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So-called Światowit from Wolin. Photo by PAWEŁ SZCZEPANIK

Professor Jan Machnik. Photo by KRZYSZTOF TUNIA

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SPRAWOZDANIA ARCHEOLOGICZNE 72/2, 2020
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THE SOUTH-EAST BLACK SEA COAST IN THE EARLY HOLOCENE PERIOD (ACCORDING TO INTERDISCIPLINARY ARCHAEOLOGICAL INVESTIGATIONS AT THE KOBULETI SITE)

ABSTRACT

Chkhatarashvili G., Manko V., Kakhidze A., Esakiya K., Chichinadze M., Kulkova M., Streltcov M. 2020. The South-East Black Sea coast in the Early Holocene period (according to interdisciplinary archaeological investigations at the Kobuleti site), *Sprawozdania Archeologiczne* 72/2, 213-230.

The paper presents the results of interdisciplinary research carried out at the Kobuleti Early Holocene site. Typological and use-wear analyses of stone artifacts helped to define the main branch of the economy of humans at the site. Palynological studies were conducted to reconstruct the paleoenvironment. The investigated plant spores proved that the climate in the Early Holocene was warm. Definition of an absolute date by means of the radiocarbon method (^{14}C) represents an innovation conducted in the study of the Stone Age in Ajara.

Keywords: Kobuleti, Artifacts, Interdisciplinary investigations, Early Holocene
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INTRODUCTION

Archaeological research has proven that the territory of Georgia has been populated since the Lower Paleolithic period (Vekua *et al.* 2002; Vekua *et al.* 2006; Lordkipanidze 2001). Archaeological sites of various periods have been discovered in Western Georgia during archaeological research (Nioradze 1933; 1953; Tushabramishvili 1960; Nebieridze 1972; Meshveliani *et al.* 1999; Tushabramishvili *et al.* 1999; Adler *et al.* 2006; Adler *et al.* 2008; Bar-Yosef *et al.* 2011; Pinhasi *et al.* 2014). The territory of Ajara has been exploited since ancient times, as evidenced by the numerous sites of the Stone Age (Grigolia 2002; Berdzenishvili and Nebieridze 1964; Gogitidze 1978; 2008). One of the most prominent sites in this regard is the Early Holocene site at Kobuleti village, where interdisciplinary studies were conducted in 2019, the results of which are presented in our publication. The main goal of this work is to show the life of Early Holocene hunters in the 8th millennia BC. Our research is based on techno-typological and use-wear analyses of the flint and obsidian artefacts found during excavations, as well as the latest palynological and radiocarbon data.

ARCHAEOLOGICAL BACKGROUND

The Kobuleti open-air site is situated on a high hill (Figs 1 and 2) to the right of the Kintrishi River (GPS: N 41 48.178 E 041 53.066) and 10 km to the east of the Kobuleti resort. The hill is 50 m high. The first archaeological study of this area is associated with the famous Georgian archaeologists Nino Berdzenishvili and Lamara Nebieridze (Berdzenishvili and Nebieridze 1964). The in-depth scientific analysis of the site was performed by the archaeologist Sergo Gogitidze (Gogitidze 1978; 2008), who supervised a number of field seasons in Kobuleti village in 1973-1986. They discovered a large amount of material by collecting a total number of thirty thousand samples. More than two-thousands of them were tools.

We had an opportunity to resume the archaeological fieldwork (head of excavations Prof. A. Kakhidze) at the Kobuleti site in 2019. It is noteworthy that it was the first time in the history of Stone Age archaeology in the Ajara region when an interdisciplinary group was involved in the work.

The excavations were carried out in the central part of the hill, where we confirmed the following stratigraphic picture:

Layer I – humus – 0.2 m.

Layer II – brown 0.45 m, containing three deposits:

1. Blackish-brownish – 0.10 m.
2. Brown – 0.15 m.
3. Light brownish with small pebbles 0.20 m.

Layer III – yellow (sterile) – from 0.65 m.

