28 THE PRELIMINARY ANALYSIS OF LITHIC ASSEMBLAGES FROM THE ARCHAEOLOGICAL SURVEY AND TEST TRENCH EXCAVATIONS AT POPOVO AND MORFI, GREECE

Nicholas Thompson[1*], Georgia Kourtessi-Philippakis[2], Domenico Giusti[1], Katerina Harvati[1,3], Vangelis Tourloukis[1,4]

[1]*Paleoanthropology, Institute for Archaeological Sciences and Senckenberg Centre for Human Evolution and Palaeoenvironment, Department of Geosciences, Eberhard Karls University of Tübingen, Germany*
[2]*Department of History and Archaeology, National and Kapodistrian University of Athens, Greece*
[3]*DFG Centre for Advanced Studies 'Words, Bones, Genes, Tools', Eberhard Karls University of Tübingen, Tübingen, Germany*
[4]*Department of History and Archaeology, School of Philosophy, University of Ioannina, Ioannina, Greece*
**nikothompso@yahoo.com*

http://dx.doi.org/10.15496/publikation-97588

Keywords: Middle Palaeolithic; Lithic Scatters; *Terra Rossa* badlands; bifaces; bifacial leaf points

28.1 INTRODUCTION

The two-year archaeological research program (2016-2017) conducted in Middle Kalamas, Thesprotia by the National and Kapodistrian University of Athens, in collaboration with the University of Tübingen in the framework of CROSSROADS, aimed at constructing a chrono-stratigraphic sequence for the open-air sites of Morfi and the recently discovered site of Popovo, by conducting a double-intensive targeted archaeological survey and test trench excavation of *terra rossa* Pleistocene deposits (Kourtessi-Philippakis et al., 2019a, 2019b; Tourloukis et al., this volume). Here we present the preliminary analysis of the lithic remains from the lowland locality of Morfi, and the upland locality of Popovo, Greece.

28.2 BACKGROUND

Although Epirus, northwestern Greece, is known for its rugged and wild landscape, the archaeological record (Fig. 1) from this region is dense and spans the Middle to Late Pleistocene (Tourloukis and Harvati, 2018; Tourloukis, 2021). Evidence for human activity is found in caves and rock shelters such as Asprochaliko (Bailey et al., 1992), Boila (Kotjabopoulou et al., 1999; Elefanti et al., 2021), Klithi (Bailey, 1992; 1999; Adam, 1998a; Roubet, 1999), Kastritsa (Higgs, 1968) and even more extensively at open-air sites, including the infamous red-bed *terra rossa* sites of Kokkinopilos (Dakaris et al., 1964; Bailey et al., 1992; Runnels and van Andel, 1993; Tourloukis et al., 2015), Mikro and Megalo Karvounari (Papoulia, 2011; Ligkovanlis,

 http://dx.doi.org/10.15496/publikation-97588

N. Thompson: https://orcid.org/0009-0003-4770-1744
D. Giusti: https://orcid.org/0000-0003-1438-4036
K. Harvati: https://orcid.org/0000-0001-5998-4794
V. Tourloukis: https://orcid.org/0000-0002-9527-2708

