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

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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.

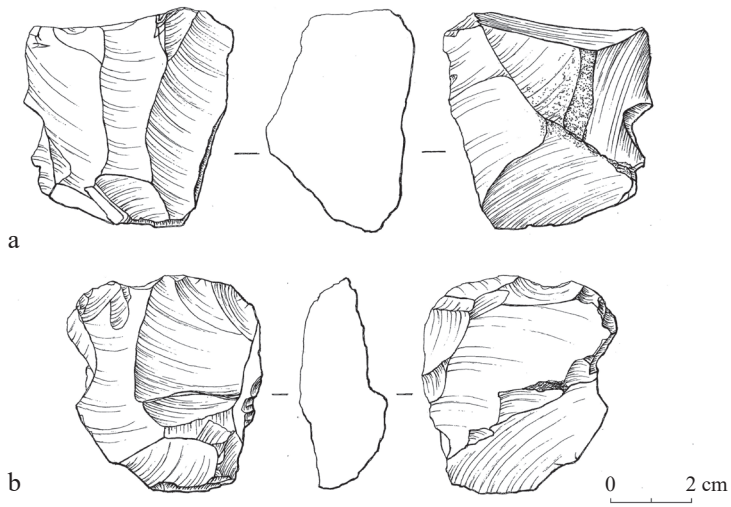

Fig. 3. Cores from the Early Bronze Age layer. (a) Core from Area 2, 503/508, Loc. 5, p. 3, (b) Core from Area 2, 503/506, Loc. 5, p. 2.

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.

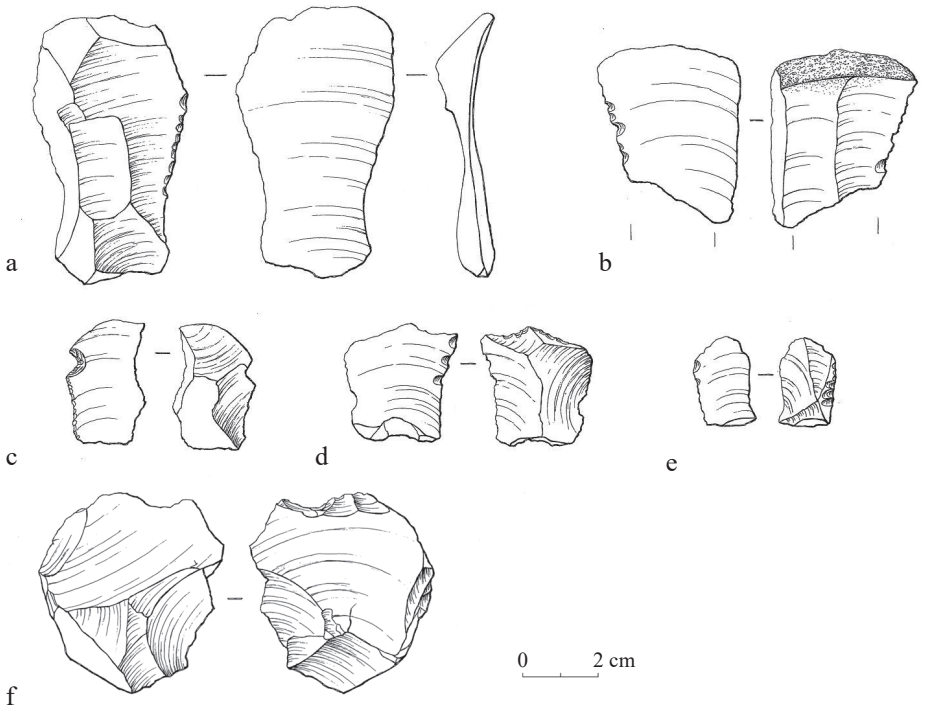

Fig. 5. Tools on flakes from the Early Bronze Age layer. (a) Retouched flake from Area 2, 505/507, Loc. 4, p. 3, (b) Retouched flake from Area 2, 503/507, Loc. 6, p. 1, (c) Notch from Area 2, 503/506, Loc. 6, p. 1, (d) Denticulate from Area 2, 505/507, Loc. 6, p. 1, (e) Retouched flake from Area 2, 501/506, 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

	Grey flint				Jasper				Total			
Tool type	Flakes		Blades		Flakes		Blades		Flakes		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.

