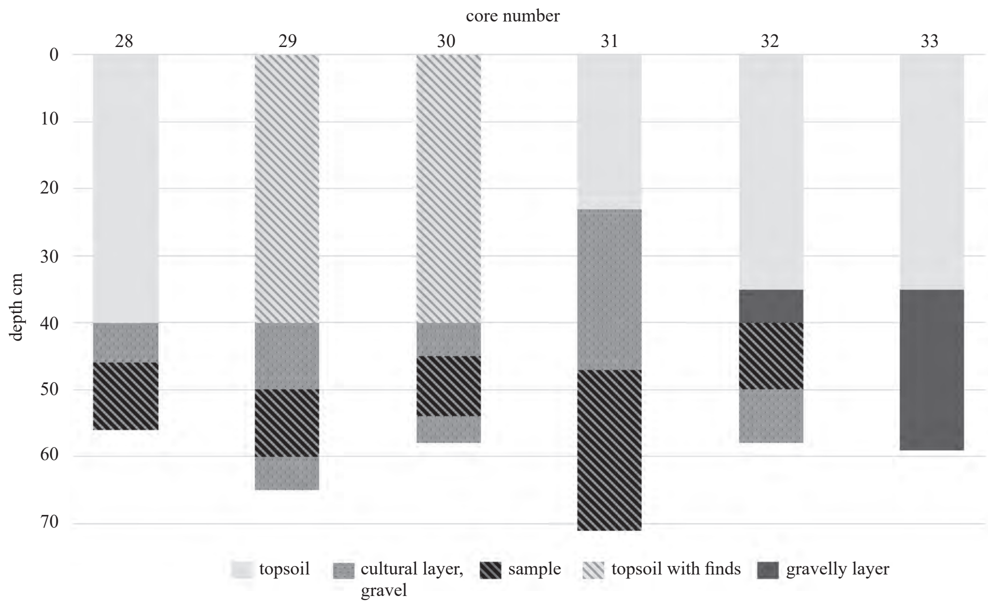

Fig. 9. The profiles of augering holes 28-33 in the field to the east of the dirt road.

of the dirt road, the phosphorous content was mainly low or moderate (25-148 mgP/kg), implying moderate to no enrichment as a result of human activity. The samples (nos. 19, 29-33) with natural, or close to natural, phosphorus content (25-53 mgP/kg) were located furthermost to the east (Figs. 4, 8-9). The topsoil is loose and stony, most likely the result of frequent tillage, and its thickness is ca. 35 cm in average. Below the plough zone, the soil is more consolidated and less stony, with an increased clay and moisture content. A cultural layer containing tiny tile and pottery fragments was met varyingly at the depth of 25-40 cm, and it extended to the depth of at least 65 cm from the surface.

Particularly in the northern part of the field, there is a distinct gravelly layer at a depth of ca. 40-60 cm, probably signifying the transport of erosional material from the hillslope by water flows. Pottery fragments continued through the gravelly horizon, indicating that it was deposited during, or after the Bronze Age. However, at places (augering holes 22, 29, 33) the finds appeared immediately on the surface, reflecting either deeper tillage and/or a change of landforms as a result of erosional processes and human activity after the Bronze Age. Towards the south and the east, with increasing distance from the slopes of Liminari, the soil is considerably less stony and more clayey. The increased clay content suggests deposition in standing water and at least seasonal presence of standing water in the area in the past, probably as shallow ponds during the wet season.

In the archaeological excavations at the site, high soil phosphorus contents were revealed to be closely related to the Early to Late Bronze Age human activity in different parts of the site.[20] The lack of enrichment of phosphorus in the samples from the field suggests that the cultural markers there mostly are redeposited. The site is, as already emphasised, located on the western edge of a wide, flat plain extending up to the Kokytos. This plain is known to have been a swampy, seasonally flooded area until it was drained in the latter half of the twentieth century. It seems probable that the edges of this swampy valley were cultivated and the cultural materials in the field to the east of the dirt road may partly be the result of manuring. The combined effects of agricultural practices together with erosional forces may explain the extensive spread of pottery fragments to the lower lying field to the east of the main site.

20 Forsén *et al.* 2011, 79-82; Forsén, this volume.

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Grave Constructions and Landscape Modification at Bronze Age Goutsoura

Sarah Lima

Introduction

Located on the lower eastern slope of the Liminari hill, the site of Goutsoura (PS 12) was identified during the first field survey season of the Thesprotia Expedition in 2004. The survey revealed some Middle and Upper Palaeolithic lithics and Early Bronze Age (EBA) ceramics covering the upper edge of a field. Phosphorus sampling, magnetometer prospection, and excavation indicated a site size of at least 90 m x 120 m (Fig. 1). The site seemed to continue up the slope toward a sheltered natural terrace, totally overgrown with maquis and grass.[1]

Since Neolithic and Bronze Age sites were underrepresented among the sites discovered by the Thesprotia Expedition, and because modern agriculture did not seem to have caused damage to the lower slope of the Liminari hill, Goutsoura was selected for excavation starting in 2007 and continuing until 2010. The objective was to examine how inhabitants of the Kokytos valley lived in comparison with inhabitants of other contemporary sites in Thesprotia and Greece throughout the Bronze Age, from 3000-1100 BC. During the investigations evidence of the way that several generations of communities organized Goutsoura's Bronze Age cemetery spaces was discovered.[2]

Goutsoura was used first as a settlement and subsequently as a cemetery during the Bronze Age. The site was inhabited between 2925 and 2400 BC (i.e., the early to mid phases of the EBA).[3] The cultural layer dating to this period is thick and continuous across the site, with no evidence of geological interruption, suggesting that the site supported a community of people engaged in farming, pastoralism, and hunting. The stratum representing the cultural layer was characterized by dark brown, sticky, clay soil with remains of wattle and daub containing low-fired ceramics, animal bone, flint flakes and stone tools (some of which contained silica gloss, demonstrating their use in harvesting).[4] Evidence of intensive occupation of the site was identified, with indicators for cultivation of plants, animal husbandry, fibre arts, and hide production.

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[1] In this chapter, site phases will be referred to, rather than locus numbers. See Forsén, this volume, fig. 1, for a map of the location of the site, a full description of the site's discovery, and the stratigraphic relationships of its features, including a full concordance of locus numbers.

[2] I am very grateful to Björn Forsén and to the Thesprotia Expedition team for the opportunity to collaborate in publishing this remarkable site. I also wish to thank Michael Galaty, Lorenc Bejko, Aristeides Papayiannis, Lynne Kvapil, Amanda Pavlick, and Brandy Vickers for their thoughtful questions and comments on various drafts of this chapter. Thanks also go to Esko Tikkala, who produced all the figures.

[3] Single lithics dating to the Palaeolithic era were identified at Goutsoura, but they could not be associated with any settlement layer on site. For soil profiles that demonstrate typical site stratigraphy for Goutsoura, see Forsén, this volume, Figs. 9a and 9b.

[4] Forsén 2011, 7; for Goutsoura's Early Bronze Age pottery, see J. Forsén, this volume.

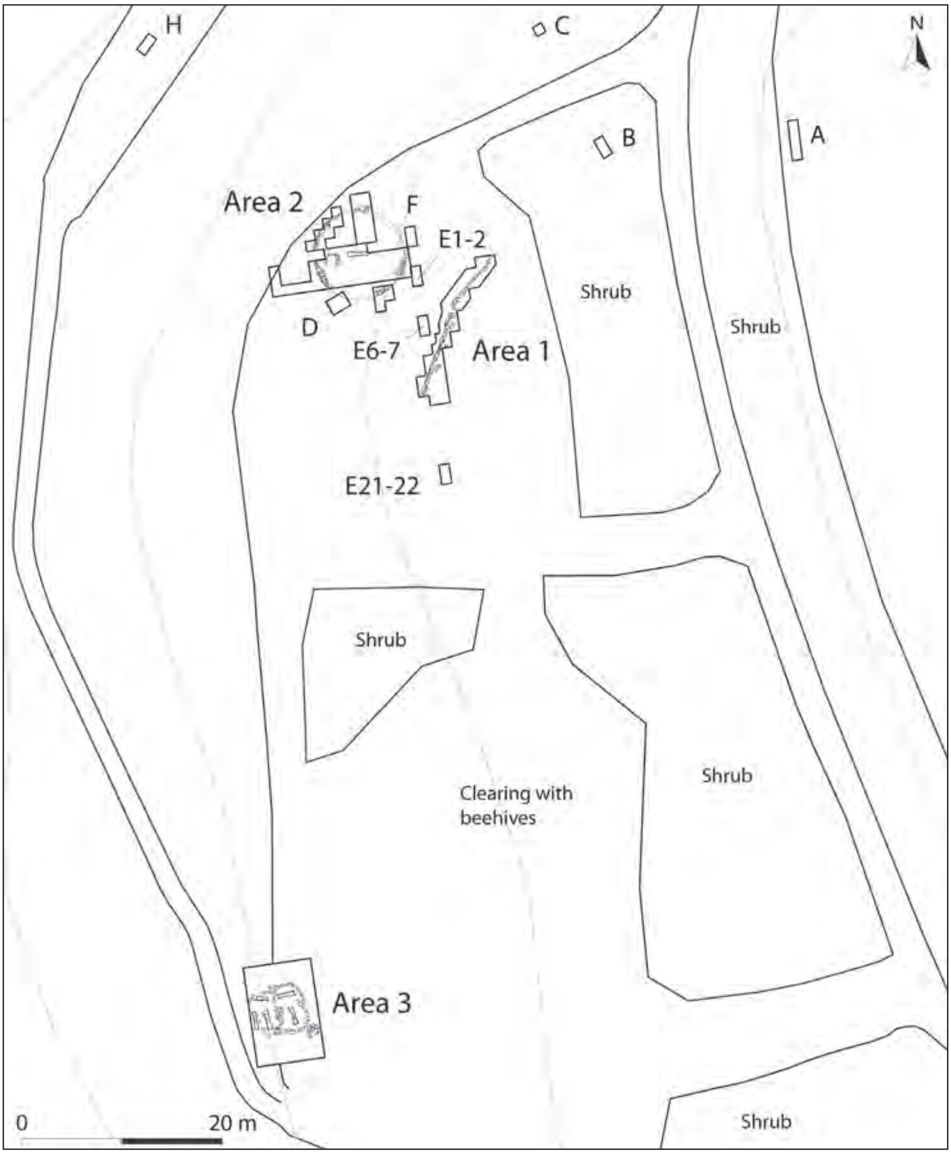

Fig. 1. General map of Goutsoura.

Finds included spindle whorls, bobbins and bone needles, and carbonized seeds such as grass pea (*Lathyrus sativus*).[5]

No evidence was discovered to indicate how life at the EBA settlement might have ended, but the complete absence of diagnostic ceramics and C-14 samples dating between 2400 and 2000 cal. BC implies that Goutsoura lay abandoned for ca. 400 years.[6]

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[5] Forsén 2011, 7; in Late Bronze Age (LBA) contexts, carbonized emmer wheat was identified. For full details of the composition of each of the substrata that composed this cultural layer, see Forsén, this volume.

[6] For a full table of Goutsoura's C-14 fixed dates, see J. Forsén, this volume, Fig. 1.

After 2000 BC, the site appears to have functioned as a cemetery without any clear evidence of the presence of a permanent settlement. Excavation revealed a cremation burial with a C-14 date of 2000-1750 cal. BC and a slab-lined cist grave with a C-14 date of 1780-1600 cal. BC, both postdating the EBA cultural layer on the northern edge of the site (Fig. 2, Cremation burial, Central slab-lined cist grave). The cist grave burial took place within the fill of a late MBA or early LBA (i.e., ca. 1800-1600 BC) burial tumulus, enclosed by a circular peribolos wall (Figs. 3-5). The peribolos was deliberately placed to encompass both the earlier cremation grave and the cist grave. These discoveries indicate that human activity resumed at Goutsoura at the beginning of the Middle Bronze Age (MBA) and continued until ca. 1300-1100 BC, that is, to the end of the Late Bronze Age (LBA).

In addition to the two aforementioned burials, several additional graves within the fill of the tumulus and just outside of its wall were revealed by excavation. These discoveries include a pit grave with a cover slab identified just outside of the peribolos (Child grave 1) and a child burial with a cover slab in the fill (Child grave 2). The occupant of Child grave 1 was buried in flexed position with knees drawn to chest. Additionally, there are at least two later graves (Child grave 3 and Child grave 4), which indicates that this tumulus continued to be recognized as a burial space at least as late as 1300 BC, and possibly as late as 1100 BC (Fig. 2, Child graves 1, 2, 3 and 4).

The inclusion of a pre-existing cremation burial into the construction of a new burial tumulus and the reuse of that tumulus through at least several generations and possibly several hundred years prompts questions about the roles that memory and practicality play in the organization of this communal Thesprotian grave site. What was the intention of building a structure above (but not disturbing) the cremation, and what factors contributed to the later reuse of the tumulus during the Late Bronze Age? The discovery of a second cemetery, located some 70 m south of the tumulus, presented further evidence that the site's burial spaces were being reused (Fig. 1, Area 3; Figs. 15-16). There, excavators discovered conjoined stone grave circles surrounding six cist burials with dates varying by spans of hundreds of years. Taken together, this second set of graves dated to a maximum range of 1780-1250 BC (i.e., from the end of the MBA until the end of the LBA). What causes and burial ideology led to the grouping of Area 3's six graves over the course of more than three centuries, and were there any connections with the cemetery in Area 2?

Goutsoura's MBA and LBA grave constructions offer an opportunity to consider how Thesprotian Bronze Age burial activity conforms with synchronous burial practices in northern Greece and Albania. Following a discussion of Goutsoura's features, parallels for MBA and LBA tumuli and cist graves from surrounding regions, including southern Albania, Epirus, the Ionian Islands, and Thessaly, are considered and evaluated.

Description

In the Bronze Age, Goutsoura had several stages of development, which may span up to 1750 years, depending on compression or expansion of their associated C-14 date ranges. The stages of development are defined by the construction of the following features: 1) an EBA open-air settlement, 2) an MBA tumulus on the northern edge of the site, 3) an LBA long wall on the northeastern edge of the site and 4) a series of conjoining late MBA and

Features	Coordinates	Stratigraphic Relationships	Postdates	Antedates
The retaining wall				
Wall 101	494/510-498/513	Set into Area 1’s second-youngest cultural layer; covered by Area 1’s uppermost cultural layer	1560-1310 cal. BC (from between stones of wall)	1320-1100 cal. BC (from uppermost cultural layer)
The northern tumulus				
Cremation burial	503/505-506	Cuts EBA cultural layer	1980/1955-1865/1755 cal. BC (from grave)	Initial tumulus fill
Burnt clay hearth	507/507	Constructed into EBA cultural layer	2925-2470 cal. BC (from EBA cultural layer)	Upper layer of tumulus fill
Stone semicircle	507/505-506 and 509/505-506	Constructed above EBA cultural layer; stones later added to create a full circle that remained open during initial deposition of the tumulus fill	2925-2470 cal. BC (from EBA cultural layer)	Upper layer of tumulus fill
Peribolos wall	504/501, 501/506-508, 503-504/509.5, 509/506-508, 507/501-502, 508/503-504, 509-504	Cuts EBA cultural layer	2925-2470 cal. BC (from EBA cultural layer)	1780-1600 cal. BC (from central cist grave)
Central slab-lined cist grave	505/505-506	Cuts EBA cultural layer; initial fill of tumulus left unfilled area around central cist	1780-1600 cal. BC (from grave)	1300-1100 BC (date of uppermost cultural layer)
Child grave 1	509/508	Below flat stone just outside of peribolos wall; depth same as tumulus fill, covered by Area 2’s uppermost cultural layer	Peribolos wall	1300-1100 BC (date of uppermost cultural layer)
Child grave 2	505/507 and 505/508	Included in tumulus fill; covered by Area 2’s uppermost cultural layer	Initial tumulus fill	1300-1100 BC (date of uppermost cultural layer)
Child grave 3	503/508	Cuts Area 2’s uppermost cultural layer	1300-1100 BC (date of uppermost cultural layer)	Topsoil
Child grave 4	509/507	Cuts Area 2’s uppermost cultural layer	1300-1100 BC (date of uppermost cultural layer)	Topsoil

Fig. 2a. Table of stratigraphic relationships and dates for principal features at Goutsoura, the retaining wall and the northern tumulus.

LBA grave circles on the southern edge of the site. This study focuses on the MBA and LBA phases of use that followed the abandonment of the EBA settlement in ca. 2400 BC.

The characteristics and relationships of the features in each of Goutsoura’s phases are described, and then the relationships between the site’s features are discussed to examine Goutsoura’s development over time, as well as its comparability to other contemporary sites in Greece and Albania.

Features	Coordinates	Stratigraphic Relationships	Postdates	Antedates
The southern cemetery				
Grave 2	521/581	Immediately covered by a thin pebble layer, as well as Area 3's uppermost cultural layer; cut a sterile bottom layer	1780-1620 cal. BC	Thin pebble layer
Grave 1	523/579-581	Immediately covered by a thin pebble layer, as well as Area 3's uppermost cultural layer; cut a sterile bottom layer	1720-1510 cal. BC	Thin pebble layer
Grave 5	525/579-581	Immediately covered by a thin pebble layer, as well as Area 3's uppermost cultural layer; cut a sterile bottom layer	Sterile bottom layer	Thin pebble layer
Grave 4	525/577	Covered by Area 3's uppermost cultural layer; cut a sterile bottom layer	Sterile bottom layer	Uppermost cultural layer
Grave 6	525-527/579	Covered by Area 3's uppermost cultural layer; cut a sterile bottom layer	1580-1430 cal. BC	Uppermost cultural layer
Grave 3	523/577	Covered by Area 3's uppermost cultural layer; cut a sterile bottom layer	1420-1250 cal. BC	Uppermost cultural layer

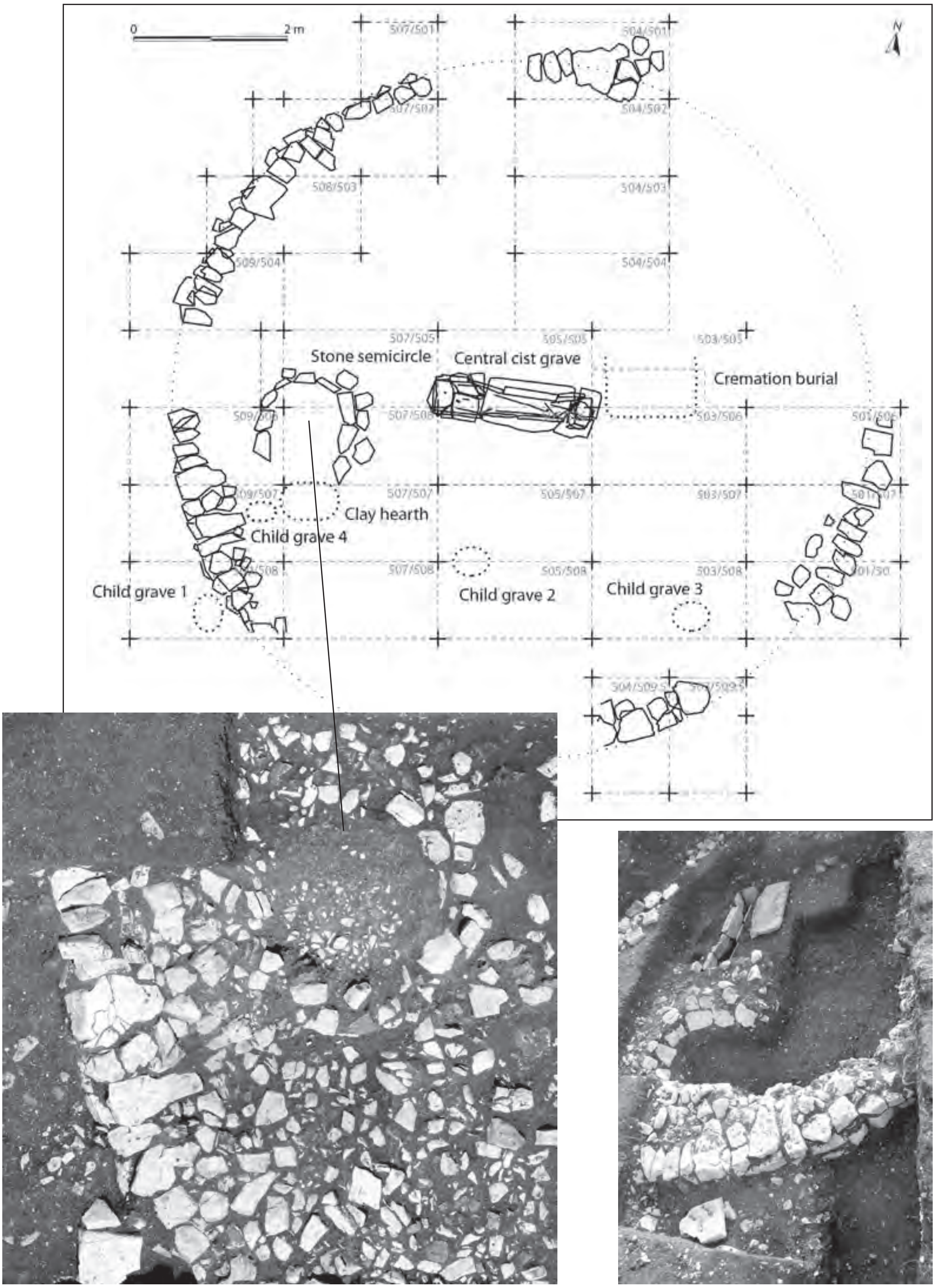
Fig. 2b. Table of stratigraphic relationships and dates for principal features at Goutsoura, the southern cemetery.

The northern tumulus

Goutsoura took on a new function as a cemetery at the beginning of the MBA, and this function endured through the middle of the LBA. Burials from the site, which spanned ca. 2000-1400 BC, included an individual cremation burial, a tumulus with a central cist burial of two adults, and several burials of children.

The cremation burial and the northern tumulus are located on the northern edge of Goutsoura (Fig. 1, Area 2). In 2008, phosphorus sampling of the site prompted investigation both in the area where the northern tumulus was discovered, as well as approximately 70 m to the south (Fig. 1, Area 3). A subsequent magnetometer survey to the north revealed indications of walls, and excavations in 2009 and 2010 uncovered a peribolos wall and a tumulus, constructed around and above a late MBA/early LBA slab-lined cist grave dating between 1780 and 1600 BC (Figs. 3-5).

The tumulus measured approximately 9.56 m in diameter, with a maximum diameter of 10.22 m and an interior diameter of 7.43 m (Fig. 3). The mode thickness for the peribolos wall of the tumulus was about 0.2 m in width, with a maximum width of 0.55 m. In some places, the peribolos wall stood three courses high, but its maximum height only reached 0.1 m above ground level at that time. It was constructed from white, rough-faced limestone boulders and cobbles, with smaller stone chips and dirt filling in the space between the wall's interior and exterior faces (Figs. 4-5).



Figs. 3-5. Area 2, top plan of the northern tumulus (above). Orthographic photo of southwestern corner of peribolos of the late MBA/early LBA northern tumulus with cobble-sized stone fill and outline of semicircular feature with small pebble fill in foreground (below, left). Peribolos of the late MBA/early LBA northern tumulus with semicircular feature and slab-lined cist grave (below, right).

The tumulus fill consisted of small pebbles and stones arranged on top of larger stones.[7] It emerged in the stratigraphy approximately 0.5 m below the surface, and the peribolos wall that had been built to retain this stony fill was discovered about 0.9-1.1 m below the surface. It is possible that the mound of the tumulus was built to stand taller when it was created sometime in the range of 1780-1600 BC and that the upper layers of fill eroded during the time it was used, but it is equally possible that the tumulus was always low to the ground. The recorded height for the tumulus fill was approximately 0.3-0.4 m, and there were some areas, such as the space surrounding the tumulus's central cist grave, where no stone fill was identified during excavation (Fig. 5).

The tumulus was built on top of an MBA cremation burial dating to ca. 2000-1875 BC (Fig. 2, Cremation burial; Fig. 6). The cremation burial had been cut into the EBA cultural layer at some stage after the abandonment of the site. A burnt clay "hearth" feature also predated the filling of the peribolos enclosure (Fig. 7), whereas the central cist grave and child graves dated to the filling phase of the tumulus (Figs. 5 and 9). The same designation was true for a semicircular stone structure near the hearth, and Child grave 1 – a burial of a child in flexed position located just outside of the peribolos (Figs. 8 and 10). Finally, Child graves 3 and 4 were excavated into Goutsoura's latest extant cultural layer dating from ca. 1300-1100 BC (Fig. 12). The LBA cultural layer contained abundant animal bone, LBA chronotype ceramics and flint flakes, which all suggest that fairly intensive visitation and activity occurred at Goutsoura during this period.

Based on C-14 dates from the cremation burial and the central cist grave from the filling phase of the tumulus, the broadest range of possible dates for the MBA burials was ca. 2000-1600 BC (Fig. 2, Cremation burial, Central slab-lined cist grave). A *terminus post quem* of ca. 1300-1100 BC was assigned to Child graves 3 and 4 on the basis of the ceramic evidence (Fig. 2, Child graves 3 and 4).[8]

Details of each of the associated features of the tumulus are briefly summarized.

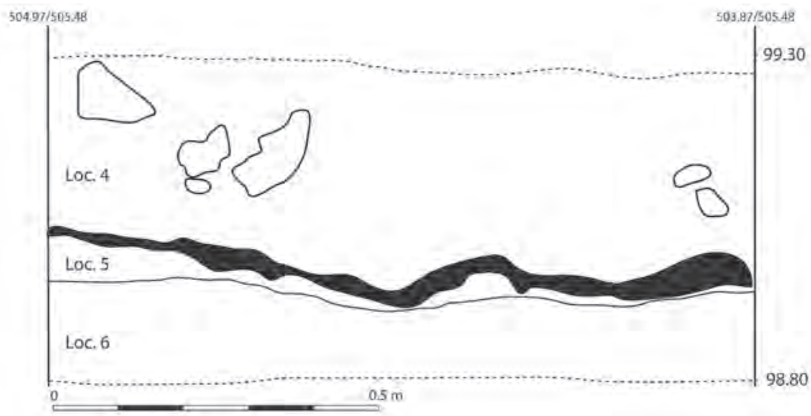


Fig. 6. Area 2, cremation burial, 1980/1955-1755 cal. BC. The burial is visible in the profile as a charcoal layer in the upper part of Loc. 5. Burned human bones and accompanying finds were made in Loc. 5 and in the lowermost part of Loc. 4.

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[7] See Forsén, this volume, figs. 11 and 12, for profile drawings of the stratigraphy of the tumulus.

[8] See J. Forsén, this volume, for a discussion of ceramic chronotypes at Goutsoura; see also Forsén, this volume, Fig. 18, for a full list of C-14 dates.

Cremation burial (Fig. 6)
Date: 1980/1955-1865/1755 cal. BC; cuts and therefore postdates the EBA cultural layer.
Location: Grid square 503/505 (Fig. 3).
Orientation: Unknown (feature not fully excavated).
Dimensions: 1.1 x at least 0.55 m.
Contents: Charred, fragmentary remains of at least one adult individual, half of a ceramic vessel, and one bone needle.
Description: This burial consisted of a shallow pit containing a single adult. It was first identified as a stain of charcoal in plan view, which, upon excavation, proved to be 0.05-0.06 cm thick and contain charred human remains and fragmentary accompanying finds (Fig. 6). The peribolos appears to have been constructed so that it would include this early cremation burial within its confines. This interpretation is explored in the discussion that follows.

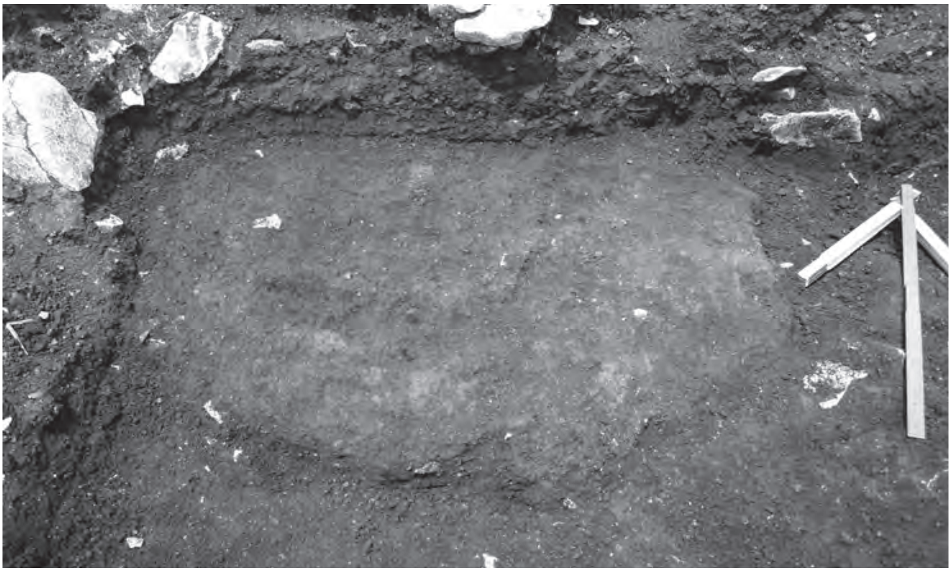

Fig. 7. Area 2, burnt clay hearth.

Burnt clay hearth
Date: Constructed into and thus postdates the EBA cultural layer dating to 2925-2470 cal. BC.
Location: Grid square 507/507 (Figs. 3-5).
Orientation: Unknown (feature not fully excavated).
Dimensions: 0.7 x 0.8 m, 0.1 m depth.
Contents: Burnt clay and bone.
Description: An abundance of burnt clay and bones as well as a boundary on its western end delineated by crushed stone, led to this feature being identified as a gravel-lined hearth with a burnt clay surface (Fig. 7). As was the case with the cremation burial, the hearth was first observed as a charcoal stain in plan view. However, no human bones were found with this feature. Based on its stratigraphic position placing it after the EBA cultural layer and before the fill of the tumulus, it is possible that this burnt clay surface is contemporary with the previously described cremation burial. This clay hearth surface may also be associated with a semicircle of stones abutting this feature to the south, which was also constructed after the EBA cultural layer (Figs. 2-3, Burnt clay hearth; see the following description for Stone semicircle).

Fig. 8. Area 2, stone semicircle with later southern addition and hearth surface to southeast.

Stone semicircle

Date: Constructed above and thus postdates the EBA cultural layer dating to 2925-2470 cal. BC; walled off from a semicircle to a full circle during the initial filling of the tumulus in the MBA; existed as an open structure after the initial tumulus fill was deposited.

Location: Grid squares 507/505-506 and 509/506 (Figs. 3-5).

Orientation: Semicircular with approximately 1 m opening on south side.

Dimensions: about 1.5 m diameter at top (minus opening), 0.8 m diameter at bottom, 0.55 m depth.

Contents: Small amounts of animal bone.

Description: The stone semicircle feature was uncovered during the excavation of the stone fill of the tumulus. There were no primary or secondary deposits of associated finds to assist in determining its function, but characteristics of its construction and its location may offer clues to its association with other nearby features.

First, the semicircle features a construction similar to that of the tumulus's peribolos wall: white, lightly smoothed cobble- and boulder-sized limestone, placed in two courses, with dirt and smaller chip-sized stones filling the space between the faces (Figs. 4-5, 8). Although the stone semicircle was made on a smaller scale, its location and its appearance seem to have been orchestrated based on the presence of the tumulus's enclosure (Fig. 5). In addition, the semicircular stone structure is open on its southern side, which directly abuts the burnt clay hearth that was constructed into the EBA cultural layer (Fig. 8). Based on the proximity of the two features and their relative positions and stratigraphy, they may have at one point operated together.

That being said, the peribolos wall around the tumulus was actually excavated into the EBA cultural layer, which means that it is also possible that the peribolos was constructed around the semicircle. As stated previously, the stone semicircle was walled off to become an open stone circle when the lower fill for the tumulus structure was deposited. When the stone semicircle was eventually filled, angular chips were used rather than the rounded cobbles or pebbles that characterized the fill of the tumulus (Fig. 4). This distinguishes the filling of the semicircle as an event separate from the filling of the other parts of the tumulus (Figs. 2-3, Stone semicircle).

Central slab-lined cist grave

Date: 1780-1600 cal. BC; cut into and thus postdates the EBA cultural layer.

Location: Grid squares 505/505 and 505/506 (Figs. 3, 5).

Orientation: East to west.

Dimensions: Cut: 2.192 x 0.578 m, Interior 1.738 x 0.403 m.

Contents: Two partially represented adult skeletons, one lying outstretched with the head towards

Fig. 9. Area 2, central slab-lined cist grave looking from north to south, 1780-1600 cal. BC.

the west, the bones of the second one in a heap at the east end of the cist. Furthermore a minuscule bronze fragment.[9]

Description: This cist grave consisted of a slab-lined cut into the tumulus fill, which contained the remains of two adults. One skull was included in the grave, whereas the second skull was placed on top of the cover slab.

This lined cist grave, along with the Child grave 2 within the tumulus fill and Child grave 1 outside the peribolos wall, is roughly contemporary with the MBA tumulus stone fill layer (Figs. 2 - 3, Central slab-lined cist grave; Fig. 9). The sequence seems to be that the peribolos wall was cut into the EBA cultural layer, ancillary features such as the semicircular structure were built above the EBA cultural layer in relation to the peribolos and pre-existing features such as the burnt surface, and then the tumulus was gradually filled, allowing for several burials to take place before the construction was covered. During that process, spaces appear to have been roughed out so that human remains could be deposited into pockets, cists, or slab-lined cists inside the fill. There was almost no tumulus fill identified in the excavated squares bordering the central cist grave, which seems to provide further evidence that that space was preselected and left open for the grave's construction.

The careful construction of the cist grave's lined slabs and its arrangement in the center of the tumulus seem to indicate that this feature was the focal point that the tumulus and its peribolos were created to encompass. The central cist grave is further distinguished from the northern tumulus's other contemporary burials because it contains two adults rather than children, and because it is the only burial within a slab-lined cist grave. Parallels with this cist grave can be observed in at least two late MBA/early LBA burials in the southern cemetery of the site (e.g., Graves 1 and 2; see descriptions for graves in the southern Area 3 cemetery).

Child grave 1

Date: Below flat stone just outside of peribolos wall; depth same as tumulus fill, below the uppermost late LBA cultural layer; abuts and therefore postdates the tumulus's peribolos wall (Fig. 2, Child grave 1).

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[9] For the human remains at Goutsoura, see Niskanen, this volume.

Location: Grid square 509/508 (Fig. 3).
Orientation: North to south.
Dimensions: 0.3 x 0.5 m.
Finds: Child burial in flexed position (i.e., knees bent to chest), pottery fragments (Fig. 10).
Description: This burial was placed just outside the tumulus's peribolos wall, and based on stratigraphy, it seems to be contemporary with the other graves that were built when the tumulus was being filled. The thick, lightly smoothed stone selected as the grave's cover slab is in keeping with the cover slabs of the other aforementioned contemporary burials.

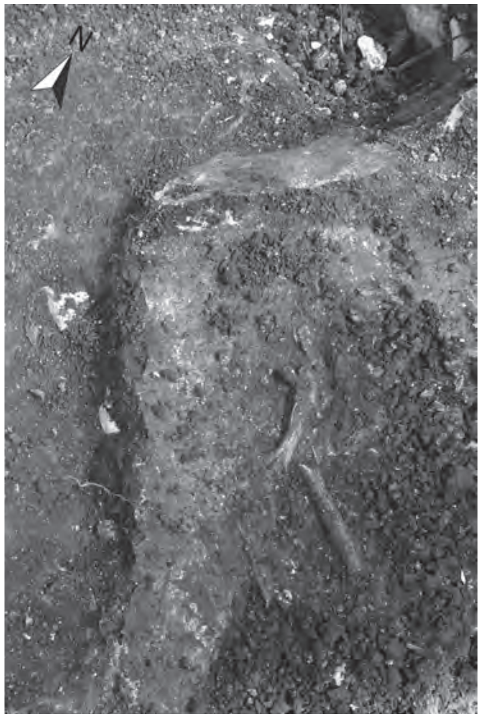

Fig. 10. Area 2, Child grave 1 in situ.

Child grave 2

Date: Included in MBA tumulus fill layer (Fig. 2, Child grave 2).
Location: Human bones in grid square 505/508 (Fig. 3).
Orientation: Unknown, though skull was oriented north to south.
Dimensions: Bones scattered over an area of 0.5 x 1 m.
Contents: Disarticulated bones (Fig. 11).
Description: This burial comprised bones from at least one child and a possible rectangular limestone cover slab, but no actual grave cut was identified. Instead, the bones were found in square 505/508, whereas the remains of the rectangular cover slab were found in 505/507. The dispersed, disarticulated condition of the bones and the location of the slab suggest that the burial had been disturbed, either during the act of filling the tumulus or during a phase before the deposition of the LBA cultural layer. Alternatively, it is possible that the slab was used to prevent the associated remains from being scavenged by animals during the putrefaction process. This burial is stratigraphically contemporary with the central slab-lined cist grave burial described previously, as well as with Child grave 1.

Fig. 11. Area 2, Child grave 2 in situ.

Child grave 3

Date: Overlain by topsoil and cuts the latest surviving cultural layer on site, dated to ca. 1300-1100 BC based on ceramic evidence (Fig. 2, Child grave 3).
Location: Grid square 503/508 (Fig. 3, Child grave 3).

Fig. 12. Area 2, Child grave 3 in situ.

Orientation: Bones were dispersed as fragmentary remains with skull oriented west.
Dimensions: Bones scattered over an area of 0.45 x 0.2 m.
Contents: Child burial with fragmentary, disarticulated remains (Fig. 12).
Description: This burial was found bordering the southern interior surface of the tumulus's perimeter wall. The grave was probably dug into the uppermost part of the late LBA cultural layer postdating the period when the tumulus was originally filled. This means that the burial extended the structure's phase of use beyond the span that originally encompassed the cremation burial, the slab-lined cist, and Child graves 1 and 2, which were constructed before and during its inception.

Child grave 4
Date: Overlain by topsoil and cuts into the latest surviving cultural layer on site, dated to ca. 1300-1100 BC based on ceramic evidence (Fig. 2, Child grave 4).
Location: Grid square 509/507 (Fig. 3).
Orientation: Unknown. The bones were identified as human during post-excavation analysis.
Dimensions: Bones scattered over an area of ca. 0.3 x 0.2 m.
Contents: Child burial with fragmentary, disarticulated remains.
Description: This burial was found bordering the western interior surface of the tumulus's perimeter wall. The grave was dug into the late LBA cultural layer postdating the period when the tumulus was originally filled. As in the case of Child grave 3, the burial action of Child grave 4 extended the use of the northern tumulus as a burial place after the original construction and fill of the earthwork.

The retaining wall

In 2008, before the discovery of the northern MBA tumulus, an LBA long wall (hereafter Wall 101) was uncovered some 10 m east of the tumulus. The long wall was explored further in 2009 (Fig. 1, Area 1; Fig. 13).

Initially, the excavated section of the wall measured approximately 9 m in length and was presumed to be the wall of a house. Excavators followed the line of the wall northward and expected that it would eventually corner eastward based on the smoothed faces of the stones on its west-facing profile. No corner was ever identified, and instead, a magnetometer survey revealed that the long wall stretched an additional 15 m, making its length at least 24 m (Fig. 13).

Wall 101 follows the natural contours of the Liminari hill and it was built with a single jog located close to grid square 497/513. This wall is one of the easternmost features identified at Goutsoura, though it is important to note that the presence of thick vegetation, a modern road, and agricultural fields prevented further excavation to the east. To the south, a series of beehives prevented further exploration.

The 2009 excavations in Area 1 exposed seven additional meters of Wall 101. Evidence for the wall's date and its dimensions are related in the following section.

Fig. 13. Area 1, top plan of Wall 101.

Wall 101

Date: Wall 101 was set into the second cultural layer in Area 1, which lay above an MBA cultural layer with a C-14 date of 1920-1730 cal. BC. A charred bone recovered from between the stones of the wall provided a *terminus post quem* for the wall's construction of 1560-1310 cal. BC (i.e., the mid-to-late LBA). The wall was also covered by the uppermost cultural layer in Area 1, which established the wall's *terminus ante quem* with a C-14 date of 1320-1100 cal. BC – i.e., the end of the LBA (Fig. 2, Wall 101).[10]

Location: Grid squares 494/510 to 498/513 (8 m east of the Area 2 Tumulus), topmost course 0.4 m below the surface, foundation approximately 1 m below the surface (Fig. 1, Area 1).

Orientation: North-northeast to south-southwest, with a slight jog at grid square 497/513.

Dimensions: 24 m (15.4 m excavated) x 0.18-0.8 m high (1-3 preserved courses). Stone sizes ranged from 0.25-0.33 m wide x 0.42-0.52 m high.

Contents: Fill deposits in the two uppermost cultural layers contained a consistent mix of MBA and LBA ceramics. The second cultural layer had large quantities of bone, charcoal, and pebbles.

Description: The wall was constructed from cobble- and boulder-sized limestone, with smoothed faces to the west and unsmoothed faces placed toward the east. As stated previously, builders set Wall 101's stones (i.e., its "riser") into the second cultural layer, which carries a *terminus post quem* of 1920-1730 cal. BC based on the C-14 date of the cultural layer that it, in turn, lies above. The wall's course was plotted along the contour of the hillside, and then a fill of stone chips, cobbles, and soil (i.e., its "packing") was deposited as part of the second cultural layer (Fig. 14).[11]

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[10] For a detailed description of the stratigraphic relationships and C-14 dates associated with the terrace wall, see Forsén, this volume.

[11] Kvapil 2012, 83, enumerates the component parts of LBA terraces.

Fig. 14. Area 1, Wall 101 riser with packing visible, *terminus post quem* 1560-1320 cal. BC.

Based on the composition of the wall's packing, the sequence of its construction, and its proximity to the tumulus feature, the long wall appears to have been constructed to extend the level area of the hillside's contour, acting as a support for a platform or even as the subpacking for a thoroughfare, such as a dirt road or path.[12] Were Wall 101 an agricultural terrace, it is likely that the western side of the wall would have contained more homogeneous soil and less stone.[13]

By standards of terrace construction, a larger amount of cobbles should have been identified on the western, upward slope side of the wall, and the riser stones should have been placed with their smoothed side facing "outward" to the downward slope side; instead, the riser stones were faced on their upward slope surfaces.[14] Quantities of white stone chips were noted within the wall's foundation, and they may represent part of the packing phase of the wall's construction. As in typical examples of the construction of LBA retaining walls, stone and dirt tread were also deposited to the west, upward sloping, side of Wall 101 to complete the packing process (Fig. 14).[15] Stone material was employed to provide support to the retaining wall as packing, but it was also added as tread to lend the resulting surface porosity and stability.

The southern cemetery

In 2009, a second cemetery was identified 70 m south-southwest of the northern tumulus and Wall 101 (Fig. 1, Area 3). A phosphorus anomaly and surface scatters of prehistoric ceramics led to the discovery of Grave 1, a slab-lined cist grave. Grave 1 was unfortunately

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[12] Cf. Spencer and Hale 1961, 8 and 9: "Crude stone walls may be built laterally across sloping surfaces, accompanied by back-slope digging and earth filling of the fore-section against the embankment…"
[13] Cf. Kvapil 2012, 83.
[14] This proposed construction sequence is based on standards for the creation of a platformed terrace, which appears to be the most likely feature that this wall represents. Kvapil 2012, 192 and 193.
[15] Kvapil 2012, 192 and 193.

looted during the course of the excavation and consequently only one human bone was recovered from the cist. Additional fragments of the scattered burial were identified during a fuller excavation of the space inside the stone-lined circle surrounding the grave in 2010. However, the majority of the burials from the southern cemetery were intact. In 2010, an area of approximately 8 x 10 m was excavated to determine the extent of the cemetery, its features, and the relationship of these burials to the rest of Goutsoura's MBA and LBA features (Figs. 15-16).

The cist graves were shallow pits lined with stones, double-reinforced on their shortest ends.[16] Each grave was covered with its own stone slab, which was, in most cases, made from reddish local limestone, with thicknesses ranging from 0.03-0.06 m. Five of the cist graves were surrounded by partial rings of stones and all but one of these grave circles were conjoined (Figs. 15-16). The area occupied by the conjoined circles measured around 5.65 x 6 m, with a wall thickness mode of approximately 0.34 m. Grave circle stones ranged in size from 0.26-0.74 m x 0.1-0.39 m and their outward-facing sides appear to have undergone some smoothing. In some locations (e.g., on the western side of the southern cemetery near Graves 4, 5, and 6), it appears that parts of the walls were shifted around before the area went out of use.

The six graves and their surrounding grave circles lay beneath a late LBA or Early Iron Age cultural layer (Fig. 2, The southern cemetery).[17] Graves 1, 2, and 5 were also each covered directly by a distinctive layer of white pebbles (Fig. 2, Graves 1-2, 5).[18] All the graves were cut into sterile soil. Stratigraphic analysis and C-14 dating have indicated at least two phases of construction for the complex, with Graves 1, 2, and 5 dating to the late part of the MBA or to the early part of the LBA (1780-1510 cal. BC), and with Graves 6, 3, and possibly 4 dating from the middle or later part of the LBA (1580-1260 cal. BC).

During the course of the Thesprotia Expedition's excavations, graves were named in order of their discovery. However, in the following description, details of the southern graves' features are summarized starting with the earliest graves and working through to the latest graves. Therefore, the order of description is Grave 2, Grave 1, Grave 5, Grave 4, Grave 6, and finally Grave 3, rather than the numerical order.

Grave 2

Date: 1780-1620 cal. BC. Immediately covered by a thin pebble layer, as well as Area 3's uppermost cultural layer; cut a sterile bottom layer (Fig. 2, Grave 2).

Location: Grid square 521/581 (Figs. 15-16).

Orientation: Northeast to southwest.

Dimensions: Cist grave cut: 0.77 x 0.38 m. Cist grave interior: 0.72 x 0.224 m. Grave circle: approximately 1.304 m in diameter (not a perfect circle), one course high.

Finds: Gastropod shells, charcoal, and disarticulated bones of a 4- to 5-year-old child in small fragments.[19]

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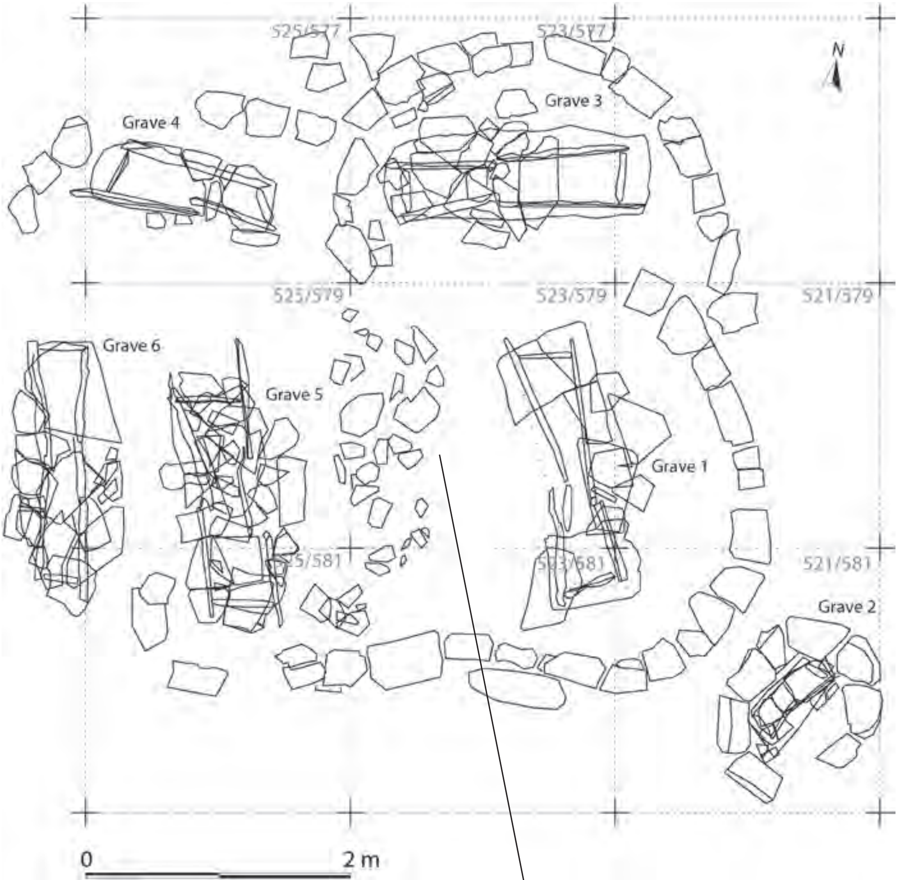
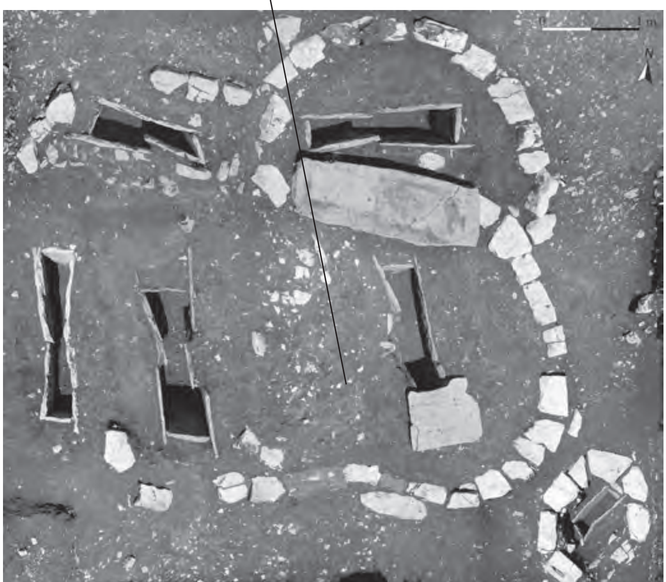
[16] Cf. the the form of the LBA cist grave at Thesprotia Expedition site E 16 (Forsén *et al.* 2011, 84.)

[17] By comparison with other parts of the site, this cultural layer seems to correspond with the late LBA cultural layer in Area 1 (covering Wall 101) and with the late LBA cultural layer in Area 2 (covering the tumulus's fill).

[18] See Forsén, this volume, for a detailed description of Area 3's stratigraphy; Forsén, this volume, Fig. 18 also contains a concordance of the strata from Area 3.

[19] The gastropod shells were presumed by excavators to be modern. For the human remains at Goutsoura, see Niskanen, this volume.





Figs. 15 and 16. Area 3, general plan of the southern cemetary.

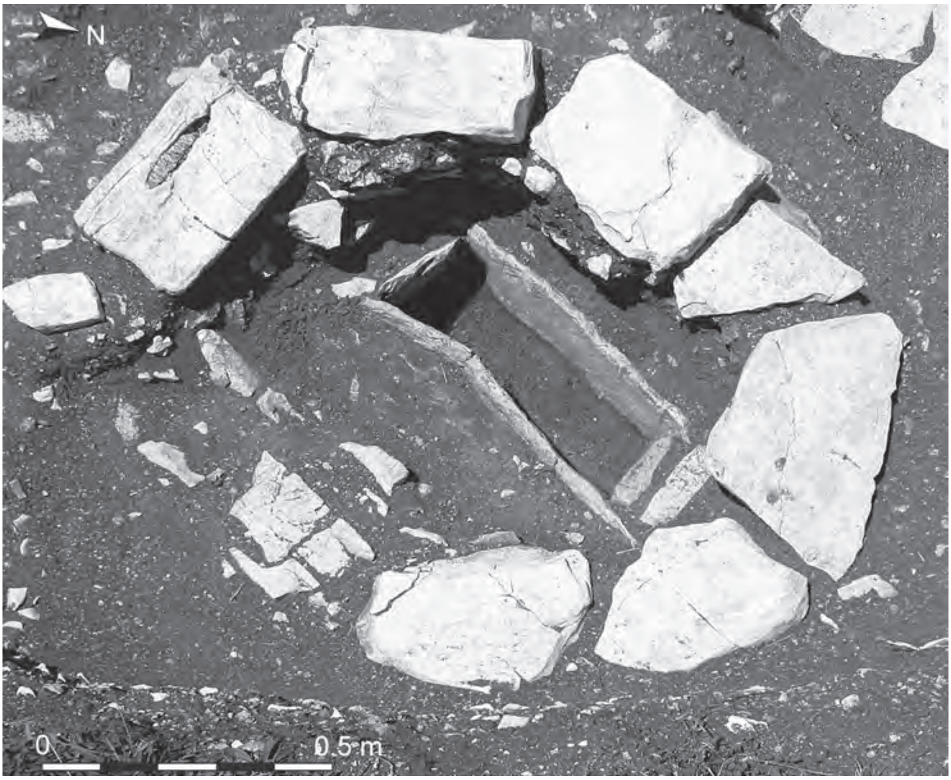


Fig. 17. Area 3, Grave 2, 1780-1620 cal. BC.

Description: This burial was executed in a limestone-lined cist and was covered by two reddish limestone slabs, which were broken into three pieces and separated by some soil.

Grave 2's surrounding stone circle differs from that of the other grave circles from Area 3, because it does not abut any of the other constructions in the area and it is much smaller, forming nearly a full ring (Fig. 17). It is the earliest of the Area 3 graves with fixed dates, and its closed form raises the question of whether all the earliest graves may once also have had separate circles.

The stratum that directly covered Grave 1 contained white limestone pebbles. The presence of these pebbles is a feature shared by the early graves of the southern cemetery. This idea is expanded upon at the end of this section.

Grave 1

Date: 1720-1510 cal. BC. Immediately covered by a thin pebble layer, as well as Area 3's uppermost cultural layer; cut a sterile bottom layer (Fig. 2, Grave 1).
Location: Grid squares 523/579-581 (Figs. 15-16).
Orientation: Northwest to southeast.
Dimensions: Cist grave cut: 2.07 x 0.69 m. Cist grave interior: 1.91 x 0.42 m. Grave circle: approximately 2.09 m in diameter (not a perfect circle), one course high.
Finds: One human bone inside the grave, with additional human bones identified outside it, to the west.
Description: This burial was executed in a limestone-lined cist and was topped by a reddish limestone cover slab, which was found broken when the grave was excavated. The grave's date

Fig. 18. Area 3, Grave 1, 1720-1510 cal. BC.

and the appearance of its surrounding stone circle indicate that Grave 1 and nearby Grave 2 were probably two of the original constructions in the cemetery (Figs. 15-16, 18). The scattered condition of the grave's remains and of its cover slab suggests that it was disturbed during the Bronze Age, perhaps as part of a robbing event or as a disinterment associated with secondary burial practices before the upper cultural layer was deposited over all the graves in Area 3 (Fig. 2, Grave 1). This idea is further supported by what appears to be an interruption in the line of stones located on Grave 1's western side. There, a string of irregular stones appears to divide it haphazardly from Grave 5, and may even indicate the remains of a stony fill covering another slab of a yet unidentified grave. Unfortunately, there was illegal digging into Grave 1 during the course of the excavation, so its contents may have been compromised.

As was the case with Grave 2, the soil that directly covered Grave 1 contained white limestone pebbles.

Grave 5

Date: Immediately covered by a thin pebble layer, as well as Area 3's uppermost cultural layer; cut a sterile bottom layer (Fig. 2, Grave 5).
Location: Grid squares 525/579-581 (Figs. 15-16).
Orientation: Northwest to southeast.
Dimensions: Cist grave cut: 1.96 x 0.58 m. Cist grave interior: 1.57 x 0.48 m. Grave circle: approximately 2.61-1.86 m (incomplete on its north and west sides), one course high.
Finds: Disarticulated burial with bones badly preserved; pottery fragments.
Description: This burial was executed in a limestone-lined cist and was covered by a reddish limestone slab (Fig. 19). The stones forming the south side of Grave 5's accompanying circle are spaced so far apart that they appear either to have been hastily placed or to represent the remains of a robbing or disinterment (Figs. 15-16). In fact, the grave circle that surrounded Grave 1 appears to have been altered from a self-encompassing circle into a longer line of stones meant to wrap around both Grave 1 and Grave 5. Another possibility is that a larger circle of stones may have surrounded both Graves 1 and 5. This larger circle could later have been shifted around to result in the irregular north-south dividing line dividing Graves 1 and 3 from 5 and 4. Regardless, Grave 6 appears to have interrupted the path of stones running between Grave 5 and Grave 4.

As was described for Graves 1 and 2, the stratum that directly covered Grave 5 also contained white limestone pebbles.

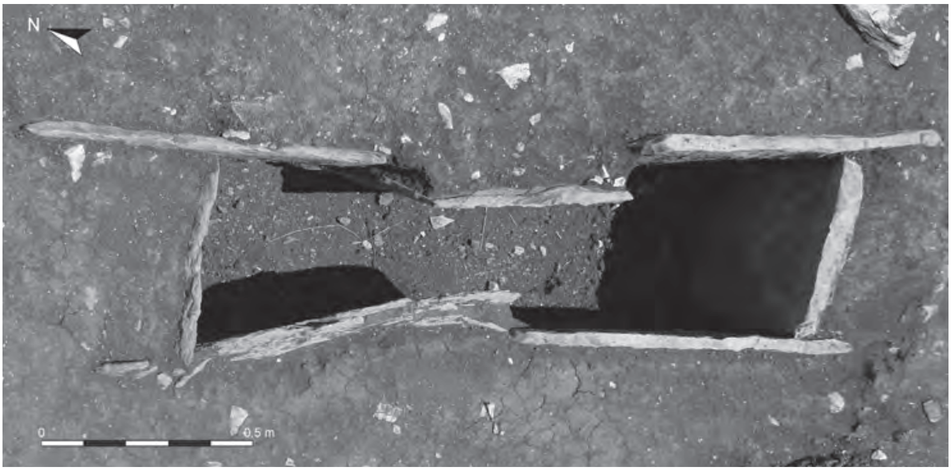


Fig. 19. Area 3, Grave 5.

Grave 4

Date: Covered by Area 3's uppermost cultural layer; cut a sterile bottom layer (Fig. 2, Grave 4).
Location: Grid square 525/577 (Figs. 15-16).
Orientation: East to west.
Dimensions: Cist grave cut: 1.37 x 0.50 m. Cist grave interior: 1.2 x 0.37 m. Grave circle: approximately 2.46 m diameter (incomplete on its south side), one course high.
Finds: Disarticulated remains with cranium and teeth placed in the western end of the grave, and long bones in the middle.
Description: This burial was executed in a limestone-lined cist that was covered by a broken white limestone slab (Fig. 20). The interior walls of the cist were finely cut and smoothed. The discovery of bones outside the cist, along with the broken cover slab, appeared to indicate that the grave had been disturbed before the deposition of the Area 3 cultural layer (Fig. 2, Grave 4). Grave 4's grave circle wall also appears to be incomplete on its southern side, which may be additional evidence that it was modified.

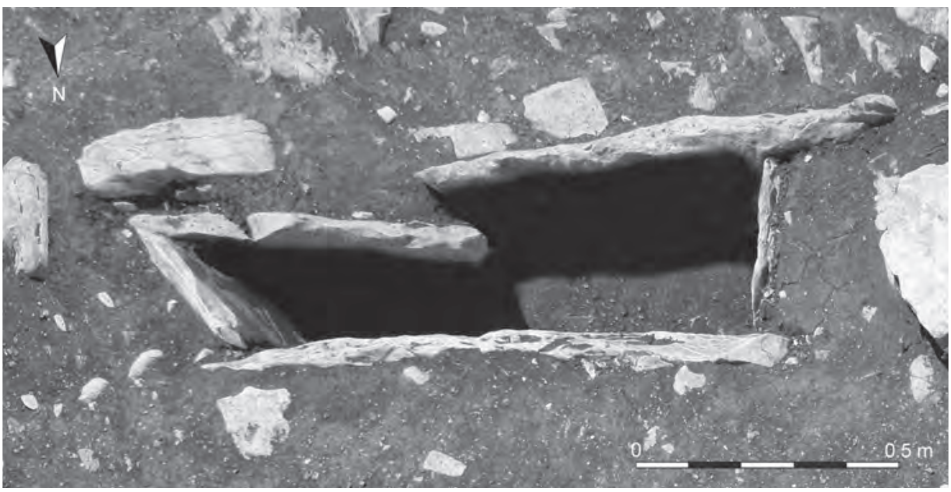


Fig. 20. Area 3, Grave 4.

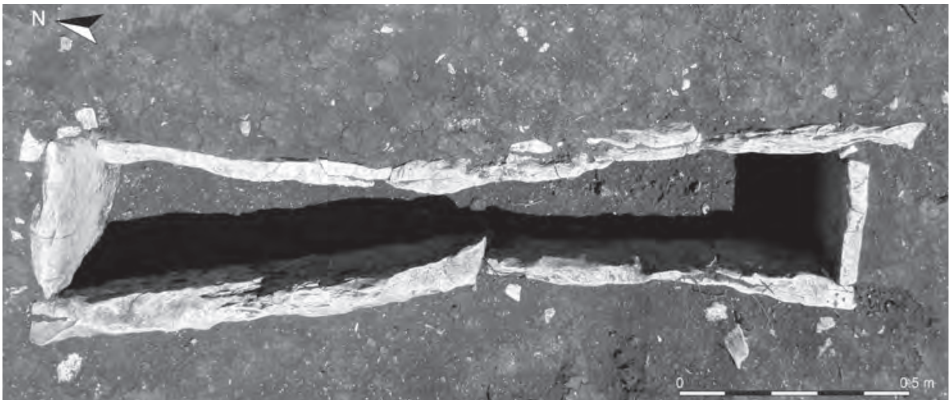


Fig. 21. Area 3, Grave 6, 1580-1430 cal. BC.

Grave 6

Date: 1580-1430 cal. BC. Covered by Area 3's uppermost cultural layer; cut a sterile bottom layer (Fig. 2, Grave 6).
Location: Grid squares 525-527/579 (Figs. 15-16).
Orientation: North-northwest to south-southeast.
Dimensions: Cist grave cut: 2.06 x 0.85 m. Cist grave interior: 1.737 x 0.326 m. No accompanying grave circle.
Finds: Fragmentary burial remains, with some human bone identified outside the grave; some green clay.
Description: This burial was executed in a limestone-lined cist and had a broken cover slab (Fig. 21). Like Grave 4, Grave 6's cist walls had been cut and smoothed differently from those of the other graves. The two also shared the differentiating trait of white limestone cover slabs.

As noted previously, Grave 6 appears to have interrupted the path of stones running between Grave 5 and Grave 4 (Figs. 15-16).

Grave 3

Date: 1420-1250 cal. BC. Covered by Area 3's uppermost cultural layer; cut a sterile bottom layer (Fig. 2, Grave 3).
Location: Grid square 523/577 (Figs. 15-16).
Orientation: East-northeast to west-southwest.
Dimensions: Cist grave cut: 1.80 - 0.67 m, 0.55 m depth. Cist grave interior: 1.6 x 0.38 m. Grave circle: 2.66 m across its northeast to southwest side (actually incomplete on its south side), one course high.
Finds: Disarticulated bones of several individuals; green clay.
Description: This burial was executed in a limestone-lined cist and was topped by a reddish limestone cover slab (Fig. 22). In spite of the mixed character of its deposition, this grave was undisturbed before excavation, probably because of the size of its huge cover slab, which required four workers to lift.

It appears that Grave 3's surrounding grave circle may have been constructed to conjoin with Grave 1, which is independently confirmed by the fact that Grave 3 represents the latest known C-14 dated feature in Area 3 (Fig. 2, Grave 3; Fig. 22). The construction of the Grave 3 circle may have borrowed stones from the neighbouring construction encircling Grave 4, where the stones now survive rather widely spaced apart (Figs. 15-16).