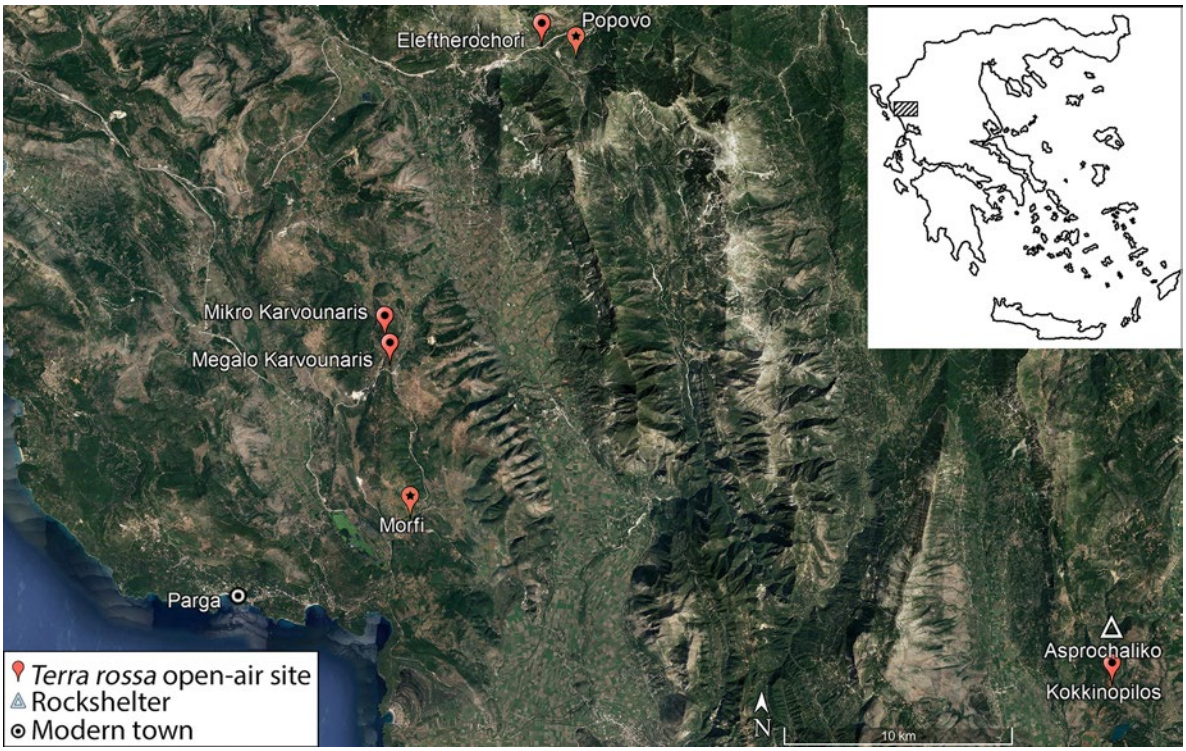

Figure 1: A satellite image with *terra rossa* red bed sites of Epirus and Asprochaliko. Popovo and Morfi are the pins with stars, while Klithi, Boila and Kastritsa are located off the map further to the north. Image, adapted from Google Earth.

2011), Morfi (Papagianni, 1999a), and Eleftherochori (Ligkovanlis, 2014; 2022) that characterize this region of Greece due to the combination of a wet humid climate, tectonics and erosion.

The *terra rossa* sites are located on the edges of rolling hills in close proximity to flood plains of both the Acherontas River for the sites of Morfi, Mikro and Megalo Karvounari, and the Louros River for Kokkinopilos. These ancient lake systems, known as raised poljes, take on their current badland form due to the combination of uplift and erosion. These sites typically occur above the coastal plains at elevations of 140 to 200 masl, protected by mountains on all sides. The exceptions to this lowland pattern are Eleftherochori and newly discovered Popovo, which are instead located in the uplands at elevations ranging from 530 to 615 masl, along the same upland drainage that joins the Acherontas flood plain further to the south.

Whereas the rock shelters of Boila, Klithi, and Kastritsa cave are younger in age, the oldest layers at Asprochaliko and the red-bed sites consist of extensive Middle Palaeolithic remains that tend to dominate the open-air lithic assemblages from this region (see Papakonstantinou and Vassilopoulou, 1997; Adam, 1999; Papagianni, 1999a; 1999b for intra-regional lithic studies). Currently, only at the open-air sites of Kokkinopilos (Bailey 1992; Adam, 2018), Megalo Karvounari and Eleftherochi (Ligkovanlis, 2011; 2014) have extensive Upper Palaeolithic remains been recovered. Of the open-air sites, only at Kokkinopilos have paleosols been dated chronometrically (Bailey et al., 1992; Runnels and van Andel, 1993; Tourloukis et al., 2015) and test trenches conducted (Dakaris et al., 1964). Therefore, the archaeological record from the remaining red bed sites is based solely on the typology of an extensive and complex surface record.

28.3 COLLECTION AREAS AND SAMPLING METHODS

At the upland locality of Popovo, lithics were recovered from five collection areas, designated as Areas 1-5. The largest *terra rossa* deposit at Area 3, provided the bulk of archaeological material, whereas the remaining collection areas with preserved sediments were patchier. The total number of lithics collected is 334, with a variability ranging from Area 1 (n=9), Area 2 (n=24), Area 3 (n=245), Area 4 (n=49) to Area 5 (n=7).

At Morfi, we collected 837 lithics from seven collection areas designated as Areas A-F and Mikro Morfi. These areas, now discontinuous on the landscape, were probably once connected and more extensive in the past. The number of finds collected from each area are: Area A (n=12), Area B (n=179), Area C (n=123), Area D (n=434), Area E (n=50), Area F (n=4), Mikro Morfi (n=35).

The lithics were collected by utilizing three separate sampling strategies: stratified lithics from 1) test trenches or 2) naturally exposed profiles; 3) surface finds. The most important is the context of test trenches, but due to the limited number of excavation units, the number of lithics recovered was insufficient to provide meaningful insights to the non-excavated remains. As such, we also collected stratified lithics from exposed section profiles in hopes of adding this data to the stratigraphy of the site, and as surface remains to help better interpret the timescale of the dense lithic scatters by use of typology (see Tourloukis et al., this volume, for the geoarchaeological results of the survey). The surveys conducted were double intensive meaning that we revisited most survey areas at least twice, but often even more times to either reinterpret the geology, or to collect more lithics.