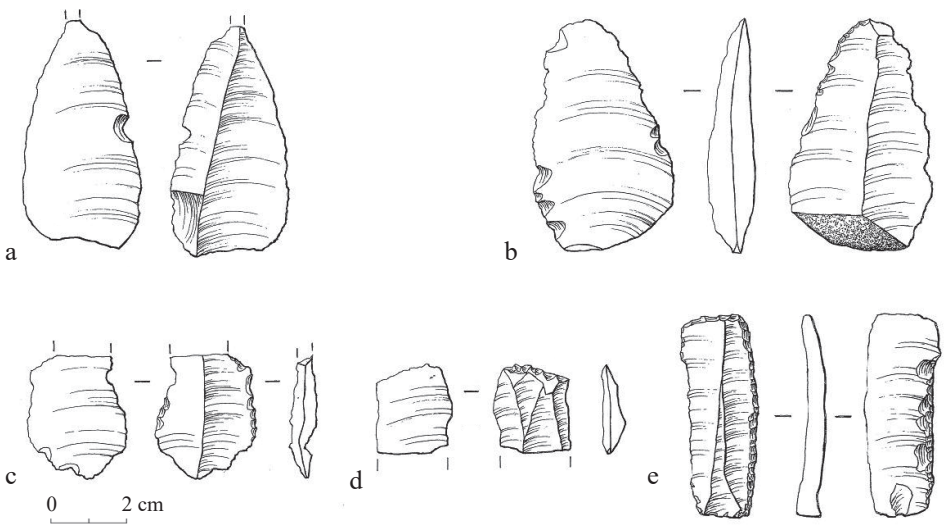

Fig. 7. Tools from the Early Bronze Age layer. (a) Notch from 501/506, Loc. 6, p. 2, (b) Retouched piece from Area 2, 503/507, Loc. 6, p. 1, (c) Retouched piece from Area 2, 503/506, Loc. 6, p. 2, (d) Retouched blade from Area 2, 503/506, Loc. 6, p. 2, (e) Endscraper from Area 2, 501/506, Loc. 5, p. 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).