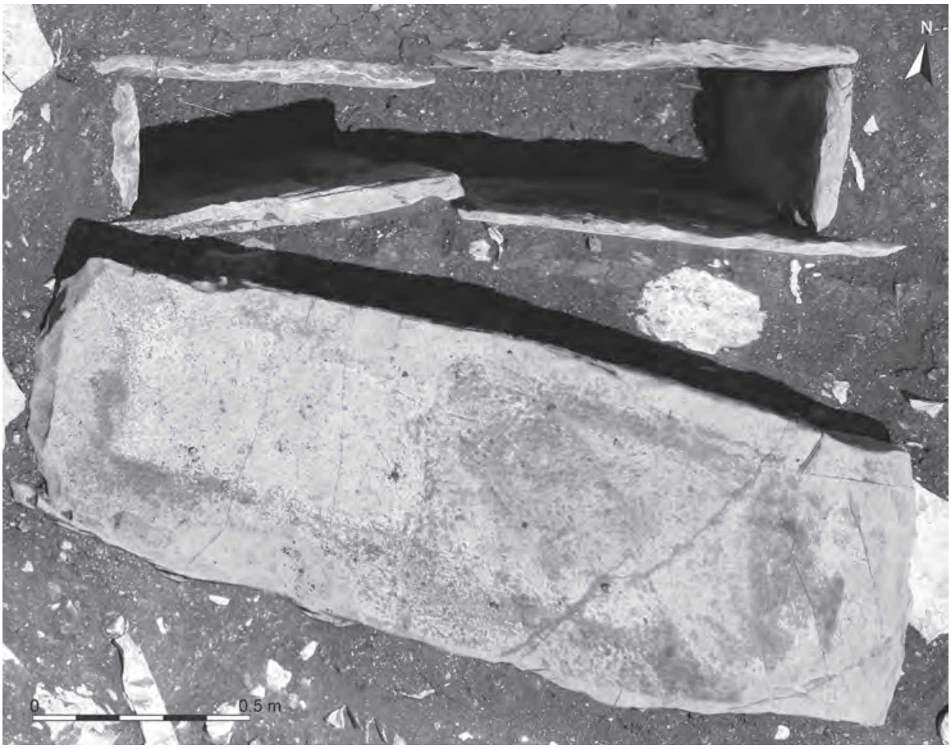


Fig. 22. Area 3, Grave 3 with reddish limestone cover slab, 1420-1250 cal. BC.

Several observations about the Area 3 cemetery follow, based on the previous evidence.First, based on the condition of the graves that were excavated, perhaps the stone cists in each of the conjoined graves functioned as ossuaries rather than as repositories for articulated remains. In each case, bones were encountered in a fragmentary state, with some parts of the skeleton missing. The consistency of one type of MBA and LBA burial practice in the southern cemetery distinguishes this area from the MBA tumulus in Area 2, which exhibited greater variety of burial practices. This interpretation excludes Grave 2, which is unique because it has its own separate and complete grave circle (Fig. 17). A possible interpretation that takes Grave 2 into account is that the southern cemetery had two stages of development: its creation, in which the graves of Area 3 contained individual burials (exemplified by Grave 2), and a second phase, in which the Graves 1, 2, and 5 were opened and the bones of additional individuals were added to the original burials.[20] For this scenario to be possible, however, all reuse of these graves would need to have ensued before the final deposition of the pebble layer that was discovered above them.[21]

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[20] Cf. the late LBA Tumulus C at Ephyra, which contained one cist grave with a single child burial and a second cist grave with an extended adult plus 13 secondary burials. Papadopoulos 1987, 140.

[21] The pebble layer could be remaining evidence for a mound that may have covered the early reused graves. Cf. the built circular tombs of the mid-to-late EBA R-Graves at the site of Steno on Lefkas, which appear to have been individual slab-cist, cremation and scatter burials with circular walls surrounding them, possibly mounded over by one continuous layer of earth. Wardle 1972, 33-35, 40.The scenario of an earlier tumulus is explored further at the end of the section.

Second, the C-14 dates of Area 3 Graves 1, 2, 3, and 6 span ca. 500 years, when taken at their maximum possible ranges. After their initial construction, these six graves underwent alterations and disturbances that changed the shape of the southern cemetery and defined new relationships among the burials. For example, it was suggested that perhaps, initially, Graves 1 and 4 each had their own stone circle (i.e., in the way that Grave 2 and its surrounding stone circle have survived) but that later these early grave circles were shifted. Stones may have been moved in order to enlarge the circles, or perhaps in order to accommodate additional burials or to relocate secondary burials. Grave 1, which features faced blocks spaced closely on its eastern side, seems to be missing stones on its western and northern sides (Figs. 15-16). Likewise, the circles around Graves 4 and 5 appear to have been disturbed, perhaps resulting in the formation of the north-south line of stones dividing the entire grave complex in half.

Another possible explanation for the position of the stones is that Graves 1 and 5 were originally encompassed by a single grave circle that was later altered to be subdivided by the north to south “wall” running between Graves 1 and 5 and possibly even later rearranged to accommodate Graves 3, 4, and 6, perhaps with some shifting of stones from the previous structure.[22] The graves themselves might also have been robbed and disturbed during these periods of reconstruction; Graves 1, 4, and 6 all showed evidence of disinterment and/or shifting of contents in antiquity, and the use of a different white limestone in the construction of Graves 4 and 6 may represent a later phase of burial in the cemetery, when that was the preferred style and stone type (Figs. 20-21; cf. with Fig. 22).

Finally, excavators were careful to note that Graves 1, 2, and 5 were all directly covered by a noticeable layer of white limestone pebbles mixed with pottery, lithics, and animal bones (Fig. 2, Graves 1, 2, 5). The white pebble stratum also covered the stone circles that surrounded those graves and even continued below the uppermost stones of the grave circle to the stones’ outward-facing edges. A possible interpretation for the presence of the pebble layer is that it indicates the original construction of a southern tumulus that eroded over time.[23] This could offer an explanation as to why Graves 3 and 6, which were found, based on C-14 dating to have originated later, did not feature the pebble layer above their cover stones. Grave 4, which shared a similar construction style with Grave 6, also did not have signs of the pebble layer. The conclusion is that Graves 1, 2, and 5 were probably constructed during earlier phases and were included within a tumulus mound during the late MBA or early LBA, and Graves 6, 3, and possibly 4 were constructed later, after the tumulus mound had eroded during the middle LBA or late LBA (Fig. 2, Graves 4, 6, 3).[24]

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[22] N.B. the haphazard north-south wall was identified as being below the uppermost cultural layer in 523/579 and 523/581.

[23] This seems similar to the mixture of sandy, stony soil that Lera *et al.* 2009, 333, have observed in the construction of tumuli at the southwestern and south central Albanian sites of Vodhinë (Prendi 1956), Kakavi (Prendi 1959; Hammond 1967, 204), and Luaras (Aliu 2004). Cf. Papadopoulos 1987, 139, who observes that pebble paving is present in the tumuli at Marathia in Aetolia (however, the Marathia tumuli are several hundred years later than the possible tumulus in Goutsoura’s southern cemetery).

[24] For a full description of the white pebble layer and its extent, see Forsén, this volume.

Discussion

The preceding description of Goutsoura's features outlined how the site developed over time, beginning with its phase as an EBA settlement from ca. 3000 to 2400 BC, followed by a hiatus from 2400 to 2000 BC, after which it became a cemetery with a variety of burial customs and the construction of at least one tumulus between ca. 1800 and 1600 BC. Both the northern tumulus and the southern cemetery showed evidence for subsequent burials and ongoing alterations, disinterment, occasional robbing and monumentalization taking place until the end of the LBA, possibly as late as 1100 BC.

The following section explores what impressions we are left with about the site's visitors, based on the Thesprotia Expedition's findings, as well as the implications that this diachronic picture has for discussions of Bronze Age burial traditions within the region of Thesprotia. This discussion begins with the site's earliest architectural features (i.e., the MBA cremation burial and burnt clay "hearth" in Area 2), and works forward through the site's latest architectural feature (i.e., the LBA or Early Iron Age Child graves 3 and 4 in Area 2).

The main point that can be argued based on the continued use of Goutsoura as a cemetery between 2000-1250 BC is that burial constructions were continually employed to commemorate the site as a place of communal memory and as a focal point of ongoing burial traditions. Evidence of this point can be observed in all three areas of the site, throughout its MBA and LBA phases.

In the description of the northern tumulus in the Description section, it was proposed that the location of the tumulus was deliberately selected to encompass a cremation burial that had taken place between 1980/1955 and 1865/1755 BC, before the peribolos wall's construction. The basis for this proposal was the cremation's location near the slab-lined cist grave in the centre of the tumulus, which was C-14 dated to 1780-1600 cal. BC (Fig. 3). The central cist grave's placement acknowledges the existence of the earlier grave. While the cremation showed no signs of being marked by a cover stone or mound, it was excavated into the surface above which the tumulus was constructed. The surrounding peribolos wall of the tumulus also seems to have been placed to include the cremation burial rather than to ignore or exclude it. The initial deposition of the tumulus's stone fill, in turn, appears to have occurred at roughly the same time as the construction of the central cist grave, perhaps with the form of the cist being roughed out ahead of time (Fig. 2, Central slab-lined cist grave). Although stratigraphic positioning designates the cremation burial as earlier, it is possible, based on the ranges of these burials' C-14 dates, that they could have been executed within a brief span of time from one another.

The incorporation of a cremation burial area into a tumulus structure is not a common MBA practice in northern Greece. In fact, the tumulus at Goutsoura is currently the earliest known example from Thesprotia. However, there are some examples of cremation burials included within tumuli in Albania. The best comparison comes from Tumulus I at the site of Vajzë.[25] Vajzë lies near Albania's central coast, within the region of Vlorë, approximately 40 km from the well-known Archaic Greek colony Apollonia (Fig. 23). Vajzë has four tumuli with graves dated between ca. 1800-1500 BC on the basis of

[25] Prendi 1955; Prendi 1957; Cf. Hammond 1967, 228-230.

Fig. 23. Locations of sites where comparanda are cited.

grave goods (i.e., late MBA to mid LBA).[26] In addition to featuring an in situ cremation burial, the graves of Vajzë's Tumulus I are mainly slab-lined cists, comparable with the Goutsoura northern tumulus's central slab-lined cist grave and with the contemporary graves from the Area 3 cemetery.[27] A second Albanian burial site further to the south, Vodhinë in the region of Gjirokastër (Fig. 23), offers another comparison.[28] There, the excavators reconstructed a sequence whereby a small cairn, a cist grave, and a cremation burial preceded the creation of an MBA tumulus.[29]

Returning to the northern tumulus and Goutsoura, it may be possible to observe evidence of further memorial rituals if the burnt clay hearth and stone semicircle features are considered together with the MBA cremation burial and subsequent cist grave (Figs. 3, 5). Unlike the cremation burial and the central slab-lined cist grave, the hearth and stone semicircle features did not have associated C-14 dates. However, their stratigraphic positions do make it possible to clarify the order of their construction and use. The hearth was constructed into the EBA cultural layer (i.e., the same stratum into which the cremation burial's pit was cut). The stone semicircle was revealed during the removal of the tumulus fill, suggesting that it either predates or was constructed with the tumulus and its peribolos (Fig. 2, Burnt clay hearth, Stone semicircle).

The stone semicircle's location in relation to that of the northern tumulus's peribolos wall clarifies the sequence further, as the western side of the stone semicircle abuts(and therefore postdates) the interior of the peribolos (Figs. 3-5). This interpretation is further supported by the fact that the peribolos wall extends an additional course lower

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[26] Prendi 1982, 214, 217-226 and fig. 6 (nos. 4 and 5).

[27] Hammond 1967, 228-230, concludes that Vajzë's Tumulus I (A) was deliberately constructed to enclose and cover a single cremation burial (Grave 12).

[28] Prendi 1956.

[29] Hammond 1967, 201-204, 310. Wardle 1972, 40, compares the form of the tumuli at Vodhinë and Kakavi with the Cemetery S tumulus at Skaros on Lefkas (Dörpfeld 1927, 211-217).

than the stone semicircle, suggesting that the semicircle rests on top of a layer of fill that is being retained by the peribolos wall. Nevertheless, the similarities in the way that both walls are constructed and the way that they run together suggest that they were in contemporary use (Fig. 2, Peribolos wall).

It was noted previously that the stone semicircle was open on its southern side, directly bordering the margin of the burnt clay hearth area (Fig. 8). These features may have been used together, before the completion of the tumulus's filling phases. One interpretation is that these constructions operated with one or both of the earliest burials in the tumulus as a focal point for burnt offerings, funerary meals, or other mortuary rituals. Based on the chronology of the tumulus's creation, these features could have functioned alongside the tumulus's aforementioned central cist grave, which was located only around 1 m to the east and was also excavated into the tumulus fill (Fig. 5). Depending on the amount of time that the filling of the tumulus took, it might even be possible to consider the stone semicircle and the hearth being used in association with the original cremation burial C-14 dated to 1980/1955-1865/1755 cal. BC (Cremation burial, Burnt clay hearth, and Stone semicircle).

There are several good MBA comparanda for the inclusion of stone semicircles within tumuli, from southwestern Greece (from the tumuli at Papoulia and Routsi in Messenia) and from the Ionian Islands (from the site of Kokolata on Kephallenia; Fig. 23).[30] As at Goutsoura, there were no grave offerings associated with these semicircular stone structures. However, Tumulus 6 at Shtoj, which had its first grave dated to the EBA and its later graves dated to the MBA (ca. 1900 or 1800 BC), did have a circular feature with associated finds. Tumulus 6 featured an oval-shaped, stone-lined platform of pressed earth, located just above a central EBA burial.[31] Several violin-shaped figurines were discovered in association with the platform, indicating that it was used as a focal point for ritual.[32] Shtoj also featured a hearth surface with charcoal and pottery finds; a similar hearth was identified in excavations of another LH III period tumulus at Vajzë.[33]

If Goutsoura's hearth and semicircular stone structures were in use when the cist grave was constructed, this chronology adds further support to the identification of the central cist grave as the feature around which the tumulus was centered. However, any speculation about their relationship depends on being able to clarify how the tumulus was built – specifically, whether the horseshoe and hearth structures were still exposed when the central slab-lined cist grave was cut into the tumulus's layer of dirt, cobble,

[30] This feature is nicely reviewed and illustrated by Oikonomidis *et al.* 2011, 196 and 197, and figs. 2f and 2g. At these sites, the semicircular structures are described as "horseshoes," and they are located inside their associated tumuli. Like Goutsoura, Papoulia had a variety of burial types, including cist burials and scattered remains with an ash layer. Wardle 1972, 39 and 40, discusses the implications of these parallels among MBA tumuli in western Greece, the Ionian Islands, and Albania, observing similarities among the Messenian tumuli and the tumuli at Vodhinë and Kakavi.

[31] Oikonomidis *et al.* 2011, figs. 1c and 1d; Koka 1990, figs. 28 and 29; and figs. 2-4.

[32] Koka 1990, 70, Tab. VIII (nos. 95-101) and 72, Tab. X (nos. 1-6). Galaty and Lafe 2008, 267 point out that the violin figurines at Shtoj are comparable to EBA violin figurines discovered at the southern Greek site of Lerna, and to a violin figurine discovered in one of the tumuli at the central Albanian site of Apollonia (Amore 2010).

[33] Shtoj's hearth: Koka 1990, 3129 and 3130. Vajzë's hearth: Prendi 1957, 92 and 95. Tumulus 6 at Shtoj has some differences in form from the example at Goutsoura and it is located in a region that lies a significant distance from Thesprotia- close to the northern coast of Albania, in the region of Shkodër. In spite of these differences, Shtoj is a contemporary site with a similar set of features being used together.

and chipped-stone fill. If the construction and filling of the tumulus took place over an extended span of time, it is plausible, based on both their proximity and their stratigraphy, that all these features could have at one point been interrelated.

In addition to the central slab-lined cist grave, two other burials were deposited along with the tumulus fill at Goutsoura: Child grave 1 (a cist burial of a child with knees drawn in flexed position; Fig. 10) and Child grave 2 (a deposit of disarticulated children's bones without a grave cut; Fig. 11). Considered as a whole, the central cist grave, the scattered child burials, and the flexed burial, each executed with different rites in the same use phase of a single tumulus, present a varied assemblage for the community that used this structure. Preference of varied burial techniques is common for southern Albanian tumulus sites during the MBA and LBA, when there could be slab-lined cist graves, stone-lined cist graves, and simple pit graves at a single site and even under a single mound (cf. burials at Vodhinë, Vajzë, and Barç located in Korçë in southeastern Albania).[34]

At the same time that Goutsoura's northern tumulus went into use in Area 2, a parallel form of large-scale burial construction was taking place on the southern edge of the site. In the previous description of the graves of Area 3, it was proposed that the white limestone pebbled layer, shared by several of the early Area 3 graves (Graves 1, 2, and 5) is a possible indicator that they were once covered by a second pre-existing tumulus that eroded over time. Based on the C-14 date for Grave 1, the *terminus post quem* for the construction of this structure would have been 1720-1510 cal. BC (Fig. 2, The southern cemetery).[35] This range conforms closely with the C-14 range assigned to the northern tumulus's central slab-lined cist burial (1780-1600 cal. BC; Fig. 2, Central slab-lined cist grave). The fact that Area 3's earliest graves, 1 and 2, were also slab-lined cists supports the idea that these constructions could have taken place around the same time.

Many Albanian sites, including the aforementioned site of Apollonia (located 10 km inland from the central coast), Piskovë (located in the southern district of Përmet), and the previously discussed sites of Shtoj, Vajzë, and Vodhinë, offer comparable, contemporary examples of the construction and use of multiple tumuli at a single site.[36] However, the site of Goutsoura presents an exception for northern Greece, because there are few, if any, MBA tumuli with surrounding peribolos walls in Thesprotia, nor are there any in the neighbouring regions of Epirus and Thessaly until the LBA period.[37] This fact makes the presence of the northern tumulus more remarkable and the possibility of a second, contemporary tumulus even more exciting. Another characteristic that should

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[34] Prendi 1982, 234-235.

[35] Area 3's Grave 2, which appears to have its own small peribolos still intact, would carry a *terminus post quem* of 1780-1620 cal. BC.

[36] Apollonia: Amore 2010; Piskovë: Bodinaku 1981; Shtoj: Koka 1985; Vajzë: Prendi 1957; Vodhinë: Prendi 1956.

[37] Oikonomidi *et al.* 2011, 192, 197; Georganas 2002, 289. During the late LBA, the tholoi at the sites of Kiperi and Ephyra come into use. Papadopoulos 1987, 140-142, observes that tumuli have a contemporary and earlier presence north of Epirus, and the presence of tumuli in Bronze Age Greek and Albanian burial landscapes appears to have its origins in the north, with a movement southward. While it is the case that some tumuli (e.g., the Kiperi tholos) may be indicators of Mycenaean influence in the region, there is no strong parallel evidence at Goutsoura to explain the construction of the MBA/LBA tumuli as the result of contact with southwestern Greece.

not go unnoticed is the size of Goutsoura's grave constructions. Based on the number of graves included, both cemeteries are twice as large as they need to be in order to fulfill their functions of merely covering over each of the burials. These burial structures share the characteristic that the amount of physical space occupied by the constructions appears to have mattered to the individuals performing the rites. This tendency to occupy more space than needed continued to resonate throughout Goutsoura's history, from the primary use phase of the northern tumulus and throughout the centuries of use of the southern cemetery.

The diversity of the assemblage of burial types in the northern (Area 2) tumulus stands in contrast to the similarity of the burials executed in the southern (Area 3) cemetery, all of which were deposited in slab-lined cist graves (cf. Figs. 3, 15-16). The consistency of practice in the southern cemetery, in contrast to the variability of the graves from the northern tumulus, suggests that different groups may have been in charge of administering practices in each location, in spite of some of the burials possibly taking place within the same generation or time span.

Whether a tumulus (or several small tumuli) covered southern cemetery Graves 1, 2, and 5, or whether they were ringed by grave circles, it is clear that stones and some graves were disturbed in Area 3 after its earliest burials took place. A possible parallel for the rearranging that occurred with the construction of southern cemetery Graves 6 and 3, and possibly Grave 4, is observable in Tumulus G at the LBA site of Pogoni-Meropi, located just south of the Greek border.[38] Tumulus G contained slab-lined cist graves surrounded by similarly loose circles of stones, which perhaps once functioned as a single-course grave circle or as a series of orthostats.[39]

Goutsoura's Wall 101, which follows the contours of the Liminari hill, presents further evidence for how burial practice received focus at the site between 1540-1310 BC (Figs. 13-14). In the preceding section, it was proposed that Wall 101 was constructed as a retaining wall that would have extended the Liminari hill's contours to create a thoroughfare. The decision to shore up ground level in Area 1, approximately 10 m east of the northern tumulus during the mid-to-late LBA indicates that the tumulus retained significance for visitors to the site centuries after its construction. Moreover, this activity indicates intensified modification of the landscape, and a community participating in a joint enterprise, perhaps viewing it as an act imbued with ritual significance. It indicates a sense of stewardship toward the site and a physical acknowledgment of its continued significance.[40] The southern extent of Wall 101 remains unknown because of the presence of beehives in the central part of the site, but the possibility of a path linking the site's northern and southern cemeteries is an attractive one (Fig. 1, Area 1). A comparison may be drawn with the later example of the cyclopean wall that was built to support the edge of the hillside at Ephyra at a cemetery site featuring three LBA tumuli.[41]

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38 Andreou and Andreou 1999.

39 Andreou and Andreou 1999, 86, figs. 40 and 41; Oikonomidis *et al.* 2011, 194-195, fig. 3c. A second parallel that may provide fuel for arguing a more deliberate construction is the much later vicinity of Halos in Thessaly; cf. Georganas 2002, 289-292.

40 Cf. Kvapil 2012, 5.

41 Papadopoulos 1987, 140. Although it is presumed to have been constructed in the LBA, the date of tumulus B is actually unknown, as it contained no diagnostic artifacts. Note that the dimensions of the cyclopean wall at Ephyra were 6.85 x 2.15 x 0.45 m, which was considerably thicker than the wall at Goutsoura.

Regardless of whether the grave circles of Area 3 represent the afterlife and the change of use of a tumulus structure or whether they represent individual burials that have been meaningfully grouped together, the circles serve to reinforce Goutsoura's function as a communal burial site during the MBA and LBA. Taken along with the site's other features, it is evident that whereas the EBA settlement lasted some six centuries, the site's life as a focal point for burial could have lasted as long as 750 years. A salient final illustration of the power of memory in dictating practice at Goutsoura lies in the site's latest known burials: Child graves 3 and 4 in Area 2, dated on the basis of ceramics to ca. 1300-1100 BC or later, and Grave 3 in Area 3, C-14 dated to 1420-1250 cal. BC. These three graves, executed long after the original construction phases of their respective cemeteries, demonstrate that the area continued to be a focus of memorializing burial activity even after the tumuli and/or grave circles were altered from their original forms.

Conclusion

The people who maintained and used the cemetery site of Goutsoura adopted a variety of burial rites and construction, destruction, and rebuilding practices that each reinforced the site's significance to its community over time. These rites and practices served to physically instill the landscape with a sense of visible and ongoing remembrance, in the form of large-scale structures such as the northern tumulus, Wall 101, and the southern cemetery.

A closer examination of the site's main features and their comparanda from other parts of the Mediterranean has demonstrated that Goutsoura has at least one and possibly two late MBA or early LBA tumuli, which are currently unique for the region of Thesprotia. The locations of their closest known comparanda are informative for considering how the region may have oriented itself between ca. 1800 and 1600 BC, as the northern tumulus's features indicate parallels to MBA examples from the Ionian Islands (e.g., Kephallenia, Leukas), and from Albania (e.g., Vajzë in Vlorë, Vodhinë in Gjirokastër, and Shtoj in Shkodër). Based on Thesprotia's location, these connections are not surprising, as both land and sea routes would have allowed for the exchange of goods and ideas during the MBA and LBA.[42] There is evidence for the adoption of new goods and social practices up and down the Ionian coast during this span of prehistory.[43]

The dynamics of Bronze Age communication between southern Albania and northwestern Greece continue to be explored, and many scenarios for communication have been proposed.[44] The most persuasive of these scenarios account for evidence of influence operating in multiple directions. For example, although Goutsoura represents one of the earliest examples of a tumulus with a peribolos wall in the region of Thesprotia (a phenomenon better represented in MBA Albania), the graves at Vajzë also feature

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42 Hammond 1967, 33-37; Wardle 1997, 514 and 516; Lera *et al.* 2009, 330; Galaty and Lafe 2008, 265-267.

43 Tartaron and Zachos 1999, 63, 71, and 72; Tartaron 2005, 157; cf. Onnis 2011, 499, arguing for intense contact between southern Greece and northern Greece/southern Albania in the MBA. Onnis argues that these networks of exchange cooled in the early part of the LBA as southern Greece turned its focus to other Adriatic zones, including Apulia. Galaty and Lafe 2008, 265 similarly observe the relationship between coastal Italy and coastal Albania at the very end of the Bronze Age and suggest that this new series of interactions may demonstrate the significance of sea contacts to exchange in earlier phases of the Bronze Age.

44 E.g., Soueref 1986; Soueref 1989; Papadopoulos 1987; Wardle 1972; Wardle 1997; Tartaron and Zachos 1999; Tartaron 2004; Tartaron 2005; Galaty 2007; Lera *et al.* 2009; and Onnis 2011.

some of the earliest securely dated occurrences of MBA Aegean metalwork and type artifacts in Albania.[45] The role that the Ionian Islands played in assisting the transmission of these goods and social practices during the MBA and the LBA warrants further exploration.[46] Overall, Goutsoura appears to have been an early adopter of the tumulus custom in northwestern Greece, and this burial practice seems to have remained rare in LBA Thesprotia and Epirus in comparison with regions in southern and western Albania, where it was popular.[47]

The sequence of events that led to the southern cemetery's construction is uncertain. Several possible phases of development have been explored for the southern cemetery, including an initial large tumulus construction, an initial large grave circle construction and an initial layout of individual graves, each with its own surrounding grave circle.[48] Regardless, it seems clear that a distinct change took place in Area 3 at the time of the construction of Graves 3, 6, and 4, at which point the stones and several graves in the area were shifted, possibly in accompaniment with disinterment of their contents. The evidence presented during the exploration of both the southern and the northern cemetery calls attention to the need for more information about what landscape markers can be used to identify eroded tumuli, as well as what that process of erosion may have meant to a cemetery's self- or community-appointed stewards.

The activities that took place at Goutsoura during its MBA and LBA use phases were resonant enough with the community that performed them to sustain the site's use as a cemetery for between 350 and 750 years, depending on how compressed the site's chronology proves to be. These communal activities included burial rites, rituals, and modification of the cemetery's landscape. These activities are intriguing because the site's burial structures, as they are currently preserved, are slightly smaller in scale but also less crowded with graves than their counterparts from the Ionian Islands.[49] The construction of Goutsoura's structures to stand larger than they needed to be was a conscious choice that should be taken into account in considering the population and social organization of the communities that used the site over time.

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[45] Several graves at Vajzë contained goods with connections to the Middle Helladic southern Aegean, including shoed and slotted spearheads, horn-shaped bronze swords with multiple rivets, Sandars type A swords, and Sandars type 6a knives. Prendi 1957, 85-88; Prendi 1982, 216-224, fig. 6 (nos. 7-10) and fig. 11 (nos. 1-5); Hammond 1967, 311, 312, 320, 328, 337, and 352, and figs. 20, 21, 23, and 27. See also Bejko 1994, 110-114 and fig. 4.2, who does not dispute the dates of these artifacts but who argues that tumuli are an LBA phenomenon in the case of the southeastern Albanian region of Korçë.

[46] In addition to the previously described MBA tumuli at Kokolata on Kephallenia, there are also several early tumuli on Lefkas: MBA Cemetery S at Skaros and MBA Cemetery F (also known as Familiengrab F) at Steno, and even a series of EBA circular stone-built graves with cremation burials at Steno (i.e., the previously mentioned Cemetery R or the R-Graves; Dörpfeld 1927). During the LBA, later tumulus structures on Kephallenia contained grave goods indicating contact with both the Peloponnesos and Central Europe (amber, bronze, violin fibulae, and Mycenaean pottery alongside handmade wares in both imitation Mycenaean and local forms). Wardle 1972, 22, 26, 37-40, 44, 108; Hammond 1967, 331.

[47] Papadopoulos 1987, 142; Oikonomidis *et al.* 2011, 197.

[48] E.g., as in the case of the EBA cemetery site of Kriaritsi in the region of Chalkidiki in northeastern Greece, where periboloi surround individual graves. The site differs, however, in that burials are more numerous and are executed as cremations in urns. My thanks to Aristeides Papayiannis for bringing this site to my attention.

[49] Similarly, the graves constructed at Goutsoura over a period of several centuries are few in contrast to graves constructed over several centuries in contemporary southern Albanian cemeteries. In addition, the discovered height of the northern tumulus at Goutsoura was 0.4 m, while the heights of the tumuli at Vajzë range from 2.0 to 2.2 m. Hammond 1967, 228.

Further clarification of the chronological sequencing at Goutsoura would add to the current account of how the site's burial structures interacted. For example, current chronological resolution does not make it possible to say whether the creation of the southern cemetery was an act of reinforcement carried out in concert with the construction of the northern tumulus of Area 2, or whether it was, perhaps, an indication of competition between disparate groups making use of (and perhaps laying claim to) the same space. Likewise, further explorations of the southern boundary of Wall 101 would clarify whether the wall served to connect the two cemeteries in any way. Understanding these structures together could assist in identifying forms of ritual practice that might have accompanied burial practice at Goutsoura, providing a richer view of activities that took place at the site.

Overall, the dates of Goutsoura's heaviest phases of site modification – the construction of the northern tumulus, the inception of the southern cemetery, and the creation of Wall 101 – even at their most compressed, would still have spanned a period of at least 80 years, 1620-1560 BC. Maintenance of the site would have required the commitment of multiple generations and may have been predicated on seasonal returns to Goutsoura, based on the ongoing activities of disinterment that appear to be evidenced in both the northern tumulus and in the southern cemetery. Based on the low number of graves discovered, these secondary burial processes appear to have been enacted on a subset of a larger population. This observation demonstrates a need for research geared toward examining evidence for the roles that status and memory played in determining these practices at Goutsoura and at comparable cemeteries.

This picture of Goutsoura shows the site's visitors harnessing the power of monuments to imprint lasting memories onto the burial landscape, which, in turn, perhaps served to strengthen the networks of living communities.

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Bronze Age Pottery from Goutsoura

Jeannette Forsén

The Bronze Age site of Goutsoura (PS 12) was excavated between 2007 and 2010, with the main emphasis concentrating on three spots named Area 1, Area 2 and Area 3. What began as four small trial trenches in 2007 turned with time into larger undertakings, the aim of which was to determine the extent and gain a better understanding of the stratigraphy and function of the site. In Area 1 we found a Late Bronze Age (LBA) terrace wall. Area 2 in its turn revealed a tumulus with a central cist grave, the burial of which can be dated to the transition from the Middle to Late Bronze Age. The tumulus was constructed on top of a Middle Bronze Age (MBA) cremation grave and a homogeneous Early Bronze Age (EBA) cultural layer. Some 75 m to the south of the tumulus in Area 3 a cemetery with cist graves was excavated, stretching in date from the very end of the MBA throughout all of LBA.[1]

The Bronze Age pottery of Thesprotia as well as of Epirus in general is notoriously difficult to date due to the lack of published sites with a clear stratigraphy,[2] the lack of contacts and thereby influences from the well-known southern Greek pottery repertoire,[3] but also the tendency to produce similar wares and shapes for many centuries. The aim with this chapter is to publish some examples of pottery from all three excavation areas, however with an emphasis on pottery originating from such strata that with the help of the stratigraphical sequence and AMS samples could be dated to specific parts of the Bronze Age.

Catalogue of pottery

The most interesting layer of Goutsoura is the undisturbed and homogenous EBA layer of Area 2, which can be fairly securely dated on the basis of four AMS samples (Fig. 11).[4] The emphasis of this catalogue is therefore on the EBA assemblage. The cemetery in Area 3 has been dated to between 1755-1255 cal BC. As no signs of any cultural layer pre-dating the cemetery exist, the finds from this area most likely date to the LBA, although some of them also could date to the very end of the MBA or even the Early Iron Age (EIA). Because the finds from Area 3 on stratigraphical grounds can be given a certain chronological bracket I have here included a representative sample of shapes and wares.

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[1] For a plan of the site as well as for a more detailed description of the excavation strategy and stratigraphy, see Forsén, this volume. In Forsén *et al* 2011, 82 I suggest that a handful of sherds should date to the Late Neolithic period, a statement that I no more support. All the pottery drawings of this chapter were made by Anna Patteri and Camilla Magnusson and later inked by Anna Patteri and Iina Musakka. I also owe thanks to Jeremy Rutter and an anonymous peer reviewer, who read through my manuscript at an early stage giving me several pertinent suggestions.

[2] The site Doliana being one of the few exceptions. Cf. Douzougli and Zachos 2002.

[3] For general overviews, where also contacts to the south are described, see e.g. Wardle 1972 and Tartaron 2004. For an overview of the LBA in Epirus, see also Soueref 2001.

[4] For a more detailed description of the AMS date sequence, see Forsén, this volume, Appendix.

The uppermost layers of Goutsoura clearly date to the end of the LBA or the EIA (indicated e.g. by the existence of a handful of kylix stems and wishbone handles), but are to quite a large degree mixed with earlier finds. I therefore have put much less emphasis on finds from those layers. The lowermost cultural layer in Area 1 and the smaller trenches next to it, which on the basis of the stratigraphy and one AMS sample date to the MBA, was not studied. A close study of the finds from that layer, which are rather fragmentarily preserved, would be a clear desideratum for the future.

In the following catalogue the sherds are presented in consecutive order. The find context of each entry is given in the following way: Square number, locus number (Loc.), pail number (p.) and finally the date within parenthesis. Diameters are always the inner ones. If a rim is turned out at a 90° angle it is called out-turned, if less than 90° it is called everted. The "lip" of a vessel indicates the top of the rim. Additionally the following abbreviations are used: E=exterior, I=interior, diam.=diameter, S=some, M=many, Mass=massive, A=angular, R=round, w=white, bl=black, br=brown, gr=grey, r-y=reddish-yellow, spark=sparkling, Ui=unidentifiable, CW=corded ware.

Area 1

1. Rim of open vessel. Small cup with straight sides. Diam. 11 cm. Medium-fine, unevenly fired, black core. E and I fired light brown (7.5YR 6/4), slip, poss. polished on E. Sspark silvery inclusions.
Find context: Trench 2 East, Loc. 3, p. 1 (16.7.2009).
Date: MBA-LBA.

2. Rim of jar. Diam. ca. 13 cm. Medium-fine, unevenly fired, black core. E slipped yellowish-red (5YR 5/6). I mottled reddish-yellow (5YR 7/6) to gray to black, burnished. MAwgr < 1 mm inclusions.
Find context: 494.5/510, Loc. 2, cleaning top of F101 (20.7.2009).
Cf. Wardle 1972, 513:709 (from Elaphotopos, Epirus).
Date: MBA-LBA.

3. Strap-handle with a small knob. Medium-fine, evenly fired, strong brown (7.5YR 4/6). E and I plain. MassAwgr < 1mm inclusions.
Find context: 492.5/508, Loc. 1, p. 2 (6.7.2009).
Date: LBA-EIA.

4. Vertical strap-handle with raised margins. Medium-coarse, unevenly fired, red (2.5YR 5/8), bluish gray core. E and I plain, "orange-red" ware. MA w < 8 mm inclusions.
Find context: Trench 1West, Loc. 2, p. 1 (14.7.2009).
Cf. Wardle 1972, 492, fig. 126:557 (from Dodona, Epirus).
Date: LBA.

5. Body sherd with conical knob. Medium-fine, unevenly fired, red (2.5YR 6/8), bluish gray core. E and I plain, "orange-red" ware. SAw inclusions.
Find context: Trench 1West, Loc. 2, p. 1 (14.7.2009).
Cf. Léra *et al.* 1996, 1017, fig. 14 and Gori 2011, 635, pl. XCV:SV147 (level 9B = 1900-1600 BC). The plastic "mamelons", or, conical knobs begin during EBA (Maliq IIIa), but carry on into the EIA.
Date: LBA (indicated by the "orange-red" ware).

Fig. 1. Pottery from Area 1 (Nos. 1-8).

6. Body sherd, large open vessel, Matt-painted. Medium ware, evenly fired yellowish-red (5YR 4/6). E light reddish-brown slip (5YR 674). Matt black paint, possibly triple zigzag.
Find context: 495.5/510, Loc. 1, p. 1 (3.7.2009).
Date: MBA.

7. Horizontal handle, crescent shaped. Medium ware, unevenly fired, red core (2.5YR 5/8). E and I fired mottled pink (7.5YR 7/4) to red (2.5YR 6/6), plain. MAw < 5 mm, SAbrbl < 3 mm inclusions.
Find context: 496.5/511, Loc. 2, p. 1 (1.7.2009).
Cf. Bodinaku 1982, 89, 91, Tabl. II:6 (from Pazhokut tumulus 7, grave 26, Albania, dated to 13th-8th century BC).
Date: LBA-EIA.

8. Horizontal handle on rim. Medium-coarse ware, unevenly fired, bluish gray core. E and I fired mottled dark red (2.5YR 4/8) to olive green (2.5Y 6/6) to black, plain.
Find context: 496.5/511, Loc. 1, p. 2 (1.7.2009).
Cf. Wardle 1972, 506, no. 629, fig. 130:629 (from Dodona).
Date: MBA.

Area 2

9. Near-vertical rim of bowl with cord impressions. Diam. ca. 18-20 cm. Fine ware, evenly fired. E black, poss. burnished. I fired dark gray (7.5YR 4/1), burnished. SAwblgr < 1mm, M spark silvery grits. Two additional sherds from the same vessel were found in 503/507, Loc. 5, p. 2 (29.6.2010). It is noteworthy that this vessel, as is the case with No. 12, has the impressions in perpendicular panels.
Find context: 505/506, Loc. 3, p. 1 (23.7.2009).
Cf. Wosinsky 1904, 39, pl. XVI:19 (from Debelo Brdo, Bosnia).
Date: EBA.

10. Broad strap-handle with fine cord impression. 4.8 cm wide. Medium ware, unevenly fired, mottled dark brown (7.5YR 3/3) to black, with black core. Unslipped and unburnished. MAw < 2 mm inclusions.
Find context: 505/505, Loc. 3, p. 2 (24.7.2009).
Cf. Wosinsky 1904, 39, pl. XVI:12 (from Debelo Brdo, Bosnia, a body sherd).
Date: EBA.

11. Body sherd with cord impressions. Medium-fine ware, unevenly fired, black core. E and I fired mottled reddish-brown (5YR 4/4) to black, both surfaces burnished. MAw < 4 mm inclusions.
Find context: 507/508, Loc. 4, p. 1 (15.7.2009).
Cf. Wosinsky 1904, 39, pl. XVI:12 (from Debelo Brdo, Bosnia, almost identical sherd and pattern).
Date: EBA.

12. Jar rim with cord impression in two vertical panels parallel to each other. Diam. ca. 18-20 cm. Fine ware, evenly fired black, burnished on both surfaces. SRbuff < 3mm inclusions. Two more sherds of the same vessel were found in 507/507, Loc. 4, p. 2 (16.7.2009) and 501/507, Loc. 5, p. 2 (1.7.2010).
Find context: 507/507, Loc. 4, p. 1 (17.7.2009).
Cf. Wosinsky 1904, 39, pl. XVI:19 (from Debelo Brdo, Bosnia).
Date: EBA.

13. Body sherd with cord and wedge impressions. Fine ware, unevenly fired, black core. E slip fired brown (7.5YR 5/4). I black, burnished. Very neat and precise cord impressions. The wedge impressions are also clear and neat. Swbuff < 1mm inclusions.
Find context: 505/506, Loc. 3, p. 1 (23.7.2009).
Cf. Roman *et al.* 1992, pl. XIII:4; 86:2 (from Leliceni-Muntele, Romania) and pl. II: 3, 5 (from Bogdăneşti, Romania).
Date: EBA.

14. Two-handled bowl, six body sherds, one strap-handle, all cord impressed (three joining fragments). Fine ware, unevenly fired, gray core, dark red skins subsurface. E black slipped, unburnished. I gray (5YR 5/1), burnished. MAw < 1 mm inclusions, Mass spark silvery grits.
Find context: 505/507, Loc. 3, p. 2 (23.7.2009).
Cf. Roman *et al.* 1992, pl. 99:1a, 100:5 from Lelicene-Muntele, Romania.
Date: EBA.

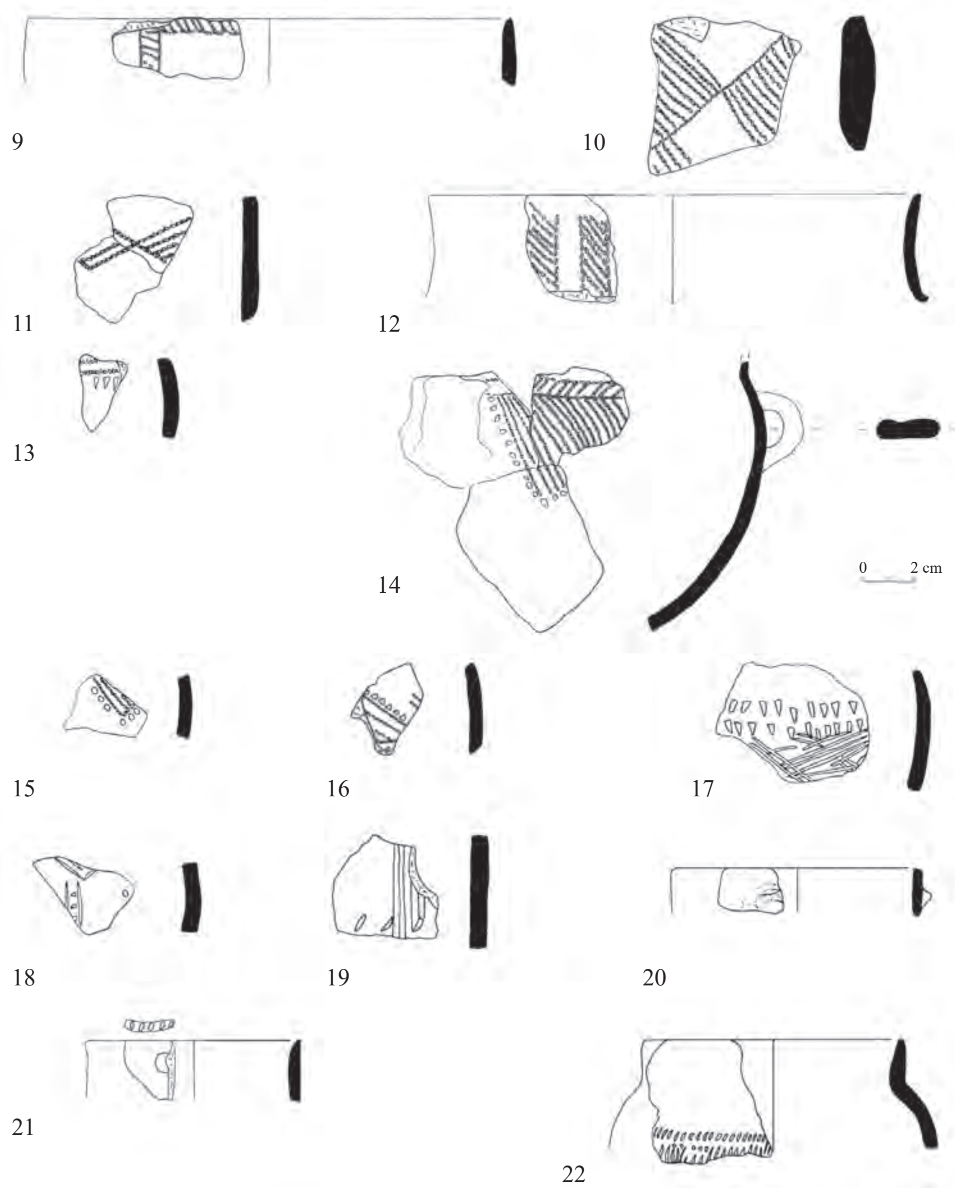

Fig. 2. Pottery from Area 2 (Nos. 9-22).

15. Body sherd with cord impression. E and I black surfaces, not polished nor burnished, dark brown subsurface skins, grey core. Mass spark silvery grits.
Find context: 505/508, Loc. 5, p. 2 (24.7.2009).
Cf. Roman *et al.* 1992, pl. 58:10, from Bogdăneşti, Romania (3rd period, CW), cord impressed triangular pattern lined with round holes, carefully executed.
Date: EBA.

16. Body sherd with cord impression. Medium-fine unevenly fired ware with dark red subsurface skins, grey core. E and I black, smoothed. Mass wgr < 1 mm inclusions, Mass spark silvery grits.

Cord-impressed with “stabbing” and fingernail impressions. The AMS sample Hela-2499, which gave a date of 2875-2615 cal BC, came from the same context as this sherd.
Find context: 504/503, Loc. 5, p. 3 (30.6.2010).
Cf. Roman *et al.* 1992, pl. 28:6, from Celei, Romania (3rd period, CW). The same decorative modes are involved although differently arranged.
Date: EBA.

17. Body sherd including shoulder, with wedge impressions and scoring, open vessel. Medium ware, unevenly fired mottled light brown (7.5YR 6/4) to reddish-yellow (7.5YR 6/8) with a black core. E burnished or polished above double row of wedges. I burnished. MARwbl < 2 mm inclusions, Mass spark silvery grits. The AMS sample Hela-2103, which gave a date of 2820-2670 cal BC, came from exactly the same context as this sherd.
Find context: 505/508, Loc. 5, p. 2 (24.7.2009).
Cf. Christmann 1996, pl. 120:4 (phase B = early Early Helladic II [EH II]). Same syntax, although differs in details e.g. only partly double row of, in this case, ovoid impressions preserved at Pevkakia. See also Roman *et al.* 1992, pl. 55:23 (Folteşti, 3rd period, CW, but without scoring). However, at Oradea Salca in western Romania, several sherds have a double row of wedge-shaped impressions with scoring and pellets (“Linsen”) as additional decoration. These are all deemed to be Baden culture traits (Roman and Németi 1978, 133, pl. 52:11; 134, pl. 53:5).
Date: EBA.

18. Body sherd with incisions. Fine ware, evenly fired black. E burnished. I burnished to gloss. Swbr < 1 mm, Sspark silvery inclusions.
Find context: 507/505, Loc. 4, p. 2 (17.7.2009).
Cf. Roman *et al.* 1992, pl. 40:3, from Ezerovo, Bulgaria (3rd period, CW). Two of three individual incised elements are present albeit in another pattern. Wosinsky 1904, 100-102, pl. CX:92 (from two burial sites in the region of Elisabethpol, Caucasus: individual incised elements are present, but in another pattern).
Date: EBA.

19. Body sherd with vertical incisions and fingernail impressions in horizontal row. Medium-fine ware, unevenly fired, black core. E fired light brown (7.5YR 6/3). I black, burnished to high gloss. SAw < 4 mm inclusions.
Find context: 509/508, Loc. 3 (burial) (15.7.2009).
Cf. Christmann 1996, pl. 19:26 (phase 3 = early EH II). The fingernail impressions on this piece occur above the vertical incisions.
Date: EBA.

20. Small cup rim, plain. Diam. 9 cm. Fine ware, evenly fired, black surfaces, fragment of horizontally placed elongated knob on E (1 cm). E and I well burn.
Find context: 509/508, Loc. 3 (burial) (15.7.2009).
Cf. Gori 2011, 338, 564, pl. XXIV: SV349 (level 8 = 2300-2000 BC).
Date: EBA.

21. Cup rim with pie-crust and round clay pellet on E. Diam. ca. 8 cm. Fine, unevenly fired. E fired mottled red-yellow-bluish grey. I dark grey (5YR 4/1). SARw < 1mm inclusions.
Find context: 509/507, Loc. 4, p. 1 (22.7.2009).
Cf. Christmann 1996, pl. 74:10 (phase 7 = late EH II, similar shape and size, but not decoration); Dragonov 1995, 231, fig. 5:17 (from Kiten, Bulgaria, similar shape, size and pellet decoration on exterior).
Date: EBA.

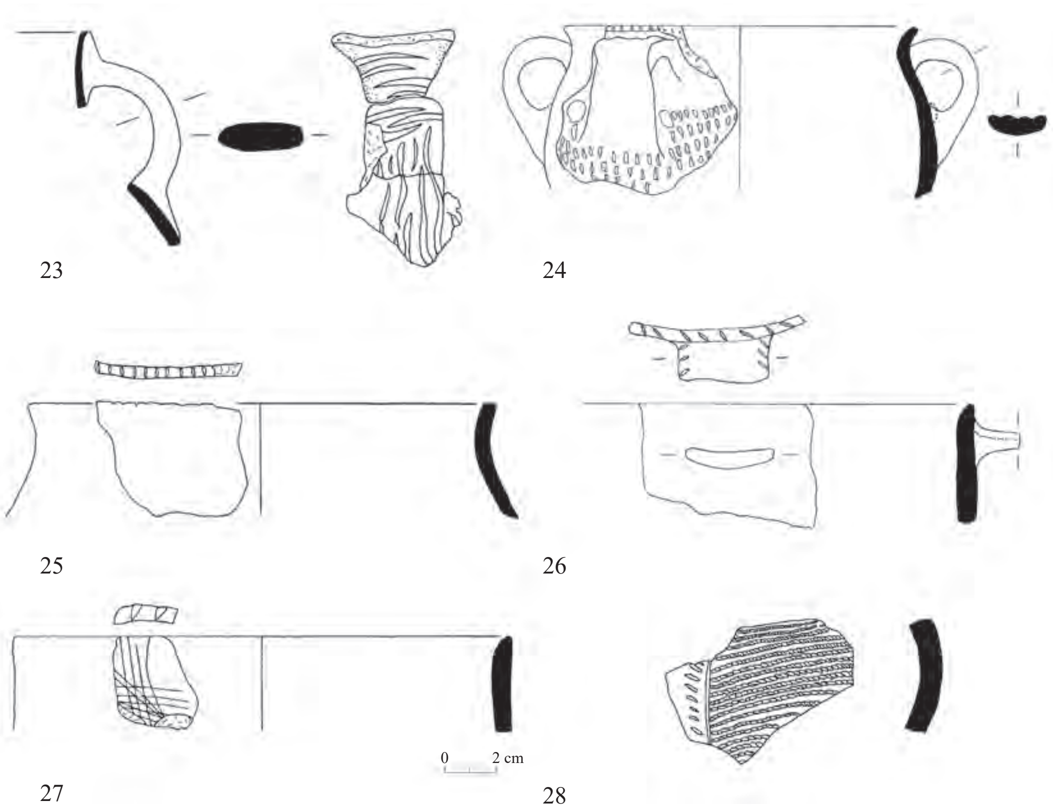

Fig. 3. Pottery from Area 2 (Nos. 23-28).

22. Jar rim with incisions on shoulder. Diam. ca. 9-10 cm. Medium ware, unevenly fired, black core. E and I fired mottled brown (7.5YR 5/3) to black, burnished. MAw < 3 mm inclusions.
Find context: 507/508, Loc. 4, p. 1 (15.7.2009).
Cf. Roman 1976, 184, pl. 84:3, from Boarta, Romania (Coţofeni, phase a III a). The shape is similar although our example has another decoration on its shoulder.
Date: EBA.

23. Jug with vertical incised strap-handle (2.9 cm wide). Medium-coarse ware, unevenly fired, black core. E mottled red (2.5YR 5/6) to black, plain. I black, burnished. SAgr < 5mm, SARw < 4mm, SAbl < 1mm inclusions.
Find context: 507/505 (circle), Loc. 4, p. 1 (16.7.2009).
Cf. Roman 1976, 192, pl. 94:2, from Basarabi, Romania (Coţofeni, phase a IIIa – although our example is not an amphora but a jug); Christmann 1996, pl. 4:4 (phase 1 = late EH I).
Date: EBA.

24. Two-handled bowl, incised lip, clay disc applications and wedged stabbings on shoulder. Diam. 13 cm. Medium-fine, unevenly fired, black core. E fired mottled very pale brown (10YR 7/4-8/2) to black. I fired mottled gray (10YR 6/1) to light gray (10YR 7/1) to black, well burnished. MassAw < 2 mm, SAgrbuff < 2 mm inclusions.
Find context: 503/506, Loc. 5, p. 1 (30.6.2010).
Cf. Roman *et al.* 1992, pl. 37:5, from Ezerovo, Bulgaria (3rd period, CW). This pottery is called CW by Roman although there are no cord impressions visible as decoration.
Date: EBA.

25. Jar rim with incised lip, very uneven. Diam. ca. 14-20 cm. Medium-fine, unevenly fired, black core. E fired mottled dark reddish-brown (5YR 3/4) to black, probably smoothed. I black burnished. SAwr-y < 1 mm inclusions.
Find context: 507/505 (circle), Loc. 5, p. 1 (17.7.2009).
Cf. Christmann 1996, pl. 119:7 (phase B = early EH II), parallel shape and incised lip.
Date: EBA.

26. Bowl rim, incised lip, strap-handle (3.2 cm wide) incised along edges. Diam. ca. > 30 cm. Medium-fine, evenly fired, black. E and I burnished. SAw < 2 mm inclusions.
Find context: 506/507, Loc. 4, p. 1 (24.7.2009).
Cf. Christmann 1996, pl. 71:3 (phase 7 = late EH II), but angle of rim differs and the incisions on handle are lacking; Bondár 2012, fig. 12:5, a comparable bowl is published from the late copper age site (Baden culture) of Nagyút-Göbölyjárás II in Hungary (however the date is very early, i.e., 3630-3360 cal BC).
Date: EBA.

27. Bowl rim with pie-crust and scored surface. Diam. 18 cm. Medium ware, unevenly fired, black core. E fired light brown (7.5YR 6/3), scored surface. I fired black, smoothed. SAwbr < 2 mm, 1 w 4 mm inclusions.
Find context: 509/508, Loc. 4, p. 2 (17.7.2009).
Cf. Christmann 1996, pl. 127:4 (phase C = early and middle EH II).
Date: EBA.

28. Body sherd with cord and fingernail impressions. Fine ware, evenly fired, black. E unburnished. I burnished. SAw < 1 mm. Very finely executed cord impressions in horizontal lines, bordered by an incised vertical line and with nail-impressions on opposite side of vertical line.
Find context: 507/508, Loc. 4, p. 1 (15.7.2009).
Cf. Wosinsky 1904, pl. V:7 (from Vládháza in Siebenbürgen).
Date: EBA.

29. Flat base with vertical finger nail impressions. Diam. 10 cm. Medium, unevenly fired, black core. E brown (7.5YR 5/4). I black burn. SAw< 2 mm, inclusions.
Find context: 505/506, Loc. 3, p. 1 (23.7.2009).
Cf. Kilian-Dirlmeier 2005, 105 and note 232, pl. 41:61 (terminus ante quem EH II). The fingernail impressions here are not vertical, but rather horizontal.
Date: EBA.

30. Flat base of bowl with vertical finger nail impressions. Diam. 9 cm. Fine, unevenly fired, dark brown core. E fired light brown (7.5YR 6/4). I grayish brown (10YR 5/2), smoothed or polished?
Find context: 505/507, Loc. 3, p. 1 (22.7.2009).
Cf. Kilian-Dirlmeier 2005, 100, pl. 36 R2-5 (developed EH II), 101, pl. 37 R3-17 (developed EH II), 163. The Nidhri parallels are body sherds rather than bases.
Date: EBA.

31. Flat base of large storage vessel. Diam. 14-16 cm. Medium ware, unevenly fired, black core. E yellowish-red (5YR 5/6), fine, thin lines of scored surface. I plain black surface. MAwgr< 3 mm inclusions.
Find context: 505/506, Loc. 3, p. 1 (23.7.2009).
Cf. Christmann 1996, pl. 3:8, phase 1 (late EH I).
Date: EBA.

32. Horizontal lug, pierced twice vertically. Medium-coarse ware, unevenly fired, black core. E dusky red (2.5YR 4/4). I black. SAw < 1 mm inclusions.

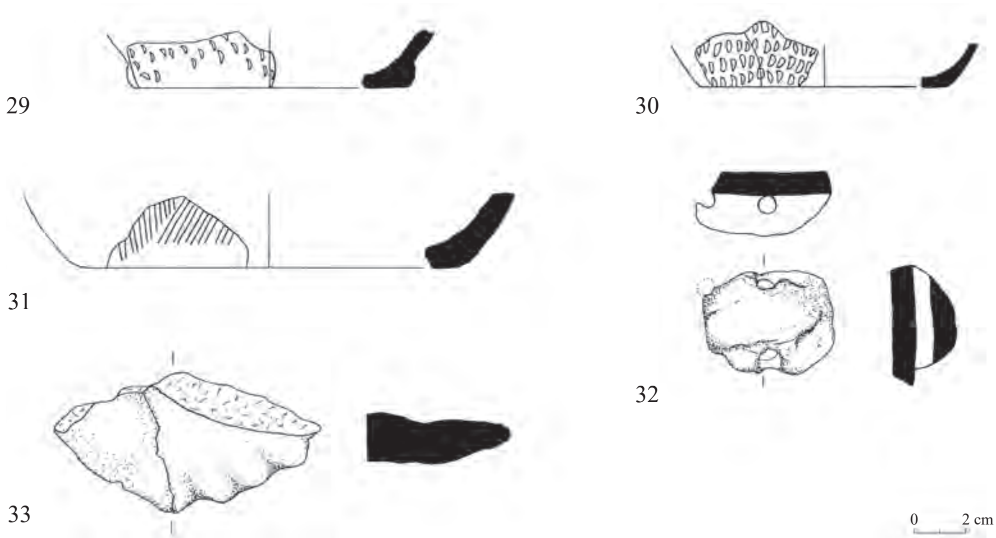

Fig. 4. Pottery from Area 2 (Nos. 29-33).

Find context: 506/507, Loc. 4, p. 1 (24.7.2009).
Cf. Christmann 1996, pl. 23:14, phase 3 (early EH II, it is noteworthy that the lug belongs to a vessel of CW); Korkuti 2006, 47, table II:2 (from Maliq IIIa-b, Albania = EH III).
Date: EBA.

33. Horizontal lug handle, crescent-shaped when viewed from above, with exterior bearing multiple finger impressions so as to produce a scalloped exterior outline. Medium-coarse ware, unevenly fired, bluish-gray core (almost black). Fired red (2.5YR 5/8), plain. MAw grits < 3 mm inclusions.
Find context: 509/508, Loc. 4, p. 1 (16.7.2009).
Cf. Benton 1947, 181, no. 83, 182, fig. 13 (Hagios Nikolaos near Astakos in Akarnania with further refs.); Weisshaar 1989, pl. 26:9 (Pevkakia, Unteres Rachmani).
Date: EBA.

34. Spoon handle. Medium-fine ware, unevenly fired, black core. Fired light-reddish brown (5YR 6/4), traces of slip (5YR 6/4), smoothed. MARw < 2 mm, SAblbrgr > 1 mm inclusions.
Find context: 509/506, Loc. 2, p. 1 (6.7.2009).
See Forsén 2011, 66:5.
Date: EBA

35. Spoon handle with fingernail impressions and fishtail end. Medium-fine ware, unevenly fired, black core. Fired mottled yellow (10YR 8/6) to red (2.5YR 6/8) to bluish grey, lightly pol or burn. SAw <1 mm inclusions.
Find context: 505/507, Loc. 3, p. 1 (22.7.2007).
See Forsén 2011, 66:1.
Date: EBA

36. Spoon with handle fragment. Medium-fine ware, unevenly fired, bluish gray core. Fired mottled yellow (10YR 8/6) to red (2.5YR 6/8) to bluish grey. SAw < 1 mm inclusions.
Find context: 505/507, Loc. 3, p. 1 (22.7.2007).
See Forsén 2011, 66:2. Cf. Pevkakia, pl. 84:23 (Pev. 7 Spät. = Lerna III:D= late EH II).
Date: EBA

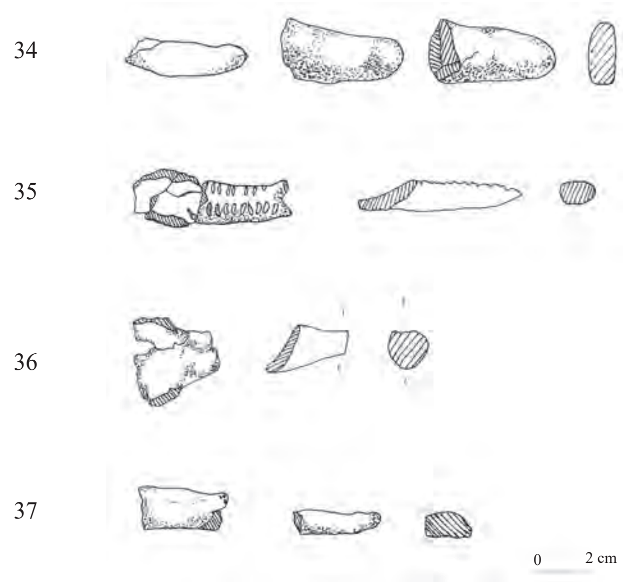

Fig. 5. Spoons from Area 2 (Nos. 34-37).

37. Spoon handle with fishtail ending. Fine, unevenly fired dark gray core. Brown slip (7.5YR 5/3-5/4). 1 w 5 mm, MARwbr < 1 mm inclusions.
Find context: 509/508, Loc. 4, p. 2 (17.7.2009).
See Forsén 2011, 66:3.
Date: EBA

38. Complete profile of storage jar, everted rim and flat base. Diam. Ui. H ca. 34. Coarse ware, unevenly fired, gray core. E reddish yellow (5YR 6/6), plain, with a round knob at maximum diam. I dark red (2.5YR 4/6), burnished. Thickness of wall ranges 0.9-1.4 cm.
Find context: 504/505, Loc. 0-4, p. 2 (8.7.2010).
Cf. Heurtley 1939, 185, no. 264 (buff coloured from Saratsé, said to be EBA); Andrea 1999-2000, 331, fig. 20:14-15, 17 (dark gray or black coloured from Sovjan, MBA).
Date: MBA

Fig. 6. MBA jar from Area 2 (No. 38).

Area 3

39. Out-turned rim of bowl. Diam. Ui. Medium ware, unevenly fired, dusky red (2.5YR 4/4), black core. E and I burnished. SAwbrbuff < 2 mm inclusions.
Find context: 511/577, Loc. 1, p. 1 (16.6.2010).
Cf. Wardle 1972, fig. 126:543 (from Dodona, Epirus).
Date: MBA-LBA.

40. Everted rim of (two-handled?) bowl . Diam. ca. 16 cm. Medium ware, evenly fired, reddish-yellow (5YR 6/6). E plain. I black slipped and burnished. MAwbr < 2 mm inclusions.
Find context: 523/577E, Loc. 0, p. 2 (18.6.2010).
Cf. Prendi 1977-1978, Tab. VI:7 (from Vodhine, Albania, but 4-handled).
Date: MBA-LBA.

