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FIELD SURVEY AND MATERIALS

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FLAKED LITHIC ARTEFACTS FROM PARADIMI AND KROVILI (THRACE, NORTHERN GREECE). REMARKS FROM THE 2020 SURFACE INVESTIGATIONS

ABSTRACT

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The paper presents flaked lithic materials from two tell-type Neolithic sites Paradimi and Krovili located in Eastern Thrace. They were obtained during systematic and detailed surface surveys. All the collected lithic materials were examined and described. Some conclusions about processing and sources of raw materials were presented along with comparisons to other Neolithic sites in northern Greece.

Keywords: Greece, Aegean Thrace, Neolithic, Paradimi culture, flaked lithic artefacts, raw material

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INTRODUCTION

This paper presents the results of the analysis of lithic finds discovered during the archaeological surface surveys at the Neolithic settlements of Paradimi and Krovili in Aegean Thrace, province of Rhodope (Fig. 1). The sites are located southwest (Paradimi) and southeast (Krovili) of Komotini, the capital of the province. Both settlements are tell-type sites.

The settlement at Paradimi was initially investigated by S. Kyriakidi and E. Pelekidi with a trial trench in 1929-1930, and it was dated by pottery to the end of the Middle Neolithic and the Late Neolithic. In 1965, G. Bakalakis undertook stratigraphic excavations with a single trench uncovering 4.5 m-thick deposits that confirmed the habitation of the settlement during the Late Neolithic and the Early Bronze Age (Bakalakis and Sakellariou 1981). These early excavations made Paradimi an eponym for the Neolithic in Aegean Thrace, characterising what became known as the “Paradimi culture” (Matsas 2017). A new trench was opened in 1997 by D. Matsas and K. Gallis, but its excavation made no significant progress (Matsas 2003). In spite of the importance of Paradimi for investigations of the Neolithic period in Aegean Thrace, apart from pottery and other forms of portable materials (*e.g.*, lithic tools, figurines), the excavations have provided little evidence for the architecture and intra-site organisation of the settlement.

The Neolithic settlement at Krovili is situated in Papa-Ampelia, close to the modern village of Krovili. Excavations have yet to be conducted here, but the site was investigated in 2004 with six borehole cores by A. Ammerman and N. Efstratiou. According to the surface pottery, they dated the site to the Middle Neolithic. Borehole cores revealed up to 4m-thick archaeological deposits. The samples of charcoal found in drilling cores date the earliest habitation of the settlement to *c.* 6000 BC and the later to 5400 BC (Ammerman *et al.* 2008), that is from the late phase of the Early Neolithic to the beginning of the Late Neolithic in Greece (Andreou *et al.* 2000: 260, table 1). A Systematic surface survey undertaken by the team of the MapFarm project confirmed later habitation of the settlement in the early phase of the Late Neolithic (5400-4900 BC).

Systematic and detailed surface surveys on both sites were carried out in 2020, within an ongoing project entitled “Mapping the early farmers in Aegean Thrace” (MapFarm, see <https://mapfarm.he.duth.gr>) (Urem-Kotsou *et al.* 2022) (Fig. 2).

MATERIAL

Detailed surface surveys carried out in 2020 resulted in the discovery of 407 lithic artefacts, 40 in Paradimi and 367 in Krovili. Several kinds of flakeable raw materials were recognized among the materials. Moreover, each type of them contains variants which differ from one another in colour, transparency, cleavage, presence or absence of intrusions, and varying usefulness for flaking (Table 1).



Fig. 1. Location of the two investigated sites

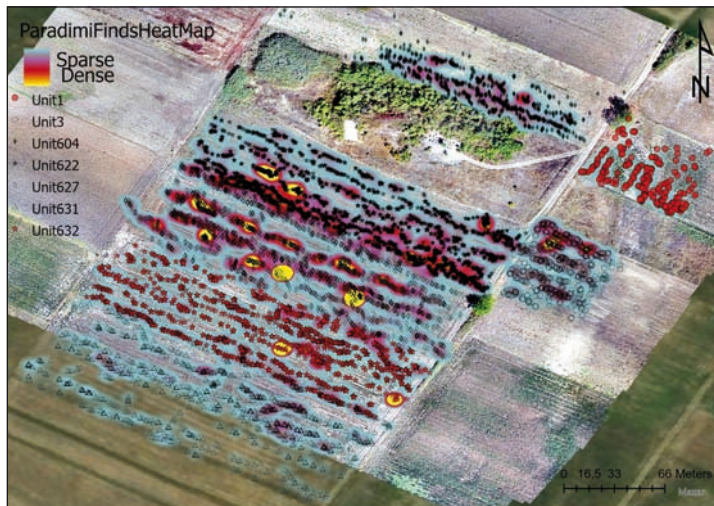


Fig. 2. Distribution and density of archaeological finds per field at Paradimi site (Sgouropoulos et al. 2022, fig. 6)

Table 1. Cumulated raw material composition of artefacts from surface surveys in Paradimi and Krovili

No	Raw material	Paradimi	Krovili	=
1	green stone		4	4
2	green jasper		2	2
3	white quartz	11	12	23
4	greenish quartz		1	1
5	light-pink quartz	1		1
6	grey translucent chalcedony		6	6
7	light grey, translucent chalcedony	4	51	55
8	light yellowish translucent chalcedony	1	97	98
9	dark grey, translucent chalcedony		1	1
10	blue-grey translucent chalcedony		1	1
11	black non translucent chert		1	1
12	black translucent chert	1	15	16
13	dark brown translucent chert,	4	41	45
14	brown translucent chert	2	24	26
15	brown striped chert		1	1
16	grey and greenish striped non translucent chert		1	1
17	yellow chert	1	1	2
18	dark grey non translucent chert		2	2
19	red non translucent chert	1	1	2
20	red-brown non translucent chert		3	3
21	green-grey non translucent chert	1	3	4
22	light grey, non translucent chert	4	69	73
23	light grey striped non translucent chert	1	2	3
24	grey non translucent chert		7	7
25	green slightly translucent chert		3	3
26	green non translucent chert		2	2
27	overheated undefined	8	9	17
28	lithic undefined		7	7
	Sum	40	367	407

Paradimi 2020

Natural pieces of raw material

Two pieces were found: one of white quartz and one of brown translucent chert.