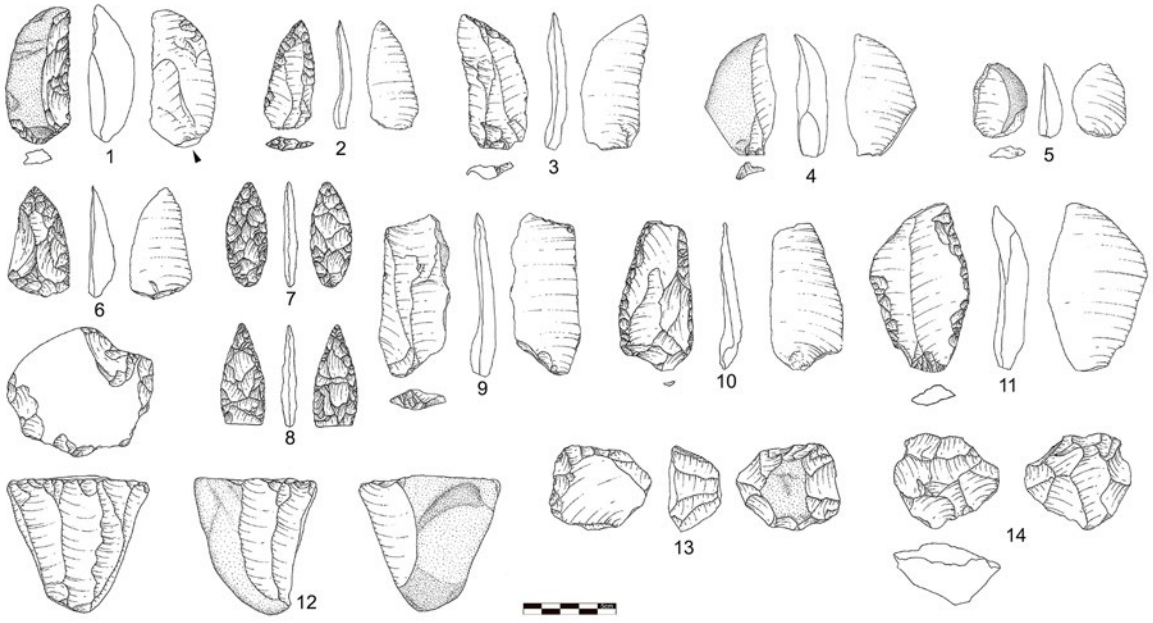

Figure 2: Sample of lithics from Popovo (2.1, 2.8, 2.9) and Morfi (2.2, 2.3-2.7, 2.10-2.14). Scrapers (2.1, 2.6, 2.11); Mousterian point (2.2); Blade (2.3); Naturally backed flakes (2.4, 2.5); Bifacial leaf points (2.7, 2.8); Backed knives on blades (2.9, 2.10); Single platform blade core (2.12); Levallois cores (2.13, 2.14).

Figure 3: Sample of lithics from Popovo (3.6,3.10-3.13, 3.15, 3.18, 3.21, 3.23, 3.24, 3.34) and Morfi (3.1-3.5, 3.7-3.9, 3.14, 3.16, 3.17, 3.19, 3.20, 3.22, 3.25-3.33, 3.35-3.41). Mousterian point (3.1); Chips (3.2, 3.3); Retouched flake (3.4); Point (3.5); Bifacial foliated leaf points (3.6, 3.7), Backed knives on blades (3.8, 3.12); Scrapers (3.9, 3.10, 3.13-3.15), Pseudo-Levallois point (3.11); Naturally backed pieces (3.12, 3.16, 3.17); Elongated flake (3.18); Bladelets (3.19, 3.20); Débordant flake (3.21); Levallois flakes (3.22, 3.25); Blades (3.23, 3.24); Plunged flake (3.26); Cores (3.27, 3.28); Levallois cores (3.29-3.35, 3.37, 3.38), Blade cores (3.36, 3.39, 3.40); Tested piece (3.41).

28.4 LITHIC PRESERVATION AND RAW MATERIALS

Because *terra rossa* sediments are acidic, organic remains like bone degrade, thus leaving lithic artifacts as the only evidence for human activities to preserve in the diachronic archaeological record from these open-air sites. Patination and freeze-thaw are common features of lithic artifacts from this region. Patination occurs when a combination of factors, such as mechanical and chemical weathering, alter the external surfaces of siliceous materials (Luedtke, 1992). The formation of patina is highly variable and is not caused by any single factor, such as the depositional age or date of manufacture of the lithic artifacts (Rottländer, 1975). In general, from the main site at Popovo, 98% of the assemblage is patinated to some extent, (compared to 91% from all the collection areas). Also, because 55% of the lithics from the main site are medium to heavily patinated, the identification of lithic raw material types is not reliable.

At Popovo, as previously mentioned, thermal frost fractures from freeze thaw are evident in the preservation of the lithic remains. After our initial sort, a total of 112 lithics from the dataset were excluded because of this post depositional process. Freeze thaw is evident when spalls randomly pop off the external surfaces like potlids from fire, but larger in scale (Luedtke, 1992). For example, when this process occurs in advanced stages, the shapes of the lithics become totally altered or even split in half making them appear as possible weathered geofacts or *vice versa*, i.e., natural pieces of flint that appear flaked.

At both sites nodular and tabular lithic raw materials are locally available. Whereas at Popovo it is more difficult to distinguish in the archaeological record, at Morfi, spherical nodules are present throughout the gravel layers of the site and were selected almost exclusively, thus partly explaining the high density of naturally backed pieces (Figs. 2.4, 2.5, 2.9; 3.12, 3.16, 3.17) from the lithic assemblage. During reduction of these cobble-sized spherical nodules, the natural backing was formed whenever a blank was removed along the lateral edges of the core. Also, of interest at Morfi is the discard of large nodular flint cores/tested pieces with a hollow geode-like center (Fig. 3.41). It seems plausible, that the ancient knappers preferred to discard these cores early in the reduction sequence instead of continuing to reduce these flawed nodules more extensively, in contrast to the more heavily reduced exhausted cores.

Even though the raw material study at Popovo is ongoing, a preliminary total of seven lithic raw material types were constructed macroscopically at Morfi using a 16x magnifying glass. The locally available flint varieties that were utilized most extensively are types 1) Gray and 2) Yellowish brown; utilized mainly in nodular form. One notable observation from this preliminary analysis was that type Gray 1 grades in color as patina forms and intensifies over time. The color changes from gray to brown to even orange or rust color. In general, artifacts produced from raw material types 1 and 2 exhibit a distinct MP character with Levallois cores, scrapers and elongated flakes and blades.