Fig. 1. Location of the Kobuleti archaeological site (illustrated by G. Chkhatarashvili)

Fig. 2. Kobuleti site. View from the south (photo by G. Chkhatarashvili)

A cultural layer was attested in the brownish layer, where we identified 3 deposits. It is clear that despite different colors, all three deposits belonged to the same period, namely to the Early Holocene period. In addition, during excavations we discovered 12 pits of various functions, in which we found numerous flint and obsidian artifacts. Bone and wood materials were not found because the soil is moist at the Kobuleti site.

METHODOLOGY

The study of the site was carried out using fairly standard methods. After dividing the trench, a grid of 1:1 m squares was marked, and each square was given an alphanumeric arrangement. The upper turf layer was removed by shovels. A patch of loam containing a cultural layer was excavated using trowels. Each lithological layer in a patch of loam was studied separately; as a result, layers 0, 1, and 2 were distinguished. These layers varied in color, but had very fuzzy boundaries. In this regard, much attention was paid to basalt blocks, the bases of which perfectly marked the boundaries between the lithological layers. For a clear distinction between cultural and lithological layers, we also used observations on the intake level of embedded objects. It should be noted that in most cases, the levels of the bases of the basalt blocks and the inlet of the embedded objects were correlated, which made it possible to reliably connect the fillings of the pits with a certain cultural layer. All finds and in-depth objects were noted in the plan with a designation of their depth from the benchmark. Profiles were drawn for embedded objects, which allowed us to reconstruct them with three-dimensional models. All loam containing a cultural layer was sifted on a sieve with 3 × 3 mm cells, and also washed. This procedure ensured one-hundred-percent detection of artifacts, including small-scale artifacts and fragments. Most microliths were also detected as a result of washing.

The use-wear analyses of flint and obsidian artifacts were carried out in the Laboratory of the Traceological Department of the Archaeological Research Institute at the Georgian National Museum. The stone artefacts were studied in two stages. The first phase included the microscopic study of the sample surfaces. Different types of completely natural traces are left on the surfaces (lines, scratches, polishes, blunts, *etc.*) of the tools after use (Semenov 1957; Semenov and Korobkova 1983). Binocular (MBS-9) and metallographic (Olympus) microscopes were used for the study of these traces. The second stage of the research concerned the functional analysis of artifacts, which resulted in the classification (Korobkova 1987; Esakiya 2005) of tools, on the basis of which the economy, its leading and secondary industries, site functions, economic characteristics and so forth were revealed.

The radiocarbon studies were conducted in the laboratory of the Geological and Geo-Ecological Department of the Herzen State Pedagogical University of Saint-Petersburg. For ^{14}C dating the LSC conventional method was used. First, the charcoal samples were processed using HCl acid (1.2N). After they were washed by distilled water, NaOH (0.1N) solution was used. At end of pretreatment, the diluted hydrochloric acid was used again. This pretreatment enabled the removal of contaminants like carbonates and organics from soils. For benzene synthesis, a steel reactor was used. The reaction of lithium carbide done under a pressure of 0,1-0,2 atmosphere and at temperature about 750°C. The lithium carbide was decomposed by distilled water to obtain acetylene. Benzene was synthesized from acetylene using a vanadium catalyst (Skripkin and Kovalukh 1998; Kovalukh and Skripkin 2007). The benzene cocktails were measured on the the Ultra Low Level Liquid Scintillation Spectrometer Quantulus 1220. The results were calibrated into calendar years according to the Intcal13 curve (Reimer *et al.* 2013) with the Oxcal 4.2 software (Bronk Ramsey 2009).

Laboratory processing of archaeological material samples obtained at the Palynological Laboratory of the Georgian National Museum were carried out in accordance with the standard method used for research of palynological and non-pollen palynomorphs (NPP), performed in four stages (Grichuk and Zaklinskaya 1948; Erdtman 1952; Moore *et al.* 1991). **During the first stage**, 100-150 g of soil (or other kinds of organic residues) was placed into a 1000-gram porcelain container. It was boiled in a 10% solution of potassium (or sodium) hydroxide (KOH or NaOH). **During the second stage**, organic remains were extracted from the soil sample by means of its centrifugation together with a solution of Cadmium iodide (CdI_2). **During the third stage**, acetolysis occurred, *i.e.* the material was dyed. During the last, **fourth stage**, the organic remains were dried and placed into glycerin.