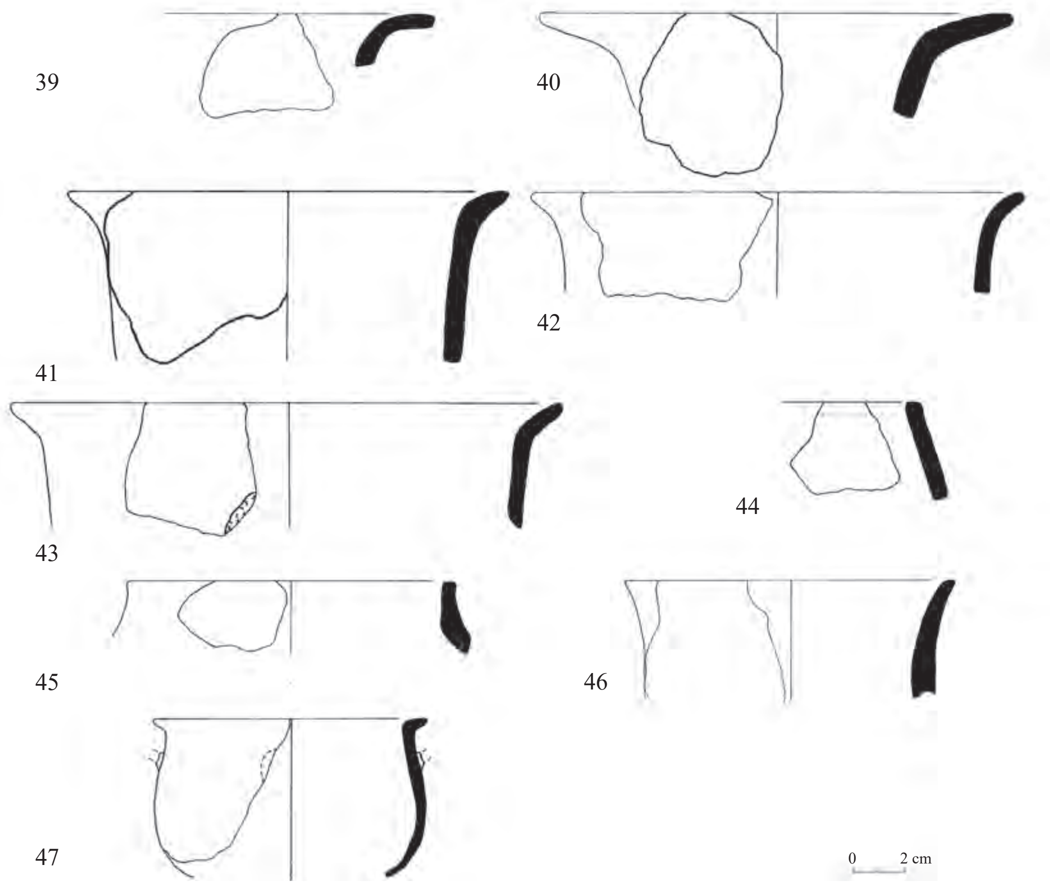

Fig. 7. Pottery from Area 3 (Nos. 39-47).

41. Everted rim of (two-handled?) deep bowl. Diam. 16 cm. Medium ware, evenly fired. E black, plain. I mottled reddish-brown (5YR 5/4) to black. MAw < 5 mm inclusions.
Find context: 523/581, Loc. 2, p. 1 (25.6.2010).
Cf. Wardle 1972, fig. 136:734 (from Mazaraki, Epirus); Prendi 1977-1978, Tab. VI:6 (from Vajzë, Albania).
Date: MBA-LBA.

42. Everted rim of (two-handled?) deep bowl. Diam. 18. Medium ware, unevenly fired, black core. E and I fired red (2.5YR 5/6), plain. 1 Aw 8 mm, SAwgr <1 mm inclusions.
Find context: 525/577, Loc. 1, p. 1 (25.6.2010).
Cf. Wardle 1972, fig. 129:598 (from Dodona, Epirus); Prendi 1977-1978, Tab. VI:6 (from Vajzë, Albania).
Date: MBA-LBA.

43. Everted rim of two-handled deep bowl. Diam. ca. 21 cm. Medium ware, unevenly fired, black core. E fired reddish-brown (5YR 5/4), plain. I fired reddish brown (5YR 4/4). MARwbl < 1 mm, 2 Agr 3 mm, 1 Rbuff 6 mm inclusions.
Find context: 523/577, Loc. 8, p. 3 (30.6.2010).
Cf. Prendi 1977-1978, Tab. VI:6.
Date: MBA-LBA.

44. Plain incurved rim. Bowl. Diam. Ui. Medium ware, unevenly fired, black core. E fired yellowish-red (5YR5/6), plain. I fired dusky red (2.5YR 4/4). SAwbr < 1 mm. OBS (similar rim in 523/577, Loc. 8, p. 1 (29/6/2010) not illustrated).
Find context: 523/581, Loc. 2, p. 1 (25.6.2010).
Date: LBA.

45. Rim of closed vessel. Jar. Diam. 10-12 cm. Medium ware, unevenly fired, black core. E and I fired mottled pink (7.5YR 7/4) to black. Poorly fired, very friable, plain.
Find context: 523/579, Loc. 2, p. 5 (8.7.2010).
Date: LBA.

46. Flaring, near vertical, rim of tankard or jar. Diam. 12 cm. Medium ware, unevenly fired, black core. E and I fired mottled yellowish-red (5YR 5/6) to dark grey (5YR 5/1), plain. MARwbr < 1 mm, 1 Aw 3 mm inclusions.
Find context: 523/579, Loc. 2, p. 4 (7.7.2010).
Cf. Prendi 1977-1978, Tab. V:7 (from Maliq, Albania, but with horizontal handle on rim).
Date: MBA-LBA.

47. Out-turned rim of small cup, handle-attachment below rim, carinated near bottom. Diam. 10 cm. Medium-fine ware, unevenly fired. E and I fired mottled yellowish-red (5YR 6/8) to dark grey (5YR 4/1), plain, sandpaper feel. MassARwblgr < 1 mm inclusions (similar vessel with carination, but red slipped, in Area 2, 505/505, Loc. 2, p. 1 (23/7/2009) not illustrated, another similar rim with handle attachment was found in Area 3, 521/583, Loc. 5, p. 1 (24/6/2010) not illustrated).
Find context: 523/577, Loc. 2, p. 1 (29.6.2010).
Cf. Wardle 1972, fig. 136:732 (from Mazaraki, Epirus).
Date: LBA.

48. Everted rim of small bowl. Diam. 12 cm. Fine, unevenly fired yellowish-red (5YR 5/6), black core. Red skins under black surfaces. E and I poss. black slipped. I polished? E plain? SAgrbuff < 1 mm inclusions.
Find context: 521/589, Loc. 2E:1 (22.6.2010).
Cf. Wardle 1972, fig. 136: 731 (from Mazaraki, Epirus).
Date: LBA.

49. Out-turned rim of small bowl. Diam. ca. 12 cm. Fine, unevenly fired, yellowish-red ware (5YR 5/6), dark grey core. E and I poss. reddish-brown slipped (5YR 4/3), no gloss. SAwblgr < 1 mm inclusions.
Find context: 523/581, Loc. 0, p. 1 (14.6.2010).
Date: LBA.

50. Everted rim of small bowl. Diam. ca. 16 cm. Fine, unevenly fired, yellowish-red ware (5YR 4/6-5/6), black core. I poss. brown slipped. MRbl < 1 mm inclusions.
Find context: 525/577, Loc. 2, p. 2 (28.6.2010).
Cf. Wardle 1972, fig. 129: 602 (from Dodona, Epirus).
Date: LBA.

51. Everted rim, handle attachment (two-handled bowl?). Diam. ca. 22 cm. Medium, even fired, reddish-yellow (5YR 6/6). E and I plain. MassAblgrbuff < 1 mm, Mspark silvery inclusions.
Find context: 523/577, Loc. 8, p. 3 (29.6.2010).
Cf. Wardle 1972, fig. 135: 707 (from Elaphotopos, Epirus).
Date: LBA.

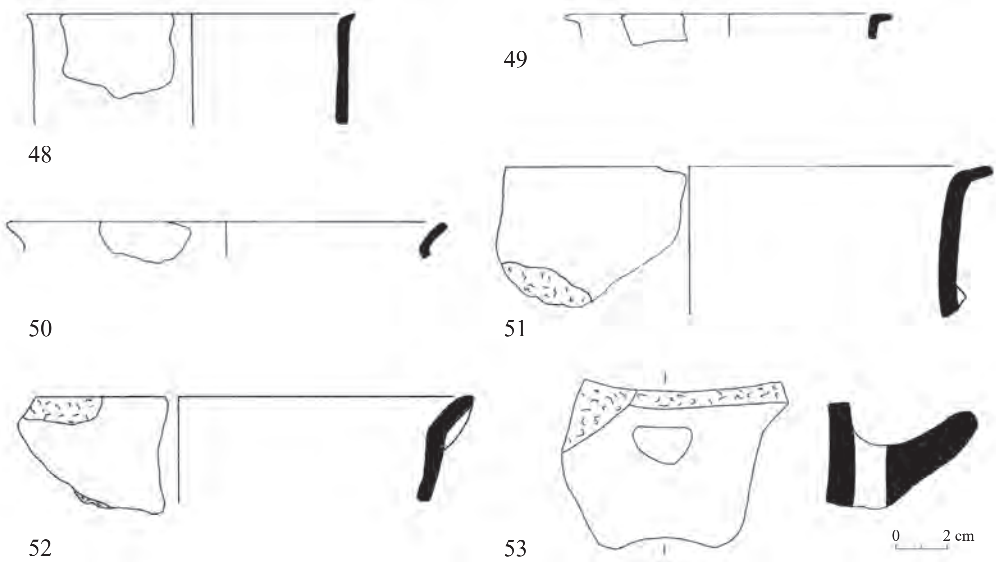

Fig. 8. Pottery from Area 3 (Nos. 48-53).

52. Everted rim, handle attachment on rim (two-handled bowl?). Diam. ca. 20 cm. Medium, unevenly fired, black core. E fired reddish-brown (5YR 6/4), plain. I fired black. MAbr < 2 mm, SAbwbl < 2 mm, Sspark silvery inclusions.
Find context: 521/575, Loc. 1, p. 2 (17.6.2010).
Cf. Wardle 1972, fig. 129: 601 (from Dodona, Epirus).
Date: LBA.

53. Vertical handle, horn shaped. Coarse, unevenly fired, reddish-yellow (5YR 6/6), black core. E plain, "orange-red" ware.
Find context: 523/581, Loc. 2, p. 1 (25.6.2010).
Cf. Wardle 1972, fig. 133: 668-669 (from Dodona, Epirus); Ambronn 2012, 67, Abb. 107:1 (from Kanlıgeçit, eastern Thrace, unstratified); unpublished parallels from Ephyra are exhibited in the Archaeological Museum of Ioannina.
Date: LBA.

Discussion

The Middle to Late Bronze Age assemblage of Area 1

This pottery is the most difficult to date, partly due to the fact that the uppermost layers are rather mixed. However, no Corded Ware or any other clearly EBA pottery was found in Area 1, which is supported by the AMS dates which span the period between 1960 and 1410 cal BC (with the exception for the uppermost cultural layer that dates to the late LBA or EIA). Disentangling the Bronze Age pottery found in connection with the terrace-wall in Area 1 has turned out to be quite difficult, although some general trends can be suggested. As we begin to know quite well what is EBA in date (Area 2) and what is LBA (Area 3) we can make some inferences as to what the MBA should look like. A systematic study of the pottery from the lowermost cultural layer in Area 1, which dates to the MBA, would clarify the picture further.

The rims in Area 1 usually have a rounded lip, compared to the pointed or square cut lips found in Area 3. From both areas the rims are usually everted or out-turned. The bases found in Area 1 are usually raised and flat, or slightly pushed up underneath. The ware from Area 1 is usually medium, i.e., either medium-fine or medium-coarse, and it is noteworthy that very little fine or coarse ware was found here.

In general the MBA pottery shapes find parallels not only at other sites in Epirus and Albania as referred to in the catalogue, but also at the Argissa Magoula in Thessaly.[5]

The Early Bronze Age assemblage of Area 2

The pottery from the EBA layer is in general dark, either black or brown, either plain or burnished, and if burnished, usually on the interior only. There is also a red slipped ware, either fine or medium, sometimes burnished, but in that case on the exterior. Lips are commonly incised. There are also a large number of scored surfaces, i.e., heavily incised strokes, in regular patterns or crisscrossing the surface. Fingernail impressions are common, most often orientated in vertical lines, but sometimes in two lines at a right angle. Impressions made by straw or small twigs are also rather common, in the form of small punctures or wedge-like impressions called "stabbing" in some archaeological literature (the result if the straw/twig was broken). There are also two (seal-?) impressed or stamped body sherds representing two different vessels (Fig. 9) for which no parallels have been found so far. Both originate from Loc. 6 (in 505/507 and 503/506). They are of fine ware with walls 0.45-0.55 thick and are black burnished on the interior, one being black-surfaced on the exterior, the other one dark reddish brown.

Lugs are included in the repertoire, either pierced twice, or in shape of larger plain horizontal lugs, or as small lugs in the shape of small knobs. Corded ware (CW) is common. At least 30 sherds were found, while three vessels were represented by at least three sherds each (in one instance joining each other). Three sherds had the white crusted filling still in the cord impressions (two were joining sherds). The fabric of the CW is usually black with many silvery sparkling inclusions. But reddish-yellow and brown

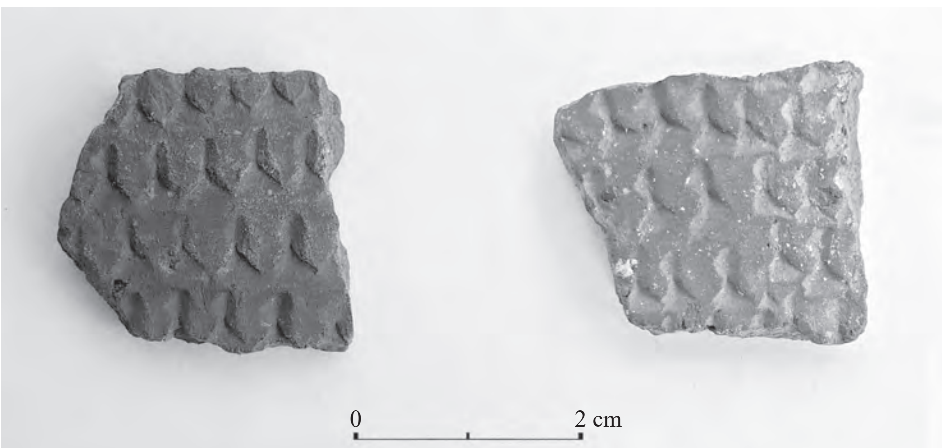

Fig. 9. (Seal-?) impressed or stamped sherds from the EBA layer of Goutsoura.

[5] Hanschmann and Milojčić 1976, 74-75, pl. 52:6, pl. 53B:2-3 and Appendix 23:17, 20, 22.

fabrics of CW also exist. It is said that CW with filled triangular patterns (e.g. Nos. 10, 11, 14, 15) are of middle European origin,[6] but the closest parallels noted here come from Bosnia and eastern Romania. It is of some interest to note that one published vessel from the Igriţa-cave in Romania has a unique combination of CW and fingernail impressions made in vertical rows covering the lower body of the vessel.[7] It is possible that many of our preserved bases that have fingernail impressions likewise had a CW impression on the upper part of the vessel, which now is missing.

Handles are usually strap-handles, sometimes incised and with raised margins. One crescent handle (No. 33) with a scalloped exterior outline finds a close parallel at Benton's Akarnanian site of Astakos.[8] In fine-medium ware there is also one fabric that has a crusted exterior surface (so-called pseudo-barbotine ware) with either an incised lip or a plain rim. Some pottery bases have fingernail impressions down the sides of the vessels to the flat, or, slightly rounded base (Nos. 29-30). One common type of jug appears in dark brown or black ware with decoration starting on the shoulder downwards carrying either a deep vertically scored surface, or, fingernail impressions, or, is combed with small additional punctures. One small jug has incisions and clay pellets and a triple grooved strap-handle. All these jugs are usually well burnished on the interior.

There are in total 11 spoons in two standard sizes that we have termed the soup spoon and the tea spoon (Fig. 10). One spoon is almost intact and incised with fingernail impressions. Four spoons have a finial ending, three are well made and burnished, while

Fig. 10. EBA spoons from Goutsoura, Area 2.

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[6] Emödi 1992, 193.

[7] Roman *et al.* 1992, 189-190, 192-194, pl. XVI:9.

[8] Benton refers to parallels at Zygouries in Corinthia and Armenochori in Macedonia (1947, 181-182).

the remainders are rather coarse and lack any finesse.[9] Similar spoons are found at many prehistoric sites spanning the Neolithic to Early Bronze Age period, e.g. Dikili Tash,[10] Sitagroi,[11] and Agia Sofia Magula in Thessaly.[12]

Some flat rims in medium ware have carelessly made taenia bands below the lip. There are no out-turned rims. They are usually just square-cut and plain, or, slightly flaring rims. The parallels from Pevkakia are numerous, but contrary to the Thessalian site it is noteworthy that we lack altogether a southern Peloponnesian connection. I have not found any S-rim bowls commonly found at Doliana, which supports the idea that the material from Doliana is overall of an earlier date, likewise corroborated by the radiocarbon dates, which span the period from ca. 3770 to 2925 cal BC.[13]

Moreover, the EBA pottery assemblage from Goutsoura (PS 12) is likewise of an earlier date than that found at Sovjan, which may explain why there are so few parallels between the two sites. Only one radiocarbon date at Sovjan (Ly-7012, 2843-2416 cal BC) overlaps with the ones from the EBA layer in Goutsoura, and this seems to be an anomaly as it does not fit the other dates from level 7, which range between 2300-2000 cal BC.[14] The 16 AMS dates taken from Goutsoura seem to indicate the existence of a hiatus in the occupation of the site lasting some 400 years, i.e., between 2400-2000 cal BC (Fig. 11).

Concerning the chronological phasing of the EBA pottery assemblage it seems that the early dates belonging to EH I (compared to southern Greece) all come from loci 4-5 below the tumulus, while the late group (comparable to EH II in the south) were sampled either in Trench A some 40 m to the east of the tumulus (A1 and A2) or just outside the stone peribolos of the tumulus (in D2). The two AMS dates, Hela-2103 and Hela-2499, are almost identical (2820-2670 and 2875-2615) although taken ca. 5 metres apart, but from the same cultural layer, locus 5.[15] Moreover both these radiocarbon dates finally give a definite date for several sherds, found in the same find context, carrying well-known modes of surface decorations such as cord impressions, wedge-shaped impressions, and scoring (Nos. 16-17).

An important note concerning the fingernail impressed pottery (such as Nos. 29-30) is that this is now likewise securely dated within the EBA repertoire in northwest Greece. Thereby it seems as if some previously published pottery with the same decoration may have been dated too early (i.e., in the Neolithic),[16] or alternatively that this décor continues throughout the Neolithic period and well into the EBA.

The EBA pottery assemblage from Area 2, under the tumulus, from what is a surprisingly homogenous cultural layer, is exceptionally important as it reflects influences, if not actual imports, from areas to the north and northwest/east. The intriguing impression is that the best parallels many times are found in areas far away, such as in Debelo Brdo

[9] Forsén 2011, 65-67 where five spoons are published.
[10] Marangou 1992, 133-143.
[11] Elster and Renfrew 2003, 403-414.
[12] Milojčić 1976, 11, pl. 18:8 said to be of classical Dimini date.
[13] Douzougli and Zachos 2002, 126.
[14] Gori 2011, 276, table 135, 338, table 136.
[15] Cf. Forsén, this volume, Appendix.
[16] Cf. eg. Andrea 1999-2000, esp. 323, fig. 11 (said to be Early Neolithic); Léra 2002, esp. 100, fig. 3 (said to be Early Neolithic), Heurtley 1939, 138, fig. 5 (said to be Early Neolithic), Sofronidou 2008, esp. 15, fig. 6 (said to be late Early Neolithic to early Middle Neolithic); Kilian-Dirlmeier 2005, esp. 105, pl. 41.61 (said to exist since the Neolithic period).

Fig. 11. The AMS dates of Goutsoura in relation to cultural phases of adjacent regions.

in Bosnia and at several sites in Romania (Lelicene-Muntele, Bogdăneşti, Celei, Oradea Salca, Boarta), as well as in Bulgaria (Ezerovo, Kiten). This impression might be an illusion, due to the fact that very little is known through the archaeological literature from areas adjacent to Goutsoura in Epirus. Nevertheless, it suggests that some changes within the population may be responsible for the settlement at Goutsoura.

The Late Bronze Age assemblage of Area 3.

Three cist graves from this area date within the LBA, whereas one could belong either to the very end of the MBA or the very beginning of the LBA. Therefore we must be careful and not assume that all the pottery should be dated to the LBA.

We find wishbone handles and out-turned rims of "orange-red ware", usually with sandpaper texture, but there is also a fine "orange-red ware" that is thin-walled and smooth. To this period belong handles rising vertically from the rim. Moreover, large horizontal handles, formed as horns, are common, and flat rims with a row of punctured holes below the lip on the exterior are also found in this context. The latter rims are also present in Area 1.

Another ware, pink or reddish-orange with a porous texture, occurs here, as do flaring rims, a vertical handle with a deep groove, as well as relief decoration in the form of small plastic pellet(s) on the exterior. Cooking ware with flat rims and taenia bands rather carelessly executed are also part of what can be termed the LBA assemblage.

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The Chipped Stone Assemblage from Goutsoura

Sofia Doulkeridou

Introduction

This study examines the chipped stone assemblage recovered from the Early Bronze Age and Late Bronze Age layers of the prehistoric site Goutsoura (PS 12).[1] Early Bronze Age layers were revealed in 2007 in Trenches A and D. Systematic excavations in Area 2 next to Trench D revealed strata from two periods: a thick Early Bronze Age (EBA) cultural layer on top of which a grave tumulus had been constructed during the very end of the Middle Bronze Age (MBA) or the beginning of the Late Bronze Age (LBA). The central burial in the tumulus has been C^{14} dated to 1780-1610 cal. BC. Above the tumulus, a layer with LBA and some Early Iron Age pottery was also recovered.[2] The EBA layer is homogenous with no later intruding finds, although with a handful of possibly Late Neolithic sherds. On the other hand the LBA layer includes quite a lot of single EBA and MBA sherds and could thus also include EBA lithics.

The methodology employed in this study applies the concept of the 'chaîne opératoire' (reduction sequence)[3] to shed light on the site's chipped stone production and technology. The lithic industry is examined by phase (i.e. the EBA and LBA layer) and within each phase by individual raw materials employed for knapping. Tool typology is also recorded. It is a first step to adding material from excavated contexts to the regional record of Western Greece and Albania. Similarities and differences between the Goutsoura lithic assemblage and other published EBA and LBA assemblages from contemporary sites in the aforementioned areas are also explored.

Research on the Bronze Age chipped stone industries from Greece has explored two main themes: i. patterns of technology and production as well as tool typology[4] and ii. patterns of obsidian exploitation and distribution in order to address issues of trade, exchange and regional connections.[5] Most of these studies have dealt with assemblages from sites in southern Greece and the Aegean Sea whereas there are notably few studies from sites in northern Greece.[6] Published studies of chipped stone assemblages from Bronze Age sites in Epirus, the Ionian Islands and Albania are far fewer and either describe surface finds or re-examine the ways in which earlier research interpreted

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1 I would like to thank Björn Forsén and Jeannette Forsén for trusting me with the study of the chipped stone material from Goutsoura and for their useful observations on different drafts of this chapter, as well as Nikoletta Dolia for inking all my illustrations. I am also very grateful to my supervisor Nena Galanidou for all her support, help and crucial comments.

2 Forsén *et al*. 2011, 80-81. see also Forsén, this volume and J. Forsén, this volume.

3 Originally developed by Andre Leroi-Gourhan this concept is adopted to approach the technology of knapped stone by Inizan *et al*. 1999, which guides my study.

4 Kourtessi-Philippakis 2010.

5 Kardulias 1999; Torrence 1986.

6 But see Kourtessi-Philippakis 1981; Kourtessi-Philippakis 2010; Moundrea-Agrafioti 1997; Skourtopoulou 2002; Tringham 2003.

chipped stone artefacts.[7] A notable exception to this is the study of the MBA/LBA chipped stone industry at Sovjan (Albania).[8] As a result, to date there is no discrete chronological sequence against which one could inscribe the Bronze Age of western Greece. This has a direct repercussion on our ability to identify and compare to it new finds coming from excavations or material collected from the surface.[9] Against this research background, the discovery, excavation and publication of Goutsoura lithic finds become essential for the study of late prehistory in Epirus.

The Early Bronze Age finds

The EBA chipped stone assemblage totals 315 pieces knapped on a few types of flint and jasper (Fig. 1). The raw materials used are: 1) a grey with bluish and brownish grey colour differentiations (for short it will be called, from now on, grey flint), more or less homogenous, of mediocre quality flint (n=265); 2) a fine-quality jasper (n=41); 3) a pale brown translucent fine quality flint (n=4); 4) a pink and not very homogenous flint of mediocre quality (n=3) and 5) a black flint of mediocre quality (n=2) (Fig. 1). The grey flint products constitute the largest component, not only of EBA but also of the LBA industries. Approximately 1/4 of the chipped stone assemblage presents a variety of degrees of patina and a very few artefacts (n=6) have been re-worked after patina was formed on their surface; these artefacts present negatives of detachment that have removed part of the patinated surface. The Liminari hill that lies very close to the EBA site possesses an abundant amount of different flint qualities as also do the streambeds of the Kokytos, which are an important source of secondary deposited

Raw material	Frequency	%
Grey flint	265	84.13%
Jasper	41	13.01%
Pale brown flint	4	1.27%
Pink flint	3	0.95%
Black flint	2	0.63%
Total	315	100%

Fig. 1. Goutsoura Early Bronze Age raw material frequency and percentage.

	Grey flint		Jasper		Total	
Reduction sequence stage	Frequency	%	Frequency	%	Frequency	%
Cortical flake	4	1.50%	0	0.00%	4	1.30%
Core	20	7.54%	4	9.75%	24	7.84%
Rejuvenation flake	4	1.50%	1	2.44%	5	1.63%
Flake	147	55.47%	21	51.22%	168	55.10%
Blade	22	8.30%	7	17.07%	29	9.51%
Bladelet	13	4.90%	1	2.44%	14	4.60%
Non-diagnostic	5	1.88%	3	7.32%	8	2.61%
Debris	3	1.13%	0	0.00%	3	0.98%
Tool	47	17.74%	4	9.76%	51	16.72%
Total	265	100%	41	100%	306	100%

Fig. 2. Goutsoura Early Bronze Age frequency and percentage of reduction sequence stages by raw material.

[7] Foss 2002; Kourtessi-Philippakis 2007; Kourtessi-Philippakis 2008; Tartaron *et al*. 1999.
[8] Kourtessi-Philippakis 2002.
[9] Tartaron 1996, 2-3 and 63-64.

flint pebbles. The knapping was done on nodules locally collected from the Kokytos river banks, to judge by the presence of river-rolled cortex on many artefacts (n=34) suggesting that the nodules had undergone water corrosion. There are also two examples of products deriving from slabs.

Aspects of technology

Not all stages of the reduction sequence (from decortification and core preparation to blank production and retouch) are present on-site. There are very few primary flakes (n=4, 1.30%), that is flakes whose 2/4 to 3/4 of dorsal face is covered by cortex and which derive from the initial stages of the core preparation, all in grey flint. There is a relatively high percentage of cores in grey flint and jasper (n=24, 7.84%). This suggests that the decortification and the initial stages of the core preparation probably took place elsewhere and that it was mainly blank production on pre-formed cores and retouch that was practiced on-site. The above observation applies both to the grey flint and the jasper (Fig. 2). Flakes by far outnumber blades and bladelets, both in the grey flint and jasper groups (Fig. 2), reaching over 55% and 51% of the total number of artefacts respectively. We can thus say that the EBA people at Goutsoura organised the lithic production in such a way as to produce flake blanks.

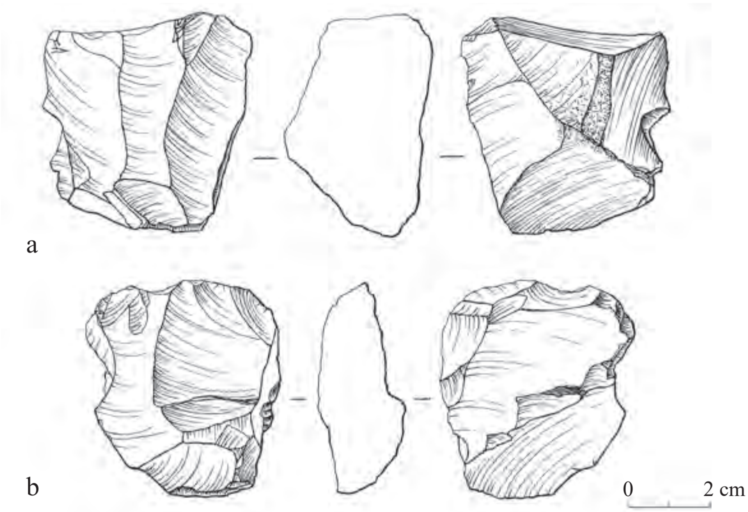

Fig. 3. Cores from the Early Bronze Age layer. (a) Core from Area 2, 503/508, Loc. 5, p. 3, (b) Core from Area 2, 503/506, Loc. 5, p. 2.

The techniques used for the detachment of blanks on grey flint are direct percussion, primarily with a hard hammer and secondarily with a soft one. The number of knapping accidents is relatively high (47 blanks, ca. 18%, mostly flakes, are hinged) and this fact indicates that the raw material was used either by not very experienced knappers or in a ‘hasty’ way to satisfy immediate needs. The cores are divided into two categories: discoid cores aiming for the production of flakes and conical/sub-conical ones aiming for the production of blades and/or bladelets (Fig. 3). The overhangs on most flakes have abrasion scars and in one case the overhang was faceted. A relatively small number of products maintain butts (49.65% of the flakes, 68.2% of the blades and 30.76% of the bladelets). The majority of butts are plain and there are significant numbers of

Type of blank	Flake		Blade		Bladelet		Total	
Butt	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Plain	47	64.38%	6	40%	1	25%	54	58.70%
Linear	8	10.96%	2	13.33%			10	10.86%
Winged	8	10.96%			1	25%	9	9.77%
Diedral	5	6.85%	1	6.70%			6	6.52%
Cortical	4	5.48%			1	25%	5	5.43%
Faceted	1	1.37%	2	13.33%			3	3.26%
Pecked			2	13.33%	1	25%	3	3.26%
Cdg			1	6.70%			1	1.10%
Punctiform			1	6.70%			1	1.10%
Total	73	100%	15	100%	4	100%	92	100%

Fig. 4. Goutsoura Early Bronze Age frequency and percentage of the types of butts by blank.

linear, winged, dihedral and cortical butts (Fig. 4). The cores in most cases are almost or completely exhausted. Most cores had negatives from multidirectional detachments; flakes were removed in an opportunistic way and there is no indication of the intentional production of preferential blanks with specific dimensions. The number of thick, grey flint flakes that present centripetal negatives from previous removals deriving from discoid cores is worth noting. This suggests that the people of Goutsoura were using that particular raw material for the production of flakes, applying methods known from early prehistory. Similar observations are published for the chipped stone industry of the Bronze Age settlement at Poliochni on Lemnos in the northeastern Aegean.[10] Finally, there are some large flakes used as cores. These flakes present negatives of removed flakes or bladelets in their dorsal (and in one case in the versal) face.

The grey flint was used mainly for the production of flakes, some of which were relatively large (minimum length: 1.2 cm - maximum length: 6.1 cm; minimum breadth: 1.1 cm - maximum breadth: 4.9 cm; and minimum thickness: 0.1 cm - maximum thickness: 2.3 cm). Blades form a fair percentage of the assemblage (Fig. 2). Some of the blades were trapezoidal in cross-section and seem to have parallel edges but they are broken, both in the distal and the proximal part, so their butt is absent, and the observations that could lead us to a conclusion about the methods of their detachment are not possible. This type of blank, though, suggests that the preparation of the core and the processes of detachment were planned very carefully. It seems that, in addition to the previous methods for working out the grey flint, the knappers who produced the abovementioned blades used, to a very limited degree, another one requiring the preparation or the physical presence of a crest on the core, and the organization of the detachments in a specific way that leads to the production of blades with trapezoidal cross-section. Nevertheless, no such core or crested blank was found. It is therefore plausible to assume that these blades were produced outside the excavated area or moreover outside the settlement and that they were transferred to Goutsoura as a complete product.

Jasper was also a raw material used mainly for the production of flakes (Fig. 2). The pale brown flint products are a hinged flake with direct, partial and short, low-angle retouch; two blades whose distal parts are broken, one of which presents also a languette on its distal part; and one flake with direct, continuous and short, low-angle retouch on

[10] Moundrea-Agrafioti 1997, 180.

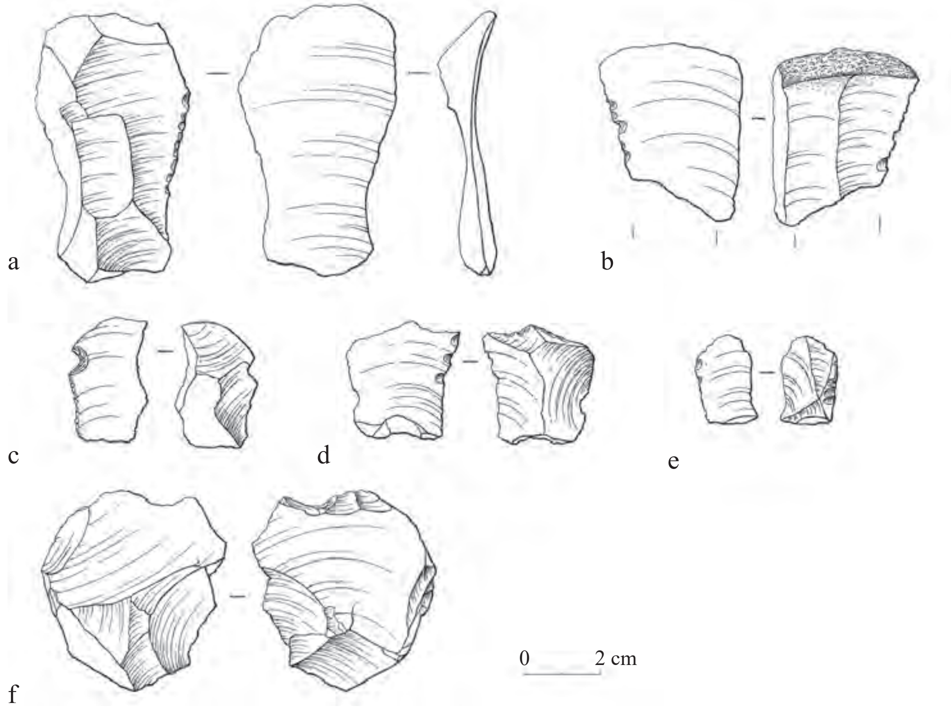

Fig. 5. Tools on flakes from the Early Bronze Age layer. (a) Retouched flake from Area 2, 505/507, Loc. 4, p. 3, (b) Retouched flake from Area 2, 503/507, Loc. 6, p. 1, (c) Notch from Area 2, 503/506, Loc. 6, p. 1, (d) Denticulate from Area 2, 505/507, Loc. 6, p. 1, (e) Retouched flake from Area 2, 501/506, Loc. 6, p. 1, (f) Flake (broken) with negatives of centripetal removals and inverse retouch on distal end from Area 2, 503/506, Loc. 5, p. 2.

the left and right edges and on its distal part. The pink flint pieces are a flake with direct, partial and short, low-angle retouch; one hinged flake; and one blade with direct, partial (at places long, at places short), low-angle retouch. The black flint products are a flake with direct, partial and short, low-angle retouch and a broken cortical flake.

Aspects of tool typology

17.74% of the grey flint products were transformed into tools. The flakes were transformed into tools by means of short, direct and/or inverse, partial retouch. A few of these retouched flakes have linear, short or long, direct and/or inverse, continuous retouch (Figs. 5a, b, e). The other tool types using flakes as blanks are an endscraper, a denticulate (Fig. 5d), a splintered piece and three composite tools. The composite tools are: a tool with silica gloss and direct, partial, semi-abrupt, short retouch in a part of its distal end made prior to the gloss; one with partial, direct, low-angle, parallel, long inverse retouch in the proximal and mesial part of the right edge and a notch in the distal part of the right edge (Fig. 5c); and one with denticulation on the proximal part of the left edge and direct, partial, low-angle, parallel and short retouch on the distal end of the upper face (Fig. 6). The grey flint blades were transformed into tools by means of linear, short, direct and/or inverse, partial or continuous retouch of a variety of angles: low, semi-abrupt or abrupt (Figs. 7c, e). There is also an endscraper on a blade (Fig. 7d), a notch (Fig. 7a), a sickle on a blade with trapezoidal cross-section that was retouched to renew its cutting edge

Tool type	Grey flint Flakes		Grey flint Blades		Jasper Flakes		Jasper Blades		Total Flakes		Total Blades	
Linear retouch	28	80%	9	75%	3	100%			31	81.58%	9	69.24%
Sickle			1	8.33%							1	7.69%
Endscraper	1	2.86%	1	8.33%					1	2.63%	1	7.69%
Denticulate	1	2.86%							1	2.63%		
Notch	1	2.86%							1	2.63%		
Splintered piece	1	2.86%							1	2.63%		
Composite tool	3	8.57%	1	8.33%			1	100%	3	7.90%	2	15.38%
Total	35	100%	12	100%	3	100%	1	100%	38	100%	13	100%

Fig. 6. Goutsoura Early Bronze Age tool type frequency and percentage by raw material and blank.

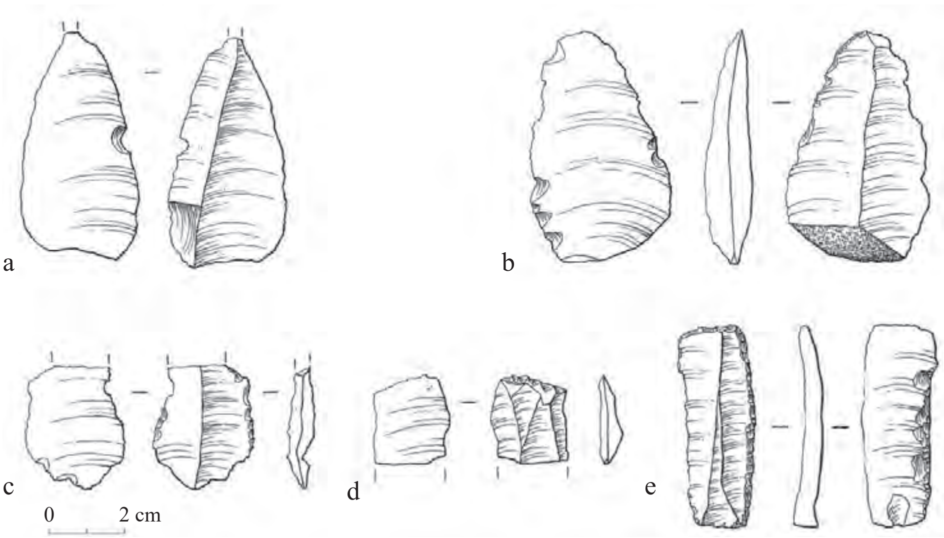

Fig. 7. Tools from the Early Bronze Age layer. (a) Notch from 501/506, Loc. 6, p. 2, (b) Retouched piece from Area 2, 503/507, Loc. 6, p. 1, (c) Retouched piece from Area 2, 503/506, Loc. 6, p. 2, (d) Retouched blade from Area 2, 503/506, Loc. 6, p. 2, (e) Endscraper from Area 2, 501/506, Loc. 5, p. 1.

and a composite tool, a sickle that was retouched to renew its cutting edge that was also an endscraper. The percentage of the jasper blanks transformed into tools is 9.76%. The jasper flakes present short, partial retouch and one jasper blade is a composite tool, a sickle whose cutting edge was renewed with retouch and was also backed (Fig. 6).

Comparisons

Use of local raw materials that were worked in the settlement area is not an unfamiliar practice for the inhabitants of EBA sites of the North Aegean. At Pentapolis[11] and Sitagroi,[12] both in the Drama basin in Eastern Macedonia, as well as in Messimeriani Toumba[13] in Central Macedonia, primary flakes, cores, rejuvenation of the core specimens and debris from

[11] Kourtessi-Philippakis 1981, 119.
[12] Tringham 2003, 85, 87, 90.
[13] Skourtopoulou 2002, 266-268.

various reduction sequence stages are present on site (Fig. 8). At Pentapolis flakes are twice as many as blades. At the same time at Sitagroi IV and V blades are almost five times as many as flakes. On the contrary in Central Macedonia, at Messimeriani Toumba, flakes are more than five times as many as blades, whereas at Kastanas blades were mainly used as blanks.[15] Finally, at Poliochni flakes on Lemnos and blades are present in almost equal numbers.[16]

	Pentapolis[14]	Messimeriani Toumba
Unworked block/nodule		4.35%
Core	2.90%	13.06%
Flake	15.18%	42.50%
Blade and/or bladelet	7.41%	7.81%
Debris	67.41%	20.72%
Tool	7.03%	11.56%
Total	100%	100%

Fig. 8. Percentages of products from different stages of reduction sequence present at Pentapolis and Messimeriani Toumba.

There are significant differences concerning the assemblage composition among all the aforementioned sites. There are sites (e.g. Pentapolis, Messimeriani Toumba and Poliochni) where unworked blocks of raw material are present and sites (e.g. Sitagroi IV and V) where there are no unworked blocks or nodules yet the percentage of cores is remarkably high. Also there are sites where the amount of debris is very high (e.g Pentapolis) whereas there are other sites where there is no information given about debris (e.g. Poliochni and Sitagroi). In all of these sites, though, there are indications suggesting that the main raw material categories were worked either *in situ* or near the site.

The number of chipped stone products transformed into tools at Goutsoura is relatively high (16.72%): not as high as at Poliochni (52.2% of the assemblage), but certainly higher than at Pentapolis and Messimeriani Toumba, which share similar percentages (Fig. 8), and at Sitagroi IV. The most common tool types at EBA sites of northern Greece are retouched blades and flakes, usually with silica gloss, endscrapers, splintered pieces, bifacial denticulates with silica gloss, piercers and arrowheads,[17] either bifacially worked or not (Fig. 9). With the exception of some tool types, which are not present in Goutsoura, the main tool types present at the aforementioned sites are also present in Goutsoura, though the quantity of each type differs from site to site.

Tool types	Pentapolis	Poliochni
Retouched piece	31.59%	13.30%
Bifacial denticulate with gloss	21.06%	
Denticulate		17.90%
Sickle	15.79%	58.40%
Arrowhead	5.26%	1.10%
Splintered piece	5.26%	0.70%
Piercer	5.26%	1.40%
Geometric microlith	5.26%	
Notch	5.26%	
Backed piece	5.26%	2.20%
Perforate		2.50%
Scraper		1.40%
Truncation		1.10%
Total	100%	100%

Fig. 9. Percentages of tool types from Pentapolis and Poliochni.

[14] The Pentapolis assemblage includes unworked blocks/nodules but the percentages are not given in the publications.

[15] Kourtessi-Philippakis 2010, 175-176.

[16] Moundrea-Agrafioti 1997, 174, 181-182.

[17] Kourtessi-Phlippakis 2010, 176.

The Late Bronze Age finds

The picture, obtained from the study of lithics coming from the LBA layer is overall similar to the one of the EBA chipped stone industry. Nevertheless the LBA layer finds present a few differentiations in blank production and tool typology. The artefacts from the LBA layer are knapped on two raw material types, those used in the EBA layer, with only one exception of a blade broken in the distal part made on an exogenous pale olive green flint of mediocre quality (n=1) (Fig. 10). As noted, the main raw materials are not only the same but they are also represented in more or less similar proportion.

Raw material	Frequency	%
Grey flint	98	79.67%
Jasper	24	19.51%
Pale olive flint	1	0.81%
Total	123	100%

Fig. 10. Goutsoura Late Bronze Age raw material frequency and percentage.

	Grey flint		Jasper		Total	
Reduction sequence stage	Frequency	%	Frequency	%	Frequency	%
Core	2	2.04%	1	4.17%	3	2.46%
Rejuvenation flake	1	1.02%	1	4.17%	2	1.64%
Flake	35	35.71%	5	20.83%	40	32.79%
Blade	11	11.22%	3	12.50%	14	11.48%
Bladelet	3	4.08%	0	0.00%	3	2.46%
Non-diagnostic	14	14.28%	0	0.00%	14	11.48%
Knapping debris	1	1.02%	2	8.34%	3	2.46%
Tool	31	31.36%	12	50.00%	43	35.25%
Total	98	100%	24	100%	122	100%

Fig. 11. Goutsoura Late Bronze Age frequency and percentage of reduction sequence stages by raw material.

Decortification flakes and core preparation flakes are absent from the grey flint assemblage whereas there is a single core rejuvenation flake (Fig. 11). Flakes and blades make up the largest part of the grey flint group. Flakes make 35.7% of the grey flint assemblage, whereas blades and bladelets 15.3%. There are also two cores (Fig. 12g), one of which is broken, and a knapping debris. There is a high percentage of detachment accidents; 23% of the flakes and 17% of the blades are hinged. Plain butts are dominant (Fig. 13).

Jasper is represented by a core and a core rejuvenation flake as well as a few flakes and blades (Fig. 11). Although there is a core and a rejuvenation of the core flake the other products are mainly blanks: flakes and blades in a ratio of 2 to 1 (bladelets are absent from the jasper group) (Fig. 11). Accidents are also frequent on this raw material type (27% of the flakes and 11% of the blades are hinged).

31.36% of the grey flint products were transformed into tools. The flakes were transformed into tools by means of a variety of direct, inverse or alternate, short and/or long, low-angle or semi-abrupt retouch (Figs. 14c, d, e, f, h). There are also two notches (Figs. 14a, b) and a sickle (Figs. 15 and 14g). Most of the grey flint blades have linear, partial retouch (Fig. 12c). There are three blades turned into simple notches (Fig. 12f); there is also a sickle blade with partial, direct, short and long, semi-abrupt, sub-parallel retouch on the mesial part of both the right and left edges; and a blade with sickle gloss and inverse, continuous, rectilinear, short, low, parallel retouch on the left edge (Fig. 12d).

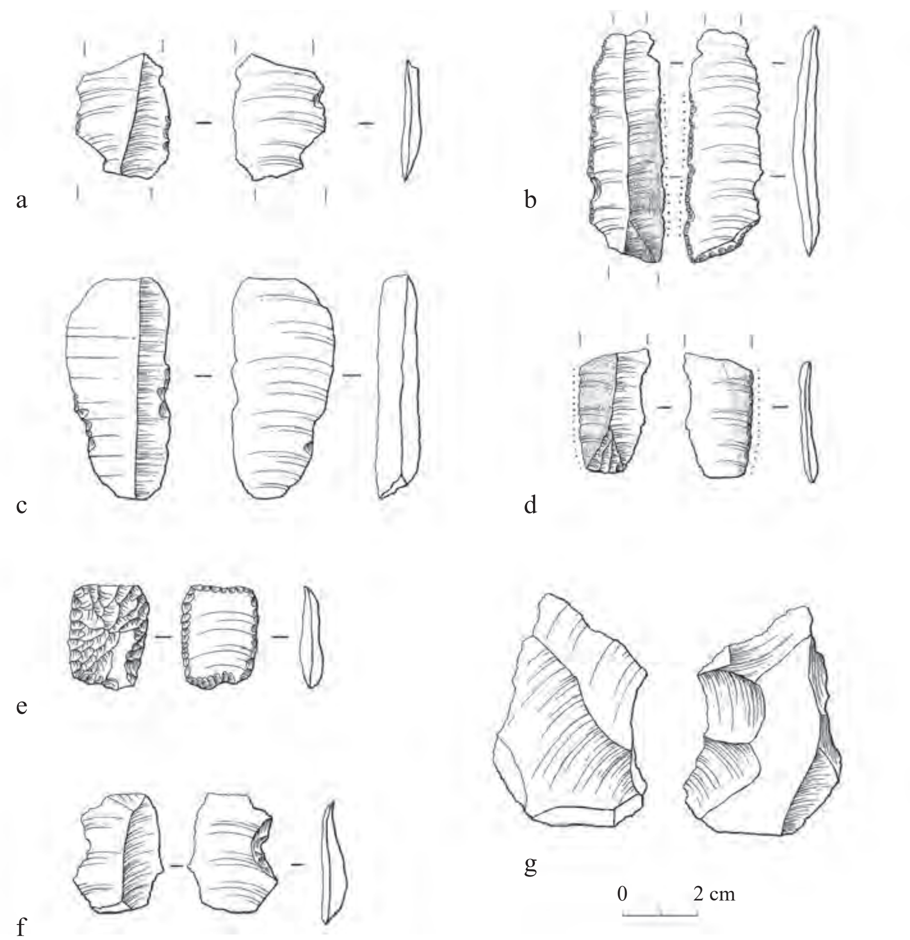

Fig. 12. Tools and a core from the Late Bronze Age layer. (a) Composite tool from Area 2, 503/508, Loc. 2, p. 1, (b) Sickle with retouch from Area 2, 505/505, Loc. 2, p. 1, (c) Retouched blade from Area 2, 503/505, E-side, Loc. 2, p. 1, (d) Sickle with retouch from Area 2, 509/507, Loc. 2, (e) Quadrangular tool from Area 2, 505/507, Loc. 2, p. 2, (f) Notch from Area 2, 503/509.5, Loc. 4, p. 1, (g) Flake core from Area 2, 501/506, Loc. 2, p. 2.

Type of blank	Flake		Blade		Bladelet		Total	
Butt	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Plain	34	65.38%	15	78.95%	2	50%	51	68%
Linear	5	9.62%	1	5.26%			6	8.00%
Winged					1	25%	1	1.33%
Diedral	4	7.69%	1	5.26%			5	6.67%
Faceted	3	5.77%	2	10.53%	1	25%	6	8.00%
Pecked	5	9.62%					5	6.67%
Spur	1	1.92%				25%	1	1.33%
Total	52	100%	19	100%	4	100%	75	100%

Fig. 13. Goutsoura Late Bronze Age frequency and percentage of the types of butts by blank.

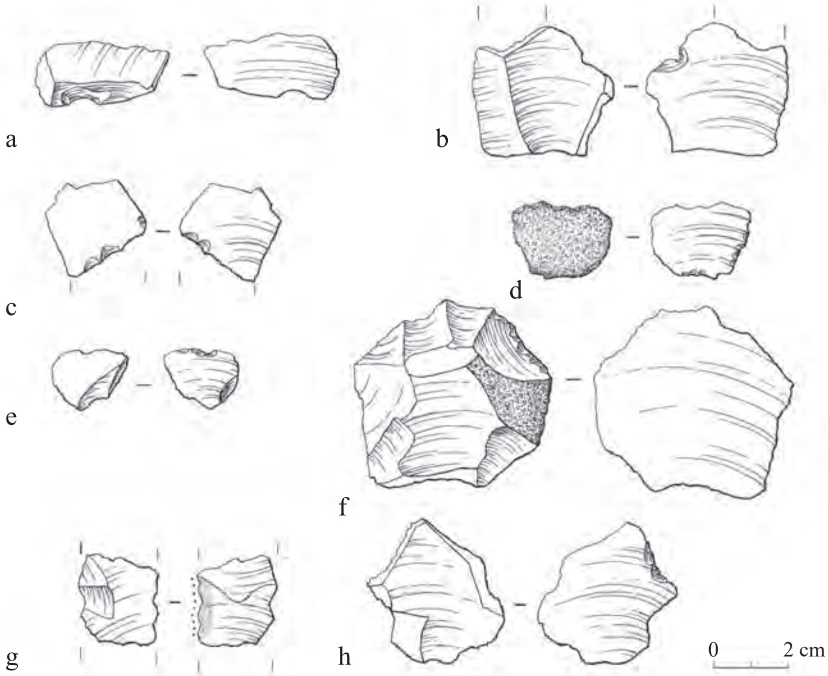

Fig. 14. Tools on flakes from the Late Bronze Age layer. (a) Notch from Area 2, 507/502, Loc. 2, (b) Notch from Area 2, 507/506, Loc. 2, (c) Retouched flake from Area 2, 504/500, Loc. 2, (d) retouched flake from Area 2, 507/506, Loc. 2, (e) Retouched flake from Area 2, 507/508, Loc. 2, (f) Retouched flake from Area 2, 507/507, Loc. 2, (g) Sickle from Area 2, 503/509.5, Loc. 3, p. 1, (h) Retouched flake from Area 2, 503/509.5, Loc. 4, p. 1.

	Grey flint						Jasper				Total			
Tool type	Flakes		Blades		Bladelets		Flakes		Blades		Flakes		Blades	
Linear retouch	14	82.35%	6	46.15%	1	100%	5	83.3%	2	33.3%	19	82.61%	8	42.10%
Notch	2	11.77%	3	23.08%			1	16.7%	1	16.7%	3	13.04%	4	21.05%
Sickle	1	5.88%	2	15.38%					1	16.7%	1	4.35%	3	15.80%
Composite tool			2	15.38%					2	33.3%			4	21.05%
Total	17	100%	13	100%	1	100%	6	100%	6	100%	23	100%	19	100%

Fig. 15. Goutsoura Late Bronze Age tool type frequency and percentage by raw material and blank.

There are two composite tools on blades, both notched pieces with direct, low-angle, parallel, partial short retouch (Fig. 12a). Finally, there is a bladelet with direct, low-angle, continuous, parallel retouch on the left edge.

Half of the jasper products recovered were tools (Fig. 11). Jasper flakes were transformed into tools by means of direct and/or inverse, short and/or long, low-angle or semi-abrupt retouch; there is also a notched piece on a flake (Fig. 15). The jasper tools produced on blade blanks are: a piece with linear retouch, a notch, a sickle (with alternate continuous, rectilinear, short, sub-parallel retouch), two composite tools (a notch combined with direct, low, parallel, continuous, short retouch on the left edge and a denticulate with linear, direct, semi-abrupt, parallel, continuous long retouch on the left edge), and a quadrangular tool with covering retouch on its dorsal face (Fig. 12e). This is a characteristic artifact of both the MBA and LBA periods in southeastern Europe,[18] where comparanda are present in Sovjan some 250 km to the north of Goutsoura in Albania and in various sites in southern (e.g. Lerna) and in northern Greece (e.g. Pentapolis, Messimeriani Toumba, Kastanas and Sitagroi).

Comparisons

At Goutsoura the same methods and techniques of detachment, usually simple and opportunistic and rarely more elaborate, were used for the production of blanks both in the EBA and the LBA. We have recorded cores with irregular morphology and large flaked flakes used as cores for the detachment of smaller flakes. We have also recorded a conical core (in EBA layer) and a few rare products that indicate the application of longer and more complex reduction sequences in both phases. The latter can be explained either by the periodic presence of experienced knappers or by the variety of activities/tasks performed on-site. The main differences between the two periods are: the great decrease in the number of flakes without a corresponding increase in blade proportions and the low variation of tool types in the LBA. Also notable during the LBA is the increase in the proportion of tools, mainly the ones made of jasper. Probably LBA chipped stone tools were produced on jasper and grey flint and were used in everyday tasks and/or when tools made of other materials were not available as complementary tools next to metal ones.[19] In any case, access to the raw material sources (river and stream banks) was easy and there was a long tradition of exploitation and knapping of these abundant raw materials.

Published chipped stone assemblages from southern Epirus derive from 13 surface sites brought to light by the Nikopolis Survey Project. These sites are dated generally from the post-Middle Helladic to the Late Helladic III periods but in most of these sites Early Iron Age pottery has also been found. Most of these sites are located in the drainage of the lower Acheron and its tributaries, two of them are situated in the Agios Thomas peninsula, one is in the zone encompassing the territory between the Acheron and Louros valleys and one is near Parga in the northwestern part of the nomos of Preveza.[20] According to Thomas Tartaron, the industries recovered from the above sites were not specialized ones, in terms of typology, technology or production. The raw materials used were primarily local, collected from the surrounding streams in the shape of small river-rolled nodules. The most common type was a bluish-grey flint, whereas reddish brown, brown, and purplish brown flints were also present in southern Epirus sites. Also, a deep brown flint that seems to be exogenous was used mainly for the production of projectile points.[21]

The data from the Nikopolis Survey Project suggest that small stream pebbles were modified only to the extent of detaching flakes; the cores were of irregular morphology,

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[18] Kourtessi-Philippakis 2002, 77-78; Runnels 1985.
[19] See the contributions in Eriksen 2010 for a discussion of lithic technology by metal using societies.
[20] Tartaron 1996, 97-181.
[21] Tartaron 1996, 288-290; Tartaron *et al*. 1999, 820-821.

with negatives from multidirectional removals. Prismatic blades are reported in very small numbers. The most common blanks are flakes whose production did not demand elaborate or special skills.[22] The number of tools recovered during the Nikopolis survey is small. Tartaron suggests that the widespread practice was the use of unretouched flakes for daily tasks, an interpretation that we fully endorse here. The retouch observed on the blanks is linear, denticulated and, in those cases where it is carefully designed, forms notches. The tool types found in this assemblage are: piercers, sickle elements, projectile points, notched pieces, denticulates and endscrapers. Silica gloss, a criterion used to characterize an artefact as a sickle or a sickle element, is present on truncated, backed, and denticulated flakes, and is not uncommon on unretouched flakes.[23]

The raw materials used in Sovjan and Maliq (both in Albania) appear to be local, such as at Goutsoura, deriving from the mountains around the Korcë basin. Sovjan and Maliq are both lakeside sites, on low tells, with households built on wooden posts. Maliq was inhabited from Late Neolithic to the Iron Age whereas occupation at Sovjan spanned all periods of the Bronze Age. At Sovjan, where the study of the assemblage is more advanced than at Maliq, we have a better picture of the lithic industry. Here most of the stages of the reduction sequence are totally absent. This is also the case in the LBA at Kastanas in Central Macedonia.[24] The respective tool types do not present a wide variety even though the percentage of tools among the assemblages is notably high. At Sovjan and also at Kastanas half of the assemblage consists of tools.[25] The main tool types at Sovjan are splintered pieces and sickles (i.e. retouched flakes or blades with silica gloss). There are also bifacially worked denticulates, some of them with silica gloss, two endscrapers and an arrowhead.[26] At LBA Kastanas splintered pieces are absent, the main tool type is retouched blade, some of which present silica gloss. The other tool types present in the Kastanas assemblage are bifacially worked denticulates, scrapers and arrowheads.[27] These are notably absent from the excavated strata of Goutsoura.

The Goutsoura assemblage exhibits many similarities in terms of technology, typology and production with the assemblages deriving from the neighbouring areas further south that were recovered by the Nikopolis Survey Project. The main similarity with the chipped stone industries of Sovjan and Maliq further north in Albania is the exploitation of local raw materials and the unifacially worked, quadrangular geometric tool. Other than that, the assemblages from both Sovjan and Maliq, along with the Kastanas one, show major differences from Goutsoura's LBA chipped stone industry in terms of typology and technology.

Conclusions

At Goutsoura the overall reduction sequence, the techniques used to detach artefacts from cores and the preferred raw materials used for knapping, the grey flint and the jasper, do not

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22 Tartaron 1996, 288-289; Tartaron *et al*. 1999, 820.
23 Tartaron 1996, 291-292; Tartaron *et al*. 1999, 821-822.
24 Kourtessi-Philippakis 2010, 176.
25 Kourtessi-Philippakis 2010, 179.
26 A *pointe de flèche en pédoncule*, Kourtessi-Philippakis 2002, 77-78.
27 Kourtessi-Philippakis 2010, 179.

change much between the EBA and the LBA. There is, however, some variation through time with regard to the desired end product: in the EBA layer, flakes are the dominant blank produced and transformed into tools, whereas in the LBA unit, the number of flakes drops significantly, the blades increase slightly but if added to the bladelets in both periods the sum proportion of blades and bladelets remains more or less the same. Also tool types in the EBA unit present a wider variety, although some tool types are represented by only a single artefact. During both periods the dominant tool type is a tool with simple linear, continuous and/or partial, low, short retouch on flakes or blades. During the LBA a significant increase in the number of notches is observed and the notable presence of the quadrangular tool with unifacial invasive retouch whose comparanda are found in Sovjan further to the north from the Kokytos valley. Finally sickles and sickle elements on blades whether they were made on grey flint or on jasper were usually renewed with retouch, unlike sickles on flakes that were not, as a rule, renewed.

The distinctive elements of the examined chipped stone industry from EBA and LBA Goutsoura are that the tool types are mostly tools with short, partial or linear retouch and there are not as many sickles as in other Bronze Age sites of northern Greece. The Goutsoura tool assemblage contains many notches and composite tools. These data indicate that the chipped stone tools were used for different tasks.

The excavated strata of Goutsoura yielded no arrowheads. This is in contrast to the surface assemblage recovered from the other sites, such as PS 17, PS 18, PS 20, PS 21 and PS 28 elsewhere in the Kokytos valley, which contain a good number of arrowheads.[28] Arrowheads from western Greek and Albanian Bronze Age sites are few. There is a hollow-based arrowhead found in southern Epirus,[29] a few tanged arrowheads from MBA Sovjan[30] and also a few barbed arrowheads from the MBA tumulus S on the Ionian of Lefkada.[31] The absence of any arrowheads from Goutsoura may indicate that the excavated area did not reveal the arrowheads that might perhaps exist in some other part of the site which was not excavated or that the activities performed on-site did not need this type of tool.

The main pattern of production technology and tool typology recorded in the Goutsoura lithic assemblage is similar to those reported from other Bronze Age sites in northern Greece and Albania. Kourtessi-Philippakis has discussed the connection of the chipped stone industries from Albania with the ones from northern Greece.[32] The evidence from Bronze Age northern Greek settlements shows that, in most cases, the most abundant raw materials were local. Moreover, in many Bronze Age sites the production of blanks and tools was taking place within the settlement with the use of both elaborated and non-elaborated detachment techniques. Finally, tool types do not present a very wide variety or significant differences between the sites.

The people who left behind the lithic artefacts of Goutsoura exploited all the opportunities that their environment, natural and cultural, was offering. By 'natural environment' I mean the sources of raw material present in the immediate vicinity of the

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[28] Forsén *et al*. 2011, 106-109, Forsén *et al*. this volume.
[29] Tartaron 1996, 292-293; Tartaron *et al*. 1999, 822.
[30] Kourtessi-Philippakis 2002, 77.
[31] Kourtessi-Philippakis 2008, 187-188
[32] Kourtessi-Philippakis 2010.

site. By 'cultural environment' I refer to chipped stone artefacts from different periods, other than the Bronze Age, that people found and used by transforming them by means of new flake extraction or retouch. These are the patinated pieces that were worked again by the Bronze Age inhabitants of the site. The presence of artefacts produced by means of elaborated lithic reduction sequences and non-elaborated ones at a time when metal tools were also available indicates that the people of Goutsoura were using different techniques according to their needs. The presence of experienced knappers is also possible. They were probably the people who applied the elaborated reduction sequences.

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Small Finds from Bronze Age Goutsoura

Aristeides Papayiannis

In this chapter a selection of the better preserved small finds from Goutsoura is presented. The site was first settled during the Early Bronze Age (EBA) period, more exactly from ca. 2900 until 2400 BC. After a short hiatus the site was used again, mainly as a cemetery, from the Middle Bronze Age (MBA) through to the end of the Late Bronze Age (LBA), i.e., from ca. 2000 until 1100 BC.[1] Most of the small finds originate from the EBA layers, although a handful can be assigned to the later phases of the site.

Bone objects

In total, five bone artefacts were found: one of them is a pendant, two are needles, whereas the function of the final two objects is unclear.

Fig. 1. EBA animal tooth pendant No. 1.

1. Pendant formed by a bicuspid of a predator, possibly a canine (Fig. 1). Complete. Perforation on the root's end, with probable traces of burning. The perforation must have been made by a sharp tool moving rotationally,[2] in a half-cone pattern. Length 0.041 m. Diam. of perforation 0.0015 m. Find context: Area 2, 503/506, Loc. 6, p. 1, 2.7.2010. This corresponds to the lowermost layer of the EBA habitation, below the central part of the tumulus.