The five extra-local varieties of the less utilized flint types are 3) Dramesi brown (Pappas, 2016), 4) semi-translucent brown, 5) Drimitsa red (Pappas, 2016), 6) pink with wide circular inclusions, 7) isolated pieces with no comparable type (dusky translucent red, red radiolarite, and brownish translucent yellow). The lithic raw material types 3, 5, 6 and an isolated type 7, when utilized, are used to produce lithics that are MP in character, including a Mousterian point (Figs. 2.2, 3.1), a naturally backed blade and core. Although some pieces are typologically UP, representing only a very small percentage of the Morfi finds, such as a semi translucent brown core (Fig. 3.27), radiolarite core (Fig. 3.28) and translucent gray bladelets (Fig. 3.19, 3.20). The extra-local materials of Drimitsa

red and the Dramesi brown are located circa 30 km to the north of Morfi as the crow flies on Google Earth (for attributes and detailed descriptions of these primary nodular flint sources see Pappas, 2016; Kourtessi-Philippakis et al., 2019a).

28.5 EXCAVATION AND STRATIFIED LITHICS

At Popovo, the stratified lithics recovered from the excavation units and section profiles (n=12) are too few, undiagnostic, and occasionally too weathered or fragmentary due to freeze-thaw. Consequently, even though the majority of test trenches were sterile and devoid of stratified lithics, including a deep-test trench, the overall diversity of Middle Palaeolithic (MP) remains from Popovo makes this a promising new source of surface material, especially in contrast to the majority of the red-bed open air sites from Thesprotia that are located closer to the coast at elevations below 200 masl.

At Morfi, all test trenches were located in Areas D and E and yielded a higher number of lithics (n=59) in contrast to Popovo. The densest concentration of finds occured in a 1m x 3m test trench (n=24) from Area D north, and (n=13) from a 1m x 1m unit, Area D south. Overall, the lithics consisted of Levallois cores, tools, flakes and debris. The Levallois method of reduction dominates the lithics from not only the excavated units, but from all areas where lithics were collected, surface or stratified. Because there are no radiometric dates to support the stratigraphic context, it is currently not possible to distinguish between an older to a younger Levallois Mousterian based solely on typology and the assemblage composition of each test trench.

Furthermore, a total of 204 lithics were collected from the stratigraphic profiles at Morfi. Again, the Levallois technique for reduction dominates, with Levallois cores, flakes, blades, including double and lateral scrapers, core edge removals, plunged flakes from blade cores, and a Mousterian point. In Area B, the largest lateral scraper (Figs. 2.11, 3.9) was recovered in association with chips (Fig. 3.2, 3.3), a retouched flake (Fig. 3.4) and a Mousterian point (Figs. 2.3, 3.1) during section cleaning, a good indication of an intact paleosol with *in-situ* remains.

28.6 SURFACE LITHICS

The surface survey consisted of a double intensive targeted inspection of exposed *terra rossa* sediments, where lithics were collected over a period of two field seasons. Only Popovo, Area 5, and Mikro Morfi were surveyed once. At Popovo, a near total surface collection was conducted (n=198), whereas at Morfi, due to the higher density of surface remains, only a representative surface collection was carried out (n=571). Overall, the finds are mainly MP in character with Levallois cores (Figs. 2.13, 2.14; 3.29-3.35, 3.37, 3.38), Levallois flakes (Fig. 3.22, 3.25, elongated flakes (Fig. 3.18), débordant flakes (3.21), blades (Figs. 2.3; 3.23, 3.24), scrapers (Figs. 2.1, 2.6; 3.10, 3.13-3.15), backed knives on blades (Figs. 2.9, 2.10; 3.8, 3.12) and a pseudo-Levallois point from Popovo (Fig. 3.11). In general, at Morfi, 15% of the blanks for debitage are Levallois and at Popovo 18%, whereas facetted platforms account for 12.5% of the debitage from Morfi and 15.6% of the debitage from Popovo.

The three bifaces recovered at Popovo (Fig. 4) are possibly the main distinguishing feature of a potentially different MP facies at these red-bed sites (see Galanidou et al., 2016 for a recent summary of bifaces from Greece). Bifaces are rare and have previously only been recovered at Kokkinopilos (Runnels and van Andel, 1993; Adam, 1998b; Tourloukis et al., 2015) and Megalo Karvounari (Ligkovanlis, 2011). At Kokkinopilos two stratified bifaces have been recovered from sediments dated

to >200 ka in age (Runnels and van Andel, 1993; Tourloukis et al., 2015). Whereas at both sites, the extensive laminar blanks (Figs. 2.3; 3.18, 3.23, 3.24) and blade cores recovered (Figs. 2.12; 3.36, 3.39, 3.40) may also be part of a possibly older technocomplex dating to MIS 5. For example, at Asprochaliko the abundant laminar Levallois specimens were dated by Thermoluminescence to ~100 ka BP (Huxtable et al., 1992), while at Klissoura Cave 1, Sitlivy et al., (2007) noted that 72% of laminar blanks from the MP assemblages occur mainly in layers XVIII to XX. Layer XVIII was dated by OSL to 92.84 (7.65) ka and layer XX to 95-110 ka (Zacharias et al., 2018). Although, currently, there is no published data from other stratified Greek sites to further support this hypothesis that laminar reduction is more pronounced in the older compared to the final Mousterian.