After the laboratory processing, the material was studied and photographed, using an OMAX light microscope, scaled up to 200x-400x. Statistical processing and diagram building was conducted by means of the program 'Tilia' (Grimm 2004), while plates illustrating the photographed material were created using the program 'Corel draw'.

Identification of the pollen grains was performed on the basis of the palynological atlases and the palynotheka of present-day plants, belonging to the Research Institute of Paleoanthropology and Paleobiology of the GNM (van Hoeve and Hendrikse 1998; Reille 1992; 1995; 1998; Richter *et al.* 2004; Beug 2004; Piperno 2006; Torrence and Barton 2006).

RESULTS

Flint and obsidian complex. The lithic assemblage consists of 1533 units (Table 1-2) of flint and obsidian, of which 262 are tools (Fig. 3). The technique of removing blanks is focused on obtaining blades and microblades by manually pressing from conic and pencil-like cores. There are only 3 specimens of cores in the finds. We also have core tablets (2 specimens), which have traces of negatives clearly visible on them.

Table 1. Flint and obsidian artifacts from Kobuleti

Type	Flint	Obsidian	Total
Cores	2	1	3
Tablettes	3	1	4
Blades	17	8	25
Bladelets	110	84	194
Microblades	83	76	159
Flakes	185	93	278
Chunks	156	65	221
Chips	271	107	378
Burin spalls	6	3	9
Total	**833**	**438**	**1271**

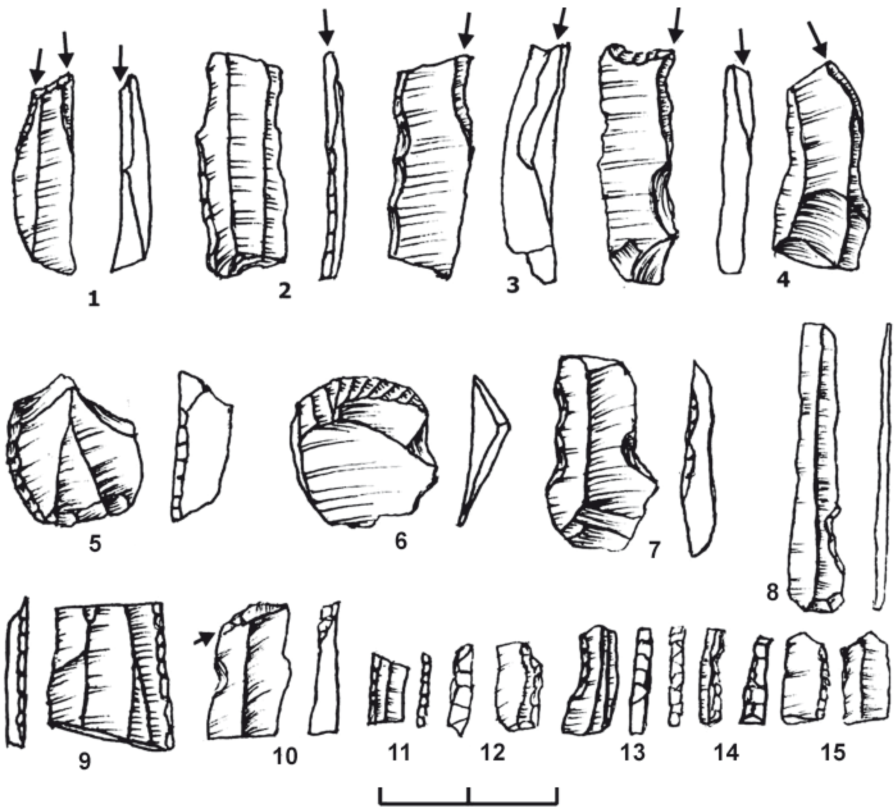

Fig. 3. Kobuleti site. Flint and Obsidian tools: 1-4 – burins; 5-6 – scrapers; 7-8 – notched blade and bladelet; 9 – retouched blade; 10 – truncated bladelet with microburin spall; 11-15 – bladelets and microblades with abrupt retouch (illustrated by V. Manko)