Chunks with traces of flaking

Three specimens were recorded: one of light grey translucent chalcedony (diameter 34 mm), one of red non-translucent chert (diameter 36 mm) and one of light grey non-translucent chert (diameter 112 mm).

Single platform blade cores

One single platform blade core made of black translucent chert has a prepared striking platform, sides and a back, and changed orientation of flaking. In the last stage it was used for making of flakes.

Single platform microblade cores

One microlithic single platform blade core with repeatedly changed orientation of flaking, made from light grey, non-translucent chert (Fig. 3: 1).

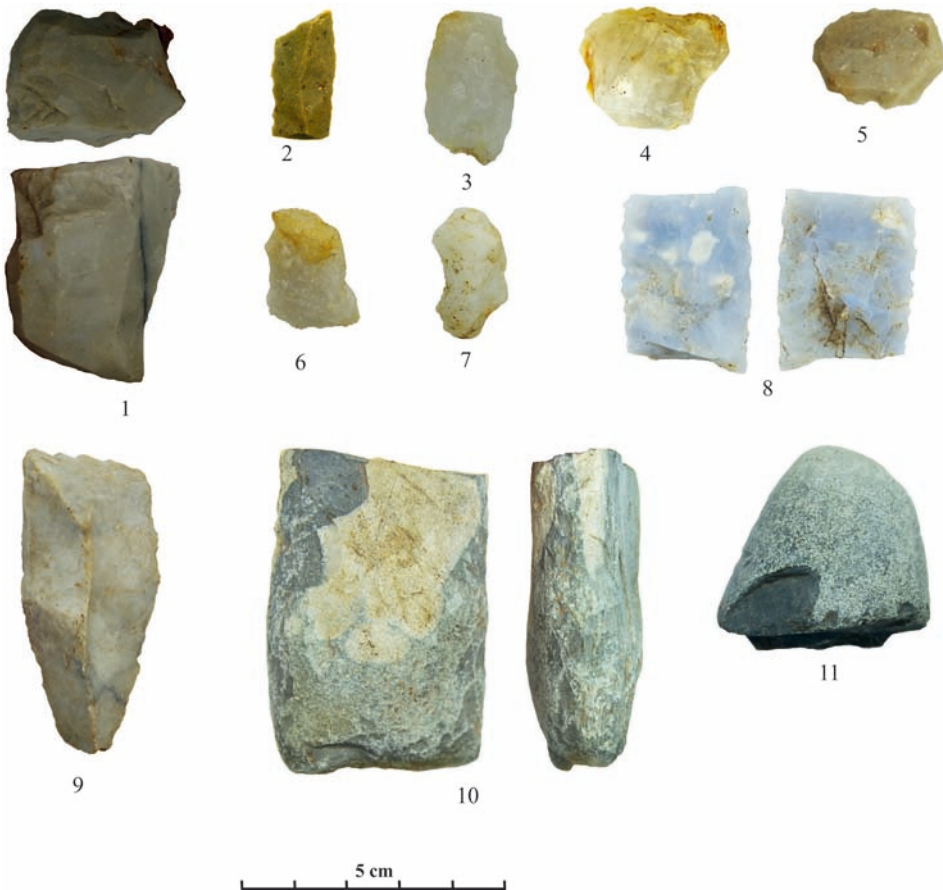


Fig. 3. Paradimi. 1 – microlithic single platform blade core light grey, non translucent chert; 2 – fragment of blade, light grey creamy chert; 3 – double front bifacial splintered piece, quartz; 4 – fragment of overheated splintered piece; 5 – round end-scraper on, quartz; 6 – truncated blade, quartz; 7 – fragment of irregular retouched flake, quartz; 8 – fragment of retouched blade; quartz; 9 – truncated blade+burin from blade, light grey chert; 10 – fragment of bifacial axe, green chert; 11 – fragment of axe or shaft-hole axe (Photo M. Dębiec, prepared by A. Pelisiak)

+50% cortical flakes

One flake of this category (dimensions: $42 \times 36 \times 13$ mm) was made from light grey non-translucent chert; it is straight in profile and has a distinct bulb and a linear butt.

-50% cortical flakes

One flake (dimensions: $61 \times 42 \times 12$ mm) made from brown translucent chert, curved in profile with a distinct bulb and a flat butt.

Unidirectional flakes

Three unidirectional flakes were discovered: one of light yellow translucent chalcedony (dimensions: $22 \times 32 \times 7$ mm; straight in profile, with a diffuse bulb and flat butt), one of dark brown translucent chert (dimensions: $25 \times 14 \times 6$ mm, straight in profile with distinct bulb and linear butt), and one of undefined lithic raw material (dimensions: $21 \times 27 \times 8$ mm, curved in profile with a diffuse bulb and a linear butt).

Multidirectional flakes

In this group one specimen was made from light grey translucent chalcedony, and four from undefined lithic raw material. Their length varied from 24 to 39 mm (average 29.2 mm), width from 27 to 45 mm (average 33.8 mm) and thickness from 7 to 12 mm (average 8.2 mm). One flake is curved, four specimens are straight in profile. They have a distinct bulb and a linear (4) or flat (1) butt.

Fragments of flakes

Flakes preserved in small fragments were made from white quartz (1), light pink quartz (1), dark brown translucent chert (2), light grey striped non-translucent chert (1), and an undefined lithic raw material (1).

Blades

Only two specimens were found: one proximal and mesial part of an irregular blade with a partly natural surface, a flat butt and a distinct bulb, dimensions $43 \times 20 \times 10$ mm, made from dark brown chert, and the mesial part of a regular, small blade, dimensions $24 \times 12 \times 4$ mm, made from light grey creamy chert (Fig. 3: 2).

Splintered pieces

Two splintered pieces were made from white quartz: a double-front bifacial splintered piece with sharp fronts, dimensions $29 \times 18 \times 9$ mm (Fig. 3: 3), and a fragment of flake or splintered piece, dimensions $28 \times 19 \times 7$ mm. There was also one fragment of an over-heated splintered piece of undefined lithic raw material (Fig. 3: 4).