	Popovo		Morfi		
	No.	%	No.	%	Total
Cores	29	13	93	11,5	122
Tools	56	25,2	218	26,2	274
Flakes	116	52,3	412	49,0	528
Blades	19	8,6	65	7,8	84
Chips	0	0	16	1,9	16
Debris	2	0,9	21	2,5	23
Nodules	0	0	9	1,1	9
Total	**222**	**100**	**834**	**100**	**1056**

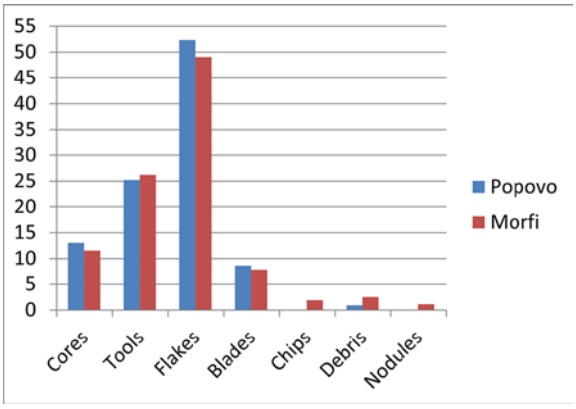

Table 1: Assemblage composition and bar graph of lithics recovered from all collection areas at Popovo and Morfi including all contexts (excavated, stratified and surface material) combined.

28.7 ASSEMBLAGE COMPOSITION

In general, the assemblage composition (Table 1) of the two sites, regardless of the differences in elevation or distance from the coast, presents some similarities. For example, flakes, tools, and cores comprise the majority of lithic finds for all the assemblages, stratified or surface.

The full range of Levallois flake cores is represented at both sites (see Figs. 2.13; 2.14; 3.29-3.38), from discoid to centripetal, whereas at Morfi there are also large blade cores (see Figs. 2.12; 3.36; 3.39; 3.40) that are absent at Popovo, even though MP blades are similar in frequencies at both sites. In general, the cores from Popovo occasionally tend to be atypical, compared to the higher density of typical Levallois cores that are found at Morfi.

28.8 TOOL TYPES

The tool-types and frequencies (Table 2) at Popovo and Morfi for the total assemblages are similar, except for bifaces at Popovo (Fig. 4), where two possible Keilmesser types and one amygdaloidal in shape were recovered as surface finds. Also, the tool-type frequencies at Popovo are much higher for scrapers, but this could be related to the shape of the raw materials because at Morfi there are higher frequencies of naturally backed pieces. In general, at both sites there are lateral, double, transverse and convergent scrapers with occasional Quina retouch (Figs. 2.1, 2.6; 3.14, 3.15), more at Popovo than Morfi. As for points, there are Levallois, Mousterian, pseudo-Levallois (Fig. 3.11), bifacial leaf points (Figs. 2.7, 2.8; 3.6, 3.7), from both sites, and a possible Gravette point (Fig. 3.5) from Morfi. Shouldered points are missing from all the red bed sites, except for a possible fragment from Megalo Karvounari (Ligkovanlis, 2011) even though there is a large assemblage of these points from Kastritsa (Adam, 1989; Adam, 2007). The