2. Bone needle (Fig 2). Complete, but originally broken into two pieces. Cross-section ovoid, wider at the flat head, more rounded towards the point. Surface polished, with probable traces of the procedure (very thin and shallow lines on the length axis). The eye of the needle is circular and unpolished, the perforation made from both sides. Length 0.095 m. Diam. 0.003 m, 0.007 m (head). Diam. of eye 0.003 m. Find context: Area 2, 503/508, Loc. 5, p. 2, 29.6.2010. This corresponds to the EBA layer beneath the southeastern part of the tumulus.

Fig. 2. EBA bone needle No. 2.

[1] For the site and its stratigraphy and chronology, see e.g. Forsén, this volume; J. Forsén, this volume and Lima, this volume. All the photographs are by the author. The drawings are by A. Patteri and E. Tikkala.
[2] Kyparissi-Apostolika 2001, 138.

Fig. 3. EBA bone needle No. 3.

3. Head and beginning of stem of bone needle (Fig. 3) that is larger than the previous, intact one. Cross-section ovoid, wider at the flat head, more rounded towards the stem. Surface polished, with probable traces of the procedure (very thin and shallow lines on the long axis). The eye of the needle is circular and unpolished, the perforation made from both sides. Pres. length 0.027 m. Diam. of stem 0.0055 x 0.003 m. Diam. of eye 0.004 m.
Find context: Area 2, 503/505, Loc. 0-4, p. 1, Charcoal quest, 8.7.2010. Retrieved from just above the cremation burial that postdates the EBA habitation and predates the erection of the tumulus. Could have belonged to the cremation burial itself, but could equally well be an intrusion from the EBA layers.

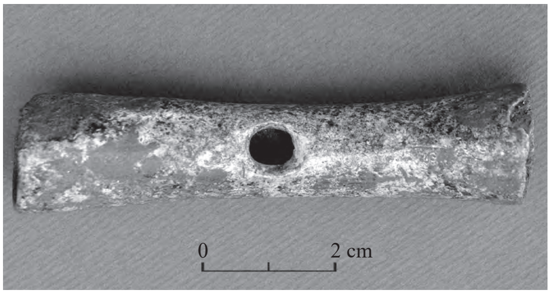


Fig. 4. EBA bone artefact No. 4.

4. Bone artefact, made from an oblong and curved bone, narrower in the middle, with vertically cut-off ends (Fig. 4). Nearly complete, only slightly chipped in both ends. The marrow was carefully extracted, so that the final product would be tubular. A blind, round hole is pierced on the ridge at the centre on one side of the bone. The interior and the exterior are smoothed, while there are traces of polish at both ends and at the perforation. Length 0.069 m. Diam. of perforation 0.006 m.
Find context: Area 2, 503/506, Loc. 6, p. 1, 30.6.2010 (x=504.62; y=507.06; z=99.12) This corresponds to the lowermost layer of the EBA habitation, below the central part of the tumulus, like No. 1.

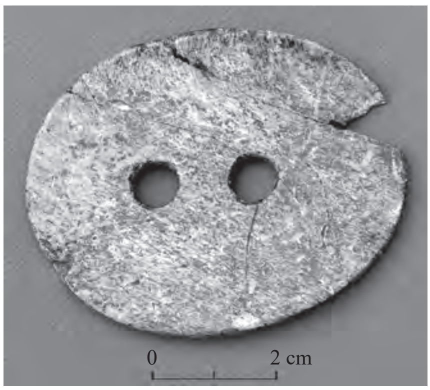


Fig. 5. EBA bone artefact No. 5.

5. Flat ellipsoidal bone artefact, broken into five fragments (Fig. 5). A small part of the periphery missing. Cross-section slightly wavy. The surface of the artefact is polished on one side, but not so thoroughly polished on the other side, where there also are several incised lines following the long axis. There are two circular holes in the centre, 0.007 m from each other. Diam. 0.055 x 0.045 m. Thickness 0.003 m. Diam. of holes 0.006 m.
Find context: Area 2, 505/506, Loc. 3, p. 1, 23.7.2009. This corresponds to the filling layer of the tumulus, which, however, also contained a large amount of EBA pottery. This object may thus also originate from the EBA layers.

The use of wild animal teeth (e.g. deer, boar or wolf) as pendants can be seen relatively frequently during and after the Palaeolithic period in Epirus.[3] There is a pendant similar to No. 1 from a wolf's bicuspid found in the Final Neolithic hut of Doliana, Epirus, where the perforation is drilled closer to the centre of the tooth,[4] and another one

[3] Bailey *et al.* 1983, 30, pl. 7; Kotzampopoulou 2008, 19-20.
[4] Yiouni 2008, 40.

from Late Neolithic or EBA Sesklo, Thessaly.[5] Such personal adornments are also known from the Late Copper Age Coţofeni Culture of present-day Romania, that corresponds to Early Helladic I and II,[6] and from the EBA Hvatan Culture of modern Hungary.[7] For EBA pendants from deer teeth see Levkas, Steno, R15b.[8]

Bone needles are common finds in prehistoric sites. Most needles, however, are cruder and wider[9] than the two specimens from Goutsoura. The latter are thinner, while their cross-section tends to be circular and their heads are only slightly projected, making them suitable for more delicate operations.

Two objects very similar to No. 4 were found at the cave of Choirospilia, Levkas. W. Dörpfeld, who considered them "handles", does not give any chronological details.[10] Objects similar to the discoid artefact No. 5 have been found e.g. in Bulgaria and Albania. One circular clay disc with two perforations from Grave 183 of the Chalcolithic cemetery of Durankulak (present day Bulgaria) has the same main morphological features,[11] while the same goes for one or two artefacts of the same material from Maliq (modern Albania).[12]

Metal objects

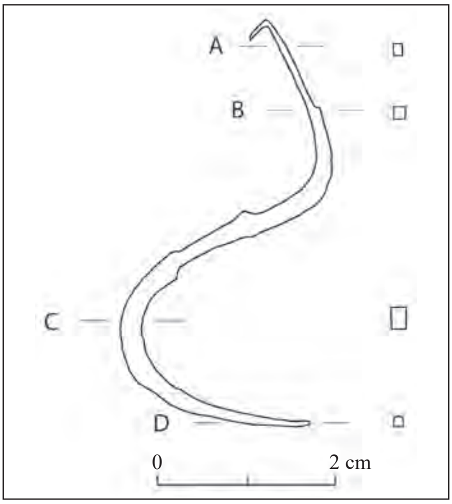
Two metal objects were found, both possibly made of copper or a copper alloy: one punch and one fish hook. There is also a small drop of copper or copper alloy that points to metallurgical production at the site itself.

6. Copper or copper alloy punch (Fig. 6). Complete. Green to blue-green patina. It is made from a forged metal wire of square cross-section, narrowing to a blunt butt – to receive a handle of perishable material – and towards a sharp point at the other end. Length 0.087 m. Maximum width 0.003 m.
Find context: Area 2, 503/506, Loc. 6, p. 2, 8.7.2010. This corresponds to the lowermost layer of the EBA horizon, below the central part of the tumulus (like Nos. 1 and 4).

7. Copper or copper alloy fish-hook (Figs. 7-8). Complete, unintentionally bent at the upper ¼ of its length and nearly broken at the upper end. Green to blue-green patina. It is made from a forged metal wire of square cross-section bent intentionally at a 45° angle to form the simple and barbless tip. It lacks any support for the line. Length 0.047 m.
Find context: Area 2, 503/507, Loc. 1, p. 1, 14.6.2010. This corresponds to the topsoil above the tumulus.

Fig. 6. EBA copper punch No. 6.

[5] Karali 1996, 336: 291; Kyparissi-Apostolika 2001, 108; Tsountas 2000, 357, pl. 46:12.
[6] Herculane-Pestera Hotilor level I (Roman 1977, pl. 52:38).
[7] Kalicz 1968, 164, Taf. LXIII:13, LXXX:26.
[8] Dörpfeld 1927, 235, Beil. 63: c.5.
[9] Cf. e.g. the bone needles from EBA Maliq II and IIIa in Korçë valley (Albania) (Prendi and Bunguri 2008, Tab. III:1-5; Prendi 2008, 414, fig. 5).
[10] Dörpfeld 1927, 333-334, Beil. 81a.
[11] Todorova 2002, Tabl. 13:12.
[12] Aliu 2006, 50, pl. 4.3, second row, middle.



Figs. 7-8. EBA copper fish-hook No. 7

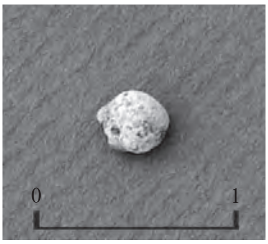


Fig. 9. Copper drop No. 8, constituting the remains of metallurgical activities.

8. Small drop of copper or copper alloy (Fig. 9). Shape not perfectly spherical. Green patina. Fragile and partly broken. Small air bubbles in the interior. Diam. 0.002 m.
Find context: Area 2, 505/505, Loc. 3, p. 2, Grave, 24.7.2009, i.e., in the soil fill of the central cist grave of the tumulus. The fill of the cist grave included some EBA pottery in secondary find context and the small sphere may thus also originate from the EBA layer.

Keith Branigan[13] uses the term punch to describe awls with a square section. It is a tool suitable for work harder than can be done by ordinary round section awls / borers. The length of punch No. 6 lies within the average given by Branigan (0.035-0.135 m), but it is somewhat thinner (average width 0.002-0.006 m). Punches are rather common finds in the EBA Aegean world.[14] They are also found in present day Albania, where they form the standard type of awl during the Chalcolithic.[15] Furthermore, in the western part of modern Bulgaria they are known to date back to the Eneolithic/EBA transition,[16] in modern Romania they have been found in Neolithic[17] and

[13] Branigan 1974, 27.
[14] Branigan 1974, 171-172 and Branigan 1968, 32, 90-91 catalogues 47 punches from the EBA Aegean (Crete: Koumasa, Platanos, Pyrgos, Kanli Kastelli, Mallia; Cyclades: Chalandriani, Naxos; eastern and northeastern Aegean: Samos, Thermi, Poliochni, Troia; Greek mainland: Zygouries, Thebes, Eutresis, Kritsana, Rachmani. Northern Greece: Sitagroi, Dikili Tash). Punches were also found in Lerna (Tripathi 1988, 245-246, nos. 70, 75-76). From EBA Leukas, one punch is mentioned outside R16 at Steno (Length: 0.056 m. Dörpfeld 1927, 294, Beil. 62:13; Souyoudzoglou-Haywood 1999, 25, 29; Branigan 1975, 42), together with a fish-hook (see below). Three punches were found at Sesklo (Late Neolithic or EBA) (Tsountas 2000, 353-534). During the Chalcolithic (Zachos and Douzougli 1999), punches are reported from Kitsos Cave (Attica), Skoteini Cave (Tharrounia, Euboia), Paradeisos (Macedonia, Hellström 1987, fig. 48:18, 19).
[15] Maliq II (Prendi 1976, Tab. XXII:28; Prendi 2008, 400, 417, fig. 12.5).
[16] Ilčeva 1993, fig. 7.
[17] Precucuteni III Culture (Marinescu-Bilcu 1974, figs. 25:17, 18); Cucuteni Culture (Marinescu-Bilcu 1981, 58, figs. 198:10, 199:2).

EBA[18] contexts, and further away, in modern Moldavia and Eastern Ukraine, there have been examples from the Eneolithic period.[19]

The fish-hook No. 7 may be classified as belonging to Branigan's Type I.[20] It is the most common type in the Aegean, perhaps because of its simplicity. Tripathi corrects Branigan's opinion that they are always of square cross-section and adds one circular cross-section fish-hook with a flat upper end for the line, from Eutresis.[21] Branigan's Types IIa (barbless and with two low rings for the line) and IIb (with barb and sometimes with an outward-curving upper end for the line) are rarer in the Aegean, but occur in the Chalcolithic of the Korçë valley[22] and in the Late Copper Age of modern Romania.[23]

No such fish-hooks are listed by Iakovidis in his discussion of this type of artefact in Mycenaean times[24] and only one probable example was found in Lerna in a late Middle Helladic context.[25] We may, thus, assume that fish-hooks of Branigan's Type I date mainly to the EBA. Consequently, the Goutsoura fish-hook No. 7, on typological grounds, most likely dates to the EBA although it was found in the very topsoil above the uppermost cultural layer covering the tumulus, i.e., in a post LBA and/or Early Iron Age context.

The small metal drop No. 8 is of great interest. Although we can hardly be certain about its nature, similar drops, either of copper or bronze, have been found in areas where metallurgical activities were taking place, as dribbles, or in metallurgical or jewelry workshops.[26] No. 8 may thus indicate metallurgical activities at the site of Goutsoura.

The punch No. 6 is the first metallic artefact to be recovered from a well stratified context dating to the EBA in Epirus. Ch. Kleitsas, using both typological and archaeometric analysis, recently proved that a very interesting assemblage of 12 cast single-edged copper alloy axes (Cu-As), all chance finds from various Epirotic origins, also date to the EBA.[27] The cast single-edged copper axe is a type known in northern and northwestern Greece, Albania, Bulgaria and Romania. The 12 cast single-edged axes along with the finds from Goutsoura prove that metallic tools were used, and perhaps even manufactured, in EBA Epirus, an area that can now be included in the wider perspective of metal circulation in the Aegean and the Balkans.

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[18] Coţofeni culture Roman 1977, pl. 8:2-3. Punches are Type a1 awls according to Roman's classification. Punches are also mentioned from the Chalcolithic site of Jilava (Gumelniţa Culture) (Morinz and Rozetti 1959, 44, 206, pl. XII:1) and from the Chalcolithic cemetery of Durankulak in modern Bulgaria (Graves 320, 368, cf. Todorova 2002, Tabl. 40:13, 46:20).

[19] They are larger than the Greek ones (0.1-0.15 m). Govedarica 2004, 185.

[20] Branigan 1974, 29. He catalogues 23 Type I fish-hooks from the EBA Aegean (Crete: Ayia Photia, Levina; Cyclades: Syros (T453); eastern and northeastern Aegean: Samos, Thermi, Emporio, Poliochni; Greek mainland: Raphina).

[21] Tripathi 1988, 247, no.89.

[22] Maliq II (Prendi 1976, Tab. XXII:30).

[23] Roman 1977, pl. 8:21.

[24] Iakovidis 1970, 354.

[25] Tripathi 1988, 194, 304, illustration 88:701.

[26] Y. Basiakos, personal communication. His estimates are based on the observation of macro-photographs of the globule, not on a close examination. We are grateful to him for his kind help.

[27] Kleitsas 2013a, 108-115; Kleitsas 2013b. For a description of one such axe, see http://amio.gr/templates/themza_j15_04/pdf/pelekys1923-1932.pdf.

Terracotta spindle whorls

The excavations produced a total of 13 spindle whorls. Four of the spindle whorls were simple reused perforated sherds (Fig. 10), four were conical in shape, three biconical, one lentoid and one was a biconical/rhomboid with punched decoration.

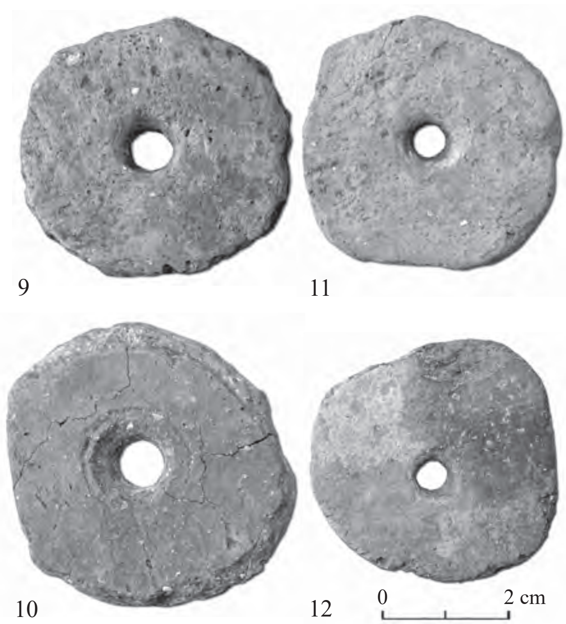


Fig. 10. Potsherds reused as spindle whorl during EBA, Nos. 9-12.

9. Circular perforated potsherd from the body of a rather large, closed vessel. Clay fine, dark in the core (dark greenish gray 4/1), reddish yellow on the outer surface (7.5 YR 6/6) and light reddish brown on the interior surface (5YR 6/3). Vertical central perforation, made after firing. Diam. 0.04 m. Width 0.007 m. Diam. of perforation: 0.006 m.
Find context: Area 2, 503/507, Loc. 5, p. 4, 2.7.2010 (x=504.60; y=507.26; z=98.96). This corresponds to the EBA layer beneath the southeastern part of the tumulus.

10. Circular perforated potsherd from the body of a rather large, closed vessel. Clay fine, dark gray (10YR 4/1). Outer surface slipped, reddish yellow (5 YR 7/6). Circumference rather irregular. Vertical central perforation, made after firing by piercing from both sides. On the inner side of the sherd, an engraved ring surrounds the perforation, obviously part of the preparation for drilling. Diam. 0.042 m. Width 0.01 m. Diam. of perforation: 0.006 m. Diam. of ring 0.016 m.
Find context: Area 2, 503/507, Loc. 5, p. 4, 2.7.2010 (x=504.82; y=507.69; z=99.00). Further see No. 9.

11. Circular perforated potsherd from the body of a rather large, closed vessel. Clay fine, dark gray (gley 2, dark greenish gray 4/1). Outer surface slipped, reddish yellow (5 YR 6/6). Circumference slightly irregular. Vertical central perforation, made after firing by piercing from both sides. Diam. 0.04 m. Width 0.007 m. Diam. of perforation 0.006 m.
Find context: Area 2, 503/506, Loc. 5, p. 1, 30.6.2010 (x=504.94; y=507.11; z=99.10). This corresponds to the EBA layer beneath the central part of the tumulus.

12. Circular perforated potsherd from the body of a vessel. Clay very fine / fine, fired mottled dark reddish gray to black on the exterior (5YR 4/2-2.5/1) and dark gray (5YR 4/1) on the inner surface, which is burnished. Circumference irregular. Vertical central perforation, made after firing by piercing from both sides. Diam. 0.036 m. Width 0.007 m. Diam. of perforation 0.004 m.
Find context: Area 2, 505/508 Loc. 5, p. 2, 24.7.2009. This corresponds to the EBA layer beneath the southern part of the tumulus.

13. Convex conical spindle whorl (Fig. 11). Complete. Clay fine, red (2.5YR 5/6). Surface plain, mottled black, probably due to secondary burning. Diam. 0.045 m. Height 0.038 m. Diam. of perforation 0.007 m.

Fig. 11. Conical spindle whorls from the EBA layer in Trench A and D, Nos. 13-15.

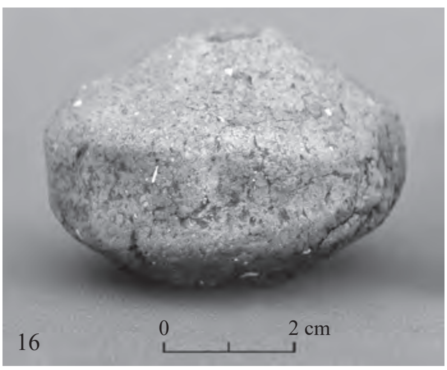
Find context: Trench A1-ext., Loc. 4, p. 1, 26.7.2007, Inv. no. 138. This corresponds to the EBA settlement layer, ca. 40 m to the east of the tumulus.

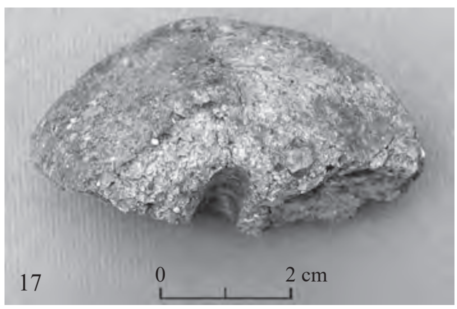
14. Truncated conical spindle whorl. Complete. Clay brown (7.5YR 4/2), fine. Surface plain. Small part of the perimeter of the base missing. Diam. of base 0.051 m. Diam. of top 0.017 m. Height 0.028 m. Diam. of perforation 0.007 m.
Find context: Trench D, Loc. 4, p. 4, 24.7.2007, Inv. no. 137. This is the lowermost locus of Trench D, i.e., it corresponds to the EBA settlement layer at the site.

15. Small convex conical spindle whorl. Complete. Clay very fine, pale yellow (2.5Y 7/4). Traces of very pale brown (10YR 8/3) slip towards the base. Base slightly convex. Diam. of base 0.035 m. Height 0.028 m. Diam. of perforation 0.007 m.
Find context: Trench A1, Loc. 4, p. 3, 23.7.2007. This corresponds to the EBA settlement layer, ca. 40 m to the east of the tumulus.

16. Squat biconical spindle whorl (Fig. 12). Complete. Clay medium fine, light red (2.5YR 6/6). Surface plain, flaking. Shaping rather crude. Vertically cut in maximum diameter, forming a wall 0.012 m. Height 0.033 m. Diam. 0.056 m. Diam. of perforation 0.008 m.
Find context: Area 2, 503/506, Loc. 5, p. 1, 30.6.2010. This corresponds to the EBA layer beneath the central part of the tumulus.

17. One half of a heavily squat biconical spindle whorl (Fig. 13). Clay medium, evenly fired, red (2.5 YR 4/6). Surface smoothed, 10R 6/8 light red to 5YR 7/6 reddish yellow. Height 0.027 m. Diam. 0.052 m. Diam. of perforation 0.006 m.
Find context: Area 2, 507/507, Loc. 4, p. 2, 6.7.2009. This corresponds to the EBA layer beneath the southwestern part of the tumulus.





Figs. 12-13. Squat biconical spindle whorls from EBA layer in Area 2, Nos. 16-17.

Fig. 14. Conical spindle whorl No. 18 from the late LBA and/or EIA layer in Area 2.

Fig. 15. Biconical spindle whorl No. 19 from the late LBA and/or EIA layer in Area 2

18. One half of the lower part of large, conical spindle whorl (Fig. 14), found in three pieces and restored. Three further fragments cannot be attached. Plain. Porous clay, fine-very fine, reddish yellow (5YR 6/6). Pres. height 0.028 m. Diam. 0.045 m. Diam. of perforation 0.007 m.
Find context: Area 2, 511/508, Loc. 2, p. 1, 2.7.2009. This corresponds to the uppermost cultural layer that is located above the tumulus and dates to the late LBA and/or the Early Iron Age.

19. Biconical spindle whorl (Fig. 15). Part of maximum diameter flaked off. Clay friable, fine with limestone inclusions, light red (2.5YR 6/6) to red (7.5R 5/8). Diam. 0.046 m. Height 0.032 m. Diam. of perforation 0.007 m.
Find context: Area 2, 509/506, Loc. 2, p. 1, 6.7.2009. Further see No. 18.

20. One half of a lentoid spindle whorl (Fig. 16). Very fine clay, unevenly fired. Core bluish gray (Glay 2, 5PB 6/1). Traces of reddish yellow (7.5YR 7/8) slip. Diam. 0.054 m. Height 0.026 m. Diam. of perforation 0.007 m.
Find context: Area 2, 511/508, Loc. 2, p. 1, 2.7.2009. Further see No. 18.

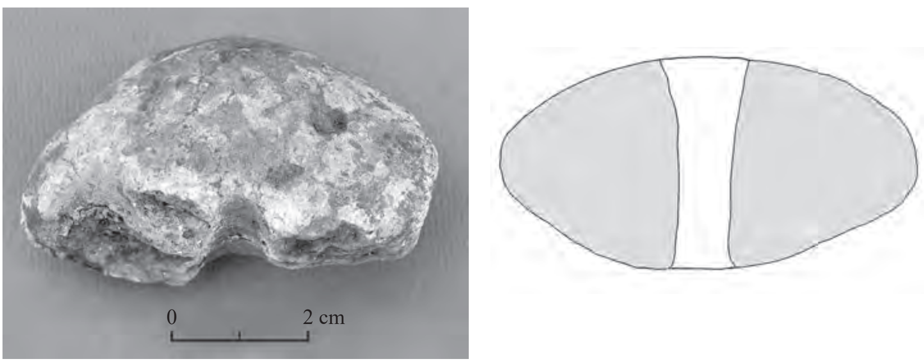


Fig. 16. Lentoid spindle whorl No. 20 from the late LBA and/or EIA layer in Area 2.

21. Biconical/rhomboid spindle whorl (Fig. 17). Complete. Very fine, brown clay. Punched decoration of horizontal rows of dots, three on one cone, five on the other and one on maximum diameter. The lower third of one cone is not covered by the decoration. Diam.
Find context: Area 3, 521/577, Loc. 1, p. 1, 16.6.2010. This corresponds to the pebble layer covering part of the grave circles in Area 3 and that on the basis of the stratigraphy can be dated to between the late MBA and early LBA.

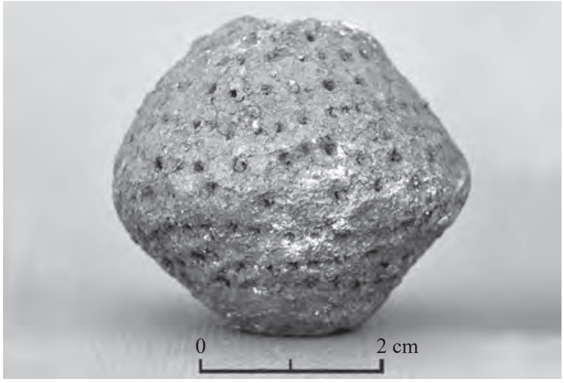


Fig. 17. Biconical/rhomboid spindle whorl No. 21 from the late MBA to early LBA layer in Area 3

Most scholars classify perforated circular sherds as weaving and spinning implements, mostly as spindle whorls.[28] The earliest finds date to the Early Neolithic period.[29] During the EBA they are found at sites in the Ionian Sea, the southern Greek mainland, the Aegean islands and Macedonia.[30] Such artefacts are found in Albania as early as the Early Neolithic period,[31] in Bulgaria from at least the Chalcolithic (Karanovo V)[32] and in Romania in connection with EBA Coţofeni culture sites.[33] M. Joukowski suggests that they were used during the initial stage of spinning for the production of cruder threads, which were further processed later.[34]

Tall conical whorls like No. 13 are more common in Thessaly during the EBA than in the Neolithic period,[35] while they appear in the Ionian Islands[36] and on the southern Greek mainland during the whole of the Bronze Age.[37] They are, also, present in the northeastern Aegean in the Final Neolithic period.[38]

Truncated conical spindle whorls like No. 14 have also been found in EH II Lithares, in EH I-II Akri Rozos on Euboea,[39] in Phase 10 of Servia (latest of EBA) and

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[28] Carington Smith 2000, 207.
[29] Carington Smith 2000, 208-209; Papaefthimiou-Papanthimou 2002, 84-89.
[30] Leukas: Choirospilia (they are not dated and could date from the Middle Neolithic to, at least, the EBA) (Dörpfeld 1927, Beil. 81a; Souyoudzoglou-Haywood 1999, 6-7, 17). Southern Greek mainland: Lithares (Tzavela-Evjen 1984, 173-174, pl. 92: δ, θ, ι, κ), Eutresis (Goldmann 1931, 295, fig. 120), Ayios Kosmas (Mylonas 1959, 146), Lerna (Carington Smith 1975, 217), Asine (Frödin and Persson 1938, 251, 177). Aegean islands: Amorgos, Markiani (Gavalas 2006, 206-207, pl. 49f), Lesbos, Thermi (Lamb 1936, pl. XXXVI:31-53a). Macedonia: Sidirokastro, Katarraktes-Fragma cave (Siros *et al.* 2007). One unfinished such artefact is reported from the MBA level of Ermones, Corfu (Arvanitou-Metallinou 1989-1991, 218).
[31] Korkuti 1995, Taf. 8:B.g; 15:20; Lera 2009, Tab. XI: 20-22.
[32] Lichardus 2001, Tab. 24.
[33] Roman 1977, 34, pl. 52: 34.
[34] Joukowski 1986, 381.
[35] Tsountas 2000, 344, pl. 44:20.
[36] Corfu, Afiona (Bulle 1934, 167, Beil. 4:16).
[37] Lithares (EH II) (Tzavela-Evjen 1984, 173, pl. 90:α, β. 91:α); Asin e (MH) (Nordquist 1987, 176, fig. 61:6); Eutresis (LH) (Goldmann 1931, pl. 265); Marmara ("Dark Ages"?) (Dakoronia 1987, 136:Δ1δ, fig. 61, drawing 37).
[38] With a very similar one (even in dimensions) as the Goutsoura speciemen from the Troad (Takaoglu 2006, 308, no. 41). Only the diameter of perforation is smaller (0.005 m).
[39] Cullen *et al*. 2013, 59, fig. 30:V5.

on EBA Amorgos.[40] However, such truncated whorls also occur in the Neolithic cave of Konispol (modern Albania)[41] and in the Late Neolithic settlement of Promachon-Topolnica IV (on the Greek-Bulgarian borderline).[42]

Small conical whorls like No. 15 are not unusual.[43] Their function as beads cannot be excluded, especially the ones with a diameter of less than 0.03 m.[44] It is known that even larger biconical whorls were used as necklace beads in LBA Epirus.[45]

Two of the biconical spindle whorls, Nos. 16 and 17, are squat in shape. No. 16 is a particularly peculiar shape, due to the vertical maximum diameter. However, conical whorls with a vertically cut wall towards the base are known from Late Chalcolithic / EBA Epirus, from EH II southern Greek mainland and from EBA southern Albania.[46] A whorl similar to No. 17 has been found in Servia.[47] The biconical whorl No. 19 again finds parallels from Final Neolithic Doliana in Epirus,[48] from EBA Serbia in Macedonia,[49] and from EH II Manika on Euboea.[50]

Spindle whorl No. 20 is the only lentoid whorl from Goutsoura. Lentoid whorls come from EBA Servia and, according to Carington Smith,[51] are a Late Neolithic/ Chalcolithic type continuing into the EBA. One is shown from EH II Manika.[52] Similar ones are reported from Chalcolithic Maliq II in Albania and from Late Neolithic Porodin.[53]

Conical and biconical spindle whorls both appear for the first time during the Middle Neolithic period.[54] The conical type is found in Thessaly and the Peloponnese. During the Late Neolithic period the shape becomes more common and such whorls are now found in Macedonia, Thessaly, Attica and the Peloponnese. During the EBA, the biconical whorl is the dominant type in the Ionian Islands,[55] Macedonia[56] and northern Aegean,[57] while the southern Greek mainland favours conical spindle whorls and

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[40] Lithares: Tzavela-Evjen 1984, 173, drawing.23:ζ, pl. 90:δ, ρ, σ, τ; Servia: Carington Smith 2000, 218, 221 (SF336), pl. 4.18:a (upper right), fig. 4.32; Markiani (II and III): Gavalas 2006, pl. 49:a, b.

[41] *HGAtlas* 2008, 42, fig. 33.

[42] Koukouli-Chrysanthaki *et. al.* 2007, fig. 50:2.

[43] For example one decorated from EC II Markiani III (Amorgos) (Gavalas 2006, fig. 8.22:1), another from EH II Lithares (Tzavela-Evjen 1984, 173, drawing 23:η, pl. 90:ε) and from MH Asine (Nordquist 1987, 176, fig. 61: 6).

[44] Carington Smith 2000, 216.

[45] Vokotopoulou 1969, 202, pl. 30:ζ΄.

[46] Doliana (Douzougli and Zachos 2002, fig. 11:7); Lithares (Tzavela-Evjen 1984, 173, drawing 25:ε, pl. 90:ξ); Maliq IIIa (Prendi and Bunguri 2008, Tab. XXIII:13).

[47] Carington Smith 2000, 218 (SF376), fig. 4.32.

[48] Douzougli and Zachos 2002, 135, fig. 11.8,

[49] The number is larger than the others. Carington Smith 2000, 216, fig. 4.32: SF45.

[50] Manika (Sampson 1985, drawing 54).

[51] Carington Smith 2000, 218, fig. 4.32: SF27.

[52] Sampson 1985, drawing 54.

[53] Prendi 2008, 267, Tab. XXII:36; Carington Smith 2000, 218.

[54] Carington Smith 2000, 216; Papaefthymiou-Papanthimou 2002, 101-102.

[55] Korfu, Aphiona (Bulle 1934, 167, fig. 4:14, 15), Ermones (MBA mostly) (Arvanitou-Metallinou 2007, 143); Levkas (Dörpfeld 1927, 284, 331, Taf. 56, 73, 81a, 83a); Ithaka, Pelikata (Heurtley 1934-1935, 35, fig. 30:141, 145).

[56] Kritsana (Hausmann and Milojčić 1976, Taf. 51:1, 25, 26); Saratse (Heurtley and Ralegh Radford 1930, 140, 150); Kastanas (Aslanis 1985, 195-197, Taf. 11:12, 81:1-9); Aggelochori (Stefani 1997, 105).

[57] In the northern Aegean biconical whorls occur together with spherical ones (Carington Smith 1975, 211). Cf. eg. Lemnos, Poliochni (Bernabò Brea 1964, 655, pl. 169); Lesbos, Thermi (Lamb 1936, 161, figs. 46-47).

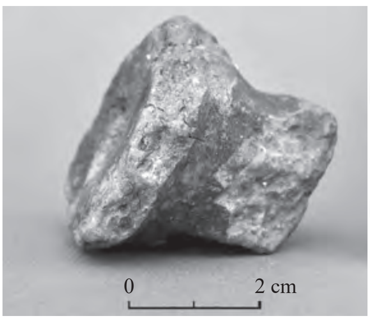
biconical ones are practically absent.[58] The Cyclades again show a marked preference for flat discoid and conical spindle whorls.[59] Biconical whorls in Macedonia remain in use throughout the Bronze Age and well into the Early Iron Age, but after the MBA – and indeed the late EBA – they coexist with increased numbers of conical ones.[60]

It is interesting that both forms are present in Epirus from the Chalcolithic onwards, following the dominance of biconical forms in the Late Neolithic period.[61] This picture can now be confirmed for the EBA as well, by the small assemblage of three biconical, four conical and one lentoid spindle whorls, with the addition of four circular, perforated potsherds from Goutsoura. The balanced ratio of biconical to conical whorls at this site seems to occupy the middle distance between the northern and southern Greek mainland preferences.

The spindle whorl No. 21, which comes from a late MBA or early LBA context, differs totally from the other specimens recovered from Goutsoura. Two such whorls, with punched decoration are published by Tsountas,[62] according to whom such whorls were found during both the Neolithic period and the Bronze Age. A burnished, undecorated biconical-rhomboid whorl from Kallithea, Epirus, was found together with finds dating to the LBA and Early Iron Age.[63] A late date seems also to be suggested by a whorl, similar both in form and decoration to the Goutsoura example that was found in an Early Iron Age tomb at Vergina.[64]

Terracotta spools

22. Spool with most of both ends and part of the body missing (Fig. 18). Clay fine, reddish gray (10R 5/1). Surface unslipped, black burnished (2,5Y 3/1 very dark gray). Perforated in the long axis. Pres. length 0.031 m. Diam. of body: 0,033 m. Diam. of perforation 0.007 m.
Find context: Area 2, 501/508, Loc. 4, p. 2, 25.6.2010. This entity corresponds mainly to the EBA layer beneath the southeastern corner of the tumulus.



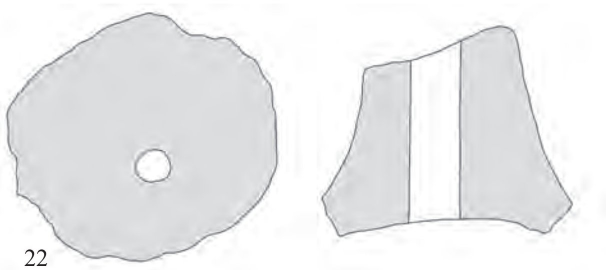


Fig. 18. Terracotta spool No. 22 from Area 2.

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[58] Carington Smith 1975, 209.
[59] Gavalas 2006, 206.
[60] Carington Smith 2000, 217-218.
[61] Late Neolithic: Gouves (Douzougli and Zachos 2002, fig. 4:10). Chalcolithic: Doliana (Douzougli and Zachos 2002, fig. 11:7-9; Yiouni 2008, 36).
[62] Tsountas 2000, 344, Pl. 44:14, 15.
[63] Surface find from Agios Athanasios and Agios Konstantinos in the Aoos valley (Douzougli 1996, 35, Pl.3:ι).
[64] Tumulus AH, grave IX, dating to the first half of the ninth century BC (Andronikos 1969, 260, fig. 100, pl. 133).

23

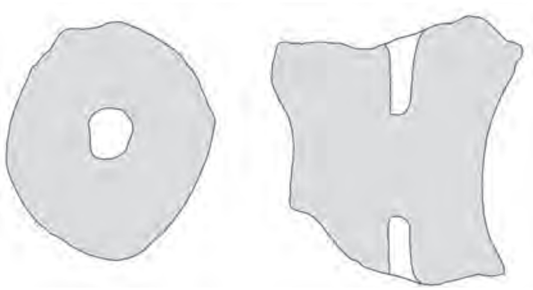

Fig. 19. Terracotta spool No. 23 from Area 2.

23. Spool with most of both ends missing (Fig. 19). Clay very fine, unevenly fired, reddish yellow (5YR 7/6) on the slipped and burnished surface, light red (5R 7/6) to black in the core. Perforated in the long axis. Pres. length 0.028 m. Diam. of body 0.033 m. Diam. of perforation: 0.008 m.
Find context: Area 2, 514/506, Loc. 1, p. 1, 6.7.2009. This corresponds to the topsoil that covered the tumulus.

Spools with longitudinal perforation are attested since the beginning of the Middle Neolithic period.[65] They appear in sites near the Ionian and the Aegean seas, sometimes in fairly substantial numbers.[66] They are also mentioned as a common find in EBA contexts in southern Albania, such as in Maliq IIIa, Luaras, the Piscovë tumulus etc.[67] In Epirus, they are found in four sites: a MBA tomb at Skaphidaki, Preveza (a spool of a biconical form);[68] a Late Helladic / Early Iron Age child burial from the acropolis of Ephyra (one specimen);[69] three from Dodona, dated broadly to prehistoric times;[70] an unspecified number from the "Nekyomanteion" of Ephyra.[71]

The spools have been interpreted either as shuttles[72] or as warping tools.[73] If we accept the first interpretation, then the shuttle would be the perforated spool with the wrapped string and a long wooden axis passed through the perforation. According to the second interpretation, spools would have been used in the course of warping, a crucial preparatory stage in weaving with horizontal looms. If this is indeed the case, then it fits well with the absence from Goutsoura of any evidence for loom-weights, the only part of

[65] Achilleion III (Gimbutas *et al*. 1989, 252-253, fig. 8.6).
[66] 42 are mentioned at Ermones, Corfu (MBA. Arvanitou-Metallinou 2007, 144, fig. 7. Also, from Corfu, spools are reported from Afiona (Bulle 1934, Abb. 4:20) and 20 at Phylakopi, Mylos (from every period. Bosanquet and Welch 1904, 213, pl. XL:36). Spools also come from Lefkas, Syvros (EBA. Andreou 1975, 218; Souyoudzoglou-Haywood 1999, 17); Amali (MBA? Dörpfeld 1927, Beil. 59a); Skaros (EBA and MBA. Souyoudzoglou-Haywood 1999, 18, 29; Dörpfeld 1927, Beil. 73:12); Ithaki, Pelikata (EBA. Heurtley 1934-1935, 35); Euboia, Kalogerovrysi (MBA. Sampson 1993, 119, fig. 76:2); Boeotia, Thebes (Demakopoulou and Konsola 1975, pl. 38b); Eutresis (Goldmann 1931, pl. 266:1); Argolis, Asine (MH. Nordquist 1987, 57, fig. 63); Lerna (MH. Caskey 1957, 147); Laconia, Ayios Stefanos (Taylour 1972, 216).
[67] Prendi and Bunguri 2008, 241, Tab. V:21; Bodinaku 1981, Tab.1:14.
[68] Andreou 1994, 243, Pic.34; Tartaron 1996, 166, 221.
[69] Dakaris 1958, 112.
[70] Evangelidis 1935, 208, pl. 9B:2, 4, 10; Hammond 1967, 301.
[71] Dakaris 1963, 91.
[72] Barber 1991, 107; Tzachili 1997, 175; Arvanitou-Metallinou 2007, 144.
[73] Tzachili 1997, 210; Arvanitou-Metallinou 2007, 144; Carington Smith 1975, 404-410.

the vertical loom with weights that has a good chance of survival.[74] The number of loom-weights in the EBA Aegean is generally very limited, while in Albania they are mentioned as finds from Maliq IIIa and from Kallamas.[75]

The spools gain popularity in Crete in the Middle Minoan Period, when, according to I. Tzachili, the vertical looms equipped with weights multiply.[76] Their scarcity has been generally attributed to two factors: a) The use of some kind of loom without weights, such as the horizontal. It should be noted, however, that in Egypt this kind of loom was succeeded from the sixteenth century BC onwards by a type of vertical one which did not involve weights.[77] b) The use of objects difficult to locate archaeologically, such as stones.[78] Some elliptical clay loom-weights with a deeply incised cross, sometimes perforated, from the Late Neolithic Kallamas at the Albanian part of the Great Prespa Lake give us an idea of what such stones might have looked like.[79] Another plausible explanation could be that weaving activities were taking place elsewhere.

In any case, it seems that the vertical loom with weights was more time and labour-consuming, but better suited for the production of colourful textiles, an instrument mostly desired by societies with a clear vertical stratification and increased complexity, such as the palatial economies of the MBA and LBA southern Aegean, where it was considered a valuable commodity.[80] A small Epirotic community of the EBA without that level of social complexity and the concomitant antagonisms, needed less powerful insignia of status and probably produced less elaborate, time and labour-consuming textiles in the context of a household level production. These textiles could be made on looms without weights, either vertical – like the Egyptian ones of the LBA – or horizontal. The second case is further supported for Goutsoura by the presence of clay spools.

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[74] Arvanitou-Metallinou (2007, 144-145) reaches the same hypothesis in her examination of the MBA weaving and spinning material from Ermones, Corfu.

[75] Prendi and Bunguri 2008, 239-240, Tab. V:6-11; Lera and Toucheas 2013, fig. 30.

[76] Tzachili 1997, 181.

[77] Tzachili 1997, 153, 199-200.

[78] Tzachili 1997, 177, 179, 199. The use of stones as loom-weights is implied by their very Greek name (λαιαί – stony) and mentioned by Iulius Pollux (οἱ λίθοι οἱ ἐξηρτημένοι τῶν στημόνων κατὰ τὴν ἀρχαίαν ὑφαντικήν – stones suspended from the warps in ancient weaving) (Onomasticon VII.36). Stone weights were used until recently in the Scandinavian vertical loom (Hoffmann 1964, 21; Tzachili 1997, 158-160).

[79] Lera and Toucheas 2013, fig. 30.

[80] Tzachili 1997, 200-201.

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Human Skeletal Remains from the Bronze Age Cemetery of Goutsoura

Markku Niskanen

This chapter focuses on human skeletal remains recovered from the Bronze Age site of Goutsoura, which includes two burial grounds: the northern tumulus located in Area 2 and the southern cemetery located in Area 3.[1] Very large numbers of human bones were recovered from these two burial grounds. There were a few fairly intact and undisturbed burials as well as separate skeletal elements of numerous additional individuals.

Bone preservation is variable. Some bone finds were well-preserved and remained intact during their recovery and storage, but many others either broke into smaller fragments or even disintegrated, which greatly increased the number of already very large number of fragments. Findings presented here are to be considered very preliminary as they are based on only one week of review of this vast quantity of uncleaned bone fragments. The time constraints prevented the proper counting and organizing of bone fragments. Therefore, the proportional representations of different anatomical regions are not given and all statements on numbers of individuals (e.g. the minimum number of individuals) are preliminary.

All stature estimates from long bone lengths are done using Ruff *et al.*'s sex-specific equations for South Europeans.[2] Sex is determined from the pelvic shape[3] or joint size.[4] Age of children and sub-adults is estimated from dentition,[5] diaphyseal length[6] or epiphyseal closure.[7] Bone finds from the northern tumulus are discussed first, followed by a discussion of bone finds from the southern cemetery.

The northern tumulus

The northern tumulus included a central slab-lined cist grave, several burials of children (Child graves 1, 2, 3 and 4), a cremation burial and isolated (scattered) human bone finds. The central slab-lined cist grave is discussed first, followed by the child graves and additional burnt human bones found from this area.

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[1] For the general description and stratigraphy of the site, see Forsén, this volume; for the grave structures, see Lima, this volume. I have gained much from the careful excavation and detailed reports by the square supervisors Tommi Turmo, Sarita Sandell, Otso Manninen, Jarkko Saipio, Niko Latvakoski and Rasmus Åkerblom. I also want to thank Björn Forsén for his help while studying the material and writing this chapter. The drawings were made in field by Niko Latvakoski (Figs. 4-5) and Rasmus Åkerblom (Figs. 6-7) and later inked by Anna Patteri. Figs. 1-3 are by Esko Tikkala.

[2] Ruff *et al.* 2012, table 3.

[3] Buikstra and Ubelaker 1994.

[4] Male-female sectioning points are from Spradley and Jantz 2011, table 8.

[5] White and Folkens 2000, fig. 17.1, table 17.1.

[6] Cordoso *et al.* 2014.

[7] Cordoso 2008a; Cordoso 2008b.

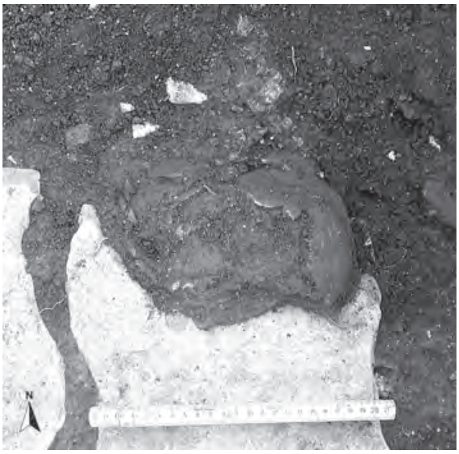

Fig. 1. Broken skull found on top of the eastern end of the central cist grave's cover slab in the tumulus.

Central slab-lined cist grave

This cist grave is located in an east to west direction in the centre of the northern tumulus. According to the excavation report, a broken skull was found on top of the eastern end of the cist's cover slab (Fig. 1).[8] This skull broke into many small pieces during recovery, but includes at least the parietals and a broken frontal bone. When this cist grave was opened it revealed what appeared to be the skeletal remains of two adults (Fig. 2). Individual 1 was buried in supine position fully extended with the head towards the west. Individual 2 is represented by a heap of disarticulated postcranial bones and a few loose teeth at the eastern end of this cist. This heap of bones may also include bones from a third individual.

Fig. 2. Skeletal remains in the central cist grave of the tumulus.

Bones of Individual 1 were found in anatomically correct positions, as in an undisturbed burial. The skull of this individual was, however, incomplete. It included a partially preserved mandible, the mastoid regions of temporal bones (mastoid height 26.5 mm) and the occipital bone, but not its frontal bone and parietal bones. The incomplete skull from the grave top (Fig. 1) includes these missing cranial elements and apparently does not include those found inside the grave. These two partial skulls may well represent the one and the same skull, demonstrating that this grave had been opened and the burial disturbed. Bones of this individual were very poorly preserved and disintegrated during their recovery. It was thus possible to make only a few observations and take even fewer measurements.

Individual 1 was a female, based on her small mastoid processes (height 26.5 mm). She was in her late teens or early 20s at the time of death because there is only some dentine exposed in M_1s and incisors. The enamel of the M_3s is hardly even polished, and because a trace of the epiphyseal line is visible in a proximal left radius, this would indicate, furthermore, that this individual's radial epiphyses had just completed union.

[8] For a more detailed description of the grave, see Forsén, this volume and Lima, this volume.

This generally occurred at age 16-17 in the early twentieth century Lisbon females representing the middle-to-low socioeconomic group.[9] This Portuguese reference population is probably quite appropriate for the Bronze Age Mediterranean Europeans for age assessment purposes because it predates recent acceleration in growth and maturation rates.

Her estimated stature based on skeletal length was lower than 150 cm (perhaps 143 cm based on Fig. 2, which was used in skeletal length estimation). Thus, she was very short-statured. A well-preserved left fibula from bone bags of "the second individual" indicates a much taller stature (154.26 cm, as estimated below). However, this fibula is much more likely associated with Individual 2 or even a third individual because it is better preserved than other bones of Individual 1 and its epiphyses are fully fused. This epiphyseal fusion indicates that this bone belongs to an older individual because the fibular and radial epiphyses fuse at about the same age.[10]

Individual 2, and the apparently additional individual, are represented by postcranial bones and a few loose teeth from a heap of bones at the eastern end of the cist that was sampled as "Bones #2". These bones are considerably better preserved than those of Individual 1. A fairly well preserved right ilium clearly exhibits female morphology. This female individual was fully grown at the time of her death because all epiphyses of lower limb bones and vertebrae are completely fused indicating a fully grown adult individual. Two loose teeth from the eastern end of this grave appear to originate from two or more individuals, due to different amounts of tooth wear. An apparently recently erupted third molar (M_3) indicates a young adult (late teens or early 20s). Another M_3 has some dentine exposed indicating clearly older age (late 20s or early 30s).

I have used sex-specific equations for prehistoric and historic South Europeans published by Ruff *et al.* to estimate stature of this individual and other individuals discussed in this chapter.[11] Applying an equation for summed maximum lengths of femur (M-1) and tibia (M-1a) (right femur 43.1 cm + right tibia 35.2 cm = 78.3 cm) provides a stature estimate of 158.06 cm for this individual. Her stature was thus quite average for this period.[12] This female had a rather slender body build, as indicated by her femoral head super-inferior breadth (40 mm), which is small both absolutely and relative to femoral length for European females (average 42.5 mm).[13] Because joint size relative to long bone length correlates with body build, this individual probably had a rather slender physique.

A pair of fibulae (the left one has a maximum length of 33.3 cm; the right one is not measurable) included in bone bags of "the second individual" are due to their good preservation and the epiphyseal fusion schedule clearly associated with Individual 2. I converted the maximum fibular length (33.3 cm) to the maximum tibial length (34.29 cm) using a regression equation (Tibial length in cm = 1.026 × Fibular length in cm + 0.129, r = 0.986, SEE = 0.52 cm, n = 64). This estimation of tibial length from fibular length is thus about 0.9 cm too short (length of right tibia 35.2 cm - estimated tibial length from length of left fibula 34.29 cm = 0.91 cm) if these bones are from the same individual.

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9 Cardoso 2008b, table 14.
10 Cardoso 2008a, tables 18 and 19 vs. Cardoso 2008b, table 14.
11 Ruff *et al.* 2012, table 3.
12 On prehistoric and historic European statures, see Niskanen *et al.*, in preparation.
13 For the European average, see Ruff *et al.* 2012, table 2.

Stature estimation based on this fibular length (154.26 cm) is also 3.4 cm shorter than that based on the length of right tibia (157.66 cm), which also demonstrates this length disparity.

The above tibial length-fibular length disparity is, however, just barely within 95% confidence interval for individual values about mean if tibial length is regressed against fibular length, whether bones from the same side or opposite sides are compared. We thus cannot rule out that this left fibula and right tibia belong to an individual whose left lower leg is possibly a little shorter (but not pathologically so) than his/her right lower leg. Relative robusticities of the bones in question (based on a visual examination) are also what one would expect if these bones are from the same individual. The existence of a possible third individual included in this cist grave is mainly based on teeth from the eastern end of this cist grave appearing to originate from a young adult and a much older adult, based on different amounts of tooth wear. The direct dating of bones from inside this grave would be required.

Considerable differences in bone preservation between these two (or three) individuals and the fact that some cranial elements of Individual 1 were relocated on top of the flat cover slab of the grave indicate that there were two separate burial events. There was at first a primary burial of a young female individual laid down in supine position (Individual 1). At a later date, there was a secondary burial of disarticulated skeletal elements of another female (Individual 2), who was also rather young at the time of death, and possibly some elements of a third individual, at the eastern end of the cist. Furthermore, Individual 2 and this possible third individual were apparently not buried as complete bodies, but as collections of various bones from these individuals. Alternatively, these disarticulated skeletal remains from the eastern end of this cist could represent an earlier burial (or burials) that was (were) pushed to one side of this grave to make room for Individual 1, but the above-mentioned much poorer bone preservation of Individual 1 argues against this interpretation.

Child Grave 1

Square 509/508, Loc. 3 (Burial Block) contained the skeletal remains of a child buried in hocker position.[14] There is a partial braincase; a mandible (permanent M_1 in place, M_2 crown with unformed roots); a maxilla (permanent first incisor that has a fully formed crown, but only half of its root is formed; M_2 that has a complete crowns, but no root formation); a right temporal piece, including a mastoid process measuring 16.5 mm in height; a permanent mandibular incisor with almost completely formed root; small cranial base fragments; a left and a right clavicle; a left and a right scapula; long bone fragments; a left radial shaft; carpal and tarsal fragments; a proximal tibia with unfused epiphysis; a right femoral shaft; a fragmentary maxilla with four reasonably well preserved teeth (a first and a second incisor that have fully formed crowns and ½ formed roots, a canine that has a fully formed crown and ¼ formed crown, a first premolar that has a fully formed crown and a root that has begun to form). All these skeletal elements are clearly from the same individual because there is no overlap of elements and all age diagnostic features indicate approximately the same age, i.e., ca. 7-8 years.[15]

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[14] The Burial block was lifted and excavated at the store rooms in Gardiki. For a more detailed description of the grave, see Forsén, this volume and Lima, this volume, Fig. 10.

[15] Based on dental development according to White and Folkens 2000, fig. 17.1, table 17.1.

Child Grave 2

In Square 505/508, Loc. 3, cranial pieces of a child, including a mandible, were recovered as sample C.[16] The dental age is ca. 6-7 years based on an almost completely erupted M_1. In addition, three isolated teeth, including one maxillary incisor, one maxillary canine and one mandibular incisor, were also recovered from this square. These isolated teeth were placed in a different bone bag from remains of the cranial specimen discussed above. The crowns of these permanent teeth are formed, but the roots are still at least partly unformed, indicating ca. 6-9 years of age.[17] These teeth are thus likely not from the same individual. In addition, there are also fragmented pieces of long bone shafts and some rib fragments.

Child Grave 3

Cranial and postcranial elements of an infant came from square 503/508. This infant grave may belong to the bottom of Loc. 1 and even to the uppermost cultural layer.[18] My age estimation of this infant is ca. 6-8 months because the deciduous incisors and molars have not yet erupted, although their crowns are formed or almost formed.[19] Furthermore, the pars *basilaris* is in three separate pieces.[20] There are also numerous frontal and parietal fragments. Postcranial elements include rib fragments, pieces of most long bones (humera, ulna, radia, femora and tibia), as well as fragments of several "flat" bones (scapulae and iliac wings).

Child Grave 4

Skeletal remains of an infant were found in square 509/507.[21] The cranial remains include pieces of both temporal bones, pieces of a sphenoid, and recently erupted deciduous incisors, indicating age of ca. 12-18 months. The postcranial pieces include a tibial shaft piece ca. 53 mm long, clavicles, ribs, as well as fragmented bones.

Cremation burial

Burned human bones were recovered from a charcoal layer in square 503/505, Loc. 4-5, which was interpreted as a cremation burial predating the tumulus.[22] The bones parietal and cranial base fragments as well some postcranial fragments are also included. These recovered bone fragments do not indicate whether this is the actual site of cremation burial, although the clear charcoal layer seems to speak for it.

The southern cemetery

The southern cemetery is located 70 m south-southwest of the northern tumulus. The cemetery consists of six slab-lined cist graves (Graves 1, 2, 3, 4, 5 and 6) surrounded

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[16] For a more detailed description of the grave, see Forsén, this volume and Lima, this volume, including Figs. 11-12.
[17] See White and Folkens 2000, fig. 17.1, table 17.1.
[18] For a more detailed description of the grave, see Forsén, this volume and Lima, this volume.
[19] See White and Folkens 2000, fig. 17.1.
[20] The fusion of pars basilaris and pars lateralis occurs at 5-7 years of age according to Schaefer *et al.* 2009, 15.
[21] See Lima, this volume.
[22] For further information concerning the cremation burial, see Forsén, this volume, and Lima, this volume, Fig. 6.

by conjoining stone circles.[23] All graves except Grave 1 (looted during the course of excavation) were recovered intact. Human skeletal remains recovered from these graves are here discussed in numerical order from Grave 1 to Grave 6.

Grave 1

Diagnostic human remains recovered from inside this grave include a temporal bone fragment, a short femoral shaft piece (midshaft antero-posterior and medio-lateral diameters are 28.0 mm and 27.5 mm, respectively), probably from a left femur, and a separate femoral head fragment (supero-inferior breadth 43.5 mm). The sides of these femoral pieces were not determined. Their relative sizes suggest that they could originate from the same individual.

A partial left innominate found in the eastern part of this grave is definitely from a male individual, based on its masculine sciatic notch shape. Acetabular height measured from this innominate is 52.5 mm. A right maxilla of an adult, also from the east of this grave, is more likely to derive from a male individual than from a female, due to its size and robusticity. A fairly complete shaft of a right femur (midshaft antero-posterior and medio-lateral diameters are 28.5 mm and 27.5 mm, respectively) was also found at the eastern end of this grave. This femoral shaft piece and the one from inside of Grave 1 grave have similar midshaft diameters to those of the Bronze Age males from Lerna[24] and the Roman Imperial period males.[25] They are thus more likely to derive from male individual(s) than from female individual(s).

It is difficult to say if the above bones originate from the same individuals. Because the average difference of the acetabular and femoral head diameters is 8.7 mm (± 1.8 mm), it is possible that at least the femoral head recovered from inside this grave could be associated with the left innominate found in the eastern end of this grave, but this size-match does not demonstrate that all the specimens mentioned above represent the same individual.

Grave 2

This burial was found in a small cist (only 0.77 m long), apparently constructed for a child. The bones from the cist comprise disarticulated cranial and postcranial bone fragments of an infant or a young child. All teeth are deciduous teeth and include the following: fully formed central incisor crowns, almost fully formed lateral incisor crowns and partly formed molar crowns. This degree of dental elements indicates an infant who was about six months old at the time of death.[26]

Cranial elements are also represented by a separate *pars basilaris*. Postcranial remains are represented by vertebral bodies without appendixes and eight long bone diaphysis. Humeral diaphyseal length (77.5 mm) indicates an infant of about six months of age (0.478 years).[27] This is consistent with the above age assessment based on the dental development.

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23 For the construction and stratigraphy of these graves, see Forsén, this volume and Lima, this volume.
24 See Angel 1971, table 6.
25 See Minozzi *et al.* 2013, table 3.
26 See White and Folkens 2000, fig. 17.1, table 17.1.
27 Based on applying a combined-sex regression equation in Cardoso *et al.* 2014, table 5.

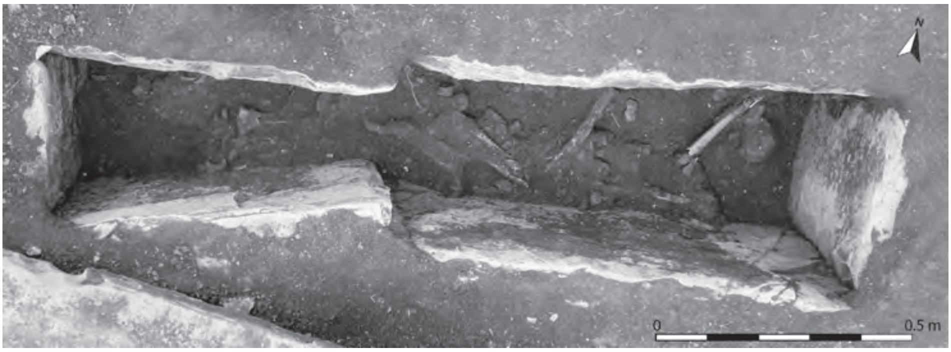


Fig. 3. Skeletal remains in Grave 3 of the southern cemetery.

Grave 3

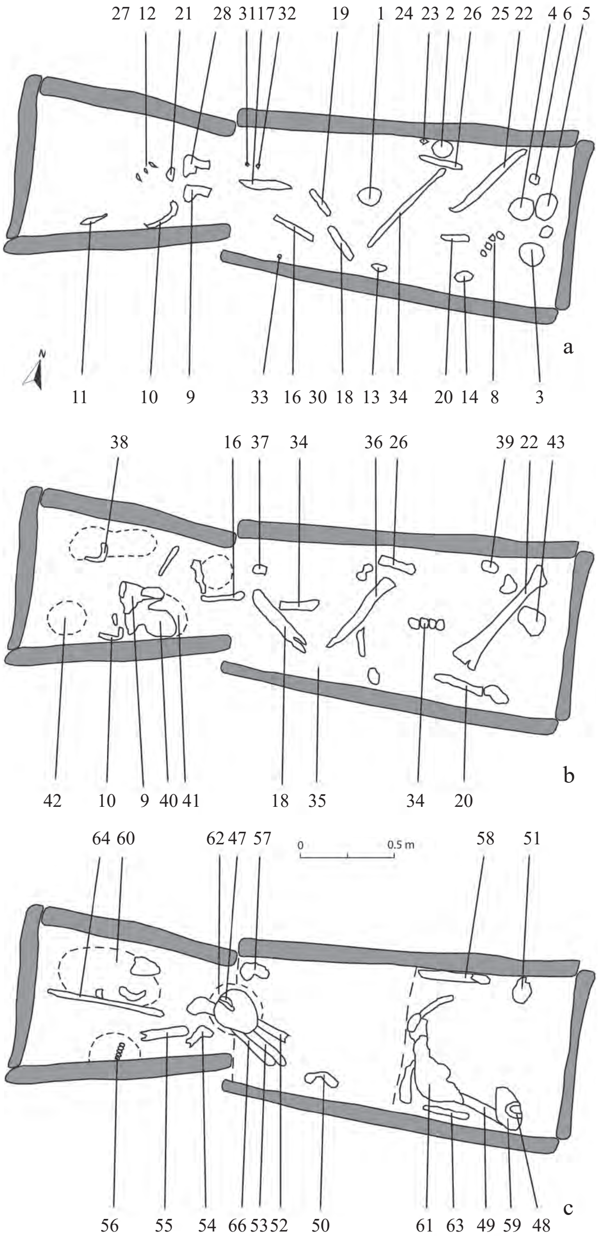
This grave (Fig. 3) contains disarticulated bones of many individuals of both sexes and different ages from several stratigraphic layers. There are also bone clusters, which may well represent bone piles. Bones of one particular individual may thus be distributed between different layers. There are also cranial and postcranial elements (representing upper limb, lower limb and axial skeleton) from different parts of this grave (i.e. west, middle and east part). There is no apparent spatial organization of the skeletal material inside this grave. Cranial and postcranial elements of children and adults were recovered from different parts of this grave (i.e. west, middle and east part), and they were found mixed in bone clusters and/or bone piles. This pattern possibly suggests that many of these bones may not have been laid in this grave in anatomical order. However some of these bones may represent disturbed burials of articulated skeletons. Due to this complex pattern and the very many bones recovered, it was impossible to sort out bones, thus individuals represented, within the short time this study was conducted.

Most of the bones were numbered during the excavation. Sometimes one number was assigned to a concentration of smaller bones. The location of the numbered bones was noted on three consecutive sketches (Figs. 4a-c), representing different depths of the grave. The bones are here described from the top to the bottom, and from the east to the west according to these numbers.