Lithic tools

Seven specimens are of white quartz. Two end-scrapers: one round end-scraper made of splinter with a steep front, dimensions $23 \times 30 \times 12$ mm, and a round end-scraper on flake, dimensions $25 \times 19 \times 5$ mm (Fig. 3: 5); one truncated blade with convex truncation made from an irregular blade, dimensions: $23 \times 13 \times 5$ mm (Fig. 3: 6); three fragments of retouched flakes: one fragment of crushed retouched flake, diameter 18 mm; one fragment of irregular flake with one edge retouched on the dorsal side (Fig. 3: 7); one fragment of a multidirectional flake, one edge retouched on the dorsal face, dimensions $27 \times 33 \times 9$ mm;

one irregular blade, one edge partly irregularly retouched on the dorsal side, straight in profile, faceted butt, dimensions $42 \times 18 \times 6$ mm.

Two tools were formed from light grey, translucent chalcedony: one fragment of retouched flake; one mesial part of a regular retouched blade, both edges with bifacial retouch and slightly glossy polishing, dimensions $34 \times 25 \times 11$ mm (Fig. 3: 8).

One tool is of light grey, non-translucent chert, a truncated blade+burin formed from a regular curved blade from a single platform blade core with a flat prepared butt, one edge retouched on the dorsal side, dimensions $60 \times 28 \times 14$ mm (Fig. 3: 9).

One tool is of green-grey non translucent chert. It is mesial and close to cutting edge fragment of a bifacial axe retouched on the whole surface, dimensions $62 \times 44 \times 22$ mm (Fig. 3: 10).

Other tools

This group contains:

Seven polished axes and their fragments made from green stone: a fragment of a polished axe; a quadrilateral axe completely polished, cutting edge destroyed, butt broken off, dimensions of preserved part $74 \times 42 \times 17$ mm; a crushed fragment of the butt and one edge of a polished axe; a small fragment of polished axe; a fragment of a side of a polished axe.

Dimensions of preserved part $38 \times 50 \times 16$ mm; fragment of axe or shaft-hole axe, butt is rounded, polishing on all preserved surfaces, dimensions of preserved part $38 \times 43 \times 33$ mm (Fig. 3: 11); fragment of the cutting edge of an axe.

Also found were: one probable fragment of a stone polished chisel; one spherical, regular grinding stone, dimensions 68 mm; one fragment of a spherical grinding stone; one natural stone pebble without traces of use; one fragment of a longitudinal hammerstone with polished sides and butt, working part broken off, dimensions $134 \times 54 \times 46$ mm; one fragment of a probably longitudinal pestle with polished sides and crushed working part, dimensions $98 \times 50 \times 44$ mm; one fragment of a polished pebble, dimensions $57 \times 40 \times 32$ mm; one fragment of a stone pebble with traces of polishing, dimensions $58 \times 30 \times 26$ mm; two fragments of polished stone plates.

Krovili 2020

Natural pieces of lithic raw material

This group contains the following pieces of raw material: two of white quartz (33 and 47 mm in diameter), one of greenish quartz (55 mm in diameter), one of grey translucent chalcedony (55 mm in diameter), one of light grey translucent chalcedony (42 mm in diameter), six of light yellowish translucent chalcedony (from 20 to 38 mm in diameter), three of black translucent chert (from 35 to 46 mm in diameter), eight of dark brown translucent chert (from 29 to 49 mm in diameter), five of light grey non-translucent chert (from 18 to 86 mm in diameter), and one of green translucent chert (43 mm in diameter).

Chunks with traces of flaking

Chunks with traces of flaking constitute one of the largest group of lithic artefacts. It contains: one chunk of green stone (diameter 47 mm), four of white quartz (dimensions from 28 to 33 mm, average 30 mm), one of grey translucent chalcedony (diameter 48 mm), five of light grey translucent chalcedony (dimensions from 28 to 50 mm, average 38.4 mm), eleven of light yellowish translucent chalcedony (dimensions from 32 to 48 mm, average 39 mm), one of dark grey translucent chalcedony (43 mm in diameter), three from black translucent chert (dimensions from 34 to 36 mm, average 35 mm), three from dark brown translucent chert (dimensions from 38 to 41 mm, average 39.5 mm), seven from brown translucent chert (diameter from 17 to 46 mm, average 34.3 mm), one of red non-translucent chert (diameter 55 mm), one of green-grey non-translucent chert (diameter 32 mm), four of light grey non-translucent chert (dimensions from 20 to 70 mm, average 44.25 mm), and two of an unidentified lithic raw material.

Single platform blade cores

Four specimens were discovered: two small fragments of cores; one irregular single platform blade core with a prepared striking platform, a flaking surface covers partly both sides of the core, from grey non-translucent chert (Fig. 4: 1); one fragment of probably a blade core, raw material undefined.

Single platform microcores

This group contains: one crushed used up flake microcore made from light yellowish translucent chalcedony; one single platform flake core, striking platform prepared from light yellowish translucent chalcedony; one fragment of flake microcore made from light yellowish translucent chalcedony; one worn up single platform microcore made from black translucent chert (Fig. 4: 2); one worn up microcore, light grey, from non-translucent chert with red patina.

Microcores with changed orientation of flaking

Seven specimens were found: one blade microcore with changed orientation of chipping, from translucent chalcedony; one microcore with changed orientation of chipping made from light grey, translucent chalcedony; one Microlithic blade/flake core with changed orientation of flaking, from light yellowish translucent chalcedony; one worn up microcore with changed orientation of chipping, striking platform prepared, from black translucent chert; one crushed and worn up core, from black translucent chert; one crushed worn up core with changed orientation of chipping in a last stage of use for flake removal, from black translucent chert (Fig. 4: 3); one used up flake core with changed orientation of flaking, from dark brown translucent chert.