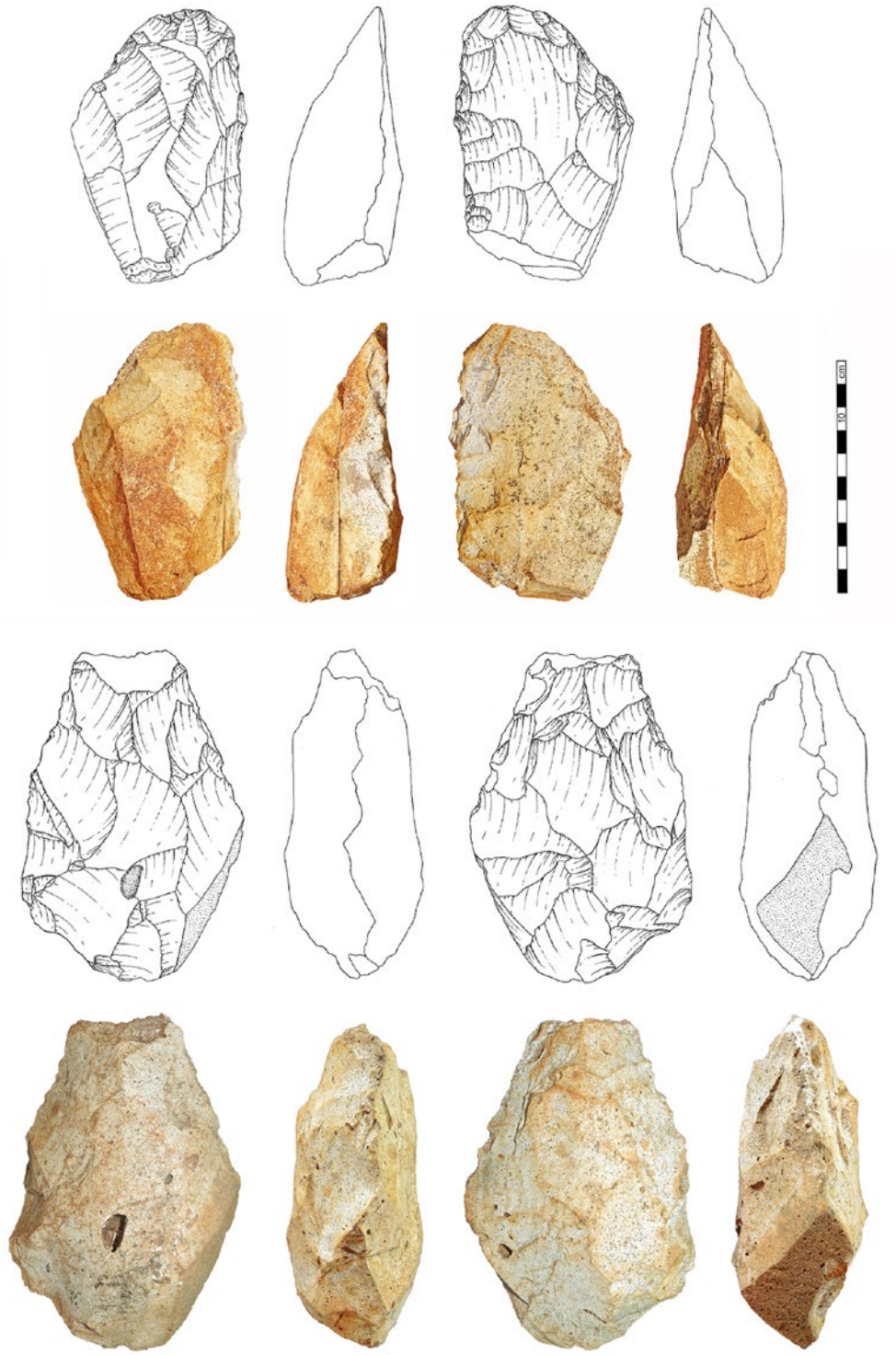

Figure 4: An amygdaloidal (bottom) and Keilmesser (top) bifaces recovered as surface finds from the initial survey at Popovo.

high frequencies of retouched pieces at Morfi compared to Popovo may reflect possible edge damage from surface material and not retouch, something that will be reinvestigated further when the material is reanalyzed. Finally, at Morfi, there are notched

	Popovo		Morfi		
	No.	%	No.	%	Total
Handaxes	3	5,4	0	0	3
Bifacial pieces	1	1,8	0	0	1
Scrapers	27	48,2	43	19,7	70
Backed knifes	5	8,9	34	15,6	39
Retouched pieces	13	23,2	76	34,8	89
Points	6	10,7	15	6,9	21
Endscra-pers	1	1,8	5	2,3	6
Notched pieces	0	0	30	13,8	30
Denticu-lates	0	0	8	3,7	8
Perfora-tors	0	0	7	3,2	7
Total	**56**	**100**	**218**	**100**	**274**

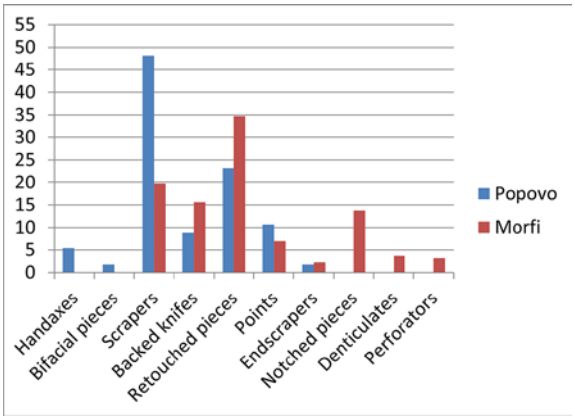

Table 2: Tool type frequencies and bar graph of Popovo and Morfi including all contexts and collection areas.

pieces, denticulates and perforators, that are absent from the Popovo assemblage.

In closing, future prospects will focus on conducting a comparative analysis with other red bed sites of the region, and to further interpret the spatial distribution of the lithic remains by constructing GIS-based inferences about intra-site and regional variability from both Popovo and Morfi, and from other red bed sites of the region.

28.9 CONCLUSIONS

In summary, the surface lithic assemblages of Popovo and Morfi are similar to other red-bed sites of Epirus that exhibit a long and rich Middle Palaeolithic history characterized by possibly an older techno-complex (with bifaces and large laminar blanks, possibly pre-MIS 5), to a younger Mousterian that is more typical to other Greek assemblages of this period. At both sites, the preferential method of reduction is dominant (on discoid and centripetal cores) and toolkits of scrapers (double, lateral and transverse), naturally backed knives and points (Mousterian, Levallois and pseudo-Levallois) with a reliance on locally available nodular flints that are more heavily patinated at Popovo in contrast to Morfi. Brown Dramesi flint and red Drimitsa flint are a few of the non-local varieties that were occasionally utilized at distances of ~30 km. At both sites, the lithic inventories also include isolated finds from the Upper Palaeolithic, such as endscrapers, bladelet cores and bladelets, whereas the majority of finds are Middle Paleolithic in character.

Consequently, because excavated sites older than MIS 3 are especially rare in Greece, the appearance of this possibly older Mousterian in Epirus reinforces the importance of trying to establish a chrono-stratigraphic framework for the conspicuous open-air red-bed sites of this region. Hence, the ambitious plan to conduct trial trenches in order to provide context to the archaeological assemblages that could be dated chronologically, and thus subsequently added to the geological sequences across the sites of Popovo and Morfi, would contribute greatly to our knowledge of not only the ages of these sites but also to identify the duration of activities and depositional histories of the archaeological remains.