The uppermost layers of the eastern part produced skeletal remains of different individuals. Skeletal remains of subadult individuals include a partial left proximal tibia with an unfused proximal epiphysis (No. 22), two permanent tooth crowns (a mandibular incisor and a premolar) with unformed or only partially formed roots, a partial right hand of a child (No. 25) and a very short partial tibial shaft of a child (No. 26). Skeletal remains of adults include a fully formed third molar, six thoracic vertebrae with fully fused epiphyseal rings, a left talus (No. 34) and a right proximal tibial shaft (No. 36).

Human bones from the uppermost layer of the middle part include bones of subadult and adult individual(s). Those of immature individual(s) include a thoracic vertebra (probably T2) (No. 16) and a right femoral distal epiphysis (No. 39). Those of adults include a thoracic vertebra (T3), a partial left distal humerus, an olecranon process of a left ulna, and parts of both left and right hand (No. 24).

Skeletal finds for the uppermost layer of the western part include bones of at least one adult and one child. There is a left mandibular half (No. 10) of a young adult female, based on the small amount of tooth wear in the third molar and this mandible's



Figs. 4a-c. Sketches showing the position of bones in Grave 3 at different depths.

low symphyseal height (27 mm). There are also two rib fragments (No. 38), which are more likely to derive from an adult than from a child due to their thickness. Bones of children include a small-sized proximal metacarpal fragment (No. 41) that has an unfused epiphysis and a permanent premolar with unformed roots (No. 42), which indicates ca. five years of age.[28] It is not possible to state whether these bones are from the same child or not.

It is very difficult to say if bones from the deeper layers of this grave originate from earlier burials than those from the higher and more recent layers, or if there were bone piles. That is, bones of one individual may have been recovered from different layers. Very detailed and time consuming comparisons of bones or their direct radiocarbon dating would be required to solve this problem.

Skeletal elements recovered from the deeper layers of the eastern part also originated from several different individuals. Both sexes and different ages are represented. There are four cervical vertebrae (from C3 to C6), a partial proximal tibia, a proximal right ulna and a femoral or humeral head fragment (No. 44). The overall size of these bones suggest female, much more than male. There is also a broken mandible (No. 48) and a permanent canine, two permanent premolars and four molars

[28] See White and Folkens 2000, fig. 17.1, table 17.1.

possibly from the same mandible. Of these molars, M_3 exhibits no tooth wear, but the other three (one M_1 and two M_2s) exhibit some tooth wear.

Some skeletal elements from the northernmost edge of this eastern part of the grave originated from at least one adult male, based on their overall size. These include a left partial lateral clavicle piece, femoral head fragment and a talar fragment (probably No. 58).

In addition to the above skeletal remains of adults, skeletal remains of immature individuals were also recovered from this part of the grave. These include two permanent maxillary central incisor crowns, three other incisor crowns, one canine crown with some root formation, one partially formed premolar crown and four molar crowns with unformed root (No. 51). These teeth are probably from one child, whose age was about 5-7 years based on the degree of dental development.[29] Additional skeletal remains of immature individuals include a proximal unfused radial epiphysis, a proximal humeral fragment and numerous rib fragments (No. 63). These bone elements are from one, or several adolescent individuals.

Skeletal elements from the middle part originate from at least two different individuals. A small lumbar vertebra with unfused epiphyses and an unfused proximal tibial fragment are certainly from a child, whereas a vertebral body with a completely fused epipheseal ring (these bones are from No. 45) and a completely fused iliac crest (No. 50) are definitely from an adult individual.

There was a concentration of human bones originating from several different individuals at the boundary between the middle and the western part of the grave. Bones of children or adolescents include a proximal right humerus, five vertebral bodies without epiphyses, an unfused ischium (No. 62), a sternal piece, a distal left femur and an unfused femoral head (No. 66). These bones could have originated from one individual, but that is far from certain. Femoral head diameter (40-42 mm) indicates that this individual (or one of these individuals) was quite likely a female.[30] The age of this individual (if all bones are from the same individual) was anywhere between 10 and 16 (18) years.

Adult bones include a femoral shaft fragment of an adolescent or an adult, due to its overall size from the westernmost edge of the middle part, a left distal femur (epicondylar breadth 69.5 mm indicates female), a femoral shaft piece that fits with the above distal femur (No. 53), as well as several loose teeth of one or several adult, or nearly adult individuals (drawing number not marked on the bone bag, but I assume this to be No. 56). These teeth include four incisors (dentine exposed), one canine (some wear), one premolar (some enamel polishing), one second molar (some enamel polishing) and one third molar (no tooth wear).

Skeletal remains of several different individuals were also recovered from the western part of this grave. These include a large permanent canine, three crowns of permanent molars, a proximal metapodial fragment with an unfused epiphyses and sternal pieces (No. 46). All of these remains could have come from the same individual, whose age was ca. five or six years of age at the time of death. Remains of an older child or children were found in the middle of the western part. These included a humeral shaft of a child (ca. 8-12 years of age based on its size), an unfused proximal metapodial and

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[29] White and Folkens 2000, fig. 17.1, table 17.1.
[30] On femoral head size see Spradley and Jantz 2011, table 8.

one proximal row phalange (No. 55). These bones could have originated from the same individual, but that is difficult to verify.

A scattering of human bones representing at least one young adult individual and one juvenile individual were found in the northwestern corner of this grave. Bones of a young adult include a partial right hand and wrist including four metacarpals (from II to V), a hamate, four proximal row phalanges, a fragment of distal left humerus, six vertebral pieces with apparently fused epiphyseal rings and one vertebral fragment with an unfused ring. These skeletal elements (No. 60 and/or 61) could well originate from the same young adult individual. These bones were mixed with skeletal elements of one or more children. These include an unfused distal metatarsal and two probably unfused femoral condyle fragments of a small-sized distal femur.

Grave 4

Disarticulated human bones were recovered from this grave. A fragmented cranium including teeth was recovered from the western end of this grave, whereas postcranial bones (including several intact long bones) were recovered from the middle of this grave. These bones originate from at least two adult individuals, but not necessarily from more than three adult individuals. The most likely scenario is that these bones represent one adult male individual and one smaller-sized individual, probably female. When possible, the bones are described according to the numbers they were given when excavated (Fig. 5).

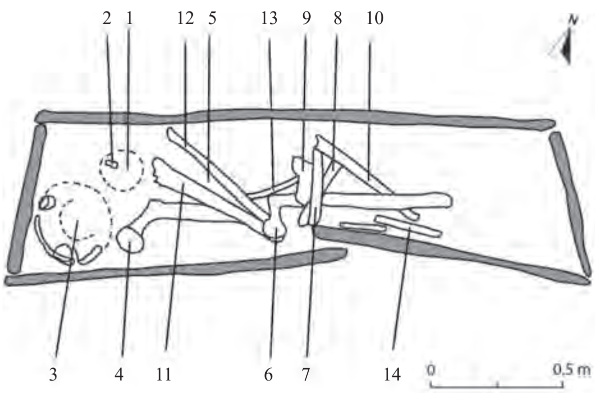

Fig. 5. Sketch showing the position of bones in Grave 4.

There are several braincase fragments (No. 3). The sutures (lambdoid and coronal) are still open, indicating that these cranial elements did not originate from a very old individual. There is an isolated and heavily worn maxillary incisor. There is a partial mandible (No. 1) including five teeth: left and right lateral incisors exhibiting exposed dentine, a left canine with caries at the medial side, a medial left incisor with caries at the lingual surface and the first premolar (P3) with a cavity.

Among the most intact postcranial remains the following can be mentioned. First, there is a complete right femur (No. 4). Its superior-inferior head diameter (45.5 mm) indicates a male.[31] Stature estimation from maximum femoral length (444 mm) is 163.6 cm. Secondly, there is a complete left tibia (No. 11), which probably is from a female individual, due to its gracility. Its maximum length (338 mm) provides stature estimations of 152.8 cm. These stature estimates are provided by Ruff *et al.*'s equations for South Europeans.[32]

[31] On femoral head size see Spradley and Jantz 2011, table 8.
[32] Ruff *et al.* 2012, table 3.

Finally, there is a complete right humerus (No. 10), which robusticity suggests it belonged to an adult male individual. Its maximum length (310 mm) provides a stature estimation of 160.2 cm, if Ruff *et al*. equation for males is applied.[33] This humerus and the above femur could be associated with the same probable male individual because stature estimates provided by upper and lower limb bones are well within the normal range in light of a very large European data set.[34]

Other postcranial bones recovered from this grave are too incomplete to be measured. Their overall size, robusticity, side (left or right) and other features, however, suggest that these bones can be associated with the same two or three individuals that are represented by the three measurable long bones.

Grave 5

This grave included disarticulated and relatively poorly preserved human bones. Both cranial and postcranial elements were recovered. Based on three left distal femora this grave appears to include skeletal remains of one adult male and two females. These two females are either late adolescents or young adults. When possible, the bones are described according to the numbers they were given when excavated (Fig. 6).

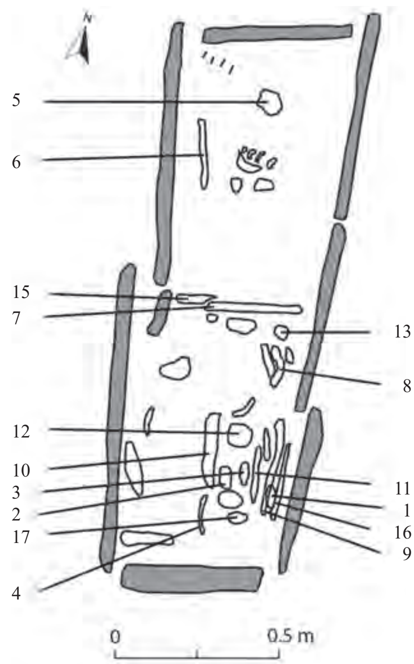

Fig. 6.Sketch showing the position of bones in Grave 5.

A male is represented by a left distal femur (epicondylar breadth of 83.4 mm, estimated from its articular breadth of 77 mm) (No. 4) and a left proximal tibia (epiphyseal breadth of ca. 78 mm, estimated from its articular breadth of 76.5 mm) (No. 9). These dimensions are ca. three or four millimeters larger than the male-female sectioning points (femoral epicondylar breadth 80 mm; proximal tibial epiphyseal breadth 74 mm).[35] These two bones – a left distal femur and a left proximal tibia – could very well originate from the same individual due to the size and shape of their articular surfaces. Epiphyseal union of these skeletal elements appears to be complete, indicating fully adult age.

Two females are indicated by small articular sizes of two other (a left and a right) distal femora, a right proximal tibia (articular breadth 68.5 mm) and a partial proximal right humerus (humeral head diameter 41 mm is considerably smaller than the male-

[33] Ruff *et al.* 2012, table 3.

[34] Ruff *et al.* 2012; Niskanen *et al.* in preparation.

[35] For the male-female sectioning points, see Spradley and Jantz 2011, table 8. It should be noted here that although joint sizes change much less than long bone lengths when average stature changes, considerable temporal stature changes result in some changes in average joint size. For example, short-statured Bronze Age Greeks published by Angel 1971 have slightly smaller average sex-specific joint sizes than the much taller-statured Euroamericans in Spradley and Jantz 2011.

female sectioning point of 46 mm).[36] It was not possible to determine the epiphyseal fusion of these bones, but there are two partial vertebral columns of two adolescent or young adult individuals found at the southern end part of this grave. Epiphyseal rings are either unfused or in process of fusing. The small overall body vertebral size in both of these columns strongly suggests that both of them originate from fairly small female individuals.

Numerous teeth of at least two individuals were recovered from the northern end of this grave. At least one older adult is included because dentine is exposed in many incisors, canines, premolars and molars. There were also teeth of one or more younger adult because one first molar (M_1) and one second molar (M_2) had no dentine exposed.

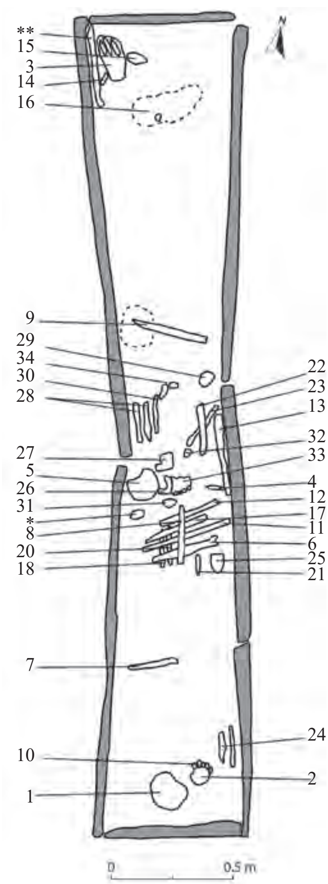

Fig. 7. Sketch showing the position of bones in Grave 6.

Grave 6

Human skeletal elements recovered from this grave are fragmentary. The minimum number of individuals is three because there are parts of three right humera. One of these individuals is a small and gracile male or a large and robust female. Two other individuals are probably both females. When possible, the bones are described according to the numbers they were given when excavated (Fig. 7).

Cranial elements from the northern end of this grave are somewhat more likely to derive from an adult female than from an adult male. The mastoid process height is 27 mm and thus indicates female more likely than male. The supraorbital region is somewhat masculine, but the nuchal region is clearly feminine. The cranial sutural closure indicates that this individual was a mature adult. All right side maxillary teeth and all three left maxillary molars are in place. There is a large cavity in the right M_1's distal surface, facing a cavity in M_2's mesial surface. Dentine is exposed in incisors, canines, and in the first premolar. All three molars from the right side have flat occlusal surfaces, but no dentine is exposed. Molars from the left side are all heavily worn and dentine is exposed from their entire occlusal surfaces. This individual was apparently heavily using his/her left side for chewing, due to painful cavities in his/her right side molars.

A right humerus (No. 34) from the middle of this grave is more likely to be from a male than from a female individual because its head diameter is quite large (46 mm) relative to the maximum humeral length (305 mm), and because this humeral head diameter is about the same as that of average Roman Imperial period males.[37] Based

[36] On humeral head size see Spradley and Jantz 2011, table 8.
[37] Minozzi *et al.* 2015, table 3.

on a very large European data set,[38] short males tend to have large joint sizes for bone lengths and tall females small joint sizes for bone lengths, which helps in sex assessment of individuals around the male-female sectioning points. Stature estimated from this humeral length using Ruff *et al.* male equation is 158.2 cm.[39]

Epicondylar and articular breadths (78 mm and 72 mm, respectively) of a left distal femur (No. 13) from the middle of this grave is a little below the male-female sectioning point.[40] This distal femur is thus either from a large and robust female or a small and gracile male. It was unfortunately impossible to determine the length of this femur to establish whether it could have originated from the same individual, whose right humerus is discussed above.

There are two right proximal tibiae of about the same size from this grave. First there is a right proximal tibia (No. 29) from the middle of this grave. Its articular breadth (69 mm) indicates a female. This proximal tibia is too small to match a left distal femur (articular breadth 72 mm) also from the middle of this grave discussed above. Another right proximal tibia (also No. 29) also recovered from the middle of this grave has a very similar articular breadth (68.5 mm). The tibial proximal epicondylar breadth values for these two right tibiae are ca. 70.5 mm and ca. 70.0 mm because the mean difference between these two proximal tibial measurements in my European skeletal data is 1.5 mm. These values are considerably below the Euroamerican male-female sectioning points and very similar to the Euroamerican female mean (69.19 mm).[41]

There is a partial vertebral column from the so-called "Bone Middle". The vertebral heights of measurable vertebrae (C3, C4, T3, L2, L3, L4 and L5) summed is 128.70 mm. The overall vertebral size is very small, which indicates female more than male. Therefore, equations for females generated using a sample of 26 females in my European skeletal data are used below. A regression equation (Vertebral column length in mm = 2.759 × the above summed height in mm + 92.835, r = 0.779, SEE = 14.2, n = 26) provides an estimate of 447.88 mm for the total vertebral column length from C2 to S1. Stature estimated from this column length with a regression equation (Stature in cm = 1.597 × Vertebral column length in cm + 76.541, n = 246, r = 0.713, SEE = 4.05) is 148.2 cm.

Conclusions

The very large number of human skeletal remains from Goutsoura, representing both sexes and all ages, could provide a considerable amount of information on the skeletal biology of people in this region during this period. This chapter provides only a very preliminary report on what was a large assemblage and is based on one week of making a quick inventory of easily identifiable bones (or more properly their fragments) found in a very large number of bone bags.

This very preliminary study, however, reveals that there is considerable mixing of skeletal elements of different individuals in these graves. The presence of small bones

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38 Niskanen *et al.* in preparation.
39 Ruff *et al.* 2012, table 3.
40 Spradley and Jantz 2011, table 8.
41 Cf. Spradley and Jantz 2011, table 8.

(e.g. phalanges, carpals, vertebrae, etc.) inside the cist graves may suggest that earlier burials inside the cist-graves were pushed to one side to make room for later burials. Alternatively, these small bones were missed when bones were collected after excarnation to be buried elsewhere.[42] If these cist graves functioned as ossuaries these Bronze Age burial customs have some similarities with recent Greek burial customs.[43]

My preliminary findings indicate that the Goutsoura people apparently had average statures for the Bronze Age Greeks. Definite or probable males have stature estimates within 158.2-163.6 cm and definite or probable females within 143.0-158.06 cm. These statures are very similar to mean statures (males 161.1 cm, n = 19; females 150.4 cm, n = 11) of the Bronze Age inhabitants of Lerna computed from mean femoral lengths using the same regression equations.[44]

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[42] On excarnation, see Dowd 2008.
[43] For burial customs in modern Greece, see Blagojević 2013.
[44] On femoral lengths of the Bronze Age Lerna sample, see Angel 1971, table 6.

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Faunal Remains of Goutsoura: The Early Bronze Age Strata

Vivi Deckwirth

Introduction

The corpus of published and unpublished Greek archaeological faunal assemblages is steadily growing, and providing us with valuable information on the development of its faunal history,[1] environments, economy, handicrafts and subsistence patterns, as well as enabling intra- and inter-regional site comparison for gaining a wider perspective on eventual inter-dependencies, differences and changes over time. However, as shown by mapping the sites of analyzed material, they tend to concentrate on the northeastern, eastern and southern parts of mainland Greece together with Crete and several other Aegean islands, revealing that the northwest (Epirus) has gained only little attention, mainly due to limited previous research activity in this region.[2]

In the first two volumes of the Thesprotia Expedition the osteofaunal assemblages from the sites PS 25 (Agios Donatos of Zervochori) and PS 36 (Mavromandilia) in the Kokytos valley were published, adding to our knowledge on the strategies of livelihood and economy in Thesprotia during a time period from the Early Iron Age into Roman times.[3] These results gave us important new information on Epirote subsistence strategies and were in accordance with and complemented complemented previous observations from Kassope[4] (southern Epirus) and ancient literary sources,[5] which describe Epirus from the Archaic Period into the Roman times as an area with an economy based on animal husbandry. However, for Thesprotia we do not yet have information on the early phases of animal husbandry.

This article presents the results of the analysis of the Early Bronze Age (EBA) faunal material from the site Goutsoura (PS 12). The objective was to investigate if animal husbandry was already practiced at the site during this time period, to characterize it, and to evaluate its scale in comparison to the exploitation of wild species. The composition and relative species abundance is investigated, compared and discussed with data from contemporaneous faunal assemblages. Previous Epirote fauna osteological research activity and its implications for Bronze Age subsistence are presented and discussed by Tartaron.[6] The Final Neolithic/EBA site of Doliana, north of Ioannina, provides important

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[1] Including diachronic morphometric intra-species variations. I want to thank Björn Forsén for giving me the interesting opportunity to study the bone material from Goutsoura and Kassiani Lazari of the 32nd Ephorate of Prehistoric and Classical Antiquities, Igoumenitsa, for making it possible and her kind hospitality. I also thank Paul Halstead for providing me with updated data on the Doliana fauna and Eftychia Yannouli for valuable comments on the previous version of this paper.

[2] For compilations of fauna osteological research in Greece, see e.g. Payne 1985a; Trantalidou 1990; Reese 1994; Fillios 2006, 102-113; MacKinnon 2007a; MacKinnon 2007b. For Epirus, see also Tartaron 2004.

[3] Niskanen 2009; Deckwirth 2011.

[4] Friedl 1984.

[5] See e.g. Hernández 2010, 65-80.

[6] Tartaron 2004, 141-142, 179-189.

Fig. 1. The location of Goutsoura and other EBA sites mentioned in the text. 1 = Argissa Magula; 2 = Doliana, 3 = Goutsoura; 4 = Helike; 5 = Kastanas; 6 = Lerna; 7 = Megalo Nisi Galanis; 8 = Pentapolis; 9 = Pevkakia Magula; 10 = Platia Magula Zarkou; 11 = Sitagroi; 12 = Skala Sotiros; 13 = Thermi; 14 = Tiryns.

comparanda results.[7] However, the paucity of published local and regional comparanda is obvious, which gave an impetus to focus also on data available from Thessaly, suggested by the overall resemblance of the EBA Goutsoura pottery to that from the site of Pevkakia Magula.[8] In addition to the faunal material from Pevkakia Magula, results from the Thessalian sites of Platia Magula Zarkou and Argissa Magula are considered (Fig. 1). Besides geographical and ecological divergencies further variations are expected at the level of sample size, methods of collecting, analysis and reporting, indicating the necessity for caution in drawing conclusions.[9]

Goutsoura is located in the Kokytos valley near the modern village of Rachouli, on the lowest eastern slope (ca. 104-116 masl) of the Liminari hill, with an open view towards the plain extending to the Kokytos (nowadays ca. 1.5 km to the east from the site) and further beyond to the Paramythia mountain range in the east.[10] The site shows several periods of activity, with a first settlement dated to the EBA period between ca. 2900-2400 cal. BC, followed by a hiatus, whereafter it was used mainly as a cemetery from the end of the Middle Bronze Age (MBA) to the end of the Late Bronze Age (LBA), i.e., from ca. 2000 to 1100 cal. BC.[11]

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7 Tartaron 2004, 142; Douzougli and Zachos 2002. Additionally, updated faunal data has been provided by Halstead, pers. comm. Further, see n. 73.

8 Forsén *et al.* 2011, 81. Additionally, the Corded ware identified at EBA Goutsoura suggests we should include also northern sites (i.e. southern Albanian EBA sites, such as Oricum and sites from the Korçë basin, e.g. Maliq) into our comparanda material, but these are not considered here due to limited availability of faunal results. The date of the Pevkakia Magula EBA bone assemblage from the excavations in 1967-70 used by Jordan 1975 in his thesis was subsequently revised based on pottery finds to represent a mixed entity of the EBA and MBA (Amberger 1979, 9). The results by Jordan 1975 were excluded from this study.

9 The possible effects of these variations on the faunal composition of the respective sites are acknowledged, but not further compared or analyzed for this article.

10 Forsén *et al.* 2011, 79; Forsén, this volume.

11 For the stratigraphy and dating of the site, see Forsén, this volume. For the human bones, see Niskanen, this volume. There were also identified isolated human bones and fragments thereof in the bags of faunal material provided for this analysis. However, they were omitted from further study and are not considered in any results presented here.

	n	%
Area 2	3379	95.37
Trench D	113	3.19
Trench A	51	1.44
Total	3543	100

Fig. 2. The absolute and relative distribution of the EBA faunal material.

Goutsoura was excavated as three areas (Area 1, Area 2 and Area 3) and several trial trenches. Clean EBA layers were detected in Area 2 (ca. 40 m^2 excavated EBA layers), in Trench A (4.5 m^2) and Trench D (3 m^2).[12] Area 2 lies in the northwest corner of the site next to Trench D, whereas Trench A is located ca. 40 m to the east from Area 2. The majority of the EBA faunal material originates from Area 2, with additional samples deriving from Trenches A and D (Fig. 2).

For studies on subsistence strategies other find categories should also be considered. There are several such at EBA Goutsoura. One of these is represented by spindle whorls and spools indicating some kind of textile production at the site.[13] We do not know if wool or flax was used for this purpose. However, at several EBA sites the increase in size of sheep compared to the Neolithic has been associated with a shift to use a woolly variety of sheep.[14] The recovered sickle elements consisting of blades with silica gloss[15] could have been used for the harvest, but they are also suitable for the collection of plants for winter feed for animals. Additionally, the palynological studies at the lakes of Kalodiki and Ioannina (ca. 15 and 40 km from the Kokytos valley) suggest an increasing human impact, with remains of open ground vegetation and cultivated plants during the EBA.[16] Furthermore, a recovered fishhook[17] implies the supplementation of subsistence by fishing activity, which could have been practiced either at the nearby river or lakes not too far away. Thus, the artefact finds give us some suggestions for subsistence strategies, but the faunal material itself provides the most reliable evidence.

Materials and methods

The faunal material from Goutsoura comprises a total of 6103[18] specimens of bones or teeth and their fragments recovered from Areas 1, 2 and 3 as well as several trial trenches during the excavations at the site in the years 2007-2010. The EBA material consists of 3543 fragments, of which 3379 specimens (95.37%) derive from Area 2, 51 (1.44%) from Trench A and 113 (3.19%) from Trench D (Fig. 2). Neither whole or partial skeletons nor articulated elements were found. The material will be discussed as one sample unit

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[12] See Forsén, this volume, Fig. 4 for a map.

[13] Forsén *et al.* 2011, 81-82; Papayoannis, this volume.

[14] See e.g. Argissa Magula (Boessneck 1962, 46-47), Pevkakia Magula (Amberger 1979, 70-71, 148), Platia Magula Zarkou (Becker 1991, 20-21), Sitagroi (Bökönyi 1986, 79-80), Skala Sotiros (Yannouli 1994, 216). A shift in the age profile of sheep is also suggestive of a changed exploitation pattern. However, flax continued to be used for textile production in the LBA as well, as indicated by the Linear B tablets from Knossos and Pylos (Halstead 2001).

[15] Forsén 2011, 7.

[16] Forsén 2011, 8. See also Lelivelt 2011.

[17] See Papayiannis, this volume.

[18] Bone samples with insufficient field documentation and worked specimens are omitted from the evaluation and not counted into any absolute or relative values presented here. However, the total specimen count of 6103 includes also bones recovered from the topsoil of the site. For the definition of the topsoil, see Forsén, this volume.

without investigation of possible spatial patterning of the identified species or anatomical elements. Bones modified by humans (i.e. worked bones) are not included.[19]

Taphonomy is to be kept in mind when interpreting the species variety and their relative importance. Various factors affect the resulted sample size and consistency. Firstly, the material represents most probably only a sample of the remains of animals or parts of them used and discarded at the site. Morphological and chemical properties of the soil and of the bones themselves affect the preservation of the bones or their fragments.[20] No sieve was used to recover possible small bones of mammals or bones of fish and birds. The use of a sieve has influence on the recovery rate of bone fragments, and can even lead to a shift in species variety and relative abundance, depending on mesh size.[21] However, the results of the soil sample analyses did not include remarks on additional bone fragments of any size.[22] Furthermore, the sample size as such affects the number of identified specimens (NISP) and the minimum number of individuals (MNI), with a decreasing NISP value as the sample size increases and a decreasing MNI as the NISP increases.[23] Thus, the MNI does not equal the original number of individuals present at the site and the NISP and MNI are both strongly dependent on the degree of fragmentation within the assemblage.

All bone fragments were dry cleaned of most sand with a brush, but not weighed because of residual sand and the resulting inaccuracy of the weighing method for analytic purposes. Morphological characteristics and measurements were applied in order to classify each specimen as precisely as possible to taxonomic level, anatomical element and/or part of element, side, age and gender.[24] Attention was paid to the recognition of pathologic alterations or signs of processing. Some of the bone pieces were joined into more recognizable fragments, increasing the overall identifiability and the accuracy for the determination of the MNI. Specimens identified only to the level of mammalian of origin were further categorized into the following size-classes: large-sized mammals include species similar in size to red deer and cattle, medium-sized species similar in size to sheep, canids and pigs, and small-sized, similar in size to such as hare or hedgehog. If these did not apply, the specimen was determined and counted as indeterminate.

Determination of the relative species composition of the material is based on NISP and MNI calculations. Both are widely used in zooarchaeological literature and presented either as raw values or percentages based on them. However, applying them as basis for inter-site comparisons should include caution since methods of recovery, levels of fragmentation and fragment identification, as well as approaches to calculate the NISP

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19 However, they are presented and discussed by Papayoannis, this volume.

20 At the site, the soil is mostly light clayish, brown and sandy with variable content of white limestone pebbles of different sizes eroded down from the Liminari hill (Forsén, this volume). For inter- and intra-taxonomix variability of bone density and its implications to taphonomic loss, see e.g. Ioannidou 2003.

21 See e.g. Payne 1972; Clason and Prummel 1977 or Shaffer and Sanchez 1994. Additionally, for the possible dietary importance of small mammals (Insectivora and Rodentia) and their underrepresentation in the faunal remains of archaeological contexts, see Stahl 1982.

22 B. Forsén, pers. comm.

23 See e.g. Grayson 1981.

24 For age estimation, the status of epiphyseal fusion for post-cranial bones as well as the dental eruption and wear stages were applied according to Silver 1969; Noddle 1974; Andrews 1982; Grant 1982; Grigson 1982; Payne 1985b; Rolett and Chiu 1994; Greenfield and Arnold 2008. Measurements were taken according to von den Driesch 1976. The osteometric results will be presented in a separate forthcoming study.

and MNI values vary. Unfortunately, the methodology used is not always clearly stated in literature. For the present study, the NISP and MNI values were counted as a single analytic unit consisting of all loci identified on the basis of stratigraphy as belonging to the EBA layer.[25] However, combining data from different spatial units decreases significantly the MNI value.[26] For the determination of the MNI value for each species the most abundant bone, its laterality, size, age and gender were taken into consideration when applicable.

The material was analyzed at its place of storage in the village of Gardiki. The taxonomic identification is based on experience, reference material consisting of comprehensive literature[27] and personal photo archives. Some uncertain specimens were measured and photographed for the purpose of consulting reference collections at other locations.[28]

Identified taxa and other results

The nature of the EBA faunal remains suggest that they are waste material from slaughter and food preparation, since they represent, largely, animals of taxa of economic significance (Figs. 3a-3b). The presence of some species may be regarded as intrusive (i.e. not of human impact). At least 13 species were identified (Figs. 3b-3d). The fragmentation degree was high. The majority of the fragments was unburned with only few specimens showing signs of predisposition to heat, becoming grey to white or covered with soot. Some fragments were poorly preserved, with their surfaces eroded, affecting the possibility to take reliable measurements when this otherwise would have been feasible. Puncture-like biting marks were identified on a few fragments suggesting they were disposed by feeding to dogs. The occurrence of epiphyses in the sample is low, reflecting their lesser resistance to taphonomic factors. Preserved whole bones represent teeth or bones from distal extremities with a short and compact structure: mostly phalanges and tarsal bones.

Of the total EBA sample, 28 pieces (0.79%) remained unidentified to animal class, genus, species and anatomical element (Fig. 3a). The majority of specimens were mammalian of origin (98.76%). However, of these were 1533 specimens (43.81%) assignable to the mammalian class only, without any further identification as to genus or species or anatomical position. For further 1644 fragments (46.98%) the determination as mammalian together with an anatomical identification was possible. For a subset of these a further subcategorization as deriving from a large-, middle- or small-sized mammalian was possible, and some allowed even additional identification as belonging to a cloven-hoofed animal (Artiodactyla) or even further to the suborder of ruminants (Ruminantia). The majority of these anatomically identified, but taxonomically further

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[25] For the loci of the EBA layer, see Forsén, this volume, especially Fig. 14.

[26] Casteel 1977, 126.

[27] Including e.g. Boessneck *et al.* 1964; Lemppenau 1964; Bosold 1966; Schmid 1972; Wolsan 1982; Gabler 1985; Payne 1985b; Prummel and Frisch 1986; Prummel 1987; Prummel 1988a; Prummel 1988b; Amorosi 1989; Lister 1996. Further, see Results.

[28] I wish to express my gratitude for the possibility to use the osteological reference collections of the Finnish Museum of Natural History in Helsinki and the Wiener Laboratory of the American School of Classical Studies at Athens.

	Including teeth (NISP)	Including teeth (%)	Excluding teeth (NISP)	Excluding teeth (%)
Mammalia	3499	98.76	3332	98.7
Aves	3	0.08	3	0.09
Reptilia	12	0.34	12	0.35
Amphibia	1	0.03	1	0.03
Pisces	0	0	0	0
Indeterminate	28	0.79	28	0.83
Total	3543	100	3376	100

Fig. 3a. The absolute amounts (NISP) and relative (%) proportions of the animal taxa identified.

	Including teeth (NISP)	Including teeth (%)	Excluding teeth (NISP)	Excluding teeth (%)
Bos	52	12.94	34	13.28
Sus	126	31.34	65	25.4
Ovis	14	3.48	10	3.91
Capra	14	3.48	14	5.47
Ovis/Capra	64	15.92	44	17.19
Capreolus	1	0.25	1	0.4
Canis sp.	8	1.99	7	2.73
Vulpes	4	1	4	1.56
Erinaceus	7	1.74	7	2.73
Lepus	4	1	4	1.56
Ruminantia	9	2.24	4	1.56
Megaruminantia	22	5.47	7	2.73
Mesoruminantia	77	19.15	55	21.48
Total	402	100	256	100

Fig. 3b. The absolute amounts (NISP) and relative (%) proportions of the identified mammalian genera and the suborder of ruminants.

	Including teeth (NISP)	Including teeth (%)	Excluding teeth (NISP)	Excluding teeth (%)	Loose teeth (NISP)	MNI
Bos	52	18.71	34	19.54	18	2
Sus	126	45.32	65	37.36	61	7
Ovis	14	5.04	10	5.75	4	1
Capra	14	5.04	14	8.04	0	2
Ovis/Capra	64	23.02	44	25.29	20	5
Canis sp.	8	2.87	7	4.02	1	1
Total	278	100	174	100	104	18

Fig. 3c. The absolute amounts (NISP) and relative (%) proportions of the identified domestic taxa.

	Including teeth (NISP)	Including teeth (%)	Excluding teeth (NISP)	Excluding teeth (%)	MNI
Capreolus	1	3.12	1	3.12	1
Vulpes	4	12.5	4	12.5	2
Erinaceus	7	21.88	7	21.88	2
Lepus	4	12.5	4	12.5	2
Aves	3	9.38	3	9.38	2
Reptilia	12	37.5	12	37.5	n.a.
Amphibia	1	3.12	1	3.12	1
Total	32	100	32	100	10

Fig. 3d. The absolute amounts (NISP) and relative (%) proportions of the identified wild taxa. N.a. = not analyzed

undifferentiable specimens represent fragments of ribs, long-bone diaphyses, vertebrae and the neurocranium.

Of the analyzed EBA faunal material only 310 fragments (8.75%) could be determined as to genus and/or species (Figs. 3c-3d). Of these, 89.68% are domestic and 10.32% wild (Fig. 8). The identified taxa are described in more detail in the following.

Cloven-hoofed animals

Cloven-hoofed animals (Artiodactyla) are present with remains of middle- and large-sized ruminants[29] and the genus pig (*Sus*). Not all fragments of the suborder of ruminants (Ruminantia) could be differentiated more accurately to the distinct genus of cattle (*Bos*), sheep (*Ovis*) or goat (*Capra*). However, in order to evaluate the relative importance of the ruminants compared to pig, the category of not further differentiable ruminants (Ruminantia) is included into the analysis and presentation of the results (Fig. 3b). Additionally, of the ruminants, special attention was also given to the identification of possible members of the family of cervids (Cervidae). Interestingly, of these only the genus *Capreolus* was identified.

Ovicaprids

The differentiation of sheep (*Ovis aries* L.) from goat (*Capra hircus* L.) can be difficult from fragmented material. However, there exist several distinctive bone and dental traits which differ morphologically between these species, providing more strength to the identification with increasing number of preserved features on a fragment.[30] The total amount (NISP) of the osteological remains identified as ovicaprid is 92 specimens (Fig. 3b). Of these, undifferentiable sheep or goat (*Ovis/Capra*) count 64 fragments (69.56%) and differentiated sheep and goat 14 specimens (15.22%) each. Altogether, the category of ovicaprids represents 33.09% of the identified domestic fauna (Figs. 3c and 7).

Sheep is identified with cranial (50%) and post-cranial (50%) elements. Of these, only one specimen originates in Trench A (7.14%), whereas 13 specimens (92.86%) were recovered from Area 2. The cranial elements include two fragments of a left caudal mandibula with standing M_3, a fragment of the neurocranium (pars basilaris) and four loose teeth (28.57%). The loose teeth are maxillar and mandibular first (25%), second (50%) and third (25%) molars. The post-cranial fragments represent an arcus with processus spinosus of a thoracic vertebra, a proximal right and left scapula, a right proximal ulna, a right radius diaphysis, a right pelvis and a proximal right femur. The anatomical distribution is suggestive for the processing of whole carcasses at the site (Fig. 4). Interestingly, no horn core fragments were present, which could be suggestive for their collecting for a defined purpose and processing elsewhere. They would have been useful to define the gender of the animals used at the site. Additionally, the preserved right pelvic

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[29] Even though sheep and goat are small ruminants they are here categorized as middle-sized ruminants (Mesoruminantia) based on their size as middle-sized mammalia. Ruminants of the size of cattle or red deer are categorized as large-sized ruminants (Megaruminantia).

[30] See e.g. Boessneck *et al.* 1964; Boessneck 1969; Payne 1985b; Pohlmeyer 1985; Gabler 1985; Prummel and Frisch 1986; Halstead and Collins 2002; Zeder and Lapham 2010; Zeder and Pilaar 2010; Gillis *et al.* 2011. For sexual dimorphism in sheep and goat, see e.g. Boessneck *et al.* 1964; Lemppenau 1964; Prummel and Frisch 1986.

Anatomical region	Head	Vertebral column and thorax	Upper front extremities	Upper hind extremities	Lower extremities	Total	MNI
Proportion of meat	Low	Quite much	Much	Much	Least		
Ovis, incl. teeth, NISP (%)	7 (50)	1 (7.14)	4 (28.57)	2 (14.29)		14 (100)	1
Ovis, excl. teeth, NISP (%)	3 (30)	1 (10)	4 (40)	2 (20)		10 (100)	
Capra, incl. teeth, NISP (%)	5 (35.72)		1 (7.14)	7 (50)	1 (7.14)	14 (100)	2
Capra, excl. teeth, NISP (%)	5 (35.72)		1 (7.14)	7 (50)	1 (7.14)	14 (100)	
Ovis/*Capra*, incl. teeth, NISP (%)	29 (45.31)	2 (3.13)	16 (25)	12 (18.75)	5 (7.81)	64 (100)	5
Ovis/*Capra*, excl. teeth, NISP (%)	9 (20.46)	2 (4.55)	16 (36.36)	12 (27.27)	5 (11.36)	44 (100)	
Sus, incl. teeth, NISP (%)	86 (68.25)	8 (6.35)	16 (12.70)	3 (2.38)	13 (10.32)	126 (100)	7
Sus, excl. teeth, NISP (%)	25 (38.46)	8 (12.3)	16 (24.62)	3 (4.62)	13 (20)	65 (100)	
Bos, incl. teeth, NISP (%)	28 (53.85)	3 (5.77)	5 (9.61)	2 (3.85)	14 (26.92)	52 (100)	2
*B*os, excl. teeth, NISP (%)	10 (29.41)	3 (8.82)	5 (14.71)	2 (5.88)	14 (41.18)	34 (100)	
Capreolus, incl. teeth, NISP (%)					1 (100)	1 (100)	1
Capreolus, excl. teeth, NISP (%)					1 (100)	1 (100)	
Lepus, incl. teeth, NISP (%)			3 (75)		1 (25)	4 (100)	2
Lepus, excl. teeth, NISP (%)			3 (75)		1 (25)	4 (100)	
Vulpes, incl. teeth, NISP (%)	1 (25)		2 (50)	1 (25)		4 (100)	2
Vulpes, excl. teeth, NISP (%)	1 (25)		2 (50)	1 (25)		4 (100)	
Erinaceus, incl. teeth, NISP (%)	1 (14.29)		5 (71.42)	1 (14.29)		7 (100)	2
Erinaceus, excl. teeth, NISP (%)	1 (14.29)		5 (71.42)	1 (14.29)		7 (100)	
Canis sp., incl. teeth, NISP (%)	4 (50)		1 (12.5)		3 (37.5)	8 (100)	1
Canis sp., excluding teeth, NISP (%)	3 (42.86)		1 (14.28)		3 (42.86)	7 (100)	

Fig. 4. The absolute amounts (NISP) and relative (%) proportions of the anatomical elements based on body region for the identified mammalian species at EBA Goutsoura.

fragment represents only a small part of the acetabulum together with a short section of the ischium, and hence does not either allow the distinction of sex. Age estimation is based on dental and epiphyseal fusion data.[31] All elements may derive from a single

[31] Silver 1969; Schmid 1972, table IX; Payne 1973; Grant 1982; Greenfield and Arnold 2008. For goat, see also Noddle 1974.

individual over 3-years-of-age. Thus, the MNI for sheep is one adult (Figs. 3c and 4). The available osteometric data was not suitable for a reliable evaluation of size. Sheep is present in all the faunal comparanda assemblages investigated for this article.[32]

Goat is represented by cranial (35.71%) and post-cranial (64.29%) elements. All derive from Area 2. The cranial elements include the following mandibulae segments: right rostral part with standing P_2, left corpus with standing M_1 and M_2, left corpus with standing dP_2-dP_4 and M_1-M_2, as well as left corpus fragment with standing P_2-P_4. No loose teeth were identifiable as goat. The post-cranial fragments derive from a distal left humerus, a proximal left metacarpus, a proximal left tibia, a distal right tibia and right pelvis. Whole carcass utilization is indicated also for goat (Fig. 4). As with sheep, there were no horn cores of goat either, but the pelvic fragments are suggestive for male. The dental eruption and wear data together with the available epiphyseal fusion data are suggestive for a MNI of two: a young and an adult individual each (Figs. 3c and 4). Goat is identified in all investigated comparanda material.[33]

The further undifferentiable category of sheep or goat (*Ovis/Capra*) consists of a total of 64 specimens. Of these 13 (20.31%) were identified as possibly sheep (*Ovis*?) and 14 (21.88%) as possibly goat (*Capra*?). The remaining 37 (57.81%) fragments were further indistinguishable. The fragments include cranial (45.31%) and post-cranial (54.69%) elements. Of these four (6.25%) originate in Trench A, three (4.69%) in Trench D and 57 (89.06%) in Area 2. Cranial elements include mandibular fragments and loose teeth. The loose teeth originate from both the upper and lower jaws, and represent 31.25% of the identified total count or 68.97% of the identified cranial elements. Post-cranial elements represent all major body parts suggesting the processing of whole carcasses (Fig. 4). As with the categories of sheep and goat, this sample did not include horn core fragments and the identified pelvic fragments allowed no distinction of gender either. Age estimation based on dental eruption and wear as well as epiphyseal fusion suggest the presence of at least one juvenile (under 10-months-of-age; unfused distal humerus epiphysis) and two subadult and two adult individuals (MNI 5) (Figs. 3c and 4).

Cattle

For cattle (*Bos*), the differentiation from red deer (*Cervus elaphus* L.) and the distinction between the wild (*aurochs, Bos primigenius* Boj.) and domesticated forms (*Bos taurus* L.) may be challenging if the material is poorly preserved. For the differentiation there exist several publications and an indication of origin is given by differences in size and robusticity: red deer bones are more slender with stronger muscle attachment sites than domestic cattle, and aurochs is larger with more prominent muscle attachment sites than red deer or domestic cattle.[34] For undifferentiable specimens the categorization as large-sized ruminant (Megaruminantia) was applied. Aurochs represents only a minor part of

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[32] Boessneck 1962, tables 1 and 6; Amberger 1979, 52, 59, 62-63, 70-71, 148, tables 12, 15; Hinz 1979, 107, tables 21 and 22; Becker 1991, 20-22, fig. 30, tables 2 and 5-6; Douzougli and Zachos 2002, 138; Halstead, pers. comm.

[33] Boessneck 1962, tables 1 and 6; Amberger 1979, 52, 59, 62-63, 70-71, 148, tables 12, 15; Hinz 1979, 107, tables 21 and 22; Becker 1991, 20-22, fig. 30, tables 2 and 5-6; Douzougli and Zachos 2002, 138; Halstead, pers. comm.

[34] Lemppenau 1964; Bosold 1966; Schmid 1972; Bökönyi 1974, 106-107; Bökönyi 1986, 71-72; Prummel 1988b; Lister 1996.

the otherwise highly varying total frequency of identified cattle remains at Greek EBA sites.[35] Both, auroch and domestic cattle have been identified at the comparanda sites of Argissa Magula, Pevkakia Magula and Platia Magoula Zarkou.[36] Cattle is present also at Final Neolithic/EBA Doliana.[37] Especially during the early phases of domestication man possibly continued to capture young aurochs individuals for the purpose of breeding with the result of *transitional forms* as shown by osteometric data.[38] Therefore, the identified bones of aurochs in EBA assemblages with an adult age-at-death suggest either the utilization of individuals hunted and killed at the indicated age-at-death, or individuals captured as young and reared until culling at the indicated age-at-death.[39]

In the faunal material of EBA Goutsoura a total of 52 specimens were identified as *Bos*. That is 18.71% of the identified domestic species. Of these, 11 specimens derive from Trenches A (3.85%; 2/52) and D (17.30%; 9/52) and 41 from Area 2 (78.85%; 41/52). Cranial (53.85%; including loose teeth) and post-cranial (46.15%) elements are present (Fig. 4). Cranial elements include fragments of the left praemaxilla, left and right zygomatic processus, left maxilla with standing M^1-M^3, right rostral mandibula with standing P_2, left mandibula and the hyoid bone. Loose teeth or fragments of them include incisor (44.44%; 8/18), premolar (22.22%; 4/18) and molar (33.33%; 6/18) teeth. The cheek teeth originate from both the upper and lower jaws. Identified post-cranial elements include fragments of ribs, left humerus diaphysis, proximal left radius, proximal right ulna, a right carpi accessorium, metapodial fragments, cranial ramus of the left os pubis, right tibial diaphysis, left astragalus as well as first, second and third phalanges. The anatomical distribution indicates whole carcass processing at the site (Fig. 4). As with the ovicaprid remains, no cattle horn cores were present either. This would strengthen the assumption that horn cores were collected for a defined purpose and processed elsewhere. The horn cores would have been suitable for sexing cattle, as are metapodials and the pelvis too.[40] Unfortunately, the Goutsoura sample contained neither horn cores nor applicable pelvic or metapodial fragments for this purpose. Preserved long bones were fragmentary, allowing only a limited set of osteometric measurements. They indicate the presence of domesticated cattle only and are suggestive for female.[41] Based on the post-cranial elements, partial dentitions and loose teeth the MNI is two, with one subadult and one young adult individual each (Figs. 3c and 4).[42] Furthermore, the Goutsoura material includes five additional fragments identified as large-sized ruminant (Megaruminantia)

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[35] Aurochs is still present also in later bone assemblages, as shown for example in the material of second century BC Messene (Nobis 1994, 302).

[36] Boessneck 1962, 40-42, tables 1, 6, 15, 17; Amberger 1979, 23, 25-32, 48, 141, tables 1, 4-5, 10; Hinz 1979, 107, 111, tables 1, 21 and 22; Becker 1991, 22-25, tables 2, 7.

[37] Douzougli and Zachos 2002, 138; Halstead, pers. comm.

[38] Boessneck 1962, 30-31; Bökönyi 1974, 111-112; Bökönyi 1986, 63, 72.

[39] See e.g. Reichstein 1979, 245; Halstead 1987. Interestingly, at many Greek Bronze Age sites there still are concurrent identifications of wild and domestic forms of cattle and pig (e.g. Payne 1985a, 219). Unlike cattle and pig, sheep and goat had no indigenous ancestors on mainland Greece (e.g. Bökönyi 1973, 166).

[40] See e.g. Armitage and Clutton-Brock 1976; Grigson 1982; Thomas 1988; Berteaux and Guintard 1995; Davis 2000; Sykes and Symmons 2007; Telldahl *et al.* 2012.

[41] Based on comparison with previously published data in Boessneck (1962, 80-85); Amberger (1979, tables 8, 9 and 11); Bökönyi (1986, appendix C table 5.25); von den Driesch and Boessneck (1990, tables 32-33); Becker (1991, table VI) and Yannouli (1994, table 6.18).

[42] Silver 1969, tables A and D; Schmid 1972, table IX; Grigson 1982, appendices 2-4. See also Andrews 1982.

which may originate from cattle (*Bos*?). These comprise metacarpal, mandibular, pelvic as well as first phalanx fragments.

Deer

Greek Bronze Age faunal assemblages have shown the presence of three species of deer: red deer (*Cervus elaphus* L.), fallow deer (*Dama dama* L.) and roe deer (*Capreolus capreolus* L.), with red deer being usually the most numerous. Interestingly, only roe deer was identified at Goutsoura, and even then only by one third phalanx (Fig. 5) from Area 2 (Figs. 3b, 4). It represents 3.12% of the total NISP of wild species and the MNI is one (Figs. 3d and 4). Similar species have been excluded morphologically and metrically.[43] Roe deer has previously been identified at the EBA comparanda sites of Pevkakia Magula, Platia Magula Zarkou and Final Neolithic/EBA Doliana.[44]

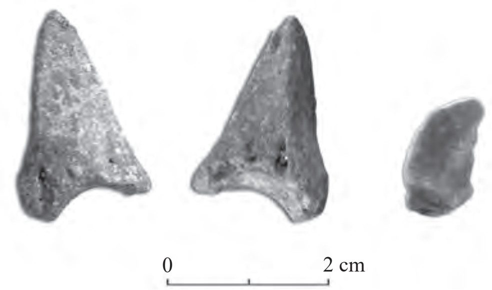

Fig. 5. Third phalanx of a roe deer (*Capreolus capreolus* L.) from Area 2, Square 503/508, Locus 5. Abaxial view (left), axial view (middle) and view of proximal articular face (right).

Pigs

Wild boar (*Sus scrofa ferus* L.) is still present in many parts of mainland Greece and a native process of domestication is accepted to have taken place as early as the Pre-Pottery Neolithic in some regions.[45] Interestingly, several Bronze Age faunal reports include concurrent identifications of wild and domesticated (*Sus scrofa domesticus* L.) pig together with *transitional individuals* which fall in-between in the osteometric scattergrams.[46] This suggests a continuation of the process of pig domestication during the Bronze Age. However, the nature of the wild and transitional pigs in these assemblages can be interpreted in different ways. Either the wild pigs represent the remains of individuals hunted, for example, for the purpose of obtaining specific products (e.g. tusks, meat and leather) or they were captured with the intention to be tamed[47] and introduce new genetic material into the existing domesticated pig population, which could be reflected in the presence of the transitional forms. These are mutually not excluding possibilities and the age at death of the wild individual does not necessarily equal the age at the time of capture. The transitional individuals can also be the result of unintentional inter-breeding

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[43] See e.g. Bosold 1966.

[44] Amberger 1979, 133-134, table 1; Reichstein 1979, 243, 246-247; Bökönyi 1986, 92, tables 5.2a-5.2b; Becker 1991, 27-28, table 2; Yannouli 1994, table 4.1; Douzougli and Zachos 2002, 138; Greenfield and Fowler 2005, 27, 96-97; Reese 2013a, 457; Halstead, pers. comm.

[45] E.g. at Sitagroi (Bökönyi 1986, 81). See also Bökönyi 1974, 208.

[46] See e.g. Bökönyi 1986, 81, 83, figs. 5.14-5.17.

[47] See e.g. Bökönyi 1974, 205 and 207.

facilitated by an extensive management system (i.e. free-ranging in the woodland)[48] and the remains of the wild pigs represent those killed to prevent this from happening.

Altogether, the distinction of the three pig forms may be difficult from fragmentary material. Cranial features such as the size of the lacrymal bone, the length of the lower third molar and the boars tusk are most suitable for the purpose. However, caution should be applied with reliance on post-cranial features and measurements, since several factors (e.g. genetics, gender, nutrition and temperature) may affect the size of an individual leading to overlapping osteometric results of the different genders (female, male, castrated) between wild and domestic animals from different areas and periods of time. For the comparanda sites investigated here, concurrent identifications of wild and domestic pig have been made at EBA Argissa Magula, Pevkakia Magula and Platia Magula Zarkou as well as Final Neolithic/EBA Doliana.[49]

At Goutsoura the genus pig (*Sus*) is represented by 126 specimens, comprising 45.32% of the domestic species NISP. Of these, the majority (97.62%; 123/126) originates in Area 2, with only three (2.38%; 3/126) deriving from Trench D. About half (48.41%) of the positive identifications consist of loose teeth or fragments of them from both (Figs. 3c and 4), the upper and lower jaw, with incisivi being the most abundant (62.30%; 38/61), followed by canini (14.75%; 9/61) and molars (14.75%; 9/61), premolars (4.92%; 3/61) as well as further undifferentiable cheek tooth (3.28%; 2/61). The remaining specimens consist of cranial (38.46%) and post-cranial (61.54%) elements. The cranial elements include fragments from the viscerocranium (os nasale, maxilla, mandibula). The post-cranial fragments represent the spinal column (thoracal vertebrae), front and hind limbs (scapula, humerus, ulna, tibia, calcaneus, metapodia and phalanges) as well as the pelvis. The anatomical distribution indicates the processing of whole carcasses (Fig. 4). Age estimation is based on dental data and epiphyseal fusion.[50] Unfortunately, the preservation status was low with fusion data available only for an unfused distal right humerus (under 1.0-1.5-years-of-age), a fused right acetabulum (over 1-years-of-age), a fused distal right tibia (over 2-years-of-age) and an unfused proximal right calcaneus (under 2.0-2.5-years-of-age). Additionally, a fetal individual is identified by a left proximal ulnar fragment.[51] Therefore, the presence of at least three individuals is indicated by the post-cranial elements: one fetal, one immature-subadult and one adult. However, based on the most frequent post-cranial element (proximal left ulna) there would be four individuals.

Dental data is provided by partial dentitions and loose teeth only. Age estimates based on single teeth and partial dentitions should be regarded with caution, since for example aberrations in the dentition can lead to abnormal dental wear. The partial dentitions include a maxillar fragment with standing I^3, a maxillar fragment with standing P^{2-4}, a maxillar fragment with standing dP^3, a mandibular fragment with standing P_{3-4}, a mandibular fragment with standing M_1, and a mandibular fragment with standing dP_4. The MNI based on partial dentitions would be one immature-subadult, one subadult and one subadult-young adult. The loose teeth provide us with some additional information on the

48 See e.g. Bökönyi 1974, 211-212.

49 Boessneck 1962, 35-37, 47-48, tables 1, 6, 8, 10, 15 and 19; Amberger 1979, 141; Hinz 1979, 24, 27, 64-65, tables 4-5, 11; Becker 1991, 24-25, 28, tables 2, 8, 10; Douzougli and Zachos 2002, 138; Halstead, pers. comm.

50 Silver 1969, table A; Schmid 1972, table IX; Bull and Payne 1982; Grant 1982; Rolett and Chiu 1994; Wright *et al.* 2014.

51 Amorosi 1989, 231.

age distribution of this sample. Habermehl describes the root morphology of mandibular first and second incisivi to be age-dependent.[52] In some of the sample specimens the root tip is preserved and enables us to estimate the age of these individuals. It is possible to identify individuals of the estimated age of 2-3 years, 7-9 years and over 10 years, one adult individual each category. The sample contains also one M_2 germ indicating the presence of a subadult individual. Unfortunately, the fragmentary status of the recovered male mandibular canini does not allow the usage of the Brandt-formula for the calculation and estimation of age.[53] Their remaining length varies from 20 mm to 48 mm. Their original length is difficult to assess from broken material. The measurements are not indicative for the absence of wild boar. The lack of adequate third molars makes the situation even more intriguing, but unfortunate. Measurements of post-cranial elements are scarce due to their preservation status. Based on published metrical values,[54] the above named fused distal tibia fragment indicates the presence of domesticated pig.

Thus, the fragmentary state of the recovered material allows no definite exclusion of the usage of the wild form of pig at the site. The available tibial measurement derives from an adult domestic pig. The preserved canini fragments are inconclusive in regard to the differentiation of wild from domesticated individuals. However, they indicate the presence of at least one adult male. The available data suggests a total MNI of 7, comprising one foetus, one immature-subadult, one subadult, one young adult and three mature adults. Furthermore, there are 13 additional fragments identified as possibly pig (*Sus*?) of origin. They comprise neurocranial, maxillar, dental, scapular, radial and ulnar and pelvic specimens.

Canids

The category of canids (Canidae) includes domestic dog (*Canis familiaris* L.), wolf (*Canis lupus* L.) and red fox (*Vulpes vulpes* L.). The distinction is based on morphology and osteometry. However, dog may be difficult to discern from wolf if the material is fragmentary and the specimens lack suitable features. Thus, remains of dog and red fox are frequently identified at EBA sites, but wolf is more seldom with previous positive identifications at e.g. Lerna, Pevkakia Magula and Sitagroi.[55] This scarce occurrence of wolf is not directly indicative of its rarity during EBA in Greece, but rather explained by its underrepresentation in the zooarcheological samples due to lack of affirmed positive distinction from domestic dog and its lesser likelihood to end-up in the faunal sample of a site. It has been suggested from cutting marks on osteological remains, that dog was also consumed for food in Greece before it attained a special status as human companion during the LBA as indicated by their remains in human burials.[56]

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[52] Habermehl 1985, 105.

[53] As presented by Habermehl 1985, 103.

[54] See e.g. Bökönyi 1986, table 5.28 (Measurements for tibia) in appendix C; Becker 1991, table VII (Tibia); Greenfield and Fowler 2005, appendix 4C.15 Tibia.

[55] Amberger 1979, table 1; Bökönyi 1986, tables 5.2a-5.2b; Reese 2013b, 300-301. For further prehistoric identifications of non-domestic canids see Yannouli 2003.

[56] Day 1984. Day also notes that the custom of burying dogs with humans was practiced already during the EBA and MBA on Cyprus as well as by the LBA among the Hittites.

In the fragmentary Goutsoura material differentiation of domestic dog from wolf posed a problem. Based on morphology none of the fragments can definitely be identified as domestic dog or wolf, but based on size dog is represented at least by two fragments of a left maxilla with standing M^1-M^2 and tooth sockets for P^1-P^4.[57] However, there are six further specimens determined as *Canis sp*. (i.e. domestic dog or wolf) (Fig. 3b). These include a rostral fragment of the right mandibula of a young adult (as indicated by tooth sockets), one lower left caninus fragment, one proximal left ulnar fragment, one right calcaneus, one fused distal metapodial fragment as well as one fused first phalanx (Figs. 3c and 4). All specimens can derive from one individual only. Thus, the canid remains include most probably at least one young adult (MNI 1) domestic dog as indicated by the permanent dentition and its osteometry. All specimens except one (left lower caninus; Trench D) derive from Area 2. Of the used comparanda sites, domestic dog remains have been reported from Argissa Magula, Pevkakia Magula, Platia Magula Zarkou and Doliana.[58] Of these, cutting marks have been reported on the remains from Pevkakia Magula.[59]

Red fox is present only in the material from Area 2, consisting of four fragments representing 12.5% of the identified wild species and one possible specimen (Figs. 3b and 3d). The remains comprise one fragment of the caudal left maxilla with permanent, but not worn, P^3 and P^4, one proximal diaphysis fragment of the right femur with unfused and missing epiphysis and two diaphyseal fragments of a right radius (Fig. 4). The proximal femur fuses prior dental change.[60] For the radius fragments no age estimate is possible. The possible fox specimen is a fragment of the left pelvis. The fox remains represent at least two individuals (MNI 2): one young adult and one juvenile. Of the investigated comparanda sites fox has been previously identified at Platia Magula Zarkou and Pevkakia Magula.[61]

Additionally, there exist two dental fragments and one fragment of a short-bone diaphysis which were determinable as Canidae (i.e. red fox, domestic dog or wolf) of origin. None of the described Goutsoura canid specimen shows any cut marks, and hence, there is no indication of their possible use for food despite their occurrence amongst other food debris.

Other mammalia

The hedgehog (*Erinaceus europaeus* L.) is counted by seven specimens and one possible fragment. It represents 21.88% of the identified wild species (Figs. 3b-3c). All derive from Area 2. The best preserved specimens are a left femur of a young individual as indicated by the caput in fusion and missing unfused distal epiphysis (Fig. 6) and two distal fragments of right humeri. One of these humeri has a fused epiphysis. However,

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57 In wolves, the P^4 is longer than the combined length of M^1 and M^2 (Bökönyi 1974, 314). Unfortunately, in this specific specimen the P^4 is missing, but its approximate length, as indicated by the tooth socket, is equal or less than the total length of M^1+M^2.

58 Boessneck 1962, 49, tables 1, 6, 8; Hinz 1979, 48-56, table 1; Becker 1991, 25, table 2; Douzougli and Zachos 2002, 138; Halstead, pers. comm.

59 Hinz 1979, 56. No signs of cutting were identified at Platia Magula Zarkou (Becker 1991, 25).

60 Habermehl 1985, 112-116.

61 Boessneck 1962, table 1; Hinz 1979, 71-73, table 13; Becker 1991, 28-29, table 11.

without both epiphyses it is difficult to determine the accurate age category. The remaining specimens consist of a left ulna corpus, a right proximal ulna, a corpus of radius and a caudal right mandibular fragment (Fig. 4). The MNI would therefore be two (Fig. 3d). The uncertain identification could be an additional corpus fragment of radius. Hedgehog has previously been identified at such EBA sites as Sitagroi, Skala Sotiros and Lerna, but not in the corresponding layers of the comparanda sites.[62] The Lerna example has shown cut marks indicating human processing. Several authors suggest that in the majority of cases the species should be regarded as intrusive (i.e. not by human impact) to the faunal assemblages.[63]

Fig. 6. Left femur of a hedgehog (*Erinaceus europaeus* L.) from Area 2, Square 501/507, Locus 6. Distal epiphysis unfused and missing. Cranial view (left) and caudal view (right).