Table 2. Flint and obsidian tools from Kobuleti

Tools	Flint	Obsidian	Total
Burins	32	30	62
Scrapers	6	9	15
Burin-Endscraper	1	0	1
Chisels	9	6	15
Retouched flakes	5	4	9
Retouched blades/ bladelets/ microblades	30	59	89
Notched blades/bladelets/ microblades	10	17	27
Truncated blade/ bladelets/microblades	7	12	19
Microblades with abrupt retouch	5	20	25
Total	**105**	**157**	**262**

As is clear from the typological analysis of the material, flint and obsidian were not knapped on the spot. This conclusion follows from a comparison of the quantities of blades and flakes/chunks. There are three times more blades than flakes. Apparently, a large portion of the artefacts were brought to the site in the form of ready products.

The majority of the tools are retouched bladelets and microblades. Some of the bladelets are notched. Burins represent the second most numerous group of tools. They are rather diverse. We can distinguish side and angle burins. There are also many double-faceted burins. The majority of the burins are made on blades, but some of them are made on flakes. The same category of tools also contains the only combined tool – a burin-endscraper.

There are few scrapers among the finds, only 15 samples. The majority of them are made on flakes. Almost the same quantity of chisels is made on blades. Apparently, the functions of the endscrapers and chisels were performed by the retouched flakes presented in the collection.

Truncated blades are also found. Some of them are truncated facetted blades, which still contain the negatives of microburin spalls. A separate group of tools is composed of those produced specifically for hunting. This is a series (25 samples) of bladelets and microblades with abrupt retouch.

Use-Wear analysis. Blades, flakes and chunks made in flint and obsidian were selected for use-wear analysis (Inventory Number: Kob./2019/4-197; Kob./2019/403-491). In total, 288 artifacts have been studied with this method. The use-wear analysis has revealed several types of tools, the majority of which have displayed no visual signs of secondary knapping or wearing out. Several among them are multifunctional tools. We have distinguished the following functional groups of tools, among others: knives, scrapers, endscrapers, burins, combined tools, and carving tools. The analysis shows that knives, scrapers and endscrapers dominante among the tools. The blades and bladelets were used for making various other tools.