As for the stratified lithics from the test trenches at Morfi, unfortunately, even though the sample of lithics recovered are typical Levallois in charac-

ter, there are currently too few in number to distinguish solely by typology if the finds are from the older or younger Mousterian. Therefore, with the exception of a characteristically Levallois debitage, with facetted platforms and dorsal scar patterns typical of centripetal flake and uni/bidirectional laminar reduction, the currently available data do not facilitate a more refined characterization. Alternatively, apart from the tephra layer located at the base of the site, there is unfortunately no other chronological marker to help remedy this situation. As a result, typology is the sole parameter for providing a provisional timescale for the archaeological record at Morfi.

At Popovo, on the other hand, the geology of the site is heavily deformed by tectonics and the stratigraphy cannot be followed horizontally across the site. Unfortunately, the lithics were even fewer in number than in Morfi, and also affected by freeze-thaw and, in many instances, the stratified lithics from the test trenches were highly fragmented and at times even more weathered than the surface finds. Nevertheless, Popovo is typologically similar to other surface scatters with lithics ranging in age from the Middle Palaeolithic to even younger periods including Upper Palaeolithic and possibly even Holocene in age at other eroded surface exposures to the north of the main site. Therefore, Popovo provides a good source of new archaeological surface material, especially for bifaces that are lacking at Morfi, but the lack of stratified remains hinders any better understanding of the timescale of activities that were conducted at the site.

Finally, in the future, with the addition of test trenches at Morfi, a more detailed picture could possibly emerge with a more rigorous approach to sampling across the site. The goals would be to locate stratified lithics, and to identify paleosols in an effort to provide a more detailed context to the remains. Increasing the density of lithic finds and constructing a more secure vertical dateable context to the overall geological sequence might provide the necessary data to make better sense of the stratified remains. However, without a chronostratigraphic sequence, critical data remains lacking to accurately describe and interpret the extensive surface scatters located where the rolling red-bed *terra rossa* sediments are preserved.

ACKNOWLEDGMENTS

This research was supported by the ERC Consolidator Grant ERC-CoG-724703 ("CROSSROADS") awarded to K.H. and by a postdoctoral research grant awarded to V.T. by the Wenner-Gren Foundation (Gr. 9271). K.H. is also supported by the ERC Advanced Grant ERC-AdG-101019659 ("FIRSTSTEPS"). We are also grateful to the Thesprotia Ephorate of Antiquities, the Thesprotia Prefecture, as well as the National and Kapodistrian University of Athens. We also thank O. Metaxas for drawing and inking a sample of lithics, V. Lekou and T. Tsirogiannis for assisting in the study of lithics, and V. Sitlivy and C. Garefalakis for providing assistance with their extensive knowledge of Middle Palaeolithic archaeology. Finally, we thank T. Tsanova and E. Adam for their critical comments during their review of this manuscript.

REFERENCES

Adam, E. 1989. A Technological and Typological Analysis of Upper Palaeolithic Stone Industries of Epirus, northwestern Greece, Oxford: British Archaeological Reports International Series 512.

Adam, E., 1998a. To know and to have: Raw material availability and Upper Palaeolithic stone assemblage structure in Epirus. In Klithi: Palaeolithic settlement and Quaternary landscapes in northwest Greece. Vol 2: Klithi in its local and regional setting, McDonald Institute

for Archaeological Research.

Adam, E., 1998b. The Work of IB EPKA in 1998, AD 53, Chronika B2, 519.

Adam, E., 1999. The Upper Palaeolithic stone industries of Epirus in their regional setting. British School at Athens Studies, pp. 137–147.

Adam, E., 2007. Looking out for the Gravettian in Greece, PALEO. Revue d'archéologie préhistorique, (19), pp.145–158.

Adam, E., 2018. A note on the Upper Palaeolithic industrial sequence in the lower Louros river valley, district of Preveza, Epirus, northwest Greece, in Nowak, P., K. Sobczyk, M. Nowak, J. Zralka (eds) Multas per gentes et multa per saecula: Amici magistro et collegae suo Ioanni Christopho Kozlowski dedicant (pp. 191-198) Jagiellonian University.

Bailey, G., 1992. The Palaeolithic of Klithi in its wider context. Annual of the British School at Athens, 87, pp. 1–28.

Bailey, G., 1999. The Palaeolithic archaeology and palaeogeography of Epirus with reference to the investigations of the Klithi rockshelter. British School at Athens Studies, pp. 159–169.

Bailey, G., Papaconstantinou, V. and Sturdy, D., 1992. Asprochaliko and Kokkinopilos: TL dating and reinterpretation of Middle Palaeolithic sites in Epirus, north-west Greece. Cambridge Archaeological Journal, 2(1), pp. 136–144.

Dakaris, S.I., Higgs, E.S., Hey, R.W., Tippett, H. and Mellars, P., 1964, December. The climate, environment and industries of Stone Age Greece: Part I. In Proceedings of the Prehistoric Society (Vol. 30, pp. 199-244). Cambridge University Press.

Elefanti, P., Marshall, G., Stergiou, C.L. and Kotjabopoulou, E., 2021. Raw material procurement at Boila Rockshelter, Epirus, as an indicator of hunter-gatherer mobility in Greece during the Late Upper Palaeolithic and Early Mesolithic. Journal of Archaeological Science: Reports, 35, 102719.