The brown hare (*Lepus europaeus* Pall.) is present with four fragments, thus representing 12.50% of the identified wild fauna (Fig. 3b). All originate in Area 2. Bones of the front extremities are in majority, with one distal right humerus and two left ulnar fragments. Additionally, a fused distal metacarpal or -tarsal bone is present (Fig. 4). The MNI would therefore be two (Figs. 3d and 4). Data on age estimation in the brown hare based on skeletal elements is scarce. The distal epiphysis of the humerus fuses prior the proximal one,[64] therefore the individual indicated by the fused distal humerus can be subadult or adult. Hare is regularly identified in Greek archaeological wild faunal assemblages, including the investigated comparanda of Pevkakia Magula and Platia Magula Zarkou as well as Doliana.[65]

Birds and fish

The bones of birds (*Aves*) and fish (*Pisces*) are less likely to preserve and be recovered in archaeological assemblages, due to their smaller size and fragility. The used recovery methodology at Goutsoura is biased against smaller remains since no sieving was applied. This may explain why no remains of fish were found in the bone assemblage of the site (Fig. 3a). However, the find of a fishhook strongly suggests that the diet was supplemented at least occasionally by fish. Fish remains have been identified at the EBA comparanda site of Pevkakia Magula.[66]

Bird remains are also underrepresented. In the material only two fourth phalanges of predatory birds and one fragment of a long-bone diaphysis were identified as bird. All

[62] Bökönyi 1986, 94-95, tables 5.2a -5.2b; Yannouli 1994, 159; Reese 2013a, 460; Reese 2013b, 300-301.
[63] See e.g. Bökönyi 1986, 95; von den Driesch and Boessneck 1990, 112.
[64] Habermehl 1985, 107-110.
[65] Boessneck 1962, table 1; Hinz 1979, 82-84, table 16; Becker 1991, 29; Douzougli and Zachos 2002, 138; Halstead, pers comm. In some publications *Lepus capensis* Linnaeus 1758 is used.
[66] Boessneck 1962, table 1; Amberger 1979, 142, table 1; Hinz 1979, 99-103.

derive from Area 2 and they represent 9.38% of the identified wild species (Figs. 3a and 3d). The recovered phalanges from Goutsoura are of different size and morphologically distinct, indicating the presence of at least two individuals (MNI 2). The morphological traits suggest the presence of tawny owl (*Strix aluco* L.) and white-tailed sea eagle (*Haliaeetus albicilla* L.). Otherwise, birds are quite frequently represented in EBA faunal remains, reflecting both, the local environment (i.e. species variety) and human dietary and/or handicraft preferences (i.e. species suitable for food/artefact manufacture).[67]

Reptilia and amphibia

The total NISP of reptile and amphibian specimens is 13 (Fig. 3a), consisting of tortoises and/or turtles, as well as frog or toad. The order Testudines (i.e. tortoises or turtles) is represented by 12 fragments (37.5%) of the identified wild species. A whole skeleton or articulated elements would indicate the intrusive character of a winter hibernating individual. The identified specimens are fragments of the carapace and plastron only. They wear no signs of human processing. They derive from Trench A (two plastron fragments) and Area 2 (carapace and plastron fragments). Identification to species was not possible due to fragmentation and lack of adequate comparative material. However, Hermann's tortoise (*Testudo hermanni* Gmel.) has been identified at contemporary layers in Pevkakia Magula and Platia Magula Zarkou, and Caspian turtle (*Mauremys caspica* Gmel.) at Argissa Magula and Platia Magula Zarkou.[68] The European pond turtle (*Emys orbicularis* L.) is present at Magula Pevkakia and Platia Magula Zarkou.[69] Other possible taxons are the Greek tortoise (*Testudo graeca* L.) and the marginated tortoise (*Testudo marginata* Schoepf), the latter of which is present at least at Tiryns.[70]

The material from EBA Goutsoura includes also one fragment of the left ilium of a frog/toad from Area 2 (Fig. 3d), thus representing 3.13% of identified wild species. Frog/toad is also identified by Gejvall in EBA Lerna (Lerna III-IV), but remained unpublished, as well as at Thermi with some bones of the extremities.[71] The Goutsoura specimen does not show any cut marks and an intrusive origin (i.e. non-human) is not excluded.

Pathologies

No pathologies were identified. This may be the result of the overall state of fragmentation of the bone sample, residual soil attaching to the bones with obscuring minor changes, or be suggestive of a healthy population of domestic animals and the exploitation of healthy

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[67] See e.g. Lerna (Reese 2013a, 460; Reese 2013b, 301-302), Pevkakia Magula (Amberger 1979, 142, table 1; Hinz 1979, 88-94), Platia Magula Zarkou (Becker 1991, 30-31, table 14), Sitagroi (Bökönyi 1986, tables 5.2a-5.2b), Tiryns (von den Driesch and Boessneck 1990, 114-116, table 13). No bird remains were identified at Argissa Magula (Boessneck 1962, table 1).

[68] Boessneck 1962, 7, tables 1 and 6; Hinz 1979, 95-96, table 19; Becker 1991, 31, table 15. It should be noted, that identification of *Clemmys caspica* at Argissa Magula is based on *most probable possibility* and not by indentification *per se*, as already stated by Boessneck 1962, 37.

[69] Hinz 1979, 95-96, table 19; Becker 1991, 31. The site listing in this chapter is not exhaustive.

[70] von den Driesch and Boessneck 1990, 116-117, table 14.

[71] Lamb 1936, 216; Reese 2013a, 460; Reese 2013b, 301.

wild specimens. Animals with clinical signs of disease and/or traumata could have been deposited outside the settlement, since they would not have been used or used only partly for food purpose. In these cases the altered parts would not be present in the sample collected during excavation.

Discussion

A subsistence strongly based on domesticated animals (89.68%) is identified at EBA Goutsoura, with pig and ovicaprids the most abundant, followed by cattle and dog (Figs. 3b-3c and 7). Wild fauna represent with 10.32% only a minor part of the identified species, indicating a supplementary function in the economy and include both, dietary suitable and fur-bearing species (Figs. 3b, 3d and 8). Of birds and fish, only bird remains were identified, but a fishhook is suggestive for the exploitation also of aquatic resources at least occasionally. An intrusive character of the reptilian and amphibian individuals as well as the hedgehog remains cannot be excluded.

The nature of the practiced animal-based subsistence, and the pattern of animal husbandry in particular, is identified through the relative species frequency as well as age and sex distribution of the identified animal individuals. Increasing sample size raises the accuracy of conclusions. At EBA Goutsoura the state of preservation of the sample posed limitations for the evaluation of the named characteristics. Considering the relative importance of the identified domestic species, their position varies according to whether loose teeth are included into the calculations or not (Fig. 3c). If these are included, pig is the most important with 45.32% of all identified domestic species followed by ovicaprids with 33.09% and cattle with 18.71%. If the loose teeth are excluded from the calculations, ovicaprids represent the majority (39.08%), with pig close-by (37.36%) and cattle remaining on third place (19.54%).[72] Despite the fact that teeth are more resistant to degradation than bone, faunal reports rarely discuss the effect of loose teeth on the relative distribution of species if NISP is used as basis for calculations and interpretations.

Inter-site comparison is usually based on NISP of the total count of identified specimens of a species. Unfortunately, early reports represent mostly only a list of species identified in the sample with occasional remarks on their frequencies or relative abundance. The inter-site comparison of the relative importance of the respective species here is based on the available NISPs for Argissa Magula, Pevkakia Magula and Platia Magula Zarkou, but on Minimum Number of Anatomical Units for Doliana which poses some limitations for direct comparison and evaluation (Figs. 7 and 8). According to these, the inhabitants of all comparanda sites (i.e. Argissa Magula, Pevkakia Magula, Platia Magula Zarkou and Doliana) relied on a subsistence based on animal husbandry with a supplementation by wild fauna (Fig. 8). All major domesticates (i.e. pig, ovicaprids and cattle) are present at each, but in varying frequencies, suggesting three exploitation patterns of domestic animals during the EBA based on the identified main species with emphasis on either pig, ovicaprids or cattle (Fig. 7).

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[72] The importance of ruminants in the Goutsoura subsistence, whether domesticated or wild, is additionally reflected in the NISP of the further undifferentiable categories of Ruminantia, Megaruminantia and Mesoruminantia as shown in Fig. 3b.

Of the investigated faunal assemblages, Goutsoura is the only one with pig dominating over ovicaprids followed by cattle. At Pevkakia Magula and Platia Magula Zarkou ovicaprids dominate, whereas cattle at Argissa Magula and Doliana.[73] However, if we consider also other EBA faunal assemblages, there is similarity of the Goutsoura material to the relative domesticate frequencies at e.g. Helike (Achaea) and Pentapolis (Macedonia), with the difference that Helike has additionally an identification of horse/equid (Fig. 7).[74] Thus, it seems appropriate to include these sites into the discussion. Data on the age distribution of pig at Goutsoura, Helike and Pentapolis is available with suggesting local rearing and consuming, and additionally a possible provisioning of other sites as put forward at least for Helike and Pentapolis.[75] The usage of pig as primary meat source implies for the presence of ovicaprids and cattle a possibility for emphasis on their secondary products, but with continuation of their primary products exploitation as suggested by young individuals in the assemblages. Younger individuals may also have been purposefully culled as part of the herd strategy in order to prevent or minimize a possible shortage of feed during the winter season.

Ovicaprids represent at Goutsoura the second most important domestic species with an equal amount of identified specimens (NISP) of sheep and goat, but with goat remains more abundant than sheep if MNI values are compared (Figs. 3c and 7). Of sheep, the remains of an adult individual were identified, and of goat those from one young and one adult individual each. The further undifferentiable ovicaprid remains consisted of five additional individuals comprising also the age categories of juvenile and subadult. The presence of these younger individuals indicates the exploitation of ovicaprids for primary products alongside secondary use. If considering secondary products, goat produces more milk than sheep and the wool of sheep is of better quality, thus explaining the presence of both species. The presence of adult animals is suggestive for the exploitation of secondary products such as wool and milk[76] additionally to their use for the maintenance of the population by local breeding. Local breeding and consumption is also indicated by the presence of younger age categories. The birth of offspring is the prerequisite for producing milk. Ovicaprids at Helike comprise all age categories with adult individuals in majority, reflecting the situation at Goutsoura.[77] At Pentapolis sheep are more abundant than goats and the age distribution with rare adults and missing individuals under 12-months-of-age is suggestive for a primary use for meat production only.[78]

Cattle are represented at Goutsoura by at least a subadult and a young adult, suggesting their use for primary products. At Pentapolis the major culling occurred before

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[73] The Doliani faunal data given by Douzougli and Zachos 2002, 138, are not correct. The correct and more updated approximate percentages of MinAU are for cattle (*Bos taurus*) 38.8% instead of ca. 8%, for sheep (*Ovis aries*) 19.5% instead of ca. 33%, for goat (*Capra hircus*) 1.8% instead of ca. 3%, for sheep/goat (*Ovis/Capra*) 14.8% instead of none, for domestic pig (*Sus domesticus*) 12.0%, for dog (*Canis familiaris*) 3.9% instead of ca. 4%, for cat (*Felis sylvestris*) 0.2%, for hare (*Lepus europaeus*) 0.2%, for wild boar (*Sus scrofa*) 0.4%, for bear (*Ursus arctos*) 0.2%, for red deer (*Cervus elaphus*) 7.8% instead of ca. 8%, and for roe deer (*Capreolus capreolus*) 0.6% instead of ca. 1% (Halstead, pers. comm.).

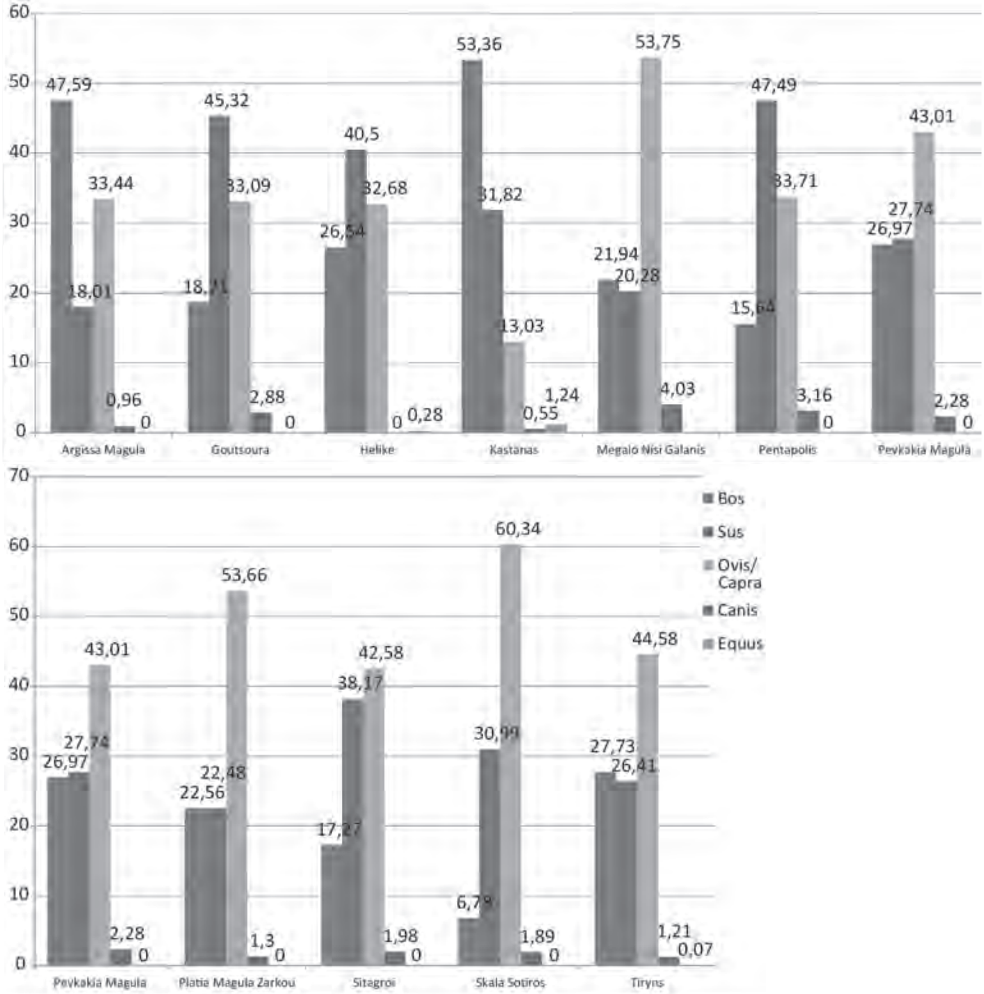
[74] Fillios 2006, 122, appendix table 1.

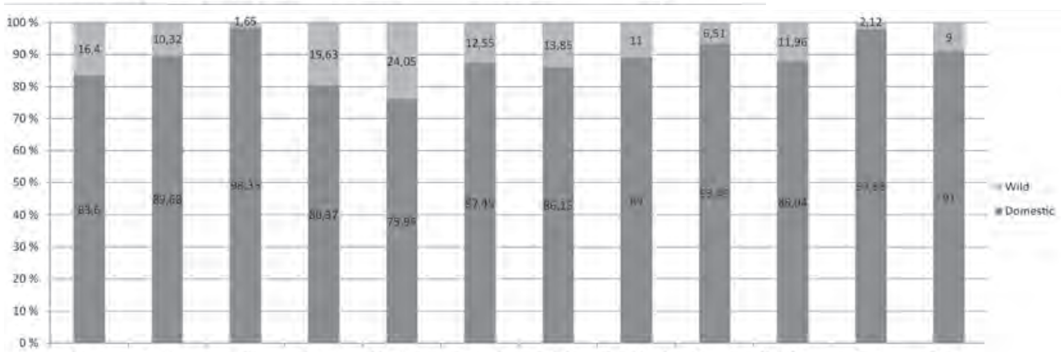
[75] Yannouli 1994, 206-207, 333; Fillios 2006, 130-132.

[76] The secondary product category "milk" includes also products made of milk, such as cheese, which would allow a longer storage time and easier transport.

[77] Fillios 2006, appendix table 10.

[78] Yannouli 1994, 187.





Figs.7 (above) and 8 (below). Relative frequencies of domestic species at EBA Goutsoura and comparanda sites presented as percentages. Calculations based on available NISP and for Doliana on MinAU. Values for Doliana are approximate. Fauna of Megalo Nisi Galanis represents material from the Late Neolithic and EBA, and that of Doliana from the Final Neolithic and EBA. For Platia Magula Zarkou shellfish are not included into the calculations of wild species in Fig. 8.

the age of 3.5-4.0 years and for a modest amount only there after. None were identified to be under 1-1.5-years-of-age.[79] For Helike a small amount was slaughtered at 1-2-years-of-age, with the majority being culled at over 2-years-of-age.[80]

Thus, for Goutsoura, Helike and Pentapolis a self-contained animal production economy based on pig is indicated with additional exploitation of domestic ruminants for both primary and secondary products. Furthermore, the results suggest, at least for Helike and Pentapolis, a possible provision of other sites with primary products of pig.[81] For Goutsoura we noted an absence of ovicaprid and cattle horn cores despite the presence of other cranial elements in the assemblage. However, these cranial elements did not include any fragments of the horn-bearing region of the skull which makes the evaluation for possible hornless forms of these species impossible. The absence of horn cores may also be due to the sample size or a purposeful collecting for manufacturing artefacts somewhere else, either at the site or outside it. Halstead and Fillios note that this kind of mixed composition of livestock provides additionally to the broad product variety a buffer to minimize the risks of adverse natural forces.[82] This kind of risk increases with production specialization based on one or a maximum of two species of livestock only. Halstead and Fillios also note that a husbandry pattern based on mixed livestock is consistent with a small-scale settlement and farming, since the species vary in their management requirements which would be difficult to realize on a larger scale.[83] This is confirmed by a broad age profile and wide range of skeletal elements of the animals in the given bone assemblages.[84]

The second exploitation pattern of domestic stock as suggested by comparison of available NISPs shows a dominance of ovicaprids followed by pig and cattle or cattle and pig, respectively. This pattern is recognized at Pevkakia Magula (ovicaprids > pig > cattle) and Platia Magula Zarkou (ovicaprids > cattle > pig). The age profiles at the sites are suggestive for a mixed use of the ruminants for both primary and secondary products with minor site specific variation. Pig is, again, exploited for its primary products (i.e. meat and fat) with adult individuals present indicating local breeding.[85] At Pevkakia Magula sheep are more abundant than goat, with the age profile emphasizing secondary production, but possibly with an importance in milk, since females dominate the assemblage.[86] However, female sheep are suitable for both milk and wool production.[87] Secondary product exploitation is reflected also in the age profile of the Pevkakia Magula cattle, with more numerous mature than immature animals.[88] The amounts and age profiles of pig at Pevkakia Magula also suggest its exploitation for meat as supplementation for the otherwise primary exploitation of secondary products of the small ruminants and cattle.[89]

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[79] Yannouli 1994, 197-198.
[80] Fillios 2006, 133, appendix table 10.
[81] Yannouli 1994, 333; Fillios 2006, 130-131.
[82] Halstead 1993 and 1996, 24; Fillios 2006, 181.
[83] Halstead 1993 and 1996, 24; Fillios 2006, 181.
[84] Fillios 2006, 181.
[85] Hinz 1979, 25-26; Becker 1991, 24-25.
[86] Amberger 1979, 52, 59, 63, tables 12 and 17; Hinz 1979, 112.
[87] Amberger 1979, 63.
[88] Amberger 1979, 23, tables 5-6; Hinz 1979, 111.
[89] Hinz 1979, 24-27, 112-113, tables 5 and 7.

A similar relative distribution of the domestic species to Pevkakia Magula is shown in the material of, for example, EBA Sitagroi and Skala Sotiros.[90] At the site of Platia Magula Zarkou cattle follow ovicaprids in importance prior to pig. Sheep are more abundant than goat at the site, but both show broad age profiles indicating primary and secondary exploitation with an emphasis on secondary products.[91] This is also the case for cattle, the versatile usage of which should be noted when interpreting the meaning of its importance compared to pig.[92] Pig is again used for primary products.[93] The exploitation pattern of domestic species shown at Platia Magula Zarkou is reflected in the faunal material of, for example, EBA Tiryns and LN/EBA Megalo Nisi Galanis.[94]

At Argissa Magula and Doliana a third exploitation pattern of domestic species is identified, with a dominance of cattle followed by ovicaprids and pig.[95] At Argissa Magula the age profile for cattle shows a dominance of adults over infantile, juvenile and subadult individuals, hence indicating their exploitation for both primary and secondary products with emphasis on the latter.[96] The same is shown and indicated for ovicaprids, together with a dominance of sheep over goat.[97] Pig follows as third in relative importance and their age profile shows again their use for primary production and maintenance of a local breeding population.[98] At Doliana the age profile for cattle and sheep are suggestive for their primary use for meat production with a possible secondary use.[99] Sheep remains are more abundant than those of goat.[100] A slightly different exploitation pattern, with pig following cattle prior ovicaprids, is identified at, for example, EBA Kastanas.[101]

The here presented exploitation patterning is based on available data which are not always directly comparable and should therefore be considered with a caveat. The comparison here is based on NISP and Minimum Number of Anatomical Unit values which should be considered when making interpretations. As known, the NISP value is strongly affected by sample size, grade of fragmentation and used excavation methodology, but also associated with the amount of identified species and therefore also the species variety identified at a site.[102] This is reflected especially in the wild fauna composition of the comparanda assemblages and the species variety identified from the different excavation areas at Goutsoura, with the most abundant being that of Area 2, which also has the highest amount of recovered fragments.

At Goutsoura the applied excavation methodology without sieving is biased against small mammalian bone elements and is undoubtedly reflected also in the underrepresentation of bird and fish remains. However, the scarcity of these may also be

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[90] Bökönyi 1986; Yannouli 1994.
[91] Becker 1991, 20-22, tables 2 and 4.
[92] Becker 1991, 22-24, table 7.
[93] Becker 1991, 24-25, table 8.
[94] von den Driesch and Boessneck 1990; Greenfield and Fowler 2005.
[95] Boessneck 1962. For the updated data on the Doliana fauna, see n. 73. For Argissa Magula NISP values are available and for Doliana percentages based on Minimal Number of Anatomical Units.
[96] Boessneck 1962, table 17.
[97] Boessneck 1962, 42, tables 1, 6 and 18.
[98] Boessneck 1962, table 19.
[99] Douzougli and Zachos 2002, 143; Tartaron 2004, 142.
[100] See n. 73.
[101] Reichstein 1979, 250, table 1.
[102] See e.g. Grayson 1981.

the result of local taphonomical factors since the remains of both taxa are less resistant to natural destructive forces than mammalian bones. This could also be the reason for low numbers of very young mammalia, since their bones are not yet fully ossified and prone to lesser preservance. Both, bird and fish are frequently identified at other EBA sites in varying amounts, depending on the local environmental setting and viscinity to aquatic resources. Despite the missing osteological remains, the exploitation of fish at Goutsoura is strongly suggested by the find of a bronze fishhook. The three identified bird bones at Goutsoura represent 0.08% of the total NISP and 9.38% of the identified wild species. The faunal remains of Platia Magula Zarkou did not contain any fish remains, but several water bound bird species have been identified and represent 0.22% of the total NISP of the site.[103] At Pevkakia Magula fish comprise 0.45% and bird 0.19% of the total NISP, and at Pentapolis 1.55% and 0.06%, respectively.[104]

Altogether, the wild fauna of a given site does not only represent species hunted for supplementing subsistence (i.e. for food or other products), but also those killed to protect the livestock. They also reflect the local environment and allow us to draw conclusions on it based on known habitat preferences of the given species. In the case of Goutsoura the tawny owl lives near open mixed and deciduous forests, which are also suitable for the roe deer and red fox, as well for the brown hare and hedgehog if situated close to areas of open vegetation such as fields, pastures or meadows. The white-tailed sea eagle may well follow major rivers from the coast to the inland and visit lakes.

Concluding thoughts

With the faunal analysis of EBA Goutsoura we have presented the earliest evidence so far of animal husbandry in the Kokytos valley and Thesprotia. The results are suggestive for a livestock-based economy utilizing all major domestic species (i.e. pig and ovicaprids, followed by cattle) in a self-contained production manner with a supplementation by wild species. Since zooarchaeological data from other EBA excavations in the region are currently not available it is difficult to place the observed pattern of animal husbandry in a relevant and useful regional framework. However, the results of Goutsoura show a similar pattern of livestock exploitation to Helike (Achaea) and Pentapolis (Macedonia), and confirm the role of animal husbandry in subsistence during the EBA also for this region in northwestern Greece.

Animal husbandry seems to be already established at EBA Goutsoura. Therefore, it would be intriguing to investigate more properly the origin of the domestic species identified at the site and the route by which they arrived. Important questions in this respect would be if animal husbandry developed in the region autochtonous from local wild boar and aurochs populations, by influence or through importation of primary stock from somewhere else (as it would be the case for sheep and goat anyway). However, such a study would need a comprehensive analysis of Neolithic and Bronze Age archaeological remains, including the find contexts and molecular genetic analysis of the bones. Several possible routes are already postulated by the data on pottery from EBA Goutsoura.[105]

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[103] Becker 1991, 30-31, table 2.
[104] Amberger 1979, 142, table 1; Yannouli 1994, appendix D, table D1. See also Hinz 1979, 88-94, 99-103.
[105] Forsén *et al.* 2011, 81.

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Faunal Remains of Goutsoura: The Late Middle Bronze Age to Early Iron Age Strata

Stella Macheridis

Introduction

The site of Goutsoura (PS 12) was first settled during the Early Bronze Age (EBA) when it was permanently inhabited. After a short hiatus the site was used mainly as a cemetery, from the late Middle Bronze Age (MBA) through to the late Late Bronze Age (LBA) or perhaps even early Early Iron Age (EIA). A tumulus in Area 2 and a separate cemetery in Area 3 that belong to this phase of the site were excavated by the Thesprotia Expedition. Activity on the site may have continued even longer, although the evidence of this is limited to the finds from one small trial trench, Trench H, which only could be roughly dated to the EIA or later.[1]

In this chapter, the results from the osteological analysis of the faunal remains from late MBA to EIA contexts at Goutsoura are presented. The bones derive from three types of contexts.[2] Most were found in the uppermost cultural layer of the site which is dated to the late LBA or possibly even the early EIA. This layer could be traced in Area 1, Area 2, Area 3 as well as in the large trial trench of 2008 and Trenches F, E1-2, E6-7 and E21-22. It post-dates not only the tumulus, but also the cemetery in Area 3 and seems to derive from the occasional revisiting of the site. Most of the faunal remains from this layer were found above the tumulus which itself was erected at some stage between the late MBA and early LBA. The animal bones can perhaps shed light on the kind of activities that took place at the tumulus after its usage phase.

The second context concerns the small animal bone assemblage from Trench H, approximately dated to the EIA or even later. Thirdly, we have faunal remains from the cemetery in Area 3, dated between the late MBA and late LBA. The bones of this last category are somewhat mixed, deriving from the usage of the graves as well as shortly thereafter. While they might not be from the actual graves, they derive from activities connected with them. As they are associated with graves in some way or another, zooarchaeological perspectives can shed some light on the burial activities on-site.

In this report, the material studied and methods used in the zooarchaeological examination are described. Next, the taxonomic representation is discussed together with taphonomic issues regarding the material. A short presentation of the range of identified taxa is followed by a more general zooarchaeological discussion of the finds. Subsequently, the animal bones are discussed contextually, starting with the earliest sub-

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[1] For a preliminary overview of the site, see Forsén *et al.* 2011. For more detailed studies of different aspects of the site, see the contributions by Forsén, J. Forsén, Doulkeridou, Deckwirth, Niskanen and Lima in this volume. Fig. 9 is by Esko Tikkala, all other illustrations by the author.

[2] For these three contexts and their date, see Forsén, this volume. No exact date could be given to the finds from Trench H, which therefore here are treated separately. Trench H is located on a higher terrace than all the other excavation areas and trenches of Goutsoura and contained a rock tumble interspersed with EIA or later pottery.

assemblage from the late MBA to the late LBA, followed by the late LBA to the early EIA. Finally, this material is compared to the animal bones from the EBA layers which have been examined by Vivi Deckwirth.[3]

Material and methods

The studied material consist of 644 fragments (2,843 g), of which the majority of the fragments were recovered in Area 2 (Fig. 1).[4] Many fragments also derive from Area 1, the large trial trench of 2008, as well as Trenches F, E1-2, E6-7 and E21-22, all located only some 5-10 m to the southeast of Area 2. In general the uppermost cultural layer, dated to the late LBA to early EIA, contained the majority of the fragments (55%). This is not surprising as this layer covered most of the excavated areas (in total ca. 152 m^2), while the earlier bone fragments were found only associated with graves in Area 3, and Trench H only had a size of 2 m^2.[5]

	Late LBA to early EIA				Late MBA to late LBA	EIA or later	Total
	Large trial trench, Trenches F, E1-2, E6-7 and E21-22	Area 1	Area 2	Area 3	Area 3	Trench H	
NSP	150	31	351	15	54	43	644
Weight	311	140	1519	104	530	259	2863

Fig. 1. Distribution of animal bone fragments as Number of Specimens (NSP) and weight (g).

All bones were hand collected during the excavation. No sieving or water flotation took place, which could explain the complete absence of fish and avian remains. Furthermore, the fragments were not washed when stored or studied in the archaeological storage facilities at the village of Gardiki.[6] Different atlases of animal osteology were used in connection with the study,[7] but the lack of physical references has significantly lowered the identification rate. Age and sex assessments could only be made on few bone fragments.[8] Measurements were taken when possible.[9] The Number of Identified Specimens (NISP) has been used as quantification.[10] Number of Specimens (NSP) is also used to include unidentified fragments. Because the bones were not washed, a

[3] Deckwirth, this volume.
[4] For a quantative distribution of all fragments, see Appendix I.
[5] According to Forsén, this volume, the large trial trench of 2008 covered 19 m^2, Trench F, E1-2, E6-7, E21-22 and H 2 m^2 each, Area 1 13 m^2, Area 2 62 m^2 and Area 3 50 m^2.
[6] This decision was made during the archiving of the material, based on the preservation of the bones; the fragments were however brushed.
[7] E.g. Pales and Lambert 1971; Pales and Garcia 1981; Schmid 1972; Hillson 2005.
[8] Age assessment based on postcranial fusion data in domestic mammals followed Silver 1969; Habermehl 1961 and Vretemark 1997, 41. No intact mandibles with all molars and fourth premolars were found. Reliable age assessments based on tooth wear and eruption could thus not be made. Sex assessment based on suid canine morphology followed Mayer and Lehr Brisbin Jr 1988. Cattle pelvic morphology was used for sex determination according to Vretemark 1997, 43-44.
[9] All measurements were taken according to von den Driesch 1976, except ungulate crown heights which were taken following Klein and Cruz-Uribe 1984, 47.
[10] See Lee Lyman 2008.

systematic recording of taphonomic markers was not possible, although such have been noted. Weathering was recorded following Behrenmeyer's score system.[11] Fire impact was recorded after colouration.[12] Butchery marks have been noted and when possible, attributed to filleting, skinning or dismembering, as described by Binford.[13] Smaller cut marks have more probably been hidden than more obvious chop marks. Marks of gnawing were also noted.

Issues of taphonomy and taxonomic representation

Almost all bone fragments (640 NSP) derive from mammals, while four from tortoise or turtle. The unidentified mammal fragments were, when possible, categorized by the size classes *Large-sized mammals*, including mainly large herbivors equids, bovids and cervids, and *Medium-sized mammals* including suids, ovicaprids, and canids. The assemblage comprises 143 fragments of large-sized mammals and 264 fragments of medium-sized ones. A total of 147 fragments (28%) could be identified to genus. In Fig. 2 the percentage of identified bones within each sub-assemblage is illustrated. The percentage of identified bone (%NISP) is highest in the late MBA to late LBA contexts (46%). However, this should be taken with caution, since the total number of bones is low. From the much richer late LBA to early EIA layer, a total of 115 bone fragments were identified (21%), whereas 16% of the bones in the small assemblage from the EIA were identified.

The proportion of identified bone within each sub-assemblage is connected to the degree of preservation as well as the taphonomy of the animal bones, i.e., in which ways different formation processes, factors and agents have helped to shape the material at hand.[14] In Fig. 3 such markers are presented. Bone fragments from the earliest assemblage are heavier, with an average weight of 9.81 g,[15] than

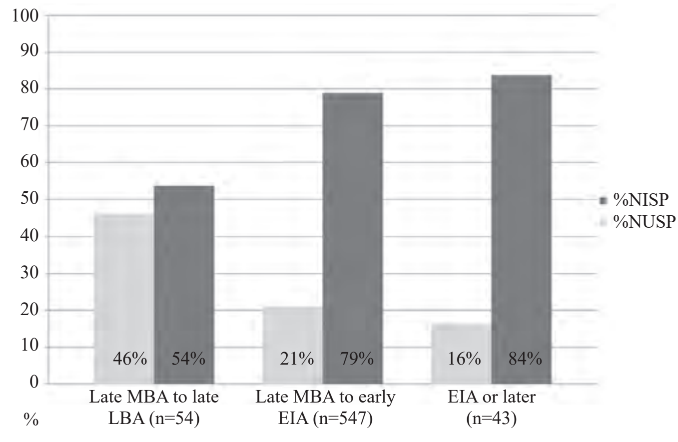

Fig. 2. Percentage of identified and unidentified bone fragments (NISP and NUSP) within each of the studied sub-assemblages.

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[11] Behrensmeyer 1978.
[12] Lee Lyman 1994, 386, fig. 9.9 with further references.
[13] Binford 1981.
[14] For an overview on vertebrate taphonomy, see Lee Lyman 1994.
[15] To nuance the picture of fragmentation within the material even more, the average weight per identified fragment is calculated as 17 g. For unidentified fragments the average weight is only 3.62 g.

Period	Cut marks	Gnawing	Burnt bone	Weathering	Root etching	Average size (mm)	Average weight (g)
Late MBA to late LBA	1	4	0	5	0	52.18	9.81
Late LBA to early EIA	3	22	3	6	1	37.74	3.79
EIA or later	3	7	0	1	0	43.45	6.02

Fig. 3. Distribution of taphonomic markers, average weights and sizes of the animal bones in different sub-assemblages.

the bones from later deposits. The average size is also larger, with an average size of 52.18 mm. This indicates that the earliest assemblage is better preserved. Since the assemblages share approximately the same geological conditions for preservation, perhaps this is due to pre-depositional activities.

Even if the fragments are dirty, some have been clean enough to show signs of taphonomic impact (Fig. 3). Gnawing marks are the most abundant. This indicates in general that carnivores had access to the bones before deposition. That weathering is present also supports the idea that at least some of the bones were exposed during a period of time before deposition. Three fragments have been exposed to fire; none were calcined. Most probably the fire impact derives from pre-depositional activities such as food preparation, rather than using fire as fuel or burning as waste management strategy.

Range of taxa

Among the identified specimens, presented in the taxonomic list in Fig. 4, domesticated mammals dominate. In general, cattle fragments are the most numerous, followed by those from sheep/goat, pig, and dog. In the most bone-rich period (late LBA to early EIA) sheep/goat is most abundant. Suids are in general more common during the late LBA and later. This increase can however only be hypothesized due to low NISPs of the earliest and latest assemblages (see Fig. 4). There are also difficulties in distinguishing between wild boar and domestic pig, while some fragments remain on the genus identification level.[16] Dog is present in all contexts except in the EIA or later context. Besides the domesticated animals, human, deer and tortoise are identified.

Taxon	NISP	Weight	NISP	Weight	NISP	Weight	NISP	Weight
Cattle (*Bos taurus*)	11	217	38	563	3	116	52	896
Sheep/goat (*Ovis aries* or *Capra hircus*)	2	12	41	186	1	5	44	203
Suid (*Sus sp.*)	1	16	4	19	2	39	7	74
Pig (*Sus domesticus*)	1	8	24	174	1	21	26	203
Dog (*Canis familiaris*)	4	46	5	39			9	85
Deer (*Cervus sp*)	1	83					1	83
Human (*Homo sapiens*)	3	39	2	13			5	52
Tortoise unspec. (*Testudines*)	2	4	1	1			3	5
Total	25	425	115	995	7	181	147	1601

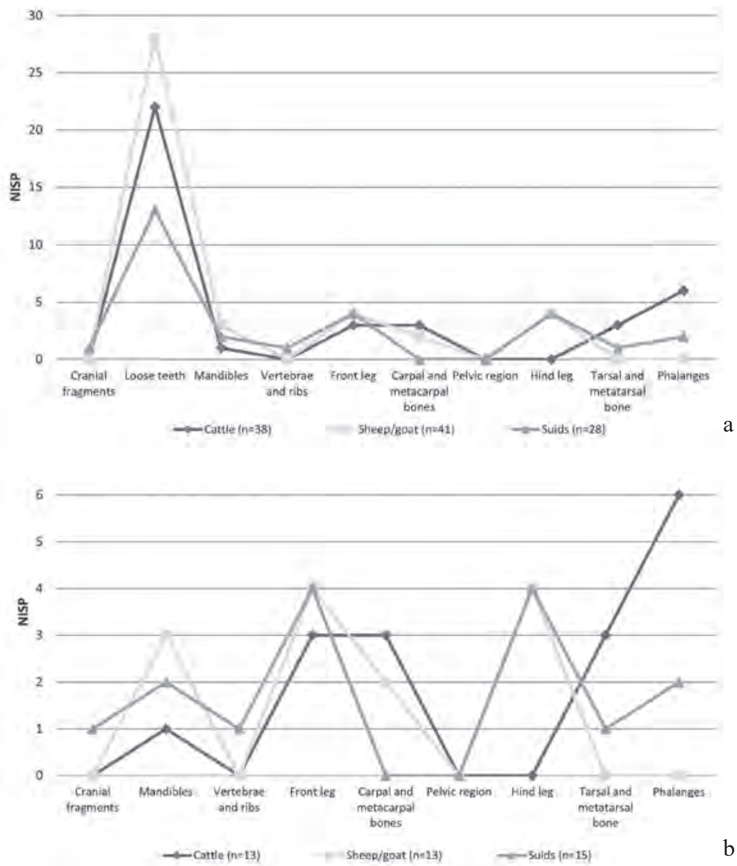
Fig. 4. Identified taxa from the late MBA to EIA contexts, quantified by NISP and weight (g).

[16] This problem is well-known and was noted already by Gejvall 1969, 19-20.

Zooarchaeological overview

The sub-assemblages from the late MBA to the late LBA, and from the EIA or later are small. Therefore, the following summary focuses mostly on the bone fragments from the late LBA to early EIA. Human bone fragments are clearly intrusions from nearby graves and therefore not included.

Cattle, sheep/goat and pig
The identified taxa (Fig. 4) are dominated by the four most common animal domesticates, i.e., cattle, sheep, goat and pig. To better understand the presence of these taxa, it is important to consider which parts of the body are represented. In Figs. 5a-b, the skeletal part frequencies of cattle, sheep/goat and pig are illustrated, both with and without loose teeth. Only the late LBA to early EIA layer is considered.[17] Because the assemblage is small, any observed trend in animal parts representation is only tentative. Loose teeth dominate the assemblage. By removing them from our counts, we can instead see an



Figs. 5a-b Skeletal part frequencies of cattle, sheep/goat, and suids, including loose teeth (5a) and excluding loose teeth (5b), from the late LBA to the early EIA layer.

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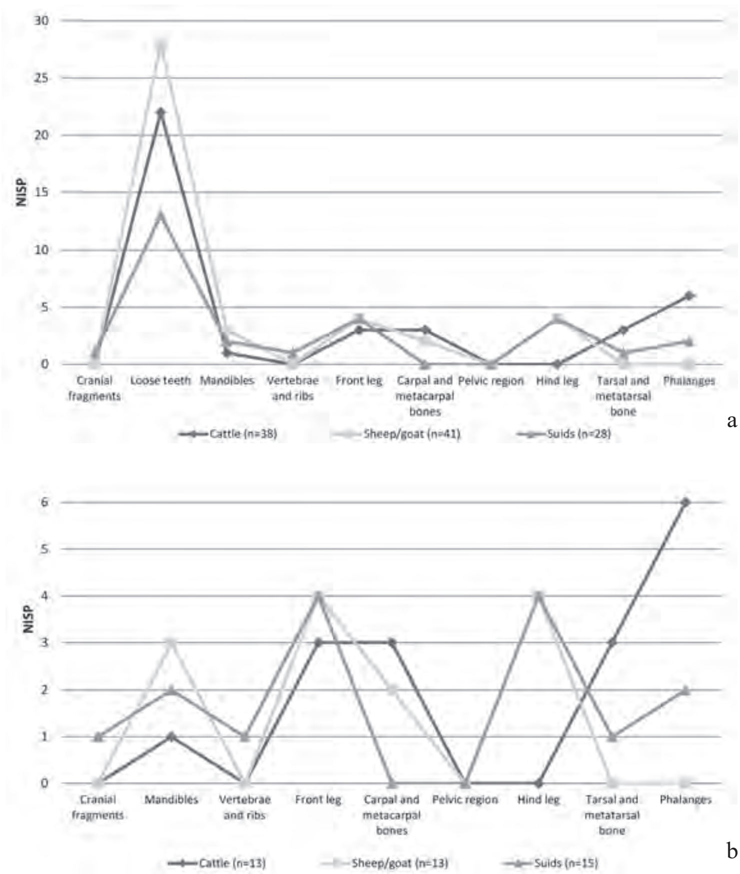
17 More detailed anatomical distributions for all animals are given in Appendix 1.

overrepresentation of long bones, such as those belonging to the front leg. Fragments of the leg bones are more compact and resilient against post-depositional destruction than other elements such as the vertebrae, which have more spongy bone structure. Cattle fragments are also overrepresented by distal compact bones, such as tarsals and carpals. Small compact bones are more prone to survive fragmentation caused by butchery or scavenging by carnivores.[18]

If we group these bones in the two main animal size groups, i.e. large-sized cattle, and medium-sized suids and ovicaprids, a more nuanced picture emerges. In Fig. 6a, we can observe a continued strong presence of loose teeth. However, for the medium-sized mammals, long bone fragments from either the front or the hind leg totally dominate the assemblage. This is also the case for large-sized mammals, but not to the same extent. For both size classes, vertebrae and ribs are much more abundant than seen in Figs. 5a-b. This can be explained by the fact that such bone fragments are hard to identify according to species despite them being easily recognized anatomically (especially ribs). We still



Figs. 6a-b. Skeletal part frequencies (NISP) of large-sized mammals and of medium-sized mammals, including loose teeth (6a) and excluding loose teeth (6b), from the late LBA to the early EIA layer.

[18] Marean 1991.

see an almost complete lack of finds of the pelvic region from large-sized mammals. Even so, the overall picture seems to indicate that the whole body, dead or alive, was more or less present. It is hard to say if the animals were slaughtered within the excavated activity area, or if there was a specific place for slaughtering nearby. If the settlement was relatively close, the animals could also have been roughly processed there. A reminder is perhaps needed that the above discussion regards only the bones from the late LBA to the early EIA layer.

Fourteen fragments of bone deriving from cattle, sheep/goat, or pig were suitable for age assessments. Twelve of these derive from the late LBA to early EIA layer. Most belong to adult individuals. The only certain remains of juvenile animals are of one pig below 12 months old, and one ovicaprid below the age of 18-30 months. The remaining two age-assessed fragments derive from adult individuals of cattle; one from the late MBA to late LBA, and one from the EIA or later layer.

Sex assessments have been possible on four suid canines from the late LBA to early EIA layer. All were male. One female pelvic bone of cattle was identified from late MBA to late LBA contexts. No bones were complete enough to yield body size calculations.[19] No certain pathologies were identified, although the unclean state of the bone fragments might hide some lesions.

When it comes to butchery marks, only two were observed on cattle; one *humerus* bears filleting marks produced by a sharp instrument, and one phalanx was split in half. Both were from the late LBA to early EIA layer. Only one pig *humerus*, found in the EIA trench, shows signs of butchering – fine cut marks on the distal end of the shaft. Similarly, one sheep/goat mandible shows signs of chopping. Probably, more butchering marks remains unrecorded because of the unclean state of the bones. Chopping and pounding the bone produce splinters. The high fragmentation of the assemblage is an indication of this. The fragmentation is higher within the late LBA to early EIA and the EIA (or later) deposits.

Dogs

Nine fragments of dogs have been identified within the assemblage. Four of these fragments were found in the late MBA to late LBA context. These bones articulate with each other to form the front leg of a dog. The bones derive from a large dog.[20] Clear gnawing marks are visible on the proximal ulna, and the shaft of the radius is weathered, as can be seen in Fig. 7.[21] Weathering covered all remains of this individual. This is interesting since the first impression might have been that they are part of a grave. But that does not explain the weathering and the gnawing, which indicates exposure rather than rapid deposition. Also the scapula seems to be chopped, although this is hard to ascertain due to the erosion of the bone.

From the late LBA to early EIA layer, five fragments of dog were identified. The shaft of a tibia was weathered and gnawed. One mandibular fragment was also weathered, again suggesting exposure of the bones, rather than rapid burial. Otherwise these bones were relatively well preserved. One maxillary fragment was also found, as well as a loose canine. These bones derive from adult individuals.

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[19] All measurements taken can be found in Appendix III.
[20] See measurements in Appendix III.
[21] Stage 1 as described by Behrensmeyer 1978. See also Madgwick and Mulville 2011, 514, fig. 2.

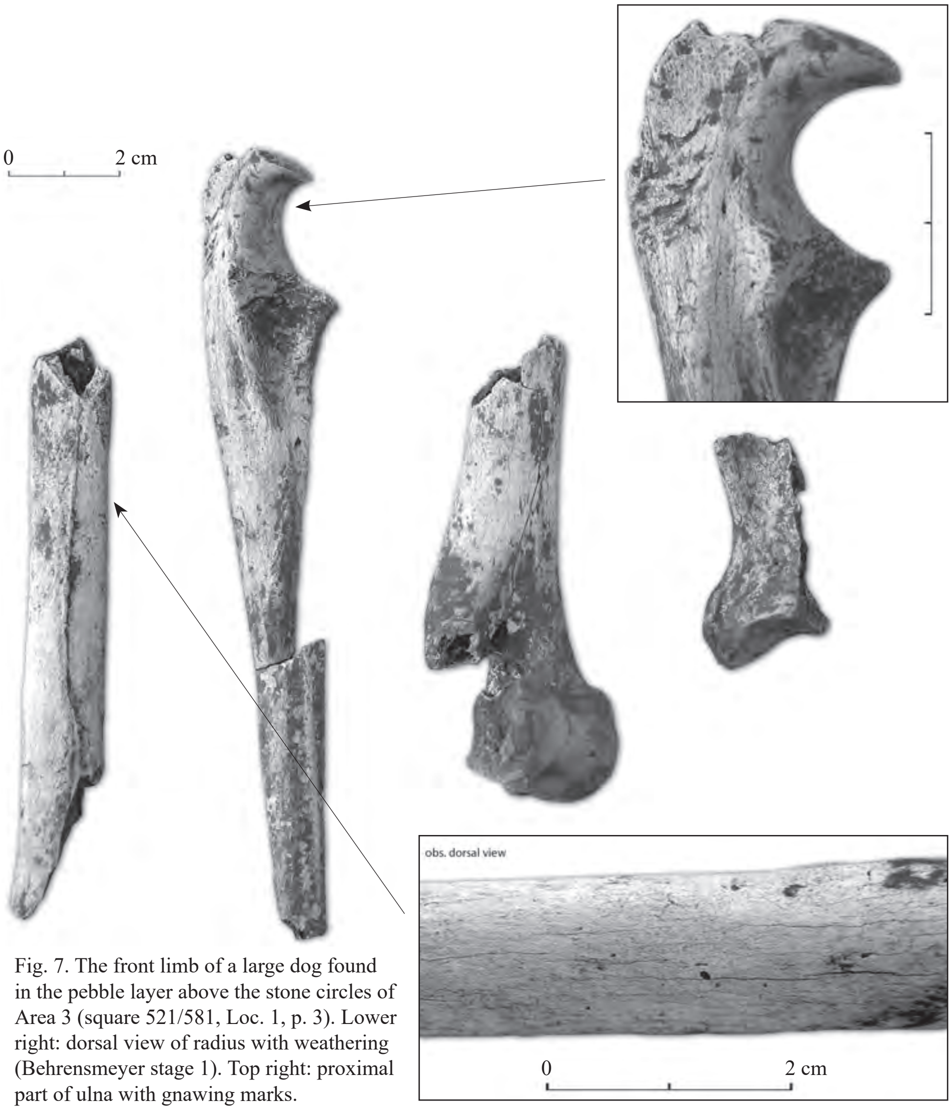

Fig. 7. The front limb of a large dog found in the pebble layer above the stone circles of Area 3 (square 521/581, Loc. 1, p. 3). Lower right: dorsal view of radius with weathering (Behrensmeyer stage 1). Top right: proximal part of ulna with gnawing marks.

Furthermore, the frequent presence of gnawing marks on bone fragments deriving from most identified bone fragments of various taxa is a sign of indirect presence of dogs. It is also an indication that dogs had access to the food leftovers that were lying around the settlement and that they played some role in the formation of the assemblages of Goutsoura.

Wild animals

Four bone fragments have been identified as deriving from wild animals, namely one deer radius and three tortoise/turtle shell fragments (*carapace* and *plastron*). Land turtles can often be found nesting in, or close to prehistoric sites. The tortoise fragments at Goutsoura are perhaps from land turtles. They do not bear any modification marks (e.g. cut marks or burning), and as they could be present naturally, they are maybe not remains of human consumption; they could be considered chance finds. As only a few fragments have been noted,[22] it is also possible the people at the site did consume this resource as food or for other purposes.[23] The issue remains open.

The single deer radius is an indication of hunting. This particular specimen was found in Area 3, associated with the late MBA to late LBA grave clusters. Unfortunately, it could not be determined as to species, but judging by size it derives from either red deer (*Cervus elaphus*) or fallow deer (*Dama dama*). It is splinted proximally, from dismembering.

The late MBA to late LBA sub-assemblage

These remains are not especially numerous, but their association with the grave cluster in Area 3 makes them significant. They are much better preserved than the other sub-assemblages. This is visible in the higher percentage of identified bone (Fig. 2), as well as the larger size and weight of the fragments (Fig. 3). The human bones found in this area came from the stone circles (square 527/579, Loc. 2, p. 2). They probably derive from the individuals buried in Grave 4, Grave 5 or Grave 6.[24] From Grave 3, only one small tortoise fragment and one unidentified mammal fragment were found.

The majority of the animal bones was found in the pebble layer above the stone circles (25 fragments), as well as in the soil layer above them (12 fragments). Eight fragments can be connected to the infill of the circles. Although the assemblage in general is well preserved, there are only few complete bones. This fragmentation, together with gnawing marks on some of the bones might indicate exposure of the bones after consumption instead an immediate burial. All in all, it is more reasonable that these bones represent general scatter from nearby consumption, rather than deriving from particular single eating events. Cattle, sheep/goat, suids, dog, and deer are present. The presence of cattle, sheep/goat and pig is not surprising, since they are the typical meat providers in Bronze Age Greece.

There are two more interesting taxonomic occurrences in this sub-assemblage. One is the aforementioned deer radius, which testifies to hunting. It also suggests that in the mortuary meals which took place in the vicinity of the graves not only the domestic animals were consumed. Hunting is a common theme in Mycenaean iconography.[25] It seems to have been an important ideological activity, associated with authority and power.[26] There is a possibility that similar symbolism also permeated the hunting at this site. However, this remains uncertain, and more examples are needed to fully discuss this theme.

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[22] As Deckwirth, this volume, mentions, articulated remains and/or a more complete shell can be seen as criteria for identifying winter-hibernating turtles, i.e., later intrusions. However, this does not take into account prehistoric intrusions between times of occupation.

[23] For example, Gejvall proposes, according to Åström 1968, 56, that turtle was consumed during periods of starvation during the Mycenaean period at Midea.

[24] For the graves and the persons buried in them, see Niskanen, this volume.

[25] E.g. Hamilakis 2003, 243

[26] Hamilakis 2003, 243-244. According to him, hunting and war were strongly connected in Mycenaean societies. Furthermore, the idea of hunting was stronger than the actual activity of hunting, is why few osteological examples are found.

The other phenomenon is the articulated front leg of a dog. Initially it was thought to be an in-mix; the remains of a larger hunting hound buried with its master from a nearby grave. Dogs in burials or pure dog burials are not uncommon in Aegean prehistory.[27] However, the bones are clearly weathered and they are also gnawed on by other canids (see Fig. 7). They do not seem to come from any grave or closed deposit. It could be consumption waste, as the scapula seems to be chopped. There are examples of other sites with evidence of dog meat consumption. One such is Lerna, where the few dog fragments showed a high prevalence of cut marks associated with consumption.[28] This is similar to the fragments of dog at Iron Age Kastro on Crete, which also showed high frequencies of cut marks.[29] The dog fragments here are not from settlement layers, but from funerary activities. It is thus possible that this consumption might have some ritual overtones, being one rare example of consumption of dog meat in ritual settings.[30]

The late LBA to early EIA sub-assemblage

The uppermost cultural layer that covered most of the site derives from activities connected to people returning periodically to the site. These revisits should be seen as associated with the tumulus and the other graves that are special to the site.[31] The majority of the animal bones were found in Area 2 from above, or in direct connection to the tumulus. The bones are more fragmented than the ones from earlier contexts. The most abundant species are cattle, sheep/goat and pig. All body parts are represented among the preserved bones. Perhaps this is an indication that the animal was slaughtered on the site, or close to it.[32] Most animals slaughtered were adult. The bones do not indicate a large number of individuals. If we were to use the Minimum Number of Individuals as quantification, remains from at least three of each cattle and ovicaprids and two suids are present. Dog is also identified as well as human and tortoise, although in very low numbers. The human bone fragments are probably from the underlying graves.

The distribution of animal bones in Area 2 reveals minor clustering of animal bone fragments in two main areas (Fig. 8). The largest concentration seems to be west of Child grave 1. Another is above the central cist grave. Some scattering of bones can also be seen in connection with the other child graves. Several bones bear gnawing marks, indicating that canids had access to the bones. Probably they also acted as agents of dispersal. That the rest of the excavated areas contained at the most ten fragments, argues in favour of this idea. The animal bone fragments and their spatial distribution support

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[27] Day 1984. In her catalogue of dog burials and occurrence of dog in the Aegean LBA and EIA, we can find, for example, Dendra, Mycenae and Asine on the mainland as well as Knossos and Gournes on Crete. See also Hamilakis 2003, 243-244. He connects the LBA practice of depositing dog remains in burial contexts to the ideological importance of hunting.
[28] Gejvall 1969, 18. He concluded that dogs were eaten by the presence of cut marks on meat-rich anatomical elements, such as the humerus.
[29] Snyder and Klippel 2003. They suggested that the eating of dog at Iron Age Kastro was not ritually charged, but part of the ordinary consumption behaviour.
[30] For the ritual use of dogs in LBA Greece, see Day 1984.
[31] Forsén, this volume; Lima, this volume.
[32] This was discussed in the previous section. It is still hard to explain exactly why pelvic fragments are almost totally absent in both Figs. 5-6.

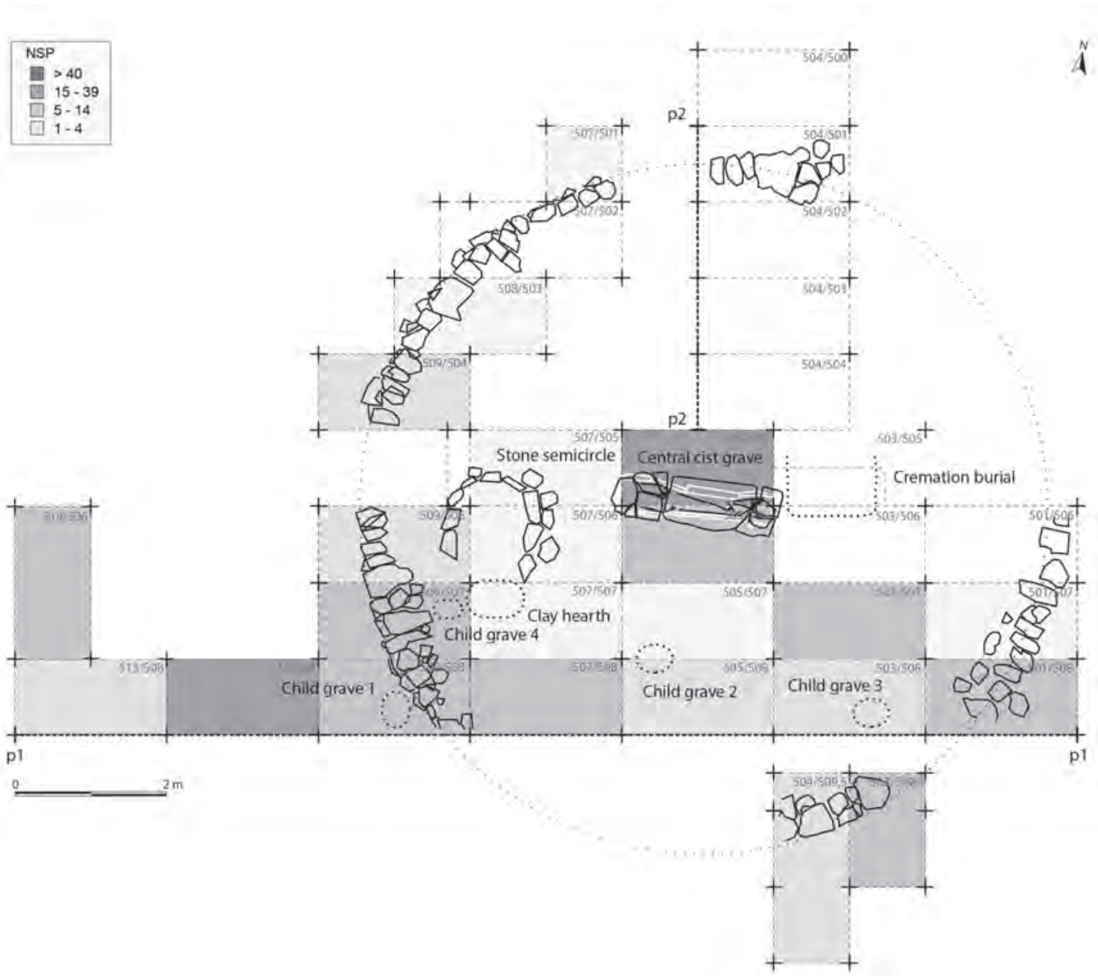

Fig. 8. Spatial distribution of animal bone fragments (NSP) in the uppermost cultural layer covering the tumulus in Area 2. The density is given as number of bones per square, i.e., per 2 m². However, square 507/508, Loc. 2 was excavated as a 4x1 m area encompassing also what later was called 509/508, and square 504/509.5 was partly also excavated as 504/510. The size of square 507/501 was as an exception 1 m², that of 503/509.5 1.5 m² and that of 504/509.5 2.5 m².

the archaeological interpretation that the late LBA to early EIA people periodically visited the site, rather than lived there permanently. It seems that most of the preparation and consumption took place in Area 2, close to the child graves and above the central cist grave inside the tumulus.

The long term zooarchaeological perspective

The animal bones from the EBA deposits at Goutsoura have been analyzed by Deckwirth.[33] She finds that the economy was foremost based on pigs and ovicaprids. Furthermore, she

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[33] Deckwirth, this volume.

identifies several wild species, such as roe deer, red fox and hedgehog. The osteological analysis of the EBA animal bones is based on a larger assemblages of remains than in the present one. To facilitate comparison, only the EBA and the Late LBA to Early EIA assemblages will be considered here. Fig. 9 illustrates the distribution of cattle, ovicaprids and suid fragments over different periods of time.

Suids are never as common as during the EBA; however, their relative abundance seems not to decrease greatly (Fig. 9) from the EBA to the LBA, a phenomenon which is not unique for Goutsoura. A decrease of suids from the EBA to the LBA is visible in other sites in the Aegean area.[34] It has been explained by changed climatic conditions, which favoured bovid species, i.e. cattle and ovicaprids.[35] Other scholars suggest it might reflect a changed regional strategy which increased centralization and control over the economic base.[36] In the case of Goutsoura, it might however also reflect the function of the site. EBA Goutsoura has been interpreted as a permanent settlement, while the late LBA to early EIA layers at the site more likely represent seasonal or occasional visits. The decrease of pig might be explained by this change. The later revisits were connected to the burials on site. It is probable that meat animals were required for these purposes. Since there is a more or less even distribution of cattle, sheep/goat and pig during the time of these revisits (the late LBA to early EIA, see Fig. 9), it could be suggested that it was

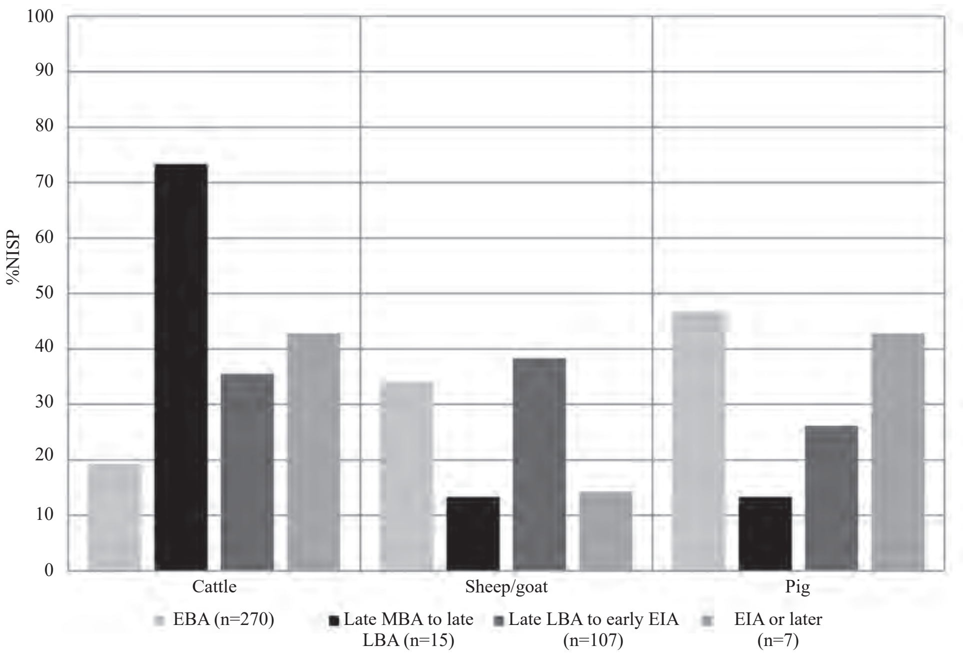

Fig. 9. Abundances of cattle, ovicaprids and suids during different historical periods at Goutsoura. The data for the EBA is taken from Deckwirth, this volume.

34 Examples of such sites are Tiryns (von den Driesch and Boessneck 1990) and Hala Sultan Tekke on Cyprus (Ekman 1977; Macheridis 2011).

35 Ekman 1977, 169; Schwartz 1974, 271.

36 Macheridis 2011.

not important which animal type was brought to the site. It might rather have been based on practical assessments, i.e. which animals were available.

During the usage phase of the graves in Area 3 (the late MBA to late LBA) and the later revisits of the site during the late LBA to early EIA, food consumption was part of the activities associated with the graves. Based on the small bone assemblage, it is perhaps premature to discuss this eating in terms of, for example, feasting.[37] Nevertheless, even on a small-scale, we should be able to regard eating as a social phenomenon. Food and drink consumption in funerary settings has been suggested as an active and social performance in LBA Greece.[38] It is reasonable that this also was the case at Goutsoura, and as such constituted an important part of the activities that took place during the later phase of the site.

Concluding summary

In this chapter the animal bone assemblages from the late MBA and later at the site of Goutsoura are presented. The remains come from three types of context: the late MBA to late LBA layers, the late LBA to early EIA layer, and finally the trench dated to the EIA or later. The smallest sub-assemblage from the EIA or later yielded too few fragments for a contextual discussion. Although also the other sub-assemblages are quite small, substantial information on the fauna, human activities and site function have been gathered.

The animal bones dated to between the late MBA and late LBA derive from activities roughly contemporary with the graves and stone circles in Area 3. Although not many, they constitute the better preserved part of the Goutsoura bone assemblage. In order of abundance, there have been identified cattle, sheep/goat, suids, dog, deer and tortoise. These bones, with the exception of the turtle remains, are most likely the traces of meals connected with the graves. It is interesting to note that dog seems to be amongst the food left-overs. This is presumably an example of dog consumption with ritual undertones. Hunting had also a role to play in these mortuary meals.

Food consumption in relation to the graves apparently continued during the late LBA to early EIA in Area 2, producing the most bone-rich sub-assemblage, where cattle and ovicaprids are the most common animals, followed by suids. Fragments of dog, human, and tortoise are also present, emphasizing some continuation in the choice of consumed species (with the exception of turtle). Deer however, or any other game animal, is absent in this later phase. The distribution of the bones seems to point to two or three foci within, or close to the tumulus, which would seem to be significant. It is probable that these foci represent the main places for consumption within the occasional revisits of the tumulus during the late LBA to the early EIA. Since the three most common domesticates occur in approximately the same proportions, it seems probable that no specific animal was preferred, and that meat availability was more important than the right taxa for the revisits.

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37 For an ethnoarchaeological discussion of feasts in connection with funerals and death, see Hayden 2009. For an overview of Mycenaean feasts, see Wright 2004.

38 Hamilakis 1998. He further suggests that eating in mortuary settings played an important role in remembering and forgetting, both connected with death. According to him, this was important in the negotiation and manifestation of power, especially in LBA Greece.