Flake cores and their fragments (6 specimens)

This category contains six artefacts: one flake core or chunk with traces of flaking with natural striking platform, sides and back, dimensions: 42 × 39 × 23 mm, from light grey translucent chalcedony; one flake core with natural striking platform made from light grey translucent chalcedony; one worn out single platform flake core with prepared striking



Fig. 4. Krovili. 1 – single platform blade core, grey non translucent chert; 2 – single platform microcore, black translucent chert; 3 – changed orientation core, black translucent chert; 4 – flake core, dark brown translucent chert or chalcedony; 5 – flake core, light grey, translucent chalcedony; 6 – flake core, dark brown translucent chert; 7 – flake core, dark brown translucent chert (Photo M. Dębiec, prepared by A. Pelisiak)

platform, from dark brown translucent chert or chalcedony (Fig. 4: 4); one crushed fragment of probably flake core (?), from dark grey non-translucent chert; one fragment of flake core, light grey, from non-translucent chert; one fragment of crushed core, of light grey non-translucent chert.



Fig. 5. Krovili. Discoidal flake core or Palaeolithic tool, size: $105 \times 112 \times 49$ mm, made of light grey, translucent chalcedony (Photo M. Dębiec, prepared by A. Pelisiak)

Discoidal flake cores

Only one probably large discoidal flake core with a linear irregular striking platform (or a Palaeolithic tool), was discovered, dimensions $105 \times 112 \times 49$ mm, of light grey translucent chalcedony (Fig. 5).

Flake cores with changes in orientation of flaking

This is a relatively large group of artefacts: one irregular flake core with changed orientation of flaking, from grey translucent chalcedony; one irregular flake core with changed orientation, linear striking platforms, of light grey translucent chalcedony (Fig. 4: 5); one crushed and worn up core, of black translucent chert; one crushed worn up core with changed orientation of chipping in a last stage of used for flake removal of black translucent chert; one used up flake core with changed orientation of flaking of dark brown translucent chert; one irregular flake core of dark brown translucent chert (Fig. 4: 6); one irregular flake core with changed orientation of flaking of dark brown translucent chert (Fig. 4: 7); one irregular flake core with changed orientation of flaking, from dark brown translucent chert; one fragment of irregular crushed core, from dark brown translucent chert; one fragment of crushed core, from dark brown translucent chert; one fragment of crushed core, from dark brown translucent chert or chalcedony; one (K64) irregular flake core with changed orientation and linear striking platforms, from a partly cortical chunk of dark brown translucent chert; one irregular changed orientation flake core of light grey non-translucent chert (Fig. 6: 1); one worn up core with changed orientation of flaking, from light grey non-translucent chert.

Flakes with +50% cortical or natural surface

Five specimens were discovered: two are of dark brown translucent chert (dimensions $40 \times 38 \times 24$ and $42 \times 13 \times 11$ mm), one straight and one curved in profile, both have a distinct

bulb, one with a with natural butt, and the other with a linear butt; three are from light grey non-translucent chert (dimensions: $92 \times 41 \times 12$ mm; $45 \times 25 \times 11$ mm; $45 \times 33 \times 13$ mm), one is straight in profile, two are curved in profile, one has a distinct bulb with a bulbar scar, two have diffuse bulbs, one with bulbar scar, they have a natural (2 specimens) or a linear butt.

Flakes with -50% cortical or natural surface

Two flakes are made from light yellowish chalcedony, dimensions: $28 \times 35 \times 10$ (curved in profile) and $28 \times 37 \times 10$ mm (straight), they have diffuse bulbs, one has a faceted butt and the other has a natural butt.

Unidirectional flakes (20 specimens)

This category consists of 20 artefacts: one crushed flake of white quartz, dimensions $24 \times 23 \times 5$ mm; one of grey translucent chalcedony (dimensions $56 \times 43 \times 8$ mm) is curved in profile and has distinct bulb with a bulbar scar and flat butt; two of light grey translucent chalcedony (dimensions: $28 \times 39 \times 8$ mm and $34 \times 28 \times 7$ mm) are straight in profile, have a distinct bulb and a linear and natural butt; four are of light yellowish translucent chalcedony, their length varied from 27 to 41 mm (average 34.25 mm), width from 18 to 32 mm (average 27.3 mm), thickness from 7 to 18 mm (average 11 mm), they are straight (2) or curved (2) in profile, all with a distinct bulb (one with bulbar scar) and a linear (1) or faceted (3) butt; two of dark brown translucent chert (dimensions: $21 \times 38 \times 7$ mm; $22 \times 27 \times 8$ mm), both straight in profile with a distinct bulb and linear or faceted butt; two from brown translucent chert (dimensions: $25 \times 23 \times 2$; $14 \times 20 \times 12$ mm), straight or curved in profile with a distinct bulb and a natural and faceted butt; five flakes are from light grey non-translucent chert, with lengths ranging from 24 to 36 mm (average 31.8 mm) widths from 24 to 45 mm (average 32 mm), and thicknesses from 7 to 10 mm (average 7.8 mm), straight (4) or curved (1) in profile, and four have a diffuse bulb (1 bulb is distinct), with a natural (2), linear (2) or faceted (1) butt; one specimen made from green non-translucent chert (dimensions: $33 \times 24 \times 9$ mm) is curved in profile, with a distinct bulb and faceted butt; two specimens are partly crushed, and are overheated and made from undefined raw material.

Multidirectional flakes

This group contains 25 flakes: three specimens are made from light grey translucent chalcedony, their lengths are from 23 to 37 mm (average 29.67 mm), widths from 27 to 31 mm (average 29.3 mm), thicknesses from 5 to 13 mm (average 8 mm), they are straight (2) or curved (1) in profile, have a distinct (1) or diffuse (2) bulb and a flat (2, one natural) or faceted butt; nine multidirectional flakes are made from light yellowish translucent chalcedony, with lengths varying between 19 and 35 mm (average 28.89 mm), widths between 20 and 40 mm (average 31.1 mm), and thicknesses between 4 and 15 mm (average 8.33 mm), straight (5) or curved in profile (4), with a distinct bulb (4, 2 with bulbar scars) or a diffuse bulb, and a linear (7), faceted (1) or natural (1) butt; one specimen of dark brown translucent chert (dimensions $54 \times 37 \times 8$ mm) is curved in profile with a distinct

bulb and a faceted butt; five flakes are from brown translucent chert, with lengths varying between 23 and 39 mm (average 29.4 mm), widths between 16 and 37 mm (average 27 mm), and thicknesses between 3 and 11 mm (average 7.4 mm), straight (2) or curved (3) in profile, with a distinct (2) or diffuse (3) bulb, and a linear (3) or faceted (4) butt.