Galanidou, N., Papoulia, C. and Ligovanlis, S., 2016. The middle Palaeolithic bifacial tools from Megalo Karvounari. The Thesprotia Expedition, 3.

Higgs, E.S., 1968. Asprochaliko and Kastritsa. Antiquity, 42(167), 235.

Huxtable, J., Gowlett, J.A.J., Bailey, G.N., Carter, P.L. and Papaconstantinou, V., 1992. Thermoluminescence dates and a new analysis of the early Mousterian from Asprochaliko. Current Anthropology, 33(1), pp. 109–114.

Kotjabopoulou, E., Panagopoulou, E. and Adam, E., 1999. The Boila rockshelter: further evidence of human activity in the Voidomatis Gorge. British School at Athens Studies, pp. 197–210.

Kourtessi-Philippakis, G., Pomonis, P. and Sakkas, D., 2019a. The archaeological surface survey in the basin of Mesa Kalamas in Thesprotia, 2011–2015: first results. Thesprotia, 1, pp. 1–20.

Kourtessi-Philippakis, G., Tourloukis, V., Sakkas, D., Michos-Rammos, F. 2019b. The surface research of the University of Athens in the basin of Mesa Kalamas. Archaeological Bulletin 70, pp. 833–838, Chronicles 2015.

Luedtke, B.E., 1992. An archaeologist's guide to chert and flint. Institute of Archaeology, University of California, Los Angeles.

Ligkovanlis, S., 2011. Megalo Karvounari revisited. Thesprotia Expedition II, Environment and Settlement Patterns, 16, pp. 159–180.

Ligkovanlis, S., 2014. Human Activity and Technological Behavior during the Middle and Upper Palaeolithic in North-West Greece: the Evidence of the Lithic Assemblages from Megalo Karvounari, Molondra and Eleftherochori 7 (unpublished Doctoral dissertation, University of Crete).

Ligkovanlis, S., Iliopoulos, G., Palli, O., Tzortzatou, A. and Tsakanikou, P., 2022. Palaeolithic artifact taphonomy in terra rossa sites at north-

western Greece revisited: Two new case studies. Mediterranean Archaeology and Archaeometry, 22(3), pp. 215–229.

Papagianni, D., 1999a. Middle Palaeolithic occupation and technology in northwestern Greece: the evidence from open-air sites. Doctoral dissertation, University of Cambridge.

Papagianni, D., 1999b. Beyond 'flint scatters' and 'findspots': assessing the potential for compiling a synthesis of the Greek Middle Palaeolithic surface data. British School at Athens Studies, pp. 130–136.

Papaconstantinou, V., Vassilopoulou, D., 1997. The middle Palaeolithic industries of Epirus. Klithi: Palaeolithic Settlement and Quaternary Landscapes in Northwest Greece, 2, pp. 459–80.

Pappas, T., 2016. The lithic raw materials in the basin of Mesa Kalamas, Thesprotia: a geoarchaeological approach (MA thesis, National and Kapodistrian University of Athens/Department of History - Archaeology), Athens.

Papoulia, C., 2011. Mikro Karvounari in context: the new lithic collection and its implications for Middle Palaeolithic hunting activities. Thesprotia Expedition II. Environment and Settlement Patterns. Foundation of the Finnish Institute at Athens, Helsinki, pp. 123–158.

Rottländer, R., 1975. The formation of patina on flint. Archaeometry, 17, pp. 106–110.

Roubet, C., 1999. Expressions of an Upper Palaeolithic management of lithic resources at Klithi (Greece). British School at Athens Studies, pp. 170–178.

Runnels, C., van Andel, T.H., 1993. A handaxe from Kokkinopilos, Epirus, and its implications for the Paleolithic of Greece. Journal of Field Archaeology, 20(2), pp.191-203.

Sitlivy, V., Sobczyk, K., Karkanas, P. and Koumouzelis, M., 2007. Middle Paleolithic lithic assemblages of the Klissoura Cave, Peloponnesus, Greece: a comparative analysis. Archaeology, Ethnology and Anthropology of Eurasia, 31(1), pp. 2–15.

Tourloukis, V., 2009. New bifaces from the Palaeolithic site of Kokkinopilos, Greece and their stratigraphic significance. Antiquity, 83(320).

Tourloukis, V., 2021. Palaeolithic archaeology: a review of recent research. Archaeological Reports, 67, pp. 61–79.

Tourloukis, V., Harvati, K., 2018. The Palaeolithic record of Greece: A synthesis of the evidence and a research agenda for the future. Quaternary International, 466, pp. 48–65.

Tourloukis, V., Karkanas, P. and Wallinga, J., 2015. Revisiting Kokkinopilos: Middle Pleistocene radiometric dates for stratified archaeological remains in Greece. Journal of Archaeological Science, 57, pp. 355–369.

Tourloukis, V., Kourtessi-Philippakis, G., Karkanas, P., Nomade, S.,Giusti, D., Thompson, N., Varis, A., Junginger, A., Schaller, M., Harvati, K., this volume. Geoarchaeological and geochronological investigations of Paleolithic open-air sites in Epirus, Greece.

Zacharias, N., Polymeris, G., Koumouzelis, M., Karkanas, P., 2018. Detecting Middle Palaeolithic sequences at the Klissoura Cave 1 in Argolid, Greece using OSL dating. In: 4th ARCH_RNT Symposium Proceedings, May 2016. University of the Peloponnese Publications Series, Kalamata.