From being permanently settled during the EBA, Goutsoura changed to being a funerary site during the late MBA to late LBA, to being revisited occasionally during the late LBA to early EIA.[39] The animal bones studied here do not contradict this. The comparison with the EBA animal bone assemblage showed that pigs were more common during the earliest phase, while the taxonomic abundances are more even in the later periods. It also showed a more diverse set of fauna, with several wild species during the EBA, as opposed to a more restricted range of taxa in the later periods. This difference is probably related to the different use of the space and not necessarily to the different economic interests of the people in the area.

[39] Deckwirth, this volume.

Appendix I. Distribution of animal bone fragments in the excavated late MBA to EIA strata of Goutsoura 2008-2010.

Area/Trench	Square	Locus	Pail	Excavation date	No	Weight (g)
1	492.5/509 Half	1	1	7.7.2009	1	9
1	493.5/508	1	2	13.7.2009	1	2
1	493.5/509	1	1	6.7.2009	1	26
1	495.5/509 Half	1	1	7.7.2009	5	15
1	495.5/510	1	1	3.7.2009	8	23
1	495.5/511	1	2	14.7.2009	1	1
1	495.5/512	1	1	13.7.2009	1	1
1	496.5/510 Half	1	1	10.7.2009	9	39
1	496.5/511	1		1.7.2009	1	3
1	497.5/511 Half	1	1	13.7.2009	3	21
2	501/507	2	2	16.6.2010	2	4
2	501/507	2	2	17.6.2010	1	1
2	501/508	2	1	15.6.2010	4	3
2	501/508	2	2	16.6.2010	7	5
2	501/508	2	3	17.6.2010	8	2
2	503/506	2	2	18.6.2010	7	10
2	503/507	2	1	15.6.2010	16	28
2	503/508	2	1	15.6.2010	4	79
2	503/508	2	3	17.6.2010	4	25
2	503/509.5	2	1	20.7.2009	1	2
2	503/509.5	2	2	21.7.2009	5	8
2	503/509.5	3	2	22.7.2009	4	2
2	503/509.5	4	1	22.7.2009	6	2
2	504/500-504	2	3	24.6.2010	4	7
2	504/509.5	2	2	13.7.2009	1	1
2	504/509.5	4	1	22.7.2009	6	7
2	504/510	2	1	10.7.2009	5	21
2	505/505	2	1	23.7.2009	43	300
2	505/506	2	1	17.7.2009	3	21
2	505/506	2	2	20.7.2009	22	24
2	505/507	1	1	17.7.2009	3	10
2	505/507	2	2	20.7.2009	1	2
2	505/508	2	2	10.7.2009	7	16
2	507/501	2	2	14.7.2009	1	62
2	507/505	2	1	15.7.2009	4	17
2	507/506	2	2	13.7.2009	3	16
2	507/506	2	1	7.7.2009	3	14
2	507/507	2	1	7.7.2009	2	57
2	507/508	2	1	1.7.2009	31	98
2	508/503	2	2	10.7.2009	1	10
2	509/504	2	1	8.7.2009	6	57
2	509/504	2	2	9.7.2009	9	21

Area/Trench	Square	Locus	Pail	Excavation date	No	Weight (g)
2	509/506	2	1	6.7.2009	8	34
2	509/507	2	1	2.7.2009	19	89
2	509/507	2	2	3.7.2009	1	4
2	511/508	2		2009	2	14
2	511/508	2	2	3.7.2009	37	240
2	511/508	2	3	6.7.2009	33	103
3	511/577	1	1	16.6.2010	5	14
2	513/508	2	1	1.7.2009	5	6
2	513/508	2	2	3.7.2009	1	6
2	513/508	2	2	8.7.2008	2	19
2	513/508	2	4	9.7.2009	2	15
2	514/506	2	3	8.7.2009	23	114
3	521/575	1	1	16.6.2010	2	28
3	521/575	1	2	17.6.2010	7	30
3	521/577	0	2	15.6.2010	1	1
3	521/577	3	1	21.6.2010	2	28
3	521/581	2e	2	23.6.2010	1	3
3	521/581	1	3	24.6.2010	10	72
3	521/583	0	3	21.6.2010	4	5
3	521/583	1	1	22.6.2010	1	83
3	521/583	1	2	25.6.2010	2	18
3	523/577	0	3	29.10.2010	1	7
3	523/577	8	3	30.6.2010	1	8
3	523/577	10	1	30.6.2010	2	2
3	523/581	2	1	25.6.2010	4	36
3	523/583	2	1	24.6.2010	1	6
3	525/577	2	3	30.6.2010	2	24
3	525/577 North side of locus	1		25.6.2010	2	23
3	525/579	0		23.6.2010	1	11
3	527/577	2	1	5.7.2010	3	12
3	527/579	2	2	6.7.2010	7	107
3	527/579	2	2	7.7.2010	1	34
3	532/577	8	1	29.10.2010	3	25
Large trial trench	E10	2	3	4.7.2008	3	15
Large trial trench	E10-11	3	1	10.7.2008	1	1
Large trial trench	E10-11	3	2	10.7.2008	1	1
Large trial trench	E10-11	3	3	11.7.2008	3	3
Large trial trench	E11-12	2	2	2.7.2008	1	1
Large trial trench	E12-13	4	1	14.7.2008	8	4
Large trial trench	E12-13	4	2	15.7.2008	13	33
Large trial trench	E14	2	3	10.7.2008	1	2
Large trial trench	G12-13	4	1	14.7.2008	1	1
Large trial trench	G12-13	4	4	15.7.2008	5	7
Large trial trench	G12-13	4	3	15.7.2008	1	7

Area/Trench	Square	Locus	Pail	Excavation date	No	Weight (g)
Large trial trench	G12-13	2	1	8.7.2008	1	1
Large trial trench	G14	4	1	14.7.2008	1	1
Large trial trench	G14	4	2	14.7.2008	1	1
Large trial trench	G9	3	2	10.7.2008	1	5
Large trial trench	G9	3	1	10.7.2008	2	5
Large trial trench	G9-11	4	4	11.7.2008	1	6
Large trial trench	G9-11	4	3	11.7.2008	4	15
Large trial trench	G9-11	3	5	14.7.2008	10	7
Large trial trench	G9-11	4	6	28.7.2008	5	2
Large trial trench	I12-13	2	2	22.7.2008	2	6
Large trial trench	I12-13	3	1	23.7.2008	1	8
Large trial trench	I12-13	2	4	24.7.2008	2	11
Large trial trench	I12-13	2	5	25.7.2008	12	8
Large trial trench	J7	4	1	21.7.2008	2	5
Large trial trench	J7	2	2	21.7.2008	3	31
Large trial trench	J8-9	2	1	16.7.2008	2	4
Large trial trench	J8-9	2	3	17.7.2008	6	21
Large trial trench	J8-9	3	1	18.7.2008	4	5
Large trial trench	J8-9	4	1	18.7.2008	3	8
Large trial trench	K6-7	2	1	23.7.2008	2	1
Large trial trench	K6-7	2	2	23.7.2008	3	6
Large trial trench	K6-7	2	3	24.7.2008	20	26
Large trial trench	K6-7	2	4	24.7.2008	2	6
E6-7		2	3	1.7.2008	1	3
E21-22		2	7	10.7.2008	1	12
H1-2		2	2	14.7.2008	1	7
H1-2		2	2	14.7.2008	5	9
H1-2		1	1	14.7.2008	1	2
F		2	1	15.7.2008	7	12
F		2	2	15.7.2008	2	4
H1-2		3	1	15.7.2008	8	15
E1-2		2	3	2.7.2008	2	10
H1-2		3	2	21.7.2008	19	173
H1-2		4	1	22.7.2008	1	10
H1-2		4	1	22.7.2008	1	32
H1-2		4	1	22.7.2008	7	11
E1-2		2	5	3.7.2008	6	3
E6-7		2	5	3.7.2008	3	3
					644	2863

Appendix II. Anatomical distributions of identified species, except tortoise of which only carapace fragments were identified.

General

	Cattle	Sheep/goat	Pig	Dog	Deer	Human
Horn	0	0	not appl	not appl	0	not appl
Cranium	0	0	1	1	0	1
Dentes	22	28	13	1	0	0
Mandibulae	7	5	2	2	0	0
Vertebrae	0	0	0	0	0	0
Costa	0	0	1	0	0	0
Scapula	0	0	1	1	0	0
humerus	1	2	5	1	0	2
Radius+Ulna	3	2	1	2	1	1
Carpalia	1	0	0	0	0	0
MC	4	2	0	0	0	1
Coxae	1	0	0	0	0	0
Femur	1	1	2	0	0	0
Tibia+Fi+Mall	0	4	2	1	0	0
Tarsalia	3	0	1	0	0	0
MT	2	0	1	0	0	0
MP indet	0	0	0	0	0	0
Phalanges indet	7	0	2	0	0	0
Total	52	44	32	9	1	5

Late LBA-early EIA

	Cattle	Sheep/goat	Pig	Dog	Human
Horn	0	0	not appl	not appl	not appl
Cranium	0	0	1	1	1
Dentes	22	28	13	1	0
Mandibulae	1	3	2	2	0
Vertebrae	0	0	0	0	0
Costa	0	0	1	0	0
Scapula	0	0	0	0	0
humerus	1	2	3	0	0
Radius+Ulna	2	2	1	0	0
Carpalia	0	0	0	0	0
MC	3	2	0	0	1
Coxae	0	0	0	0	0
Femur	0	1	2	0	0
Tibia+Fi+Mall	0	3	2	1	0
Tarsalia	2	0	1	0	0
MT	1	0	0	0	0
MP indet	0	0	0	0	0
Phalanges indet	6	0	2	0	0
Total	38	41	28	5	2

EIA (or later)

	Cattle	Sheep/goat	Pig
Horn	0	0	not appl
Cranium	0	0	0
Dentes	0	0	0
Mandibulae	0	1	0
Vertebrae	0	0	0
Costa	0	0	0
Scapula	0	0	0
humerus	0	0	2
Radius+Ulna	0	0	0
Carpalia	1	0	0
MC	1	0	0
Coxae	0	0	0
Femur	1	0	0
Tibia+Fi+Mall	0	0	0
Tarsalia	0	0	0
MT	0	0	1
MP indet	0	0	0
Phalanges indet	0	0	0
Total	3	1	3

Late MBA-late LBA

	Cattle	Sheep/goat	Suids	Dog	Deer	Human
Horn	0	0	not appl	not appl	0	not appl
Cranium	0	0	0	0	0	0
Dentes	6	1	0	0	0	0
Mandibulae	0	0	1	0	0	0
Vertebrae	0	0	0	0	0	0
Costa	0	0	0	0	0	0
Scapula	0	0	1	1	0	0
humerus	0	0	0	1	0	2
Radius+Ulna	1	0	0	2	1	1
Carpalia	0	0	0	0	0	0
MC	0	0	0	0	0	0
Coxae	1	0	0	0	0	0
Femur	0	0	0	0	0	0
Tibia+Fi+Mall	0	1	0	0	0	0
Tarsalia	1	0	0	0	0	0
MT	1	0	0	0	0	0
MP indet	0	0	0	0	0	0
Phalanges indet	1	0	0	0	0	0
Total	11	2	2	4	1	3

Appendix III. Measurements.

Area / Trench	Square	Locus	Pail	Excavation date	Species	Element	Part	Side	Measurements (mm)
2	503/506	2	2	18.6.2010	Pig (Sus scrofa domesticus)	Phalanx 2	complete		bd: 13.8, sd: 13.4, bp: 16.2, gl: 23
2	503/508	2	1	15.6.2010	Pig (Sus scrofa domesticus)	Mandibula + Dentes	ramus, corpus, M3	dex	L: 30.1, B: 14.6
2	503/508	2	3	17.6.2010	Pig (Sus scrofa domesticus)	Humerus	shaft	sin	sd: 13.3
2	505/505	2	1	23.7.2009	Cattle (Bos taurus)	Metacarpale III-IV, os	proximal part	sin	bp: 66.5
2	505/505	2	1	23.7.2009	Cattle (Bos taurus)	Phalanx 2	complete		bd: 26.1, sd. 23.4, bp: 29.9, gl: 33.5
2	505/506	2	2	20.7.2009	Sheep/goat (Ovis aries/Capra hircus)	Dens	M1-	dex	ch: 15.5
2	507/501	2	2	14.7.2009	Cattle (Bos taurus)	Astragalus	complete	dex	bd: 40.7, dm: 36.1, glm: 57.7, dl: 36.2, gll: 64.7
2	507/506	2	2	13.7.2009	Dog (Canis familiaris)	Mandibula + Dentes	corpus	sin	M1, l: 21.8, b: 8.3
2	507/507	2	1	7.7.2009	Cattle (Bos taurus)	Phalanx 1	complete	post	bd: 26.9,sd: 23.4, bp: 28.2, glpe: 59.7
2	507/508	2	1	1.7.2009	Sheep/goat (Ovis aries/Capra hircus)	Dens	M2-	sin	ch: 21.7
2	507/508	2	1	1.7.2009	Sheep/goat (Ovis aries/Capra hircus)	Dens	M1-	sin	ch: 14
2	507/508	2	1	1.7.2009	Sheep/goat (Ovis aries/Capra hircus)	Dens	M2-	dex	ch 12.4
3	509/504	2	1	8.7.2009	Cattle (Bos taurus)	Dens	M1-	dex	ch: 27.6
2	509/506	2	1	6.7.2009	Pig (Sus scrofa domesticus)	Dens	M2-	sin	L: 20.6, B: 12.5
2	509/507	2	2	3.7.2009	Sheep/goat (Ovis aries/Capra hircus)	Dens	M2+	sin	ch: 22.8
2	511/508	2	2	3.7.2009	Sheep/goat (Ovis aries/Capra hircus)	Dens	M2+	sin	ch: 14.7
2	511/508	2	2	3.7.2009	Sheep/goat (Ovis aries/Capra hircus)	Mandibula + Dentes	corpus: M1-3	dex	ch. M3: 25.7 M2: 25.5
2	511/508	2	3	6.7.2009	Sheep/goat (Ovis aries/Capra hircus)	Femur	proximal: caput	dex	dc: 21
3	521/577	3	1	21.6.2010	Cattle (Bos taurus)	Dens	M2+	dex	ch: 30.7
3	521/581	1	3	24.6.2010	Dog (Canis familiaris)	Humerus	distal part	dex	bt: 25, sd: 16.6
3	521/581	1	3	24.6.2010	Dog (Canis familiaris)	Radius	shaft	dex	sd: 14.4
3	521/583	1	1	22.6.2010	Red deer/Fallow deer (Cervus elaphus/Dama dama)	Radius	complete	dex	sd: 27.6 bp: 35.9, bd: 43.5, gl: 200, pl: 196 ll: 188
3	525/577	2	3	30.6.2010	Cattle (Bos taurus)	Dens	M3+	dex	ch: 29.4
3	525/579	0		23.6.2010	Pig (Sus scrofa domesticus)	Humerus	distal shaft		sd: 12.9
3	527/579	2	2	7.7.2010	Cattle (Bos taurus)	Calcaneus	almost compl.	sin	gb: 45
3	532/577	8	1	29.6.2010	Cattle (Bos taurus)	Dens	M2-	sin	ch: 37.6
Large trial trench	E12-13	4	1	14.7.2008	Sheep/goat (Ovis aries/Capra hircus)	Dens	M2-	dex	ch: 32.2
E21-22	E21-22	2	7	10.7.2008	Cattle (Bos taurus)	Phalanx 1	almost compl.		bd: 25.3, sd: 19.7
H1-2	H1-2	3	2	21.7.2008	Pig (Sus scrofa domesticus)	Humerus	distal shaft	sin	sd: 15
H1-2	H1-2	3	2	21.7.2008	Cattle (Bos taurus)	Metacarpale III-IV, os	distal end		bd: 54.8
H1-2	H1-2	4	1	22.7.2008	Suid (Sus sp.)	Humerus	distal part	dex	bt: 29.9, bd: 37.9

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The Walls of Elea: Some Thoughts Concerning their Typology and Date

Mikko Suha

Introduction

Elea is the primary Classical to Hellenistic settlement in the Kokytos valley. The site is located high on the western slopes of the Paramythia mountain range, above the modern village of Chrysaugi and some 4.5 km south-southeast of Paramythia. The settlement of Elea is surrounded by a massive fortification wall on its eastern side. Short stretches of walls can also be found in different places along the perimeter of the fortified area, although the builders of the city have utilized the cliffs to a great extent leaving most of the perimeter unwalled.

The aim of this article is to investigate the eastern walls, as they are the most formidable structures on site.[1] The southwestern gate and the short stretches of walls elsewhere along the perimeter are not considered here. This article concentrates purely on the structural details of the walls, utilizing them and the wall typologies to date the construction of the walls.[2]

In the 1930s N.G.L. Hammond documented the site, publishing his observations in the monograph *Epirus* in 1967. His description is a fairly short one, about one page. He refers to the site as Veliani after the old village which, by the time of his visit, was located just below the site. According to him the circuit is ca. 1800 m long, with an unusually strong fortification wall standing up to 5.7 m high, protecting the eastern side. The wall has two gates, 1.35 and 2.0 m wide. In the enceinte there are no towers but instead there are several right-angle recesses and changes of direction. There are short stretches of walls in the west and in the south and the main gate of the city is situated in the west. The plan of the town is sketchy, as is the drawing of the eastern gate. Of particular interest are the drawing of the lost threshold block of the Eastern Gate and the two photos of the site as it appeared in the 1930s.[3]

S.I. Dakaris described the site in 1971. According to him the perimeter of the site is 1550 m, encompassing an area of 10.5 hectares. The walls in the northeastern and eastern sides are massive, still standing up to 6-7 m high. The masonry of the walls is polygonal, with wall thickness varying between 0.8 to 3.5 m. In the northeastern side, on the inner side of the curtain there is an additional thickening in the lower part of the wall, built to facilitate sentry movement. In the northeastern corner there is a tower, and two gates pierce the curtain in the east and the north. The maps are more or less accurate.[4]

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[1] I wish to thank Björn Forsén for his support and guidance during the Thesprotia Expedition.

[2] The total station measurement and photographic documentation of the walls was conducted during June 2010. All illustrations and photographs used in this article are by the author.

[3] Hammond 1967, 71-72, plan 7 and plan 22, 3a-b, pls. Va and XXd.

[4] Dakaris 1971, 38, 97-98, figs. 43 and 44.

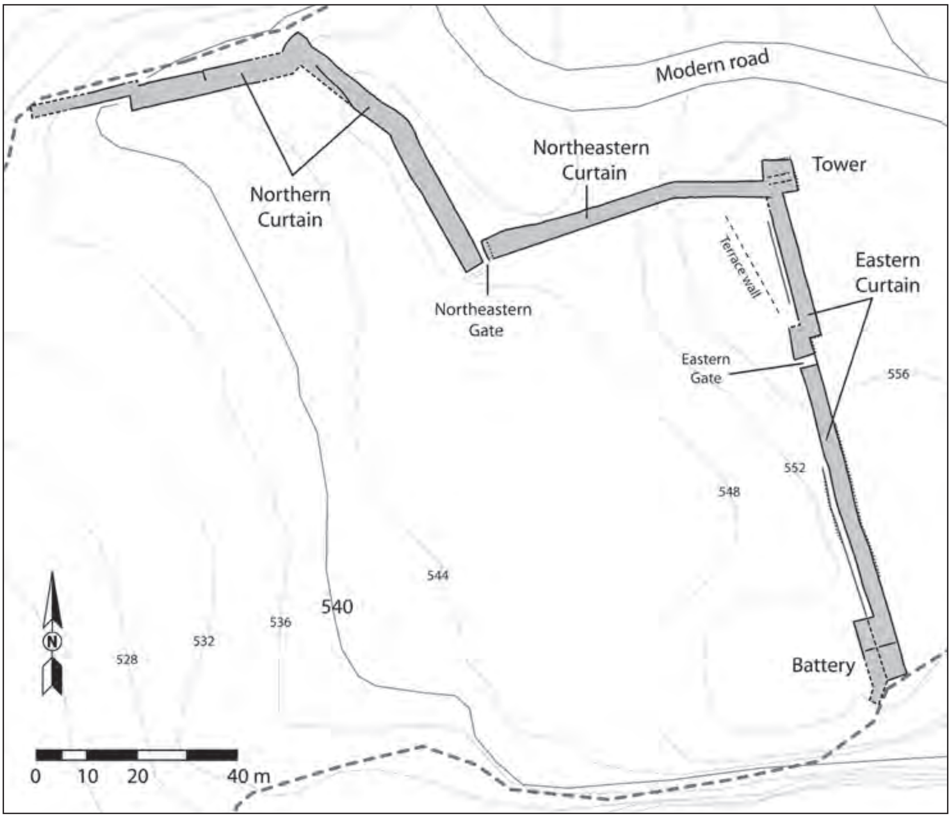

Fig. 1. The walls of Elea. The presumed course of walls, now lost, and structures embedded within the present fortifications have been drawn with dashed line.

In the 1980s, 1990s and 2000s the Greek Archaeological Service conducted cleaning operations within the city, which yielded considerable amounts of finds and revealed the plan of the city centre. The wall circuit was also cleaned, with the mass of tumbled blocks and some soil removed from the base of the walls and corner tower. The Northeastern Gate was cleared of fallen blocks, the broken lintel block of the Eastern Gate was repaired and additional lintel blocks were lifted into place to cover the gateway. Large amounts of finds were recovered from the excavations over the years. A guide book, written by Riginos and Lazaris, was published in 2007.[5]

Curtain walls

Elea is built on a large terrace jutting out westward from the Paramythia mountain range at an altitude of ca. 460-550 masl. The outcrop measures some 190-240 m north to south, by 500-550 m east to west. The terrace is connected to the mountains by a wide saddle at an elevation of 540-550 masl, and it is here where the main fortifications are situated,

[5] Riginos and Lazari 2007, 26-27.

Fig. 2. The battery, looking north. On the right is the outer face of the curtain, in the middle of the photo is the original inner face of the wall and on the left is the extension.

covering all the approaches from the mountainside (Fig. 1). The city centre, including the agora and most of the civic buildings, is located on a lower terrace at an altitude of around 500-520 masl, while the westernmost extremity of the city and its western gateway is located still lower, at 476 masl. The circumference of the site is ca. 1410 m, and the fortified city area covers some 10.5 ha.[6]

The eastern curtain wall starts from the southeastern corner, on the edge of the southern cliff where the first ca. 7 m of the curtain, now consisting of only the scantiest of remains, run in northeasterly direction. This area is almost completely destroyed and covered by thick vegetation, which, by obscuring the edge of the cliff, makes the area quite perilous. The wall then turns towards east-northeast for 4.6 m, reaching a corner where it turns 90 degrees towards north-northeast, running on clear ground.

The first clearly visible stretch of the wall constitutes a large reverse battery, 7.4 m thick by 13.2 m wide, built on the inside of the wall.[7] Originally there was no battery here, only the normal 4.6 m thick curtain wall, as indicated by the fact that the inner face of the curtain wall can still be seen running across the bastion lengthwise (Fig. 2). At some stage a 2.8-meter addition was built on the inside, turning the southern end of curtain wall into a formidable battery. The battery stands on a hillock, thus the preserved height of the wall is only ca. 2 m.

After the battery the curtain keeps its north-northeasterly direction for another 51.3 m until it meets the Eastern Gate. This curtain is in relatively good condition, up

[6] Hammond and Dakaris have slightly different measurements for the circumference, 1800 and 1550 m respectively. The fortified area is based on Dakaris 1971, 38. Riginos and Lazaris 2007, 25, 115 use the same value.

[7] Dakaris 1971, 98 considered this structure as being some sort of housing for the garrison guarding the walls.

Fig. 3. General view of the southern part of the eastern curtain wall as seen from the outside. View towards the southwest.

to 4-5 meters high (Fig. 3). While the outer face of the wall has been built on relatively level ground, the inner face traverses highly uneven terrain. The landscape first descends steeply from the southern hillock to a relatively deep valley ca. 13 m wide, before ascending another hill, upon which the gateway and the northern half of the curtain has been built. Thus the inner face of the curtain spanning the valley is much higher than the outer face, ca. 7 m versus ca. 5 m (Fig. 4). This curtain is also extremely thick: The flat-topped foundation spans the lowest part of the valley at ca. 552 masl, roughly three meters lower than the similarly flat topped foundation of the outer face. On both sides the footing protrudes some 10-20 cm from the wall. The wall thickness at the foundation level is 4.85-4.93 m, while the following "middle layer" with a notably uneven top is ca. 4.6 m thick.[8]

It would seem that the builders have, upon reaching this point in construction,[9] decided to reduce the thickness of the topmost section to ca. 3.1 m throughout the eastern curtain (Fig. 4). At least one cross-wall is discernible, running across the upper section approximately half way between the battery and the gate. Another cross-wall is built in the center of the battery, across both the curtain *and* the additional structure. As all the

[8] According to Hammond 1967, 716 and pl. XXd there were two staircases along this curtain, one close to the bastion and another closer to the Eastern Gate. I do not share this view. The first staircase can be explained by the shape of the "middle layer", rising close to the battery. The shape of the wall here does resemble a staircase, but the slope is just too gentle to be one. Besides, if this was a staircase, why would the path leading to it be so uneven? (See Fig. 5). The other "staircase" could not be verified either. The ruins are slightly different today when compared to Hammond's photo from the 1930s.

[9] Dakaris 1971, 98 considered the entire lower part of the curtain to be an "additional structure" along the inside of the curtain, i.e. something built later into the existing wall. He explained this feature as being a walkway for the sentries, leading to the housing unit built on top of the battery. Why would the sentries have patrolled in such a position, with the upper part of the wall, ca. 3 m high and 3 m thick, blocking the view outside?

Fig. 4. The differing thicknesses of the eastern curtain. In the background is the battery. Looking southeast.

curtains are covered by fallen blocks and vegetation, finding more cross-walls proved impossible.

After the Eastern Gate, 2.1 m wide, the wall continues for another 3.3 m until there is a right angle bend, or *jog*, in the wall.[10] The bend juts out some 2.3 m, giving flanking protection to the gateway. The curtain on the northern side of the gate is 4.2 m thick, reducing to 3.8 m as it reaches the projection. Close to the jog the inner facing of the wall has been so destroyed that it is difficult to say anything certain of the wall thickness.

After the jog, the wall continues its original course for a further 29.5 m until it reaches the corner tower. Again, the outer face traverses on practically level ground, while the inner face has been built on a rise. Close to the Eastern gate the ground first rises but descends again slightly towards the north. This curtain retains the two level design, the thickness of the lower part being 4.28-4.52 m while the thickness of the upper one varies between 3.24-3.52 m. Outside the curtain, approximately half way across, there is a huge boulder which seems to have rolled down the mountainside, coming to rest just short of the wall. This rock fall has clearly taken place at some stage well after the curtain was built, as the original builders would certainly have tried to utilize the boulder in the construction of the wall; they would not have left such a dangerous obstruction in front of the fortifications.

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[10] A jog in this context describes a short stretch of protruding wall, or *flank*, situated at right angles between two longer *faces* of the wall. Quoting Lawrence 1979, 349: "…straight outward faces, placed aslant, would be joined by shorter straight returns – *jogs* in archaeological parlance." Especially Winter 1971 uses the term frequently. See Winter 1971, 102, fig. 78, 109, 122; Lawrence 1979, 349-355, fig. 83.

Fig. 5. The northeastern curtain and the tower, seen on the left. View towards the south.

From the tower, the wall runs in a westerly direction for 17.9 m after which there is a slight change of direction towards west-southwest for another 40.2 m. The eastern half of this northeastern curtain is in good shape, in places still reaching up to 6 m, but as the wall runs west it is less well preserved, attaining a height of some 1.5-2 m (Fig. 5). The western end of the curtain was, until a few years ago, covered by a huge mass of tumbled blocks, since removed. After the loose blocks were removed, the outer face of the wall has bulged outwards, resulting in an irregular appearance in plan (Fig.1).

This curtain wall is different from the eastern one in that it consists of only one layer of fairly uniform thickness throughout. At the eastern end the curtain is some 3.15-3.53 m thick, but after the bend it gradually broadens towards the west, so that by the time it reaches the Northeastern Gate, the width of the wall is 4.24 m.[11] The curtain ends at the Northeastern Gate, 1.2 m wide, which, until a few years ago was completely covered by fallen blocks.

The northern curtain wall begins at the Northeastern Gate, running north-northeast for 31.8 m, then reaching a slight bend, after which it runs northeast for a further 28.9 m. This whole wall has been badly damaged rising only to a height of a couple of metres, bulging outwards and obscured by tumbled blocks. The fallen blocks cover most of the inside of the curtain, while on the outside they have been removed to reveal the line of the wall. The thickness of the wall, when possible to measure, varies between 3.99 at the southern end and 4.50 m at the bend. Close to the northern cliff the wall has almost disappeared. In addition, the modern pathway, leading the visitors from the city area to the area outside the wall, runs over the area, obscuring the remains. Judging by the scant remains, there seems to have been a salient in this corner, guarding the most vulnerable edge of the saddle.[12] After the salient the curtain turns to follow the edge of the cliff, although the first 6-12 m stretch of the wall has vanished.

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[11] When I measured the width in July 2010, the actual width of the wall along its top was 4.64 m. When the gate and its adjacent area were cleared of fallen blocks in 2006, the pressure of the fill had begun to push the wall blocks outwards. Today the large block forming the corner of the curtain and the gate leans outwards for ca. 40 cm. It has cracked in half and the pieces are supported by wooden props. The lower part of the block shows the original width of the wall, ca. 4.24 m.

[12] Dakaris 1971, 98 considered this area as forming a second tower. I, on the other hand, see this as a salient, a protruding, chevron-shaped stretch of wall.

The final, very badly preserved sector of the curtain runs along the northern cliff face for some 49 m. The whole curtain is so completely covered by a mass of fallen blocks that nothing clear can be said about it. There is a small jog in the wall approximately half way across, more distinctive along the inner face of the curtain than on the outside. The jog also defines a clear reduction in the thickness of the northern curtain: For the first 32 m or so the wall is clearly 4.6 m thick, whereas after the projection it is reduced to a mere 2.6 m.

Despite the relatively good condition of the walls, especially along the eastern curtain, no remains of the structures situated on top of the curtains are visible anywhere. In a typical fortification wall, upon the curtain there was a *parodos*, the wall-walk where the guards patrolled. The outside edge of the parodos was protected by the breastworks or *parapet*, ca. 0.5-0.6 m thick. If built of stone, such a wall thickness was obtainable by a single row of blocks.[13] It is also possible that the parapet was built of sun-dried mud brick. That could explain the relatively small volume of fallen blocks seen on site, especially near the eastern curtain.[14] Using that estimate, the width of the wall-walk in Elea would have been ca. 2.6-3.5 m, and even in the last, thin stretch of curtain the width would have been ca. 1.9-2.1 m. In all cases the width would have been sufficient for two patrolling guards wearing their full kit to pass each other unhindered.[15] The parapet was either crenellated or it consisted of a continuous screen wall. A crenellated wall is the classical sawtooth trace where higher *merlons* alternate with low *embrasures*, providing cover and field of fire for the defenders. A screen wall or *epalxis* was a level-topped wall, pierced at intervals by arrow slits or larger apertures.[16]

Today the eastern curtain is, on average, 4-4.5 m high, while the northeastern curtain attains a maximum height of some 6 m. Due to the careful construction of the exterior face as opposed to the less careful jointing in the inner, the blocks of the external face are more likely to have remained in place, resulting in an uneven appearance. However, the top blocks presently standing on the outside edge were meant to be incorporated into the wall and not to be seen, as the backs of the blocks were left very rough and irregular throughout the enceinte. To demonstrate, the Eastern Gate is spanned by a massive lintel block[17] on top of which the outer skin of the curtain, still standing approximately 1 m high, is built (Fig. 9). The blocks standing on top of the lintel are carefully fashioned on the exterior face, with narrow, careful seams throughout, whereas on the other side the blocks are rough and the joints are wide. The curtains were clearly built to a slightly greater height than that which is visible today.[18]

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[13] Lawrence 1979, 357.

[14] M. Maher studied the walls of 19 Arcadian *poleis* for his dissertation, all of which employed mudbrick in some form. Most had stone socles of varying heights, upon which a mudbrick curtain wall and parapets were built, but two had stone curtains up to the level of wall-walks, topped by mud brick parapets. The stone curtains in Alea reached over four meters, while in Phigaleia the height of the stone curtains was some 6-10 m. See Maher 2012, 63-65, 115-116, 351.

[15] Winter 1971, 127 stated that a width of ca. 1.75 m would be sufficient for such a purpose.

[16] Winter 1971, 140.

[17] See note 21 on the present state of the gate corridor.

[18] See for instance the northeastern, eastern and southeastern posterns in Kydna in Lycia, (Adam 1982, 132-135, figs. 85-87). The curtain rises up to three meters above the lintels of the posterns. On the other hand, in the main gate the parodos is built only ca. 50 cm above the lintel block, some 4.5 m from the ground. The height and width of the main gate are almost identical to the one in Elea. See Adam 1982, 129-130, fig. 83.

We may assume that the eastern curtain was built perhaps two courses or ca. 1 m higher than the remains visible today, reaching the height of ca. 5-5.5 m – some ten or eleven cubits. Either a stone or a mud brick parapet, now lost, crowned the walls.[19] It is impossible to say whether the breastworks were crenellated or consisted of *epalxeis*, but it is still safe to assume that in either case they would have added another 2-2.5 m to the total height of the walls.[20] Using the same estimates, the northeastern and at least the first stretch of the northern curtain would also have attained a total height of ca. 7-8 m. Perhaps, after the salient, on the edge of the precipitous northern cliff, the curtain did not need to be built as high. At least the last 20 m stretch, with a very thin wall, could have been much lower.

Gates

There are three gates in the enceinte of Elea. The first is placed within the eastern curtain and another is situated at the junction of the northeastern and northern curtains. The main gate was built in the western side of the settlement, utilizing a natural crevice in the bedrock.[21]

Of the two gateways built into the walls, the Eastern Gate is the best preserved one (Fig. 6). This gate is a simple axial opening across the wall, with three large lintel blocks covering the 2.1 m wide corridor.[22] On the southern side of the corridor the curtain is 3.5 m thick, while on the northern side its thickness is 4.2 m.[23] For the first ca. 2 m of the corridor, the floor was built approximately half a meter higher than the ground level both inside and outside, as indicated by the blocks still in situ. The blocks are of varying size, and the whole "threshold area" is thus uneven.[24] The gate was most likely placed on the outer edge of the corridor.[25] However, this is impossible to verify today, as none of the blocks present have any traces of pivots or bolt holes or indeed any traces connected with the gate itself.

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[19] In Elea plentiful water and clay for the bricks were easily obtainable, which makes the existence of a mud brick parapet a distinct possibility. The estimated height of the Elean curtains fall between the estimated height of the curtain of Alea (over 4 m) and the minimum height of the curtain at Phigaleia (6 m).

[20] Hammond 1967, 715 was of the opinion that in Epirus, where the rain and frost are a constant threat to walls built in this manner, the tops of all the fortification walls had to be covered by roofs to keep the filling of the wall dry. If that is the case, a screen wall would have been a more obvious choice.

[21] As this article deals with the eastern walls, I will not discuss this gate, however. See Hammond 1967, 71-72; Dakaris 1971, 97 and Riginos and Lazari 2007, 33-34 for more information on the gate.

[22] The first block had at one stage cracked, but remained in place. Hammond 1967, 72, pl. Va describe this situation. In the same photo another lintel block is also visible above the gate. Later the crack in the first block had become worse and a steel frame was added for support. In 2006 the first block and its steel frame were visible but no other lintel blocks were in place. By 2007 the cracked block had been repaired, two other lintel blocks lifted next to it to cover the corridor further and the whole roof was consolidated by concrete.

[23] A gate with practically the same dimensions can be found in Gitana, some 29 km to the east-northeast of Elea. It is a side gate, number 2. See Kanta-Kitsou 2008, 30.

[24] The main gate at Kydna in Lycia has a similar, fairly high threshold or step, although there it consists of only one carefully shaped block. The height and width of the gate are identical to the one considered here. See Adam 1982, 130, fig. 83. Another site with a similar step or threshold, 60 cm high, but consisting of several rough blocks, can be found in Kalivo near Butrint in Albania. See Crowson 2005, 54; fig. 5.10

[25] Hammond 1967, 715. I also share this view.

Fig. 6. The Eastern Gate seen from the outside, looking west. The monolithic threshold block, now disappeared, sat on top of the blocks, just behind the modern steps.

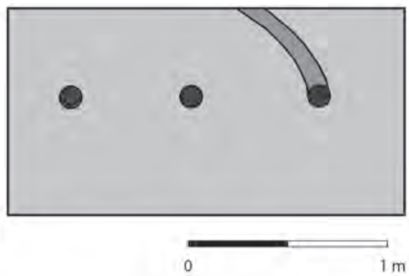

Fig. 7. The threshold block. After Hammond 1967, pl. 22, 3b.

Hammond made a sketch of the gate and, most importantly, of the large monolithic threshold block therein.[26] This block has since disappeared, but Hammond's sketch of the block helps in recreating what the gate originally looked like (Fig. 7). The threshold block sat on top of the uneven blocks described earlier. Its top would have sat slightly higher than the tops of the adjacent blocks on either side of the opening. If this was the case, the height of the corridor would have been around 2.5 m. Such an opening would usually have been covered by a two-leaved, inward-opening gate, with both leaves ca. 1 m wide, but in this case the drawing offers clues to a different arrangement (Fig. 7).

The first hole, on the left hand side, would have been the pivot hole on which the one-leaved gate turned, and the second a locking hole in the middle of the gate. The third one, with the curved groove leading away from it, was connected with the outer edge of the gate. A gate this large would no doubt have been quite heavy, and thus it seems that its outer edge was supported by a knob, which moved along the groove. The groove also indicates that the gate would have opened inwards. There are no traces of matching

[26] Hammond 1967, pl. 22, 3a describes the dimensions of this gate, which, at the time of his visit, seems indeed to have had a massive monolithic threshold block, described in pl. 22, 3b. The block has since vanished.

Fig. 8. The Northeastern Gate seen from the outside, looking south. The huge original corner block of the gateway is visible in the left-hand corner. The measuring stick rests on the later structure, built to reduce the width of the corridor.

holes in the lower edge of the lintel block, but this comes as no surprise as the block was cracked. The pivot and the bolt holes would have been situated in the area which has recently been repaired with concrete.

The Northeastern Gate is situated at the junction of the northeastern and northern curtains, so that the northern wall would have protected all approaches to it. This gateway is interesting, as it seems to have been reduced to half its original size at some point (Fig. 8). Originally the opening was 2.2 m wide, as indicated by the huge, now cracked block situated on the eastern side of the gate. At some stage the width of the opening was reduced by one meter using relatively small, quadrangular blocks. The reduction was made by building directly on top of the original two-piece threshold block. Similarly to the Eastern Gate, the floor of the corridor was built slightly higher than the ground level. Again, no traces of bolts, jambs or pivot holes are visible in the threshold or in the adjacent walls. Thus it is impossible to say, whether the original gate was one- or two-leaved. Nevertheless, after the reduction the now ca. 1.2 m wide gate would most likely have been one-leaved.

After the reduction of its width, the gate corridor would have formed a trap for any enemies entering the gate. Advancing in a very confined space, ca. 1.2 by 4.8 m, would have been very difficult. On the inside, the foundation of a house cuts across the entrance, leaving only a very narrow alley, 0.95-1.0 m wide, between the house and the city wall. Thus, anyone entering would have been forced to turn into this extremely narrow five-meter long alleyway after clearing the gate corridor, in order to advance further inside. It is likely that the reduction of the gate corridor and the building of the house are contemporaneous.

By reducing its width to half its original dimensions and building a house right next to it, the former gate was reduced to the role of a postern. No pack animals would have been able to clear the narrow corridors and ninety-degree turns, but a small team of soldiers would have been able to use it during a siege, to conduct sallies.

Flanking devices

A large corner tower, built of massive blocks, protects both the eastern and northeastern curtains. It is bonded to the adjoining curtains, which suggests that both the tower and the curtains were built contemporaneously.[27] The tower is somewhat irregular, slightly trapezoidal in shape: it protrudes 3.1 m from the eastern curtain and 4.1 m from the northern. The eastern face is ca. 6.4 m wide, while the width of the northern face is 5.75 m, giving a total area of 36.8 m² (Fig. 9). The tower is solid, its base filled with compacted rubble and stones. It seems that there is at least one cross-wall, running from east to west across the filling. In its present condition this is, however, difficult to ascertain as there is a mass of rubble and vegetation blocking the view.

The tower is built on a level footing course which protrudes ca. 30 cm from the walls, especially near the southeastern and northeastern corners. In the northeastern corner the foundation extends up to 50 cm from the line of the walls.

There would have been a chamber on the wall-walk level. Probably another, similarly proportioned chamber could have been situated above that, bringing the total height of the tower to 8-12 m, depending on the shape of the roof and the height of the

Fig. 9. The tower, looking southwest.

[27] Lawrence 1979, 221 on bonding.

Fig. 10. The jog protecting the Eastern Gate, indicated by the flight of steps on the foreground. View towards the north.

chamber(s). However, as the tower is in such a bad condition it is impossible to say whether that was indeed the case.

If we assume that the walls of the chamber were of roughly the same thickness as a typical parapet, ca. 0.5-0.6 m, the area within the chamber would have been some 23.7-25.65 m². Only the smallest of defensive catapults could be housed within such a small chamber, up to three one-cubit machines or two three-span arrow-shooters.[28]

If, on the other hand, the walls of the tower chamber were ca. 1-1.1 m thick as in the tower of Agios Donatos,[29] the size of the chamber would have been even smaller, some 16-16.5 m². In that case the chamber could only have housed up to three or, more likely, only two one-cubit catapults. Of course, it is entirely possible that no artillery whatsoever was used here.

Some 3 m north of the Eastern Gate the curtain makes a right angle turn, protruding some 2.3 m; this jog is built to protect the gate (Fig. 10). Flanking fire could thus be directed to the unshielded right side of the enemy approaching it.[30]

The reverse battery in the southeastern corner can be considered here, although it does not offer any flanking protection to the walls. The battery was built on the inside of the curtain by thickening the existing 4.6 m thick curtain with an additional platform measuring 2.8 by 13.2 m.[31] The masonry of the addition, which is clearly not bonded to the original curtain, appears to be different, much coarser. The whole structure is based on a small hillock, reducing the need for building high walls. A cross-wall is built across both the curtain as well as the addition at ca. 6 m from the start, halfway across the battery.

The reason for building such a battery here was to offer protection to the southern part of the saddle and the whole southeastern sector in general. A great number of defensive artillery pieces could be housed within, if the battery was roofed.

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[28] Bakhuizen 1992, 159. A one-cubit catapult shot bolts 46 cm long, while the machine itself was 1.54 m long by 0.87 m wide. The bolts of a three-span machine were 69 cm long, while the size of the catapult was 2.32 by 1.31 m.

[29] Suha 2009, 123.

[30] Such a layout of gate and flanking protection is typical. Lawrence 1979, 304; Winter 1971, 210.

[31] In Arcadian Gortys there are two reverse bastions built in the inside of the northwestern curtain, one adjacent to the Gate A, and the other between Posterns 1 and 2. Unfortunately, nothing much is said about them. The one adjacent to the gate is described only shortly, mentioning that it is 5.7 m thick. Nothing is said of the other, but it is visible on the map. See Martin 1947, 99, 101, n. 4.

If the battery was open to the rear, with three walls the thickness of the parapet, some 0.5-0.6 m, the area inside would have been some 12 x 7m, amounting to 90 m². Using Bakhuizen's estimates on catapult sizes, such a chamber could have housed up to four ten-mina stone-throwers[32] or three four-cubit arrow-shooters.[33]

If, on the other hand, there was also a similarly proportioned back wall in the battery, the area would have been some 12 x 6.5 m, or 78 m². Such a chamber could have housed up to four three-cubit arrow-shooters.[34] The weight and recoil of any such machines would not have been a problem in such a massive, solid construction, as even the largest, ten-mina machines would only have weighed around 813 kg.[35]

As seen, the walls utilize only the slightest of enfilading: The jog controls a face of ca. 70 m of straight curtain, while the tower, forming a second projection, controls another 30 m of straight curtain. The northeastern wall is protected by the tower for ca. 18 m, until there is a bend in the wall. From there on, the northern curtain offers flanking protection, and conversely receives it from the northeastern curtain and the tower. On the edge of the northern cliff there probably used to be a protruding salient in the northeastern corner and a fairly shallow jog, protruding only ca. 1 m, halfway across the curtain. Here the placement of the jog was probably dictated by the natural contours on site.

The large reverse battery in the southeastern corner, built inside the curtain, gave no enfilading protection although the artillery based in it could have protected the eastern side. The area immediately below the battery would nevertheless have been a dead zone; the enemy reaching it would have been safe from artillery attacks as the machines within could not have been pointed low enough. Archers would have been able to give flanking protection to the area if they were stationed at the jog next to the gate. On the other hand, only a couple of archers would have fitted into the 2.3 m wide projection, and it would have blocked the catapults in the tower from reaching the area immediately in front of the battery and the gate.

Masonry

The style of masonry is polygonal[36] throughout the enceinte, but the finishing of the blocks and the execution of the joints differs radically in different areas. The masonry in the outside face has four main styles, while on the inside face only one or two masonry styles are present, depending on the location.

The first style in the outside face of the eastern curtain is present in the southernmost few meters, around the battery on the hillock. The blocks used are mostly small (ca. 0.3 x 0.5, 0.6 x 0.4 m) but the lowest masonry courses consist of large blocks (ca. 0.8 m high by

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[32] Bakhuizen 1992, 159, tables. A ten-mina engine would have used a stone shot with a caliber of 4.37 kg. Such an engine would have been 6.37 m long by 3.18 m wide.

[33] Bakhuizen 1992, 159, tables. The length of the arrow would have been some 1.85 m, and the size of the engine would have been 6.18 by 3.5 m.

[34] Bakhuizen 1992, 159, tables. A three-cubit bolt would have been 1.39 m long and the catapult itself would have been 4.39 m long by 2.62 m wide.

[35] Bakhuizen 1992, 159, tables.

[36] Polygonal meaning that the blocks have more than four non-parallel sides in their facing, meeting at an acute angle. On terminology see Scranton 1941, 16-17, 45

Fig. 11. The masonry in the southern end of the eastern curtain, on the left, is coarser than the one found in the following sectors. View towards the west.

Fig. 12. The masonry in the outer face of the eastern curtain. Note at the bottom the shallow footing course with a level top, the following large, tooled-faced masonry, above which is the neat, quarry- or hammer-faced polygonal masonry. The frequency of triangular plugs in the lower section is also noteworthy.

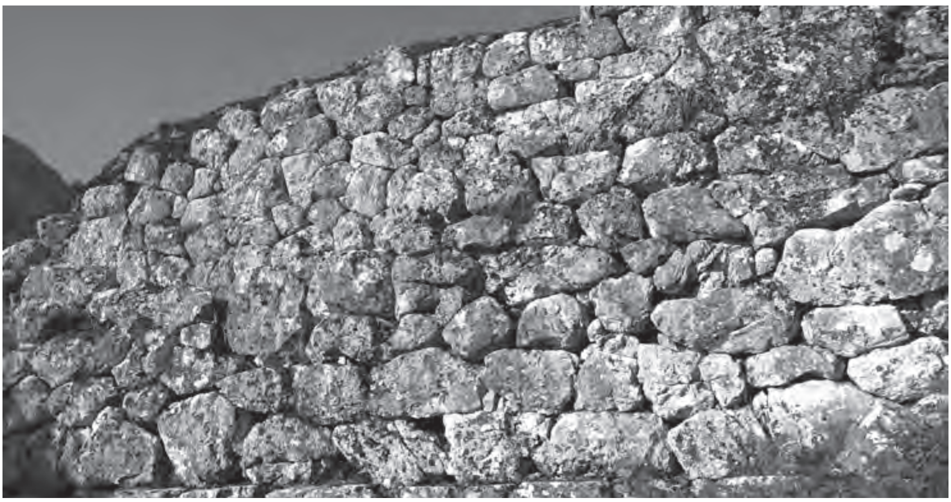

Fig. 13. The inner face of the same curtain. Note the protruding foundation with level top at the bottom, the rough appearance of the following section and the slightly more accurate finish in the thinner upper part.

1.0 m wide).The blocks have a rough appearance since the joints are very crude, leaving wide gaps around the blocks. The surface of the blocks is slightly smoothed, creating a so called tooled face[37] (Fig. 11). This kind of masonry slowly gives way to a different kind of masonry as the wall progresses toward the north.

As the wall descends the hill the masonry in the wall changes (Fig. 12). A flat topped foundation layer protruding ca. 0.2-0.3 m from the wall is built across the lowest sector of the fortifications, disappearing from view when the ground starts to rise close to the gateway. Built on top of the foundation layer is the thick lower part of the wall, ca. 2-3 m high. It consists of tooled faced blocks, predominantly oblong and somewhat more quadrangular than the masonry on the hillock. Some of the blocks have keying.[38] The size of blocks ranges from small (ca. 0.6 x 0.6, 0.3 x 0.7 m) to massive (ca. 0.9 x 1.2, 1.2 x 1.4 m). Due to the shape of the blocks, the horizontal joints can run straight for several meters. Most of the joints are gaping wide, but some of the straight joints can be relatively tight. The largest gaps in the seams are filled using small plug-stones. The plugs are usually located on the top of a masonry course, where they fill a hole between two irregular blocks. Most of the plugs are triangular in shape, standing on their apex between two blocks. Occasionally the plugs are quadrangular, but again they are placed on the upper part of the course (see Fig. 12). This kind of frequent use of plugs has several parallels in the Peloponnese.[39] Plugs are also present in the neighbouring fortress of Agios Donatos, in the internal walls of the tower and in the outside face of the curtain adjacent to the southeastern gate.[40]

The masonry in the upper part of the wall is very different: The blocks are more precisely cut, fairly similar in size, ranging between 0.7 x 0.6 and 0.4 x 0.5 m. The facing of the blocks is bulging, quarry or hammer face.[41] The joints are undulating and tight, adding to the strength of the structure: Straight joint lines would have been more vulnerable.

The masonry used on the inside face of the curtain is again different from that previously mentioned (Fig. 13). The thick lower part of the wall is built of large, slightly rounded, hammer faced blocks with loose, gaping joints, while the masonry of the upper part is similar to the outside face, although slightly coarser with loose joints.

The inside face of the battery consists of even rougher masonry, almost resembling dry rubble.[42] The blocks are rounded, bulging, quarry faced, while the joints are extremely loose, with large gaping holes between all the blocks. It almost seems that the stones used were just picked up from the ground in their natural state, without any fashioning (Fig.

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[37] Tooled face means that the facing of the block was cut smooth with a chisel. Scranton 1941, 21.

[38] Keying means cutting the block to a shape something like a capital L in order to anchor the walls against the direction of the slope. See Lawrence 1979, 238.

[39] Such use of plugs was noticed by Charneux and Ginouves 1956, 528, 532, 541. The sites in question are Paleokastro or Bouphagion and the fortress of Agios Nikolaos, all located in Arcadia. Lawrence 1979, 238 also took note of triangular plugs. Besides small plugs located on the top of the course, Lawrence noted that triangular stones the height of the masonry course could be used as well. In any case such stones always stood on their apex.

[40] On tower walls see Suha 2011, 206, fig. 4; on the curtain see Suha 2009, fig. 7.

[41] Quarry face being just unworked surface straight from the extraction of the block, or, if consciously roughened, the treatment could be called hammer faced. The distinction between the two is vague. Scranton 1941, 21.

[42] Dry rubble consists of unworked stones in their natural state, heaped loosely to form fences or field walls. Scranton 1941, 16-17, fig. 2.

Fig. 14. The inside face of the bastion. Note how extremely rough the masonry and the joints are, when compared to the adjacent curtain, visible on the left and in Fig. 13.

Fig. 15. The outer face of the northeastern curtain. The huge block mentioned in the text sits on top of the foundation, next to the jog. Note how different the masonry is in this area.

14). The masonry of the original inner face of the curtain was most likely the same which is still visible in the adjacent middle layer of the wall.

The masonry around and to the north of the Eastern Gate is notably different (Fig. 15). The curtain has a very distinct protruding, level topped foundation, a middle section consisting of peculiar masonry not found in other sectors, while the upper part again consists of similar neatly finished medium sized polygonal masonry as described previously.

The level topped footing course is again present, although now the height of the footing is around one meter, lowering gradually towards the north. The footing in this sector differs from the previous stretch of foundations in that it consists solely of large, quadrangular blocks. The blocks have a hammer faced, strongly bulging lower part, but with an up to 30 cm wide tooled band along their upper edges.

The following masonry course consists of ashlar-like blocks, with a practically uniform height of ca. 0.5 m. Above this course, the shape of the blocks is again polygonal, if rather rectangular in some cases. The blocks are large to massive in size (ca. 0.6 x 1.5-1.0 x 1.2 m), but one of the blocks is huge, ca. 2.0 x 2.0 m. This immense, nine-faceted

Fig. 16. The masonry used in the lower section of wall between the jog and the tower is very different. Large blocks have wide tooled margins, while the hammered central panel bulges very strongly. The footing course has a wide, smooth band along the upper edges of the blocks.

block forms the corner with the jog in the wall. All the blocks are neatly cut and the joints are tight. Most of the blocks used in the lower part of this sector are different from the ones used in the previous sector in that they have a very strongly bulging, hammer-faced rustication in the center of the block and up to 20-30 cm wide, tooled margins on all sides (Fig. 16). The central rustication can bulge outwards for up to ca. 15 cm.[43] Some tooled faced large blocks are still present, but they are a minority. The lintel block of the gate is tooled faced, low but very oblong (ca. 0.5 x 2.5 m), nearly quadrangular in shape. A few large holes in the masonry seem to have held blocks, now disappeared (Fig. 15).

While the lower part of this stretch of curtain differs from the previous one, the upper part of the wall has masonry similar to that elsewhere, consisting of medium sized, slightly bulging quarry- or hammer faced polygonal blocks with careful, tight joints. A short vertical groove is cut into the upper masonry approximately half way across.[44] The inside face of the curtain is similar to the previously described southern stretch, consisting of two different wall thicknesses but basically similar masonry.

The masonry of the tower (Fig. 9) is similar to the lower part of the previous sector. The blocks used are large to huge in size, coursed, and differing in appearance. On the

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[43] Similar masonry, although with much narrower margins and less protruding bossing, can be found in the southern sector in the enceinte of Arcadian Gortys. The blocks near the gate C have the same central bossing, albeit in greatly reduced scale. See Martin 1947, 106, fig. 12 and pl. XVI.

[44] Lawrence 1979, 242, 243 explains such grooves as having been used by the masons to check with a plumb line whether the wall was vertical during construction. In Epirus such grooves are especially abundant in fortification walls. Hammond 1967, 715 suggested that in Epirus such grooves were built for downpipes draining the moisture from the joints of the blocks, the freezing of which was liable to cause damage.

Fig. 17. The masonry styles in the eastern half of the northeastern curtain, looking south.

eastern face most of the blocks have tooled faces, while some are quarry- or hammer faced. In the center there is a peculiar block. The huge tooled-faced, rectangular block measures some 0.9 x 2.4 m, with a 10 cm wide, beveled edge on its underside while a 15 cm wide ledge, protruding some 5 cm is left on its upper edge. This block is unique, there are no parallels to it anywhere along the curtain. It seems as if it was meant to be used in a temple or some other monumental building, but ended up being used here. On the northern face, the lowest course has only tooled-faced blocks while most of the other blocks have a clear quarry-faced bulge. All the corners of the tower have clearly drafted margins, the width of the drafting being some 10 cm.

The lower part of the northeastern curtain has different kinds of masonry used in different areas, separated by the bend in the curtain. The eastern end consists predominantly of large, tooled faced blocks in the lower part. The masonry is polygonal, but the blocks are laid in such a way as to form straight courses. Occasionally there are blocks with a strongly bulging, hammered central rustication and tooled margins as in the previous sector, although here such blocks are again clearly a minority (Fig. 17). After the bend the masonry consists of large roundish, quarry faced blocks with less careful, gaping seams. Such masonry is slightly reminiscent of the one used in the beginning of the eastern curtain, at the battery. The following sector has only one type of masonry, that

Fig. 18. The masonry styles after the bend. Note how, in the center of the photo, the masonry of the upper part stretches almost down to ground level. The arrows indicate the presence of two of the three vertical grooves in this curtain. View towards the south.

of the upper part, stretching almost to the ground (Fig. 18). Close to the Northeastern Gate the masonry changes again. The huge block forming the corner of the curtain and the gateway has approximately 20 cm wide smooth margins all over, while the central panel with rustication is fairly shallow, almost tooled. The block has cracked and recently been supported by wooden beams.

Fig. 19. The crooked groove cut into the bend of the northeastern curtain. The cuts are indicated by the dashed line.

The upper part of this curtain consists, again, of the same kind of masonry as elsewhere. Unlike in the lower part, the masonry of the upper part is similar on both sides of the bend. Halfway between the bend and the Northeastern Gate this masonry style is prevalent, stretching almost to the ground.

There are three vertical grooves cut into the masonry in this curtain, one across the upper part of the wall at the bend, another stretching all the way to the ground in the middle of the following straight sector and a third, short one approximately two thirds across. The one in the bend of the curtain is peculiar in being very crooked, not even nearly vertical (Fig. 19). There is a slightly shallower cut on the eastern side of the groove, as if the masons may have tried to straighten it.[45]

Fig. 20. Masonry on the inside of the northeastern curtain. In the foreground is a terrace wall. View towards the north.

[45] This is very peculiar as such grooves are normally vertical, dead straight. No plumb line could be hung from such a crooked groove, and it is also far too crooked to hold a wooden downpipe. See previous note.

On the inner face of the northeastern curtain the masonry is similar to that in the previous sectors, although the blocks are slightly larger than previously (Fig. 20). The masonry style of the inner face of this curtain is similar throughout the wall, and the wall consists of only one thickness, unlike in the previous stretches. This masonry has a clear parallel at Agios Donatos, located some 5 km south of Elea.[46]

The whole of the northern curtain is badly preserved. The masonry consists of two styles, but the upper part is only preserved in one short stretch, close to the gate (Fig. 21). Large, tooled-faced blocks are used in the lower half, ca. 1.5 m high. The blocks are more regularly shaped than previously; many have an almost quadrangular shape. The joints are tight and fairly straight, due to the shape of the blocks. In the only preserved stretch where the wall still stands ca. 4 m high, the upper part is again built of smaller, bulging polygonal blocks with undulating joints. When removing the fallen blocks and other stones from the area, the restorers have used small stones to fill the gaps where the original masonry blocks have disappeared.

The bend of the northern curtain is defined by a smooth band cut into the blocks at the corner (Fig. 22). All of the original blocks have a tooled face, yet the drafting is visible as an even smoother surface some 5 cm wide, on both sides of the bend. There are no vertical grooves cut into the masonry in this curtain. This is probably because most of the upper masonry, with which the grooves are associated in all other sectors, has disappeared.

A flat topped footing course is again found in the last third of the curtain, north of the bend. The treatment of footing blocks here resembles the foundation to the north of the

Fig. 21. The best preserved stretch of the northern curtain, showing the masonry styles used. On the left, the Northeastern Gate is just visible. The restorers have filled the holes in the wall with small stones. View towards the southwest.

[46] The curved eastern curtain, just south of the tower of Agios Donatos has exactly matching masonry. See Suha 2009, 121, 128, fig. 5 left side.

Fig. 22. The bend in the northern curtain is visible in the center of the photo. Note the smooth band defining the corner, visible to the left of the stick. View towards the west.

Fig. 23. The curtain has a peculiar footing course, seen below the stick. All the blocks in the footing have a smooth band on their upper sides. View towards the southwest.

Eastern Gate, although in a greatly reduced scale. Here, despite the fact that the foundation blocks are oblong and very large, the smooth upper margin of the blocks is only ca. 5 cm wide and the whole footing only protrudes some 5 cm from the wall (Fig. 23).

The last few meters of the curtain have almost disappeared, but it seems that the few remaining blocks forming the salient in the northern corner are more rounded and bulging than any other blocks (Fig. 24). This might, of course, be due simply to the present condition of the salient, as only the largest and crudest blocks are left in place. The inside face of this curtain is not visible as it is still covered by fallen blocks, so no identification of the masonry there can be made. Likewise, the last stretch of curtain on the edge of the northern cliff is so badly destroyed and covered that nothing can be said of the masonry styles used, other than that the few visible blocks in the inside face are tooled-faced polygonal. On the external face the fallen blocks prevent us from making observations.

Fig. 24. The remains of the salient in the northeastern corner. The modern pathway over the curtain can be seen on the right. View towards the west.

Discussion

As seen, the masonry styles change constantly around the enceinte. Vertically, two very distinct styles can be discerned throughout, one on top of another. While the upper part has similar masonry everywhere, the lower part consists of several different masonry styles in different sectors. Such stylistic differences in horizontal plane can be explained by the use of several gangs of masons, working simultaneously. Each gang of masons had their own stretch of wall to build and, it seems, their own tastes as to finishing the blocks used in each respective sector.[47]

Dating any walls using purely stylistic means is difficult, and even more so when one tries to date a wall built entirely in polygonal masonry. In general, in the Greek world polygonal masonry was in vogue during the early Classical period (480-400 BC), but was later superseded by more regular rectangular masonry, *ashlar* and *trapezoidal*. In the Peloponnese "coursed polygonal" walls were again popular for a short period during the latter half of the fourth century, but as the time progressed, ashlar and trapezoidal masonry gained popularity.[48]

Hammond studied Epirote fortifications thoroughly and proposed a slightly different dating sequence for the walled sites in Epirus. Here many early, i.e. fifth and early fourth century, walls were built in trapezoidal or ashlar masonry, but later, during the late fourth and third centuries polygonal masonry became the preferred style.[49]

In 1971 Dakaris suggested a mid-fourth century date for the walls of Elea, based on the few coins found on site at the time. In addition to the finds, the dating was based mostly on the literary evidence. Pseudo-Skylax, an author of the 320s BC described the

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[47] Lawrence 1979,234.
[48] Winter 1971, 81, 90; Lawrence 1979, 235.
[49] Hammond 1967, 711-716.

situation in Epirus by the 360s-350s: At that time the Thesprotians and Molossians "lived by villages", in other words no real cities were formed at the time-or at least they were not fortified.[50] More recently, Riginos and Lazaris share basically the similar view as Dakaris, although they suggest that the walls should be dated to the first half of the fourth century.[51]

Hammond, on the other hand, had a very different view as regards the dating of the walls of Elea in 1967. He classified the polygonal walls in Epirus according to the size of the blocks used. He attributed the walls built of medium sized polygonal masonry to ca. 280-230 BC. According to him, succeeding and partly overlapping with such masonry is the large or massive polygonal style, which he dated to the time of the Epirote League, between 230 and 167 BC. This was the most populous period in Epirote history, a time when the latest extensions to the large enceintes were built in large or massive polygonal masonry. Based on this, he saw the Elean fortifications as belonging to the latter period.[52]

Some recent research on fortifications can shed new light on the dating issue, and one helpful publication is the Danish Kephallenia survey of the early 2000s, with its typology of the fortifications of the island. The typology is problematic but it can be used with reservations. I will now apply their typology to the walls of Elea, and compare the styles with the nearby sites when possible. Other parallels are also considered, if available. First I will deal with the masonry styles in the lower portions of the walls starting with the outer face, running from south to north. I shall then consider the masonry styles of the inner face. Thirdly follows the analysis on the upper parts of the curtains, which seem to have a uniform style all over.