Six from light grey translucent chert are from 31 to 80 mm in length (average 49.7 mm), from 30 to 68 in width (average 41.7 mm), and from 7 to 25 in thickness (average 12.33 mm), straight (5) or curved (1) in profile, with a distinct (2) or diffuse (4) bulb, and a flat (1), linear (1) or faceted (4) butt; one from green slightly translucent chert (dimensions 21 × 37 × 8 mm) is curved in profile and has a diffuse bulb and a faceted butt.

Fragments of flakes (143 specimens)

These constitute the largest group of lithic artefacts from Krovili. It contains one specimen made of green stone, four of white quartz, one of grey translucent chalcedony, 23 of light grey translucent chalcedony, 53 of light yellowish translucent chalcedony, three of black translucent chert, nine of dark brown translucent chert, eight of brown translucent chert, one of brown striped chert, one of yellow chert, two of red-brown non-translucent chert, 21 of light grey non-translucent chert, four of grey translucent chert, two of green slightly translucent chert, and 10 made from undefined raw materials including seven overheated specimens.

Irregular blades

There are six artefacts: one straight blade with a destroyed butt and convex bulb, dimensions 41 × 18 × 17 mm, made from light yellowish translucent chalcedony (Fig. 6: 2); one specimen curved in profile with a partly natural surface from a single platform blade core with a punctated butt and a small distinct bulb, dimensions 53 × 25 × 11 mm, from dark brown translucent chert or chalcedony; one irregular bladelet from a single platform blade core with a linear butt and small convex bulb, dimensions 40 × 20 × 5 mm, from light yellowish translucent chalcedony, and three fragments of irregular blades, from light grey translucent chalcedony, light yellowish translucent chalcedony, and light grey non-translucent chert.

Blades and bladelets from single platform blade cores (3 specimens)

Only three such items were found: one proximal and mesial part of a regular bladelet from a single platform blade core with a linear butt and flat bulb, dimensions 35 × 18 × 5 mm, light yellowish translucent chalcedony (Fig. 6: 3); one straight in profile irregular blade with a linear butt and diffuse bulb, dimensions 42 × 17 × 5 mm, from light grey non-translucent chert (Fig. 6: 4); one distal part of a regular blade, dimensions 44 × 24 × 8 mm, from light grey non-translucent chert (Fig. 6: 5).

Crest blades of second series (1 specimen)

One crest blade of second series, dimensions 55 × 20 × 8 mm is from light grey non-translucent chert.

Splintered pieces

These constitute a distinctive group of lithic artefacts: one splintered piece with sharp edges, dimensions 31 × 16 × 9 mm, of white quartz (Fig. 6: 6); one splintered piece with one



Fig. 6. Krovili. 1 – changed orientation flake core, light grey non translucent chert; 2 – blade, light yellowish translucent chalcedony; 3 – bladelet fragment, light yellowish translucent chalcedony; 4 – blade, light grey, non translucent chert; 5 – fragment of blade, light grey, non translucent chert; 6 – splintered piece, quartz; 7 – splintered piece, light grey, translucent chalcedony; 8 – splintered piece, light grey, translucent chalcedony; 9 – splintered piece, light yellowish translucent chalcedony; 10 – splintered piece, light yellowish translucent chalcedony; 11 – splintered piece, black non translucent chert; 12 – splintered piece, brown translucent chert; 13 – end-scraper, light-grey stripped non translucent chert; 14 – splintered, brown translucent chert; 15 – end-scraper, light grey non translucent chert; 16 – end-scraper, light, translucent chalcedony (Photo M. Dębiec, prepared by A. Pelisiak)



Fig. 7. Krovili. 1 – quadrilateral axe, green stone; 2 – miniature, quadrilateral axe, green stone; 3 – fragment of axe cutting edge, green stone; 4 – fragment of axe, greenish striped non translucent chert; 5 – end-scraper, light yellowish translucent chalcedony; 6 – end-scraper, light grey non translucent chert; 7 – blade end-scraper, green-grey non translucent chert; 8 – end-scraper or perforator, light grey non translucent chert (Photo M. Dębiec, prepared by A. Pelisiak)

working edge sharp opposite one blunt, dimensions $38 \times 28 \times 21$ mm, of light grey translucent chalcedony (Fig. 6: 7); one specimen with one front sharp and the other blunt and rounded, dimensions $28 \times 16 \times 13$ mm, of light grey translucent chalcedony (Fig. 6: 8); one fragment of a splintered flake, of light grey translucent chalcedony; one splintered piece made of crushed microcore, dimensions $28 \times 28 \times 14$ mm, of light yellowish translucent chalcedony (Fig. 6: 9); one almost flat splintered piece with two sharp opposite striking edges, dimensions $23 \times 24 \times 6$ mm, of light yellowish translucent chalcedony (Fig. 6: 10); one fragment of a splintered piece with retouched edges, of light-yellowish translucent chalcedony; one splintered piece with one front sharp and the other blunt and round, dimensions $36 \times 27 \times 20$ mm, of black non-translucent chert (Fig. 6: 11); one irregular splintered piece, made of chunk, dimensions $42 \times 28 \times 15$ mm, of dark brown translucent chert; one fragment of crushed splintered piece of dark brown translucent chert; one double platform splintered piece with sharp opposite fronts, dimensions $22 \times 24 \times 7$ mm, of brown translucent chert (Fig. 6: 12); one double platform splintered piece with sharp opposite fronts, dimensions $31 \times 23 \times 8$ mm, of brown translucent chert (Fig. 6: 14); one splintered piece made from unidirectional flake, sharp fronts, dimensions $30 \times 22 \times 11$ mm, from light grey non-translucent chert.

Chips (3 specimens)

Chips represent light-yellowish translucent chalcedony (1 item), and dark-brown translucent chert or chalcedony (2).

Lithic tools

Tools in the lithic assemblage from Krovili are relatively numerous. There are nine categories of artefacts.