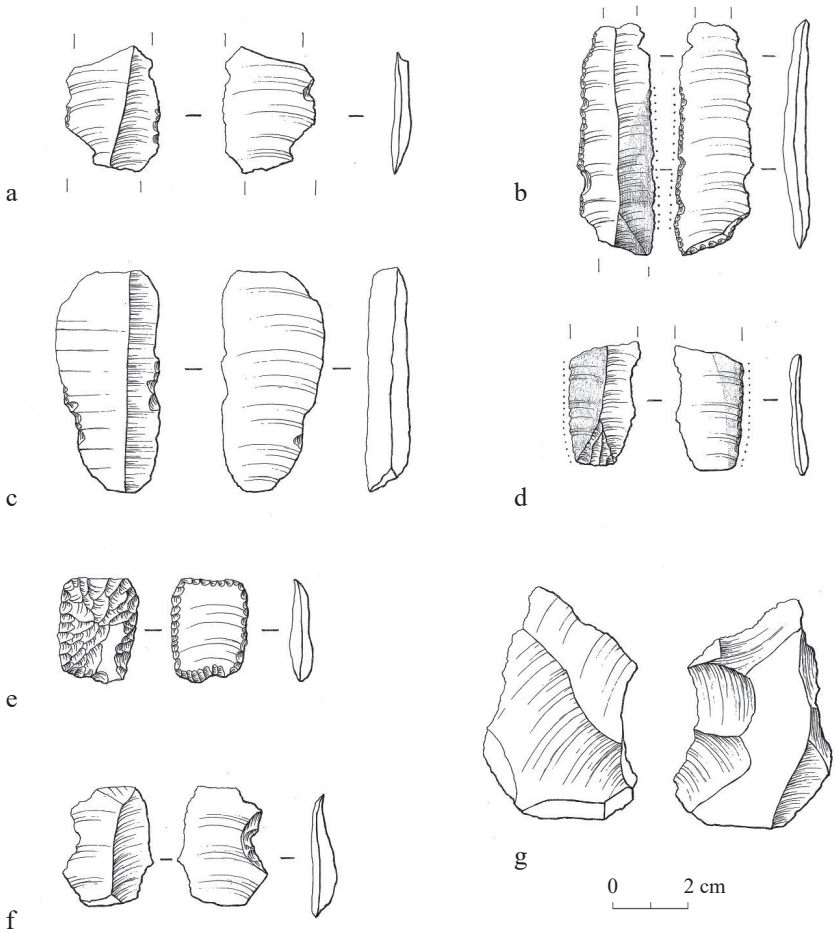

Fig. 12. Tools and a core from the Late Bronze Age layer. (a) Composite tool from Area 2, 503/508, Loc. 2, p. 1, (b) Sickle with retouch from Area 2, 505/505, Loc. 2, p. 1, (c) Retouched blade from Area 2, 503/505, E-side, Loc. 2, p. 1, (d) Sickle with retouch from Area 2, 509/507, Loc. 2, (e) Quadrangular 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.

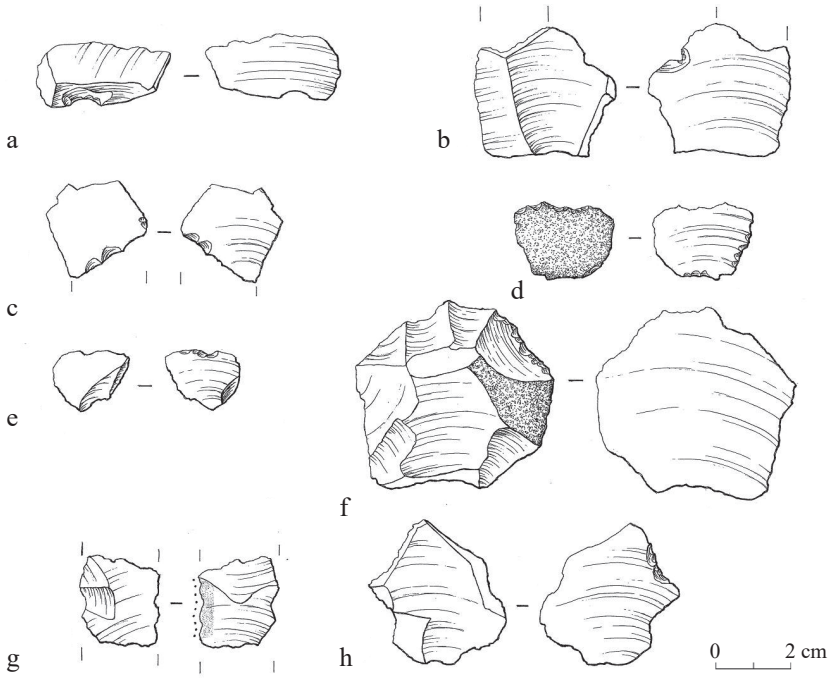

Fig. 14. Tools on flakes from the Late Bronze Age layer. (a) Notch from Area 2, 507/502, Loc. 2, (b) Notch from Area 2, 507/506, Loc. 2, (c) Retouched flake from Area 2, 504/500, Loc. 2, (d) retouched flake from Area 2, 507/506, Loc. 2, (e) Retouched flake from Area 2, 507/508, Loc. 2, (f) Retouched 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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