The masonry in the external face of the battery seems to be roughly similar to the rest of the southern part of the curtain, although of slightly different size. Thus I will consider both as one style here. The lowermost blocks are somewhat higher, more quadrangular, than the smaller, more oblong blocks laid on top. The joints are wide. I would like to compare such masonry with Randsborg's Type 13, although the description of the type is very short and vague. Based on only one parallel, at Delphi, the type is dated roughly to the fourth century.[53] This type is certainly the most problematic in Randsborg's typology, and thus not very trustworthy. A good parallel, although from far away, is at Cnidus in Asia Minor. The masonry of the curtain between Towers TT 5 and TT 6 is an exact match.[54]

The bulging blocks with the profound central rustication or bossing and extremely wide tooled margins, found to the north of the gate and in the eastern part of the northeastern curtain have no parallels in Randsborg's typology. A parallel can be found in the large enceinte of Arcadian Gortys, to the east of the southeastern gate C. However, in Gortys, the scale of the blocks, the width of the margins and the bulge of central rustication are

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[50] Dakaris 1971, 37-39, 99. The oldest finds were coins of Elea, dated ca. 360-340 BC. In addition he mentions a Kassopaian coin of 343-330 BC, a Kerkyraian and a Corinthian coin as well as one of Philip II, all dated to the fourth century. Ceramics and roof tiles were also dated to the fourth century.

[51] Riginos and Lazari 2007, 28.

[52] Hammond 1967, 660, 668.

[53] Randsborg 2002, 227, figs. IX, 27-28.

[54] McNicoll 1997, 55-58, pl. 28. Cf. the plate with Fig. 12. Although the prevalent style of the enceinte of Cnidus is ashlar, there are many stretches of angular polygonal masonry with small plug stones in the interstices. It is also worth noting that the eastern curtain, built in polygonal style, is immensely thick, 4.8 m as opposed to ashlar curtains varying between 1.4 and 2.8 m. The Cnidian wall was dated to ca. 330 BC.

considerably smaller. The walls in the southern part of the large enceinte of Gortys were dated to the first phase of fortification, to the early fourth century BC.[55] Besides Elea, I know of no other sites with such dramatically shaped blocks.

The masonry of the tower in Elea is unique, there are no other stretches with similar blocks. It could at best be compared to Randsborg's Type 17, although again the description of the type is rather vague and the photos of the walls of this type seem slightly contradictory to each other. Still, this type is the closest match for such masonry. The type is dated only loosely to the Classical period.[56]

The northern curtain wall is well built, the large tooled-faced blocks are longish, and the joints are tight. Such blocks are best compared with Type 16, dated vaguely to the period of ca. 300-275.[57] In Elea, such a date seems far too late, however.

Now the inside face, starting with the battery. It is built of rough, rubble-like material with extremely loose joints. A good parallel is Randsborg's Type 4. This type could not be dated accurately, only vaguely from the Archaic period onwards, down to the Late Classical or even Hellenistic periods (ca. 700 to the third century BC).[58] For this particular structure I would suggest a very late date, close to the end of the third century BC, as it was certainly added to the previously existing curtain.

The inside face of the eastern curtain can be compared with Randsborg's Type 7, which was dated roughly to the fourth century BC.[59] The northeastern curtain has masonry which is comparable to Type 8, dated to around 300 or the first quarter of the third century BC. Such masonry is also found in Agios Donatos, some 5 km south of Elea. There, the stretch of the curtain wall to the south of the tower especially is very similar to this stretch at Elea.[60]

Finally, the upper portions of all the walls, with medium sized, slightly bulging blocks and very carefully shaped joints are comparable with Randsborg's Type 11. According to Randsborg, this type is extremely common in Western Greece. He cites examples in Epirus, such as Kassope, Gitane and Rogoi. He dated the Type 11 walls to ca. 350-275, or even down to 200 BC.[61]

In addition to the, admittedly problematic, Kephallenian typology, other details in the walls might also help in dating them. There are a few clues as to the fairly early dating of the walls. Firstly, the fortifications utilize the natural contours of the site to a great extent, i.e., they tend to follow the highest ground available, even if that would result in a vast circuit which was never meant to be filled with housing. Such *Geländemauer*-type circuits were favoured until the early Hellenistic period when, due to constant warring,

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55 Martin 1947, 106, 129, 138, fig. 12.

56 Randsborg 2002, 231-232, fig. IX, 33-35. The best and the clearest parallel is the last, a drawing cited from a previous publication on Lycian Apollonia. Compare the drawing with Fig. 9.

57 Randsborg 2002, 228-231, figs. IX, 31-33. The first photo is the best comparison.

58 Randsborg 2002, 214, fig. IX, 8. Compare Randsborg's photo with Fig. 14.

59 Randsborg 2002, 216, fig. IX, 12 and 13. Compare especially the latter one, depicting the Dema wall in Attica with Fig. 13.

60 Randsborg 2002, 216-221, figs. IX, 14-17; Suha 2009, 127, fig. 5. Compare these photos with Fig. 20.

61 Randsborg 2002, 222-227, figs. IX, 21-26. Compare especially Randsborg's figs. IX, 25-26 with Figs. 12 and 18. This kind of masonry seems indeed to be the most popular one in this part of Greece: In addition to the examples given by Randsborg, I have observed similar masonry at Paramythia, Agios Donatos, Polyneri (Koutsi), Dhimokastro and Kastritsa, to name a few.

shortages of manpower became ever increasing in walled cities throughout the Greek world. With diminished manpower, guarding extremely long walls became impossible.[62] Of course, in Elea the natural contours of the site are extremely favorable, so only very short stretches of built walls are required for defence, i.e. it should perhaps not be considered a *Geländemauer*-site.

Secondly, the southeastern stretch of the walls especially is built fairly close to the steeply rising mountainside. To the east of the walls the ground rises, first gradually but then fairly steeply, so that some 90 m east of the curtain the ground level is at 580 masl, some 30 m higher than the walls themselves. This might have been safe as long as the attackers had only hand-held bows, the range of which is approximately 75 m. But if the attackers had catapults, the normal range of which was some 200-300 m, the situation would have become very dangerous for the defenders.

Catapults were invented in Sicily in 399/398 BC. At first they were merely gigantic arrow-shooting crossbows. Such weapons were first and foremost anti-personnel devices, which could not harm stone walls. As the catapult was rapidly refined, it was first adapted to shoot stones, and later on its spring mechanism was renewed completely. The new torsion-spring catapults were considerably more powerful and could thus seriously damage the walls. By the 330s the first heavy torsion-powered stone-shooters were in use, first by the Macedonians, and they quickly spread across the Hellenistic world.[63]

Thirdly, the general impression of the walls is that the defensive strategy behind them is passive. The walls are straight, they traverse flat, easily approachable ground and only minimal flanking is employed. Only one small tower guards the corner of two long curtains, protruding only 3-4 m from the line of the curtains. Even if it indeed had two chambers, one on top of another, only a very limited amount of protective fire could have been directed in front of either curtain, even less so if there was only one chamber on the level of the parodos. In addition, only two small gates or posterns pierce the walls, which makes for extremely limited sallies in times of siege. No outworks outside the walls are built. The passive defensive strategy was favoured before the spread of siege equipment and, most importantly, artillery.[64]

Fourthly, the lower parts of the eastern and the northeastern curtain have fairly rough masonry with gaping, carelessly made joints. Thus they were not designed to withstand a determined assault using heavy siege equipment. Rams and catapult balls were a threat to wide seams. If a ram could break open such joints, it could then dislodge the adjacent blocks which would eventually result in a breach in the wall. Rams were invented in the Middle East fairly early on, but they were truly adopted into Greek warfare only around a decade before the Peloponnesian War, i.e., roughly in the 440s BC.[65]

Although the lower part of the eastern wall has careless, gaping joints it is also extremely thick, up to 4.6 m. Such a massive wall could withstand rams or bombardment quite well. Despite being rather uncommon, such thick walls were occasionally built.[66] In Gitana, some 29 km east-northeast from Elea, the polygonal northwestern wall covering

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[62] Winter 1971, 111-114.
[63] Marsden 1969, 43, 49-62.
[64] Winter 1971, 154.
[65] Winter 1971, 85-86, n. 44, 155-156.
[66] According to Winter 1971, 134-135 "the thickest walls are usually those of the mid-fourth century or later".

the easiest approach to the city is some 4 m thick, while the thickness of walls on other sectors is ca. 2.5 m. The northwestern sector is further reinforced by six large towers. The settlement was founded and fortified around the mid-fourth century.[67]

In the enceinte of Cnidus in Asia Minor the most vulnerable sector, the eastern wall, is built of polygonal masonry. The wall is some 4.8 m thick, while the ashlar walls of the same enceinte are, on average, 2.5 m thick. It is also noteworthy that the thick eastern wall has reverse towers.[68] In Erythrae the northern curtain is some 3.5 m thick, whereas the thickness of the southwestern curtain is 4.8 m, changing into 5.2 m further east. The wall is straight, following the highest ground along the shortest possible course. Only two towers guard this sector.[69]

McNicoll dated both enceintes to approximately 330 BC. According to him such excessively thick walls were built during the fourth century by cities which had to finance the wall-construction themselves. The thick walls reappeared around the end of the third century due to the changes in defensive strategy.[70]

To counter the threat of ever developing siege equipment, the wall builders of the late Classical and early Hellenistic world refined the structure of walls. The joints were built tighter, more precise and the facing of blocks themselves was intentionally left rough, bulging. The bulge prevented the head of the ram or heavy catapult ball from breaking open the joint, by deflecting it before it could hit home. High bossing was preferred especially against the use of rams, which could hit the same spot repeatedly in quick succession.[71] This change of masonry is very clear in Elea, as the upper parts of all the curtains consist of precisely cut, bulging blocks with carefully shaped, tight joints. The new kind of masonry enabled the builders of the eastern wall to reduce the width of the curtain without sacrificing any of its stability. Such a masonry style is indeed prevalent in many Epirote fortresses, as observed by Randsborg.[72]

More details have to be used to get a better idea on dating. Small triangular and occasional quadrangular stone plugs are conspicuously common in the lower masonry of the eastern curtain, especially along its southern half. Parallels for such a widespread use of plugs are found in Arcadia. In the fortress of Agios Nikolaos the walls consist of polygonal masonry with frequent plugs. In addition, all the corners of the enceinte are drafted. Frequency of plugs was also noted in the fortress of Paleokastro/Bouphagion. Plugs, both triangular and quadrangular, are common in Gortys. The scholars who studied these Arcadian sites suggested that, at least in Arcadia, masonry with drafted corners and frequent use of plugs could be connected with the Macedonian occupation, that is, late fourth to the early third century.[73]

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[67] Kanta-Kitsou 2008: 29-31 on walls. On dating, Kanta-Kitsou 2008, 20, 22
[68] McNicoll 1997, 55-58, 72.
[69] McNicoll 1997, 65.
[70] McNicoll 1997, 72. If possible, the defenders had tried to follow the highest possible ground, no matter how large an enceinte became (see n. 59). As the siege equipment developed and as the constant warring drained the manpower over the course of the third century, the wall builders had to adapt to the new situation. The preference to always follow the high ground was abandoned and the size of the enceintes was reduced. Thick walls were necessary when the newly reduced walls crossed vulnerable sectors.
[71] Lawrence 1979, 240
[72] Randsborg 2002, 222, 224.
[73] Charneux and Ginouves 1956, 528-542; Martin 1947, 128-129, 144. According to Martin the large enceinte of Gortys was built during the early fourth century. During the early Hellenistic period the north-northeastern

Grooves cut into the masonry are found in the upper part of the eastern curtain, between the Eastern Gate and the tower. In the northeastern curtain there are three grooves, one of which is peculiarly crooked. All the corners of the tower are clearly drafted. In addition, where the northern curtain makes a slight bend, there is a shallow drafting ca. 5 cm wide on both sides of the bend. Drafting of the corners, both in towers and other turning points of walls seems to have become customary by the mid-fourth century.[74] Hammond, on the other hand held the view that the drafting only became common during the latter half of Pyrrhus' reign, i.e. during the 280s-270s.[75]

The battery in the southeastern corner was probably built in the last phase, as it is clearly added to the pre-existing curtain wall. The masonry is very crude and the addition lacks drafted margins. In the inside of the wall the large gaping joints posed no danger as the enemy had no access there.

The northern curtain is badly damaged despite being up to 4 m thick and built of large, well cut blocks. Today, most of the curtain is only 1.5 m high with only one short stretch being higher. Before the restoration, the blocks fallen from the wall were spread over a conspicuously wide area. Today the outer face is cleared of fallen blocks, whereas the inner face is not. The difference in condition between this and the eastern curtain, which is still standing up to 4.5-5 m high, is striking. Perhaps the Romans deliberately demolished it in 167 BC, to prevent any future military use of the enceinte, as was done in Orraon, modern Ammotopos, where the entire enceinte was completely destroyed.[76]

Conclusions

In Elea the builders of the wall started to build an excessively thick, massive polygonal wall some 4.5-5 m thick on the eastern side, using the stones quarried on site. The lie of the land, with level ground on the outside, hills and valleys on the inside, required thick and massive building to stabilize the lowest parts of the walls. Excessively thick walls could also withstand siege engines quite well. Contrary to Dakaris' suggestion, the thick lower part of the eastern wall is not an additional structure but originally built like this.

Different gangs of masons were responsible for their own stretches of the curtain as sub-contractors. Each gang had a different way of treating the blocks, and to add to the differences in style, the shape of the blocks themselves also affected the final outcome. The building seems to have progressed at varying speeds at different sectors.

Based on the plan of the walls, with minimum flanking protection, the presence of only one tower of modest size, the masonry of the walls and the parallels, the lower part of the walls can tentatively be dated to the late Classical period. I would like to date the walls to the latter half of the fourth century, perhaps around the 340s to 330s BC.

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wall was rebuilt completely, and the South Fort was built in the third century. More recently, Maher has suggested that the original plan of the site consisted of only one circuit, the southern extremity of which was the "South Fort". He saw only two building periods in Gortys, the original building period during the early fourth century and the Hellenistic repair of both the northeastern sector and the "South Fort", probably after 219 BC. According to him, both sectors were rebuilt following the original course of the walls. See Maher 2012, 487-489, 496, 498, fig. 7.29.

[74] Lawrence 1979, 241-243.

[75] Hammond 1967, 68.

[76] Hammond 1967, 155-156.

In the middle of the construction a new kind of masonry style was adopted. In the eastern curtain and the eastern half of the northeastern curtain the change took place when the builders had reached a height of some 2-3 m. In the middle of the northeastern curtain the work had barely begun before the change of masonry style, but closer to the Northeastern Gate the work had progressed slightly further. In the only preserved section of the northern curtain, close to the gate, it seems that the work had progressed approximately at the same rate as in the eastern curtain, reaching ca. 2 m above ground before the change of styles.

The masonry changed into a more regular one, with slightly bulging, quarry- or hammer-faced blocks and tight, well-cut joints forming an undulating web of joint lines. As the new masonry style was adopted, the thickness of the eastern wall could also be greatly reduced, from 4.6 to 3.1 m. The new kind of masonry could better withstand earthquakes, frequent in the area, despite the reduction of thickness. It was also most likely considerably cheaper to build than the previous, thick wall. However, the fundamental reason for changing the style lay in the rapid changes in siege warfare. The new kind of bulging, tight-jointed masonry could better withstand the besiegers' rams and, more importantly, catapult bombardment. As the heavy stone-throwers only became common during the late fourth to the early third century, I would suggest that the change of masonry took place around the last quarter of the fourth century BC.

The early Hellenistic period was the heyday of Epirus, especially during Pyrrhus' reign (297-272 BC). International trade, closeness to the sea and the stability of the whole area helped the local settlements to gain wealth and invest in fortification building. A couple of decades after Pyrrhus' death were still peaceful, but towards the end of the third century the neighbours of Epirus became ever more troublesome. The Illyrians conquered one of the greatest Epirote cities, Phoinike, in 230 BC. In the 220s both the Aetolians and the Illyrians conducted raids into Epirus, causing widespread destruction and even plundering Dodona in 219 BC.

As Elea was the major population center of the area, it would have been necessary to strengthen the defenses when faced with such turbulent times. Thus I would claim that the last update of the walls, adding a strong reverse battery to the vulnerable southeastern corner and the reduction of the Northeastern Gate to a mere postern, took place around the last quarter of the third century BC.

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The Gouriza Field: Looking beyond the Surface Scatter

Tommi Turmo

The site of Gouriza (PS 29) is situated to the north of the village of Agora. It lies in the middle of the fertile Kokytos valley, in a landscape consisting of alternating olive groves and cultivated fields.[1] The fields slope down gently towards the Kokytos, running at a distance of about a km towards the southwest. In the close neighbourhood of Gouriza there are another three similar rural sites (PS 30, PS 48 and PS 49), which all were discovered during the intensive field survey work of the Thesprotia Expedition and which have been interpreted as farmsteads or villages. The sites are located close to each other on a ridge in between two ravines originating close to Agios Donatos on the lower slopes of the Paramythia mountain range (Fig. 1).[2]

A series of further sites of major archaeological interest lie in the close vicinity (1-2 km) of Gouriza; the fortresses of Agios Donatos and Kioteza to the north and northeast respectively, and the monumental tomb of Marmara to the west (Fig. 1). All these sites date chiefly to the Early Hellenistic period,[3] when the valley experienced an unprecedented prosperity peaking during the reign of Pyrrhus 297-272 BC. The resulting increase of population gave rise to towns like neighbouring Elea, but it is equally observed in the rural environment with a large number of villages and other rural communities.[4]

Gouriza was discovered in spring 2006 in connection with the intensive survey, when a clearly visible surface scatter was detected on a freshly ploughed field, which was walked as tract C 7 (Fig. 2). The surface finds consisted of tiles and pottery, concentrated in the southeastern part of C 7. A similar, although less thick surface scatter was noted in the northern corner of field C 8, some 20-30 m to the south of C 7. Furthermore, large limestone blocks could be seen covered by bushes in the northernmost corner of the olive grove between C 7 and C 8. These remains all seemed to belong to one and the same site, an assumption which was confirmed in 2013 when the olive grove was newly ploughed, revealing that the surface scatter of C 7 and C 8 also extends to a large part of the olive grove,[5] thus creating a site covering in total at least 80x120 m.

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[1] A number of individuals have contributed to this article. First of all I would like to thank B. Forsén for his advice and encouragement throughout the writing process. The magnetometer maps were provided by T. Smekalova and all the information related to the excavation was based on notes by S. Silvonen, who functioned as trench master during the excavations in 2007. The photographs for Fig. 4 were taken by E. Tikkala, N. Heiska, L. Haikonen and S. Silvonen, the profile drawings in Fig. 5 were made by S. Silvonen and H. Lehto and finally, most of the pottery drawings (Nos. 1, 3-7, 9, 13-15) by A. Patteri. All other illustrations are by the author.

[2] Forsén *et al.* 2011, 116-119.

[3] Cf. Forsén *et al.* 2011, 109-113 (Agios Donatos), 114 (Kioteza), 115-116 (Marmara), in addition to which Pietilä-Castrén 2008; Riginos and Lazari 2007; Suha 2011.

[4] Forsén 2011, 15.

[5] The extensive surface scatter covers in particular the northwestern corner of the olive grove between C 7 and C 8. Moreover, the large dump derived from the excavation of the building had been spread over the surface of the northeastern and northern parts of the olive grove. The surface is therefore artificially peppered by newly excavated material, an issue which needs to be taken into consideration when carrying out possible future observations.

Fig. 1. The location of Gouriza in relation to the Kokytos and other neighbouring archaeological sites.

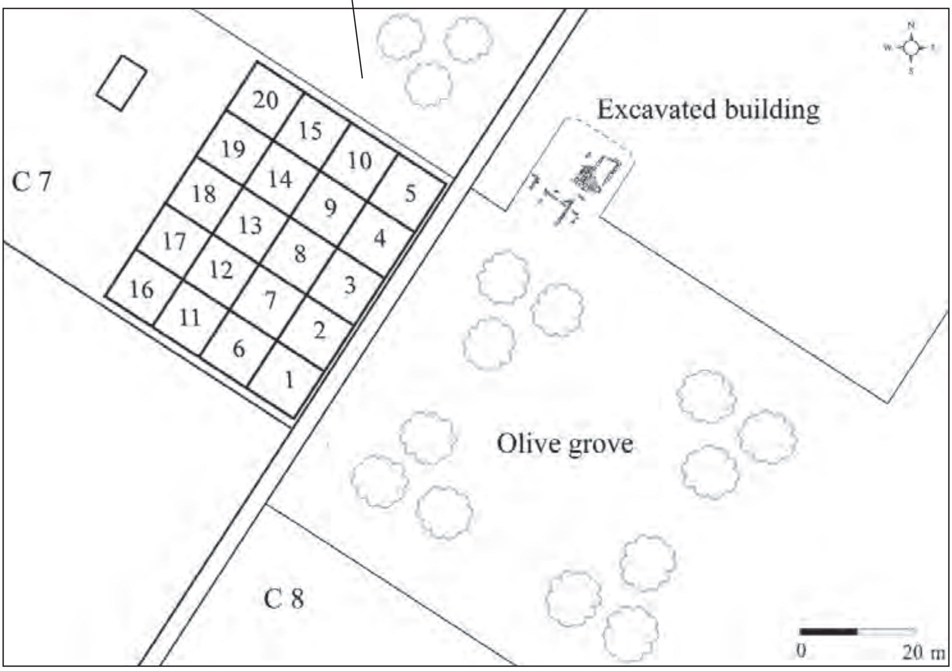

Fig. 2. Map showing the location of the fields C 7 and C 8 and the olive grove, as well as the gridded part of C 7 and the excavated building in the northern edge of the olive grove.

The following two years, i.e. in 2007 and 2008, the field C 7 and its immediate vicinity was a target of active archaeological research. Part of C 7 was gridded and intensively surveyed, then prospected by magnetometer and finally studied by trial trenches. Further, the limestone blocks were revealed to belong to the large building structure at the northern edge of the olive grove. It was first studied by trial trenches as part of the Thesprotia Expedition and later excavated in its entirety by the Greek Archaeological Service. The site as a whole was subsequently interpreted as a Late Classical to Early Hellenistic village.[6]

[6] Forsén *et al.* 2011, 116-119.

The various studies implemented in the field C 7, where the site was first observed, are tied together in this chapter. The existence of several different datasets obtained through different methods makes this tract, the Gouriza field, into a good case study of comparing the results drawn on the basis of the surface scatter with the real subsurface remains. The excavated building in the northern edge of the olive grove will be the subject of another forthcoming study.[7]

Surface finds and magnetometer prospection

After the initial observations in connection with the walking of tracts, the southeastern half of C 7 was gridded in order to collect more refined information on the distribution and extent of the topsoil finds. 20 squares measuring 10x10 m each were marked out in four rows covering a total area of 2000 m². The find density was calculated in 5 m² circles at the centre of each square. The results indicate a concentration of finds along the very southeastern edge of the field (Figs. 2-3), with the squares bordering to the dirt road showing the highest find density numbers. The surface finds consisted of badly preserved pottery sherds, fragments of Laconian roof-tiles and a loom-weight. Tiles were found in large amounts in every square, their number being in average about five times higher than that of pottery (Fig. 3).[8]

Square	Roof-tiles	Pottery	Density /100 m²
1	15	8	460
2	17	5	440
3	34	8	840
4	27	5	640
5	17	2	380
6	2	1	60
7	14	2	320
8	14	1	300
9	18	5	460
10	7	0	140
11	3	1	80
12	8	1	180
13	5	1	120
14	6	1	140
15	4	0	80
16	2	0	40
17	2	0	40
18	3	0	60
19	2	1	60
20	3	0	60

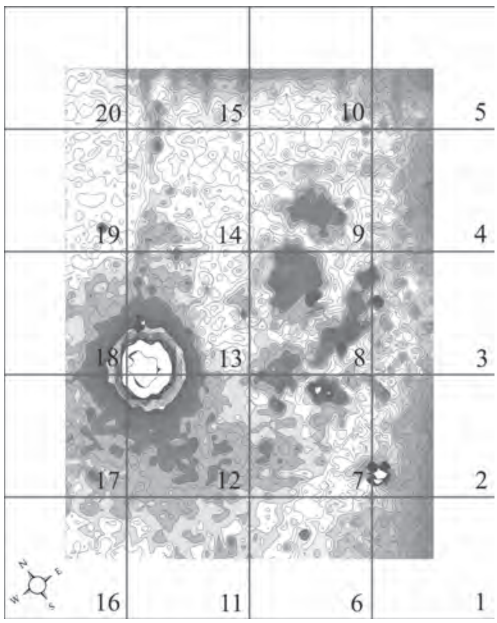

Fig. 3. Surface finds from the squares in comparison with the magnetometer map.

[7] Turmo, forthcoming.

[8] Occasional flint fragments form a small part of the assemblage. They occur in nearly all fields of the Kokytos valley. Further cf. Forsén *et al.*, this volume.

Fig. 4. Work in progress in the Gouriza field (C 7) in the years 2006 and 2007.

Once the surface finds had been documented, the part of the field that had been gridded was surveyed by magnetometer. Due to magnetic disturbances caused by the iron fence surrounding the field no measurements could be taken closer than 5-10 m to the fence.[9] The circumstances for conducting a geophysical survey were considered promising, since the subsurface remains were covered by an unobstructed flat field.[10]

The magnetometer survey gave interesting results (Fig. 3). Magnetic anomalies referring to concentrations of ceramic material and possible underground structures could be seen particularly in the eastern half of the detected area, very much as evidenced by the surface finds. Squares 8 and 9 were considered most promising, where the dark areas in the magnetometer map were assumed to indicate concentrations of ceramic material and were interpreted as possible rooms. The areas in various shades of grey delimiting these dark areas were thought to indicate traces of walls. The large round anomaly at the border between squares 12 and 13 is caused by an underground pipeline of the modern irrigation system with a standpipe. The installation of the pipeline had largely contaminated most of the western half of the prospected area.[11]

If assumed, that the magnetic anomalies of squares 8 and 9 represent the centre of the site, then the find density falls off sharply only some 10 m from the centre of the site, something that can be considered a rather low lateral displacement in a field actively

[9] The magnometer survey was conducted by T. Smekalova in 2007. See Smekalova 2009, 18-20 for the methodology used.
[10] Cf. Cavanagh *et al.* 2005 for geophysical prospection on rural sites in Greece in general.
[11] The underground pipeline is faintly visible running towards the north from the standpipe.

under cultivation.[12] This observation seemed to indicate that the actual site was buried deep, almost out of reach of the traditional ploughing. This was also confirmed by coring with a geological auger, whereby a cultural layer was found ca. 40-50 cm below the surface.[13]

Although the highest density of the surface finds had been found in the squares bordering the dirt road (especially squares 3 and 4), no magnetic anomalies could be detected here. This may depend on the iron fence surrounding the field or the construction of the dirt road, which disturbed the magnetometer data. The detected distribution of topsoil finds in squares 3 and 4 may alternatively result from continuous ploughing, which could have accumulated the artefacts to the southeast end of the field. The field is located on relatively level ground, which is sloping down towards the south with less than half a meter in 10 m length. The measured changes in the altitude did not seem significant for the distribution of the surface finds (Fig. 4).

Excavation and stratigraphy

In 2007 a trial excavation was launched in C 7, targeted at the magnetometer anomalies observed in squares 8 and 9. Because the augering samples from the site had indicated that the cultural layer was located at a depth of 40-50 cm below surface, the uppermost 30-40 cm was removed with the help of a back-hoe. This first layer comprised the ploughzone of mixed hard packed light brown clayish soil (Fig. 5).

After the topsoil had been removed a narrow test trench (12x1 m, divided into A1, A2 and A6) running parallel to the dirt road through squares 8 and 9 was opened

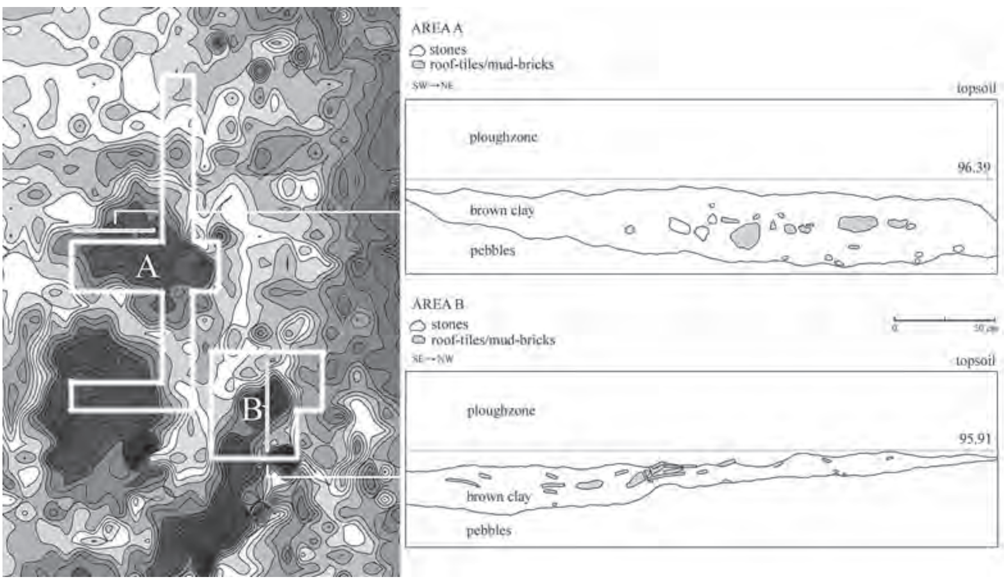

Fig. 5. Excavated areas and stratigraphy of the Gouriza field. The drawn profiles are indicated as light grey bars.

[12] Terrenato 2004, 40-41.
[13] Unpublished results of the geo-archaeological work conducted by M. Lavento and M. Lahtinen in 2007.

in order to reveal the possible wall structures and ceramic remains anticipated by the magnetometer survey. Consistent with auger measurements, roughly 45-50 cm below surface, two to three concentrations of ceramic material were detected. The finds were clustered in clearly limited areas and correspond well with the dark areas highlighted in the magnetometer map. However, the lighter areas between the concentrations did not provide fixed structures as tentatively interpreted. Instead they appeared to correspond to sections of either very little ceramic material or no finds at all.

The first long trial trench was later extended in order to cover more of the anomalies visible on the magnetometer map. The total excavated area in the field C 7 eventually amounted to 39 m^2 (Fig. 6), being divided into 14 subareas of different size (A1-A8 and B1-B6). Three different concentrations of ceramic material were localized, all apparently corresponding to the magnetic anomalies detected in the survey squares 8 and 9 (Fig. 5). Two of these concentrations were studied in more detail (mainly located in subareas A2-A5 and A7 and subareas B1-B6 respectively). The finds from these concentrations are here considered as assemblages A and B. Subarea A8 verified the existence of a third ceramic concentration, which however due to time restrictions could not be studied in detail.

Despite of the variety in the thickness of the cultural layer and in the composition of the ceramic material, the general stratigraphy for both areas can be reconstructed as comprising three basic layers (Fig. 5). The topsoil mixed by ploughing extends down to 35-45 cm below surface. This ploughzone consists of hard packed light brown clay with random fragments of roof-tiles and pottery. The following second layer includes the cultural debris; ceramic concentrations mixed with much darker and denser clayey soil. The soil was in places found very compact and difficult to remove.This layer was detected only in connection with the ceramic material and it varied in thickness between 10 and 35 cm. In those subareas where no ceramics were detected the soil turned into a layer of white pebbles mixed with gravel immediately after the ploughzone. This same third layer without finds also formed the sterile bed below the layer containing ceramics.

The find concentration assemblage A covered an area of 10-12 m^2 (Fig. 6). Finds included a large number of fragmented roof-tiles and mudbricks, pottery sherds and occasional bronze objects. The composition of the finds which at first appeared as the typical assemblage of a destruction layer commonly encountered within ancient buildings, revealed characteristics which call caution in the interpretation. The change in the soil was not directly connected to the layer of finds, but appeared well before the ceramic concentration emerged. Furthermore, no clear layer of collapsed roof-tiles was discerned. Instead, the roof-tiles of the assemblage appeared to be incorporated in a rather haphazard manner into an accumulation of various ceramic materials together with pottery and mudbricks.The find layer was broadest at the middle, reaching a thickness of 35 cm and narrowing steadily towards the edges.

The ceramics of assemblage B were located closer to the dirt road covering an area of approximately 12-14 m^2. Again, the finds were accumulated directly above the pebble layer.[14] The ceramic layer (in average 15-20 cm) is clearly thinner than in assemblage B. Here the assemblage provides characteristics which can be considered typical of the remains of a collapsed building. Roof-tiles form a thin, although very restricted horizontal

[14] It should be added that the excavation notes do not make any mention of a detected floor level other than the pebble layer mixed with gravel.

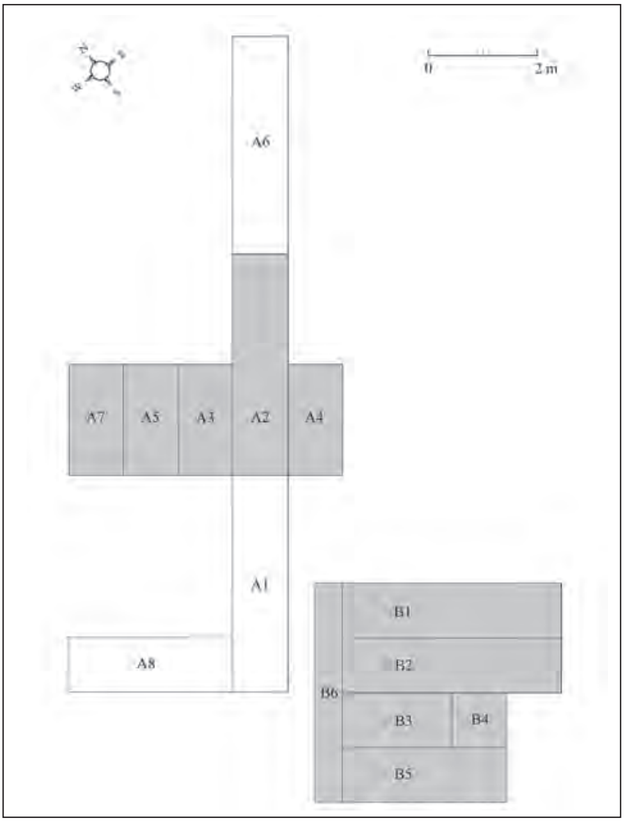

Fig. 6. Map showing the location of the excavation subareas in the field C 7 together with statistical data pertaining to pottery and roof-tiles found in each subarea.

		Pottery					Tiles	
sq	m²	n	g	Dens./m²	g/m²	MNV	n	Dens./m²
A1	4	39	203	10	51	1	132	33
A2	4	187	2 708	47	677	9	264	66
A3	2	185	3 361	93	1 681	15	148	74
A4	2	138	796	69	398	4	92	46
A5	2	102	5 473	51	2 737	5	121	61
A6	4	0	0	0	0	0	0	0
A7	2	72	398	36	199	0	39	20
A8	3	170	782	57	261	0	112	37
	23	893	13721			34	908	

	m²	n	g	Dens./m²	g/m²	MNV	n	Dens./m²
B1	4	68	348	17	87	0	81	20
B2	4	593	2 289	148	572	7	173	43
B3	2	129	529	65	265	4	146	73
B4	1	93	355	93	355	0	180	180
B5	3	189	787	63	262	3	158	53
B6	2	53	164	27	82	1	33	17
	16	1125	4472			15	771	

carpet, which allows a cautious interpretation as a destruction layer of a collapsed roof. A change in soil matrix can be associated more directly with the layer of roof-tiles and unlike in Area A the finds, which were recovered either right below or incorporated into the layer of roof-tiles, were mixed with charcoal indicating destruction by fire.

Therefore, although no fixed structures or walls could be found, the remains of Area B appear to belong to a building covered with a roof. A stone foundation for the building may originally have existed, but later been demolished and removed in connection with subsequent agricultural clearing operations. Examples of severe damage on fixed foundations inflicted by deep ploughing are common all around Greece.[15] Yet, not all rural buildings necessarily were built on a foundation made of stone. In particular, buildings which were not in the first hand meant for permanent habitation, like stables or outhouses, stood frequently on plain soil. The thick gravel bed which was detected in the field C 7 could have served as an adequate foundation for a mudbrick superstructure and a lighter roof construction. In any case, domestic buildings without stone foundation must have been much more common than the current meagre archaeological evident refers. In fact such a simple construction, which leaves a weaker foot print in the landscape, is probably more typical for the small rural sites found by survey projects than e.g. the Attic houses (Dema and Vari), which have become paradigms when interpreting surface finds.[16]

Finds

In the absence of wall structures, the closer analysis of the finds and ceramics in particularly proved decisive for the interpretation of the site. The two excavated find concentrations showed a markedly different composition of pottery shapes. Moreover, the preserved fragments provided characteristics which gave some indication of the possible origins of the material.

In general, assemblage A included a much larger bulk of pottery than assemblage B (Fig. 7), both in number of vessels (33 vs. 15) and in the variety of shapes (12 vs. 4). Yet the category of fine wares in both assemblages looks quite similar. Both assemblages are dominated by bowls and cups. The number of bowls is especially conspicuous. The bowls occur in various sizes (rim 5-16 cm), the smallest examples corresponding to the category of salt cellar. The fabric appears very homogenous, with fine, well-fired buff clay. The bowl category may include examples of one-handlers which, due to a similar looking profile without preserved handles, can easily be misclassified as bowls. The shapes of fine ware used for the pouring of liquids (jug, lekythos and lagynos) are only found in assemblage A.

The fundamental difference of the two assemblages becomes evident when looking at the plain wares and the cooking wares. The plain wares of Area A are dominated by container vessels like pithoi and amphorae (Nos. 9 and 10). Their high number is notable in particularly in relation to Area B, where they were not found at all. A similar situation prevails concerning cooking wares, which belong only to assemblage A.

The plain wares of assemblage A, while covering by far the largest bulk of the material in both weight and the number of sherds, do not offer any dominating ceramic

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[15] Cf. Haagsma 2003, 60-62, 65-68 for examples from Thessaly.
[16] Foxhall 2001, 217; Galaty *et al.* 2004, 303.

Summary of Finds

	A	B
Pottery:		
Number of sherds	684	1 125
Weight (g)	12 736	4 472
MNV	33	15
Other artefacts:		
Number of tiles	664	771
Loom-weights	0	1
Bronze objects	3	0
Iron fragments	1	0
Organic remains:		
Bones	27	0

Fig. 7. Map showing the location of the excavation subareas in the field C 7 together with statistical data pertaining to pottery and roof-tiles found in each subarea.

Pottery by ware

	A	%	B	%
Fine ware				
Cups	2		4	
Bowls	9		5	
Jugs	2		0	
Lekythos	1		0	
Lagynos	1		0	
	15	45.4	9	60,0
Plain ware				
Amphorae	2		0	
Pithoi	7		0	
Jugs	0		2	
Lekanai	1		4	
Basin	1		0	
Mortaria	1		0	
	12	36.4	6	40,0
Cooking ware				
Lopades	2		0	
Lids	2		0	
Others	2		0	
	6	18.2	0	0
Total	33		15	

fabric. Quite on the contrary the vessels show a large variety in clay matrix. Another noted characteristic, evident in particular concerning the large container vessels, is the lack of body sherds. Pithoi and amphorae were generally represented only by diagnostic rim fragments, while the body sherds, which constitute by far the largest percentage of complete vessels, were mostly missing. Amphora No. 9, for example, provided both handles, parts of the rim and base, but nothing else from the full body of the vessel.[17] The phenomenon is further emphasized in comparison with assemblage B where the number of vessels remained significantly lower than in assemblage A (15 vs. 33) despite the fact that the number of sherds was much higher (1125 vs. 684).

The peculiar over-representation of diagnostic sherds makes it highly likely that assemblage A must have gone through a process where part of the fragments of the vessels has been reused or discarded elsewhere. The large rim fragments cannot possibly represent the accidental residue in the floor, nor can they without body sherds be part of any preserved assemblage of a destruction layer. The composition of the assemblage fits much better the characteristics of a secondary deposit, strengthening the observations made already on the basis of the stratigraphy. Being located close to a domestic building, such a pile can be associated with the provisional discard of domestic household material waiting for a suitable recycling use.[18] Rubbish heaps and the existence of household refuse for practical ends are often encountered close to domestic buildings both in urban and rural contexts.[19]

[17] The total weight of the pithoi provides another example, where the lack of body sherds is reflected. Whereas the Sevasto assemblage with 11 pithoi weighed nearly 120 kg (Turmo 2011, 189), the eight pithoi of assemblage A weighed only 9 kg.

[18] LaMotta and Schiffer 1999, 21-22.

[19] Alcock *et al.* 1994, 145-147; Pettegrew 2001, 198-199.

Further evidence concerning the different character of the two find assemblages was offered by the analysis of animal bones.[20] The bones were in general badly preserved probably due to a same wet-dry cycle irrigation system, which badly deteriorates ceramic fabrics in the field. The small size and fragile condition of the bones prevented the identification of exact species, but, comprising mostly ribs and vertebrae, they could in general be classified as belonging to mammals of medium to large size. The bone finds can be considered as a typical waste from feasting. All the 27 bone fragments come from assemblage A. This makes sense if assemblage A is indeed interpreted as a rubbish dump. The floors of the ancient buildings were usually kept clean and they were swept from time to time. Organic material together with fragments of broken artefacts was dumped in a rubbish heap. The metal finds can be assumed to have ended up in the pile under similar circumstances. Although bronze handles and precious metals in general are clearly not commonly thrown away in rubbish heaps,[21] their inclusion can be explained by their broken nature.

Assemblage B shows a much more homogenous picture both concerning shapes and the fabric(s) of the vessels. The number of different shapes is in fact very limited (4). The fine ware fragments are generally very small (average length and width ca. 1-2 cm) and joins are rare, each shape represented only by one small fragment. On the basis of these characteristics they can be described as possible residue from breakage and they can be considered as primary refuse. Consisting of fragments small enough to have avoided detection during periodic clean-up, in time they probably became incorporated into the earth floor of the building.

The large jug No. 8, on the other hand, was found broken into a total of 78 sherds and spread inside a wide area of several excavated squares B1-B5 (for data on the excavated squares, see Fig. 6). These sherds provided clear breaks, which allowed the vessel to be mended from the rim to the belly. As an individual vase this large jug dominates assemblage B, constituting nearly 10% of the total weight of the ceramics. The greatest bulk of the pottery, however, both in terms of weight and number of sherds, was provided by the fabric of reddish yellow clay with small quartz inclusions. Easily breakable, it is fragmented into hundreds of sherds providing evidence of approximately 3-4 vessels of open shape, which find their closest parallel in a lekane or shallow bowl (No. 12).

The jug and the lekanai can be considered part of the final systemic assemblage (*de facto* deposit) buried under the destruction layer of the roof-tiles. Broken and scattered over the floor, the vessels provide evidence for the final function of the room, which probably involved food production or storage. If not a small roofed construction on its own, the excavated Area B may well represent part of a larger building, which was partly destroyed and covered by the current dirt road. The thick topsoil scatter detected on the other side of the road may thus belong to the same building.

Because of the short distance between Area A and Area B it seems highly likely that the two assemblages are somehow related to each other. This is evident already on the basis of the fact that the fabrics of the fine ware look very similar in both assemblages. However, no sherds or joins from vessels can be detected that would directly connect the

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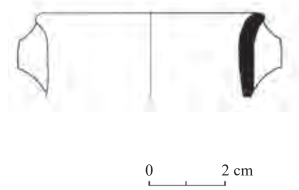
[20] The bones were analysed in 2010 by V. Deckwirth.

[21] The rarity of the bronze fragments found in the post-depositional context is testified in rubbish heaps excavated in the city of Halieis, where otherwise rich town context provided only one coin and unrecognized odd fragments of metal in two large excavated rubbish piles (Ault 1999, 567-568).

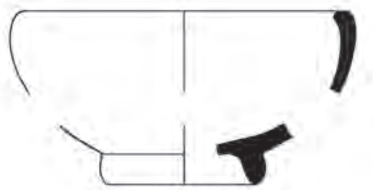
two assemblages. Rather than expecting a one-to-one relationship, the rubbish dump, comprising a wide array of pottery shapes, can be interpreted as a representative selection of ceramics used in a domestic context. Very little is missing from the pottery shapes generally associated with domestic assemblages. The great variety of fabrics present, in particularly in the plain wares, nevertheless reflects the fact that the dump received waste from not just one, but several sources. It can therefore be better interpreted as a mixed assemblage of the village, including rubbish probably deriving from several buildings and households belonging to the Gouriza site.

Catalogue

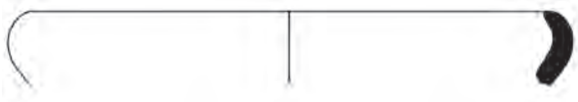
Pottery



1. Skyphos. Rim diam. 5.9 cm. Small fragment of rim with handle attachment preserved. Fine reddish yellow buff clay (Munsell 5YR 6/6) with small white inclusions. Black glazed.
Find context: B2, Loc. 2, p. 3.
Cf. Edwards 1975, 76-82; Pemberton 1989, 34-36; McPhee and Pemberton 2012, 176-177.
Date: 350-275 BC.



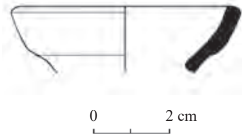
2. One-handler. Rim diam. 8.8 cm. Base diam. 4.0 cm. Est. height 4.7 cm. Strong inward curve of the wall. Ring base. Rim and base restored from four fragments. A shallow boss below rim indicates attachment point for a handle. Very fine reddish yellow buff clay (7.5YR 7/6) with small white inclusions. Black glazed.
Find context: B2, Loc. 2, p. 2; B3, Loc. 2, p. 2-3.
Cf. McPhee and Pemberton 2012, 180-183, nos. VI-75-89; Andreou 2009, 129-139.
Date: 350-275 BC.



3. Echinus bowl. Rim diam. 16 cm. Strong inward curve of the wall. Preserved in one small fragment. Very fine reddish yellow buff clay (7.5YR 7/6) with small white inclusions. Black glazed.
Find context: B5, Loc. 1, p. 1.
Cf. Sparkes and Talcott 1970, 131-132, nos. 825-842; Andreou 2009, 129-139; McPhee and Pemberton 2012, 105-107, nos. IV-7-15.
Date: 350-300 BC.

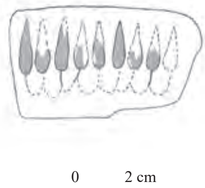
4. Salt cellar. Rim diam. 4.6 cm. Base diam. 3.4 cm. Height 3.4 cm. Inturned rim. Ring base. One-half complete, restored from eight fragments. Very fine reddish yellow buff clay (7.5YR 8/6-7/6) with small white inclusions, possible mica. Black glazed. With a rim diameter of just 4.6 cm the vessel could also be interpreted as a miniature vessel.
Find context: A3, Loc. 2, p. 6.
Cf. Gauer 1975, 198-202, no. 30,15; Sparkes and Talcott 1970, 137-138, nos. 947-950; Rotroff 1997, 167, nos. 1075-1076.
Date: 375-300 BC.

5. Lekythos. Rim diam. 5.6 cm. Preserved in one fragment. Pale yellow buff clay (2.5YR 8/3-8/4). Black glazed.
Find context: A4, Loc. 2, p. 1.
Cf. Sparkes and Talcott 1970, nos. 1107-1108; Rotroff 1997, 155-156.
Date: Fourth century BC.

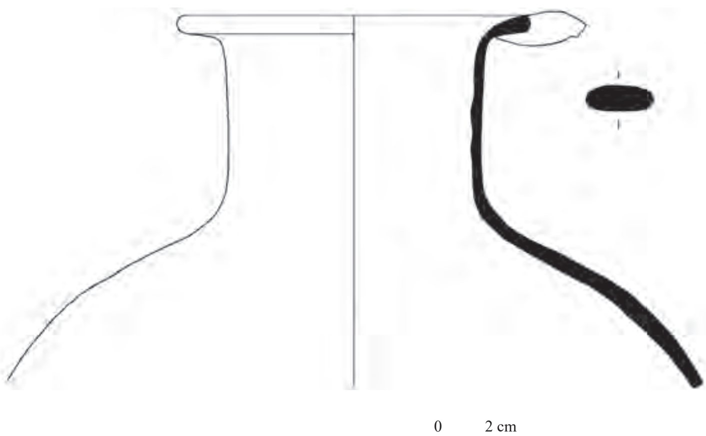


6. Lagynos? Rim diam. 3.0 cm. Preserved in one fragment. Pale yellow buff clay (2.5YR 8/2). Black glazed. Small white/red inclusions.
Find context: A3, Loc. 2, p. 1.

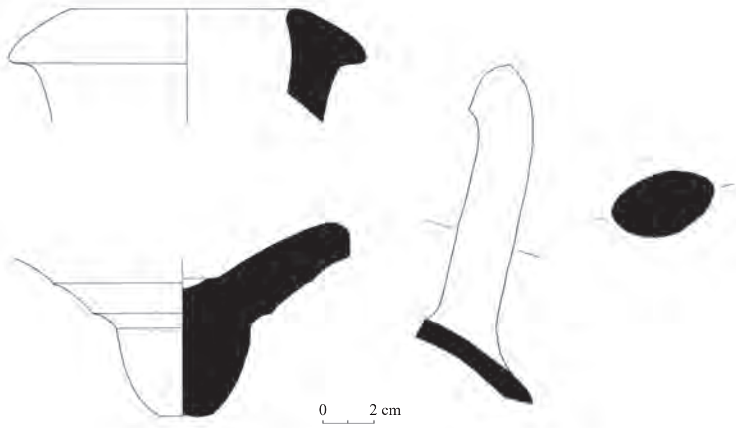
7. Crater. Rim diam. 35 cm. Preserved in two fragments. Strongly projecting rim. Top side of rim decorated with a chain of lotus buds. On overhang traces of ivy decoration. Painted in glossy black glaze. Reddish yellow sandy very fine buff clay (5YR 7/6) with small grey inclusions.
Find context: Removal of the topsoil; A5, Loc. 1, p. 1.
Cf. Hidri 1994, 154, Tab I.1.; Forsén *et al.* 2011, 118-119.
Date: 525-450 BC.



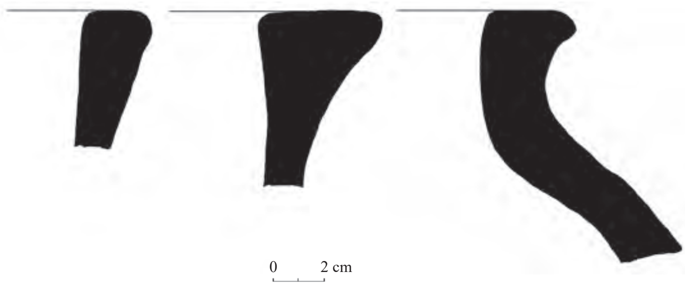
8. Jug/Pitcher. Rim diam. 14 cm. Restored height from belly to rim 15 cm. Projecting rim. Strap handle from shoulder to rim. 78 fragments. Light yellow buff clay (7.5YR 8/6-7/6) with small grey inclusions, reddish spots on surface.
Find context: B1, Loc. 1-2, p. 1; B2, Loc. 2, p. 1-7; B3, Loc. 2, p. 2; B4, Loc. 2, p. 1; B5, Loc. 1, p. 1; B5, Loc. 2, p. 4.
Cf. McPhee and Pemberton 2012, 146-147; Pemberton 1989, 18-19.
Date: Fourth century BC.



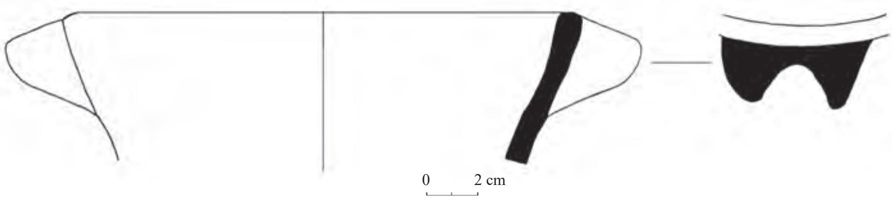
9. Amphora. Rim diam. 8.8 cm. Down-turned rim with inner edge. Handles oval in section. Preserved with rim, handles and toe. Pale yellow clay (2.5YR 8/2) with inclusions of quartz and ceramics. Light pinkish stripe in core.
Find context: A2, Loc. 1, p. 1; A3, Loc. 1, p. 1; A4, Loc. 1, p. 1.



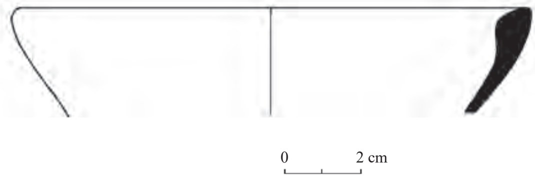
10 a-c. Pithoi. Rim diam.from 26 to 40 cm. a and c: Light red coarse fabric with black core with a lot of large white gravel inclusions, badly burnt and crumbles easily. b: Similar fabric to basin No. 11 with reddish yellow clay with a lot of large white inclusions, gravel.
Find context: A2, Loc. 2, p. 2; A3, Loc. 2, p. 1; A3, Loc. 2, p. 4.



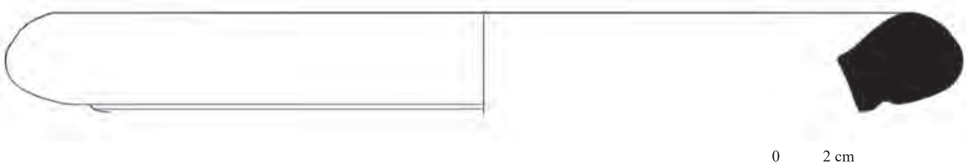
11. Basin. Rim diam. 19 cm. Handle and part of rim restored. Handmade. Spool handle. Coarse reddish yellow clay (5YR 7/6) with a lot of white gravel inclusions.
Find context: A3, Loc. 2, p. 1.



12. Lekane. Rim diam. 22 cm. Slightly incurved rim. Preserved in one fragment. Reddish yellow clay (5YR 7/8-6/8) with a lot of inclusions (large white and grey with ceramics and occasional shells), well-fired, surface scraped.
Find context: B6, Loc. 1, p. 2.

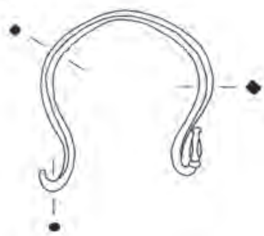


13. Heavy-rim mortar. Rim diam. 34 cm. Almost horizontal rim. Articulated by strong groove on underside. One fragment preserves part of rim. Pale yellow buff clay (2.5YR 8/2), light pinkish stripe in core. No grits. Red and grey inclusions.
Find context: A5, Loc. 2, p. 6.
Cf. Villing and Pemberton 2010, 590-594; Turmo 2011, 189-191, no.17.
Date: Late fifth to third centuries BC.

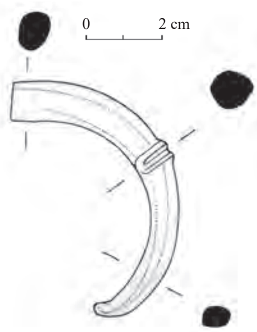


Small finds

14. Bronze handle (possibly of situla). Thickness 0.2-0.3 cm. Diameter 4.5 cm. Weight 4 g. Semicircular swinging handle ending in buds.
Find context: A2, Loc. 2, p. 2.
Cf. Gauer 1991, 279-280, E133, 144; Kanta-Kitsou *et al.* 2008, 118.
Date: Mid-fourth century BC.



15. Bronze handle. Thickness 0.4-1.0 cm. Estim. diam. 9.0 cm. Weight 33 g. Octagonal cross section with notched pearl. Roughly half preserved of the original length.
Find context: A5, Loc. 2, p. 6.
Cf. Gauer 1991, 232, Le 547-551, 554; Turmo 2011, 194, no. 29.
Date: Late Classical to Early Hellenistic.



Date

The dating of rural structures more closely often turns out to be a difficult task. One of the problems lies in the composition of ceramics dominated by cooking ware and container vessels which are generally difficult to date more precisely. The problem is emphasized in survey projects which normally collect only a handful of badly preserved ceramic fragments as surface finds.[22] The surface finds from cultivated fields are exposed to several processes of which abrasion and dry-wet cycles particularly are known to cause serious damage to the ceramic fabric.[23] The collected topsoil ceramics from the gridded area C 7 identified, for instance, only two shapes, including a rim of black glazed drinking cup and a possible lekane rim.[24] Based primarily on these diagnostic sherds, the site was dated to the Late Classical to Early Hellenistic period.

The trial excavation provided a much larger, yet still very fragmentary, ceramic assemblage. The fineware, which commonly provides more closely dated shapes, is represented in very fragmentary condition. Given the absence of joins, vessels could only rarely be reconstructed to provide fuller profiles. Nevertheless, a few distinctive shapes together with the bronze objects give a reasonable broad base for dating the site. Moreover, rather than looking at a single vessel for a date, the larger and more balanced assemblage of the excavation offers general characteristics which help to place it into a narrower time frame. The recently studied and published Hellenistic assemblage of the Sevasto house (275-220/200 BC), located some 8 km to the north in the Kokytos valley, is, for instance, a useful point of reference.[25]

A notable difference can be seen in cup shapes. Whereas the Sevasto assemblage is dominated by the Hellenistic kantharos, a prevalent shape of Hellenistic sites in the valley, the Gouriza field assemblage relies largely on the Classical skyphos.[26] Small fragments can allow only a relatively wide dating, but in general the skyphoi represent a late example of the shape dating to the Late Classical or the Early Hellenistic times (350-275 BC). Another distinctive feature of the Gouriza assemblage is the complete lack of plates. Instead, the category for serving and eating is represented only by bowls. This feature is typical of the late fourth century[27] and stands in a clear contrast to the Hellenistic assemblage (of Sevasto), where bowls and plates were present in much more equal numbers. The echinus bowl and the salt cellar also suggest a post mid-fourth century date.[28]

The bronze finds fit well with the time horizon suggested by the pottery. The only coin of the assemblage comes from the neighbouring region of Molossia and dates between 360 and 330/325 BC.[29] The elaborate bronze handle (No. 14), with a good parallel from

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[22] Sanders 2004, 163-167; Foxhall 2004, 259; Bintliff 2008, 26-27.
[23] Taylor 2000, 19-23.
[24] Forsén *et al.* 2011, 118.
[25] Turmo 2011.
[26] Two small fragments from assemblage B could tentatively belong to a Hellenistic kantharos. They are made from a markedly different fabric of gray buff clay. The one-handler is here considered multifunctional both as a drinking cup and a food bowl.
[27] Anderson-Stojanović 1993, 266.
[28] See discussion on bowls: McPhee and Pemberton 2012, 103-109; Sparkes and Talcott 1970, 128-138; Rotroff 1997, 157-168.
[29] Talvio 2011, 314.

Dymokastro, can be dated to the mid-fourth century BC.[30] The fragment of a semicircular handle (No. 15) represents a type which, although generally dated to the Late Classical period, also shares some characteristics with a handle from Sevasto. The lack of kantharoi and various distinctive shapes of plates introduced later on during the Hellenistic period gives a *terminus ante quem* for the Gouriza assemblage of ca. 275 BC.[31] In conclusion, the assemblage on the whole seems to date to between 350 and 275 BC.

A notable exception to the relative unity of finds is a crater of Late Archaic to Early Classical date. A large rim fragment was collected from the removed topsoil and, having no precise find context, it was not possible to relate it directly to the excavated units. Yet, a closer look at the fabric and glaze revealed another possible fragment of the same vessel, thus connecting the vase to assemblage A of the rubbish dump. The crater, by far the oldest dated find from the field, adds historical perspective to the Gouriza site. It also hints to the possibility that very fragmentary material includes other shapes, which although not identified, may belong to the previous and older period of habitation rather than the dominating assemblage of the Late Classical to Early Hellenistic period.

Discussion

Surface scatters of various density and extent are frequently encountered during intensive survey work and present one of the most common indications of archaeological sites. Most of the smaller scatters found in rural contexts (without related architecture) are generally interpreted as farmsteads, with various survey projects sharing much the same methodology in defining the sites.[32] Due to the humble nature of the finds and the fact that they are usually located in actively cultivated fields, such surface scatters rarely attract any further research activity, with excavations being almost non-existent. Nevertheless the great variety and complexity behind the generic term 'farmstead' is not, and probably cannot be tackled relying only on studies of surface finds.

Iniatially, without subsequent studies of magnetometer and excavation, the surface scatter in Gouriza field was no doubt positively classified as a rural building belonging to the small village which was assumed to be located in the neighbouring olive grove. All the common find categories associated with rural structures were already present on the surface. Plenty of roof-tiles, coarse and plain ware pottery, combined with a few sherds of black glaze fine wares and an occasional loom-weight, covering an area of ca. 40x50 m, making a good case to justify the classification.

Nevertheless, the following magnetometer prospection and the trial excavation in the field made it possible to distinguish and separate two archaeological phenomena which on the topsoil appeared as one uniform ceramic scatter. Moreover, while surface finds are often considered a reliable representation of the ceramics originally associated with the site, the excavation in this occasion was clearly able to reveal ceramic categories and metal finds which were not observed among the surface finds. This is probably to be explained by the fact that the site was fairly deeply buried, unlike the majority of rural

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30 Kanta-Kitsou *et al.* 2008, 118.

31 For example: James 2010, Appendix iii.

32 Pettygrew 2001, 190.

sites, which are usually shallow sites subjected to more rigorous erosional processes.[33] The larger and more versatile find assemblage expanded the archaeological basis for the interpretation, revealing characteristics which were beyond the capabilities of the survey assemblage. The case provides evidence of how different ancient activities may leave almost identical fingerprints in the landscape.

The majority of survey projects in Greece have revealed some kind of population peak during the Classical and/or the Early Hellenistic period. The rural landscape has been scattered with numerous small sites interpreted as isolated farmsteads.[34] In the Kokytos valley isolated farmsteads seem to be rare. The rural population instead appears to have lived in settlement clusters consisting of small villages like the one detected in Gouriza and adjacent satellite farmsteads. Such settlement clusters were found scattered in the valley at a distance of approximately 2-3 km from each other.[35] The population peak observed in the larger Epirus region seems to occur slightly later than usual, i.e., not until the Early Hellenistic period.[36]

The site of Gouriza has been the target of various campaigns of archaeological field work during the years 2006 to 2008. Together with the forthcoming publication of the excavated building in the olive grove, the site has a clear potential to test and refine the conclusions perceived on settlement patterns. The majority of the finds connects the habitation to the Late Classical to Early Hellenistic period, beginning around 350 BC which is somewhat earlier than the general flourishing and the subsequent population peak in the valley. Nevertheless, as a fine black glazed crater indicates, the activity around the olive grove probably originates much earlier.

The present study, although providing evidence of the benefits of magnetometer prospection, also reveals challenges to be faced when dealing with rural sites with limited or no preserved architecture. The magnetometer data relies on stone structures in limiting the areas of ceramic material into separate spaces or rooms, but the interpretation of data, which may work well in an urban context, probably needs to be further refined when applied in a rural environment.

It is also vital to understand how various disturbances during the quite recent past have contributed to the damage and consequent difficulties of interpretation of sites located in or near cultivated fields. The Gouriza field is limited in the northwest by the irrigation pipe dug deep under the cultivated soil. In the southeast the dirt road at least partly cuts through the site. In addition we have decades of continuous agricultural processes involving ploughing and possible bulldozing. We learnt to recognize the severe damage caused to rural sites particularly by bulldozing on several occasions during the field work in the Kokytos valley: not just the levelling of sites, but sometimes their entire truncation and transfer to a completely different field! Rural sites exposed to modern rigorous agricultural practices are in immediate danger of, if not being completely destroyed, at least having their find contexts seriously damaged. A large number of newly discovered sites located by archaeological surveys are therefore in great need of further study before their potential is permanently lost.

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[33] Foxhall 2004, 260.
[34] Alcock *et al.* 1994, 142.
[35] Forsén 2011, 15.
[36] Galaty *et al.* 2004; Forsén 2011.

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