Axes

Seven axes were discovered: one flat quadrilateral axe wholly polished, with a rounded butt and destroyed cutting edge, dimensions $66 \times 47 \times 15$ mm, of green stone (Fig. 7: 1); one miniature, quadrilateral axe, wholly polished with a rounded butt, dimensions $58 \times 23 \times 13$ mm, of green stone (Fig. 7: 2); one fragment of a cutting edge of an axe made probably of green jasper, dimensions of preserved fragment $44 \times 46 \times 16$ mm, probably of green jasper (Fig. 7: 3); one thinned and rounded butt of a bifacial axe probably of green jasper, dimensions of preserved fragment $44 \times 45 \times 14$ mm; one mesial part of a bifacial wholly polished axe, dimensions of preserved part $54 \times 41 \times 18$ mm of grey and greenish striped non-translucent chert (Fig. 7: 4); one crushed butt of a polished axe of green-grey non-translucent chert; one fragment of a polished axe, of light grey non-translucent chert.

Flake end-scrapers

Four specimens were found: one flake end-scraper with a semi-steep front, dimensions $33 \times 41 \times 11$ mm, from light translucent chalcedony (Fig. 6: 16); one end-scraper made from irregular flake, with an irregular front, dimensions $64 \times 49 \times 18$ mm, from light-grey striped non-translucent chert (Fig. 6: 13); one end-scraper made from irregular partly cortical flake, semi-steep irregular front, one edge with irregular retouch, dimensions $66 \times 37 \times 12$ mm,

of light-grey non-translucent chert; one rounded end-scraper made of large flake, regular front steep and semi-steep, dimensions $57 \times 62 \times 15$ mm, of light grey non-translucent chert (Fig. 6: 15).

Blade end-scrappers

This group comprises one blade end-scraper with irregular semi-steep front, dimensions $27 \times 18 \times 5$ mm, from light-yellowish translucent chalcedony (Fig. 7: 5); one blade end-scraper with irregular front, dimensions $28 \times 18 \times 8$ mm, from light yellowish translucent chalcedony; one end-scraper made from an irregular blade with steep irregular front, one edge with irregular retouch on the dorsal side, dimensions $79 \times 34 \times 14$ mm, from green-grey non-translucent chert (Fig. 7: 7); one end-scraper made from regular blade, irregular front, retouched one edge, dimensions $44 \times 27 \times 13$ mm, from light grey non-translucent chert; one end-scraper made from a regular blade from a single platform blade core, front is regular semi-steep, one edge of the blade is irregularly retouched on the dorsal side, from light grey non-translucent chert (Fig. 7: 6); one fragment of end-scraper or perforator made of regular blade, the front of the tool is prepared with semi-steep irregular retouch, dimensions $38 \times 33 \times 11$ mm, from light grey non-translucent chert (Fig. 7: 8).

Truncated pieces

One truncated piece made from an irregular blade, dimensions $42 \times 30 \times 18$ mm, of light grey translucent chalcedony (Fig. 8: 4).

Perforators

There is one fragment of a perforator with a broken-off sting made from irregular flake, dimensions $48 \times 36 \times 20$ mm, from light translucent chalcedony (Fig. 8: 3), and one irregular perforator made from flake, dimensions $62 \times 32 \times 11$ mm, from light grey non-translucent chert (Fig. 8: 1).

Retouched flakes

This is the largest group of tools. It contains one irregular flake with retouched notch, on edge irregular retouch, dimensions $37 \times 23 \times 9$ mm, of light translucent chalcedony (Fig. 8: 5); one fragment of flake partly with natural surface, one edge with irregular retouch on dorsal side, of light translucent chalcedony; one irregular flake with one retouched edge on dorsal side, dimensions $30 \times 24 \times 15$ mm, of light grey translucent chalcedony; one fragment of irregular flake with one edge retouched on dorsal side, dimensions $25 \times 47 \times 15$ mm, of light grey translucent chalcedony; one unidirectional retouched flake, dimensions $36 \times 26 \times 8$ mm, of light grey non-translucent chert; one fragment of flake with one edge retouched on dorsal side, of light-grey non-translucent chert; one fragment of flake with one edge retouched on dorsal side, of light grey non-translucent chert; one multidirectional flake with alternate irregular retouch, dimensions $57 \times 61 \times 13$ mm, of light grey non-translucent chert (Fig. 8: 2); one fragment of partly cortical flake with one edge (base) partly retouched, dimensions $36 \times 40 \times 11$ mm, of light grey non-translucent chert (Fig. 8: 6); one multidirectional flake, flat butt, two edges partly retouched on dorsal side, dimensions $42 \times 40 \times 8$ mm, of light grey striped non-translucent chert (Fig. 8: 7); one fragment of

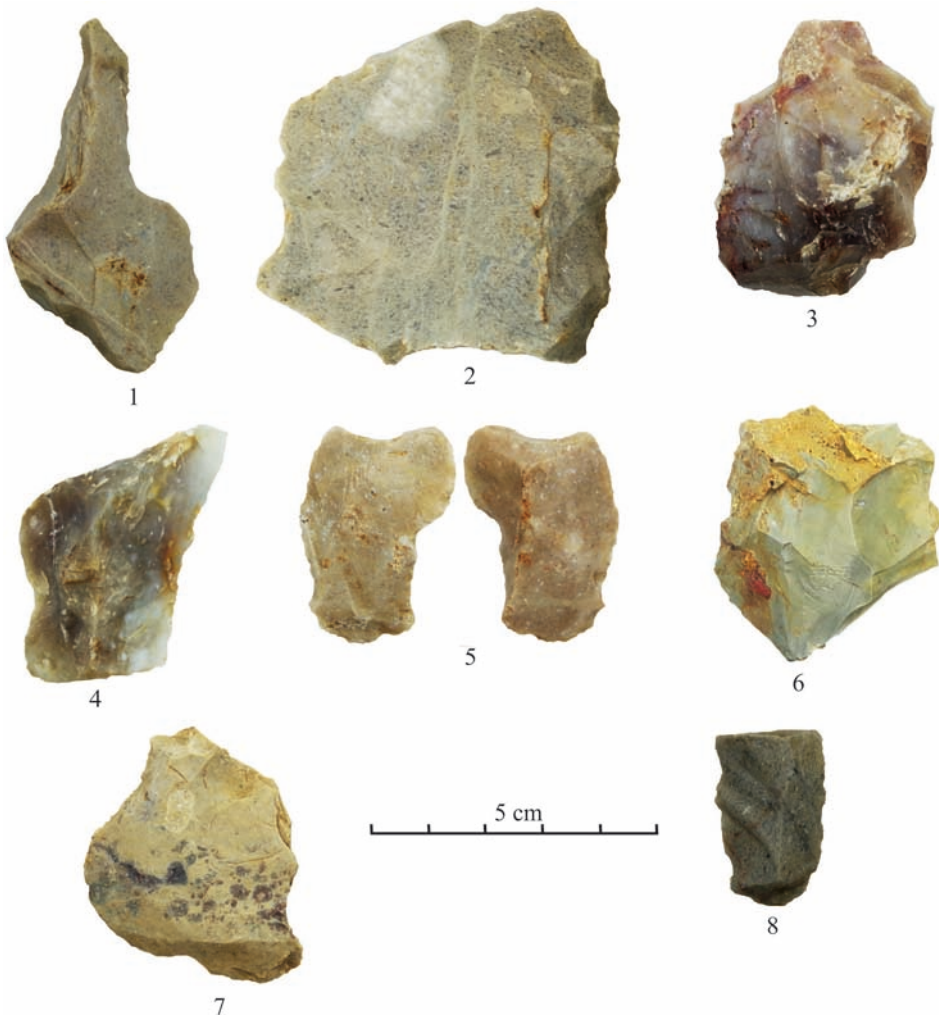


Fig. 8. Krovili. 1 – perforator, light grey, non translucent chert; 2 – retouched flake, light grey, non translucent chert; 3 – fragment of perforator, light, translucent chalcedony; 4 – truncated piece, light grey, translucent chalcedony; 5 – retouched flake, light, translucent chalcedony; 6 – retouched flake, light grey non translucent chert; 7 – retouched flake, light-grey striped non translucent chert; 8 – retouched blade, grey non translucent chert (Photo M. Dębiec, prepared by A. Pelisiak)

flake with partly natural surface with irregular retouch of two edges, dimensions $60 \times 48 \times 10$ mm, of light grey non-translucent chert.

Retouched blades (2 specimens)

There is one fragment of a curved irregular blade from a single platform blade core with one edge retouched, a faceted butt and a distinct bulb, of light grey translucent

chalcedony, and also one overheated fragment of a crushed blade with one edge crushed with steep retouch on dorsal side, dimensions $35 \times 30 \times 12$ mm, raw material overheated and undefined.

Backed bladelets

One backed bladelet, dimensions $23 \times 11 \times 3$ mm, of red-brown non-translucent chert.

Retouched chunks (2 specimens)

Two specimens were found: one chunk with one edge retouched on one side, dimensions $42 \times 28 \times 19$ mm, of light yellowish translucent chalcedony; and one chunk with irregular retouch of one edge, dimensions $33 \times 30 \times 18$ mm, of light grey nontranslucent chert.

Jagged blade

One slightly curved irregular blade with partly natural surface, with jagged edges, butt is flat and prepared, dimensions $63 \times 34 \times 16$ mm, of light grey striped non-translucent chert.

Blade with use retouch (1 specimen)

One mesial and distal part of a blade from a single platform blade core with use retouch of grey non-translucent chert was discovered, dimensions $28 \times 18 \times 6$ mm (Fig. 8: 8).

DISCUSSION

The Neolithic lithic industry in northern Greece is known on the basis of material from benchmark sites in the knowledge of the Neolithic of south-eastern Europe, *e.g.*, Dikili Tash (Darcque *et al.* 2011, fig. 2; Kourtessi-Philippakis 2009, 306; Lespez *et al.* 2013, fig. 4), Makri (Efstratiou *et al.* 1998; Skourtopoulou 1998), Makriyalos (Pappa and Besios 1999; Pappa *et al.* 2013), Movropigi (Karamitrou-Mentassidi *et al.* 2015), Sitagroi (Dimitriadis and Skourtopoulou 2003; Dixon 2003; Kakavakis 2015; Tringham 2003), Anaghiri (Papadopoulou 2018; 2020). The materials from these sites provide good typological raw material, and chronological contexts for the materials from the surface research in Paradimi and Krovili. This applies in particular to those sites where large and diverse lithic inventories (*e.g.*, Sitagroi, Makri, Anaghiri) with numerous pieces of débitage (flakes, blades and their fragments, cores in various stages of their preparation or exploitation, lumps) and tools were discovered. Stone axes are common at the Neolithic sites (*e.g.*, Elster 2003a; 2003b; Ridley *et al.* 2000; Biskowski 2003). All items from Paradimi and Krovili (Tables 1, 2, 3) find their counterparts in the lithic inventories from the Neolithic and the Early Bronze Age sites listed above (*e.g.*, Karageorgiou 2016). Conversely, the materials from the excavations in Paradimi offer limited comparative possibilities in terms of typology, chronology and the lithic raw materials used. Unfortunately, in the excavations conducted in the first half of the 20th century the lithic materials were sometimes not treated with due attention, and their importance to the study of the prehistory of Greece was underesti-

Table 2. Paradimi. Composition of lithic artefacts

	Category of artefacts	3	5	7	8	12	13	14	17	19	21	22	23	29	=	
Chipped artefacts	Natural pieces of raw material	1						1							2	
	Chunks with traces of flaking			1						1		1			3	
	Single platform blade core					1									1	
	Single platform microblade core											1			1	
	+50% cortical flakes											1			1	
	-50% cortical flakes							1							1	
	Unidirectional flakes				1		1								1	3
	Multidirectional flakes			1											4	5
	Fragments of flakes	1	1				2							1	2	7
	Fragments of blades						1		1							2
	Splintered pieces	2													1	3
	Lithic Tools	7		2								1	1			11
	SUM	11	1	4	1	1	4	2	1	1	1	4	1	8	40	

mated. Only selected, “attractive” lithic artefacts were published, and sometimes little or no information about this group of artefacts was published (Kourtessi-Philippakis 2009, 32; Archibald *et al.* 2010-2011). Unfortunately, Paradimi is one of these Neolithic sites (Bakalakis and Sakellariou 1981). The small number of artefacts leads to the assumption that some of the lithic artefacts from this site were already “lost” during the excavations. In particular, this concerns debitage, which in the publication of this site is represented by only several items, and these are only blades and their fragments, tools and artefacts made of silex and obsidian (*e.g.*, Bakalakis and Sakellariou 1981, table 4b: 1, 3, table 5b: 4, 6, table 6a: 1, 2, 6-8, 10, table 18b:11-15, table 73a: 17-23).

In the Late Neolithic of northern Greece, a variety of lithic raw materials were used. Unfortunately, raw materials are sometimes not clearly identified. Sometimes the same raw material is noted under different names (*e.g.*, flint, chert, chalcedony) in different publications.

This creates some difficulties when comparing materials from different sites. These disadvantages are offset, to some extent, by descriptions of macroscopic features (colour, transparency, presence or absence of intrusions) and the fact that most of them are local raw materials. It should be noted, however, that this remark does not apply to obsidian and Balkan honey flints, which are raw materials with distinct macroscopic features.

The obsidian is rare or very rare, and as petrographic analysis suggests, the raw material for flaking was mostly of regional or local provenience (Dimitriadis and Skourtopoulou

Table 4. Krovili. Lithic tools

Category of artefacts	Raw material											=
	1	2	7	8	16	20	21	22	23	24	28	
Axes	2	2			1		1	1				7
Flake end-scrappers			1					2	1			4
Blade end-scrappers				2			1	3				6
Truncated pieces								1				1
Perforators			1					1				2
Retouched flakes			4					6	1			11
Retouched blades			1								1	2
Backed bladelet						1						1
Retouched chunks				1				1				2
Jagged blade										1		1
Sum	2	2	7	3	1	1	2	15	2	1	1	37

2001; 2003; Kakavakis 2014; 2015, fig. 1, 37; Perlès and Vitelli 1999, 97; Sørensen 2010, 160, 164). Flaked assemblages from Sitagroi consist of artefacts made from chert, chalcedony quartz, honey Balkan flint, and so-called pebble flint (Dimitriadis and Skourtopoulou 2003; Dixon 2003; Tringham 2003). In Dikili Tash, chalcedony, quartz, rock crystal, jasper, and a variety of flints (Balkan flint) were used (Kourtessi-Philippakis 2009, 306).

The Neolithic lithic assemblage from Makri contains artefacts made from translucent or semitranslucent flints: milky-grey, yellowish, honey, black, and orange flints, and also opaque flints varying in colour from light blue-grey to grey and black. Their sources are located up to 30 km from this site, except for honey flint, whose natural deposits are located at greater distances (Efstratiou *et al.* 1998; Skourtopoulou 1998, 44). Moreover, local lithic production is confirmed by the presence of technical flakes, for example cores and rejuvenation flakes and blades in this assemblage (Efstratiou *et al.* 1998; Skourtopoulou 1998, 44).

In the lithic assemblages from Makriyalos, artefacts made from raw materials from various regional and non-regional sources were discovered, *e.g.*, from quartz, chert, jasper and flint (Pappa and Besios 1999, 191; Pappa *et al.* 2013, 82). In Turkish Thrace, Edirne Region, mainly flint and quartz were used. Other flakeable raw materials are recorded in lesser quantities, with virtually no obsidian. Milky-brown flint, black flint of inferior quality, honey flint from Bulgaria, and dark brown flint were used (Burcin 2001).

It should be added that lithic assemblages from the sites dated to the Early Bronze Age from northern Greece are also characterized by a large variety of raw materials used: chalcedony of various colours; the share of honey flint decreases, and there are quartz and jasper (Kourtessi-Philippakis 2010, 173, 174; Karageorgiou 2016, Table 1). In the Early Bronze Age at Toumba, Thessaloniki, many variants of chert of different colours, chert,

quartz, jasper, and chalcedony were used. Chert came from the vicinity of Vasilika and Galatista in Chalkidiki (Karageorgiou *et al.* 2016) At least part of the lithic raw materials in both the Neolithic and Early Bronze Age could have been obtained from the immediate vicinity of the sites in Paradimi and Krovili. Numerous blocks of quartz and chert of various dimensions (up to several dozen centimetres in diameter) are present on the surface of the ground. Easily accessible outcrops of various lithic raw material are located in the vicinity of Petrota, several kilometres from Krovili (Ammerman *et al.* 2008; Efstratiou and Ammerman 2004; Foltiadis *et al.* 2003; Kakavakis 2015, 38, 39; Kiliadis *et al.* 2006; Michailidou *et al.* 2020; Papadopoulou 2020). These sources of lithic raw material have been used since the Palaeolithic. It should be assumed that the Neolithic and Early Bronze Age communities, including those inhabiting the Paradimi and Krovili sites, obtained raw material there as well. Detailed physicochemical analysis of raw material used on both sites should be considered an important element of future research.

The analyzed lithic artefacts from Paradimi and Krovili came from systematic and detailed surface surveys. This has negative consequences for their chronological classification. It can be assumed with high probability that they are chronologically heterogeneous, and that these materials come from different periods of occupation of these locations. However, some observations are important for the knowledge of flint-making in these areas.

As already mentioned, all categories of artefacts have counterparts at Neolithic and Early Bronze Age sites in northern Greece, but it should also be noted that the material discovered on the surfaces of these sites also has its typological specificity. No items made of Balkan flints or obsidian were recorded in these collections. Regular blade cores are also absent. Moreover, a small number of regular blades from single platform blade cores were found there. Instead, a large number of highly exploited cores, including cores with changed orientation, were found. Splintered pieces are numerous. Most of half of the lithic assemblages from the surface survey at Krovili site constitutes different flakes and their fragments. Various flakes build clear evidence of *in situ* activities connected with the elaboration of flakeable lithic raw materials and the manufacturing of lithic tools. Moreover, numerous chunks with traces of flaking offers confirmation of testing of pieces of raw material for their suitability for processing. On the other hand, a large amount of material on the surfaces of both sites may be the result of the fact that in both cases they were covered by arable fields, and ploughing always has a destructive effect on archaeological sites.

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