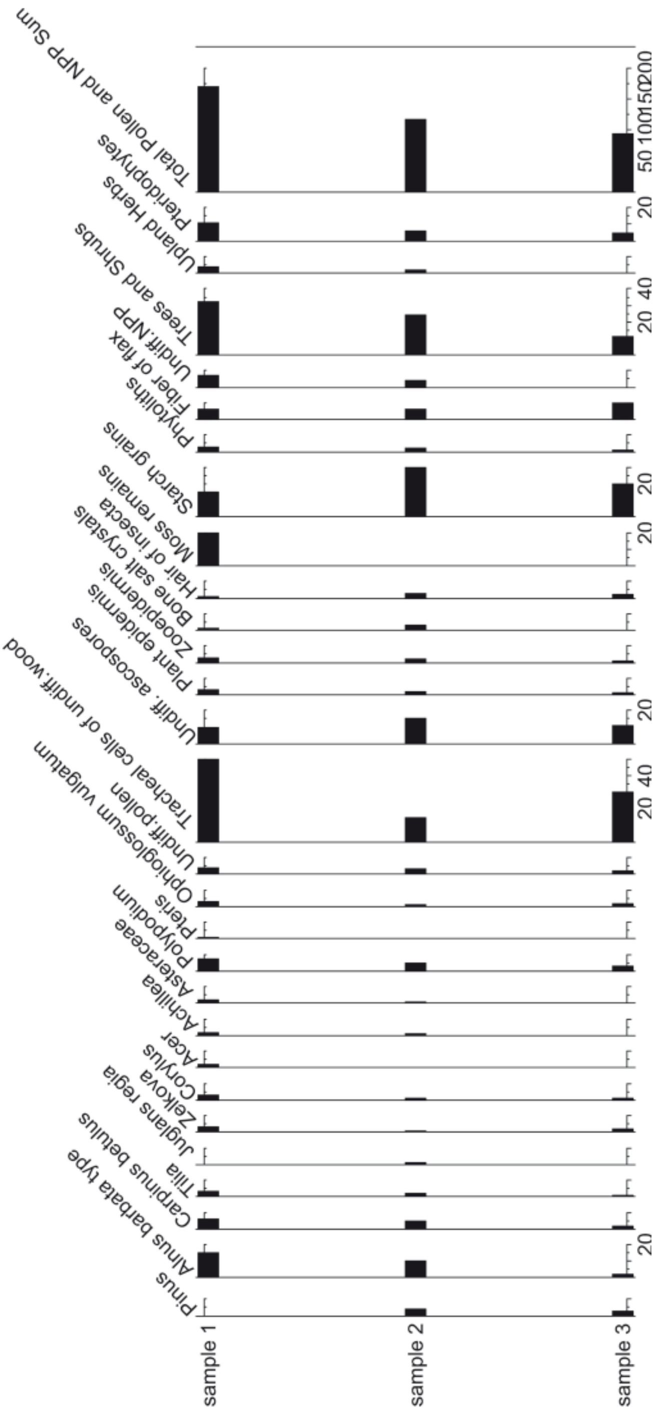

Fig. 4. Diagram of the pollen grains and non-pollen palynomorphs of the organic residues collected from the habitation layers

Table 3. Radiocarbon date of Kobuleti site

Location	Sample	Lab. Cod	Dates ^{14}C BP	Dates cal. BC (68.2%)	Dates cal. BC (95.4%)	Reference
Pit 7, Level 2	Charcoal	Spb-3084	8670±100	7908-7584	8180-7534	Chkhatarashvili and Glascock, 2020

The function of almost half of the tools was associated with the processing of products acquired while hunting (Fig. 3: 12-16). We have discovered that another large number of tools were associated with working wood/bone. Tools for working leather make up the third largest group.

The knives constitute the largest group of tools (84 samples), 81 of which were used for cutting meat, while the other 3 were used on animal skins. The tools of this type have sharp cutting edges and get blunt quickly. The traces of work (the thin crumbling of cutting edges, scratches and polished edges) are expressed weakly on these knives. Each of them was created on a bladelet and has one cutting edge. The opposite sides are knapped with blunting retouch. Three samples have 2 cutting edges and are made on middle-size blades.

The next functional group of tools is composed of scrapers (37 samples). The retouch on their working edges is the result of utilization. The cutting edge is a little bit notched (the edges blunted and rounded). The scrapers were used for processing wood.

A smaller quantity of endscrapers was also found (27 samples). The majority of them were used for processing leather; however, some of them bear traces of working on wood. During microanalysis of the edges, we revealed micro traces characteristic of processing leather (including removing the fat) and wood. The majority of endscrapers were made on blades, though 5 samples were made on flakes. We also identified two endscrapers with retouched heads.

We have also identified some burins (13 samples) in the collection, made both on blades and flakes. There are 3 burins among them that were intended for extremely delicate work (on wood or bone). They are considered to be jeweler tools. The majority of the polyfunctional tools are a combination of end scrapers and scrapers on the cutting edges of knives (7 samples).

Radiocarbon (C14) Analysis. There had been no series of absolute dates for the Kobuleti site so far. The date had only been determined approximately and according to contemporaneous sites. To acquire it, we sent the charcoals discovered in the undisturbed cultural layers to be studied in the laboratory. The laboratory research has established the site's date (Table 3).

Palynological analysis. The samples were collected from the habitation layer, dated from the 8th millennium BC, of which the three were studied by means of palynological methods. Their spectra are illustrated on the diagram (Fig. 4). The composition of the palynological spectra are not rich in pollen grains or spores, which is characteristic of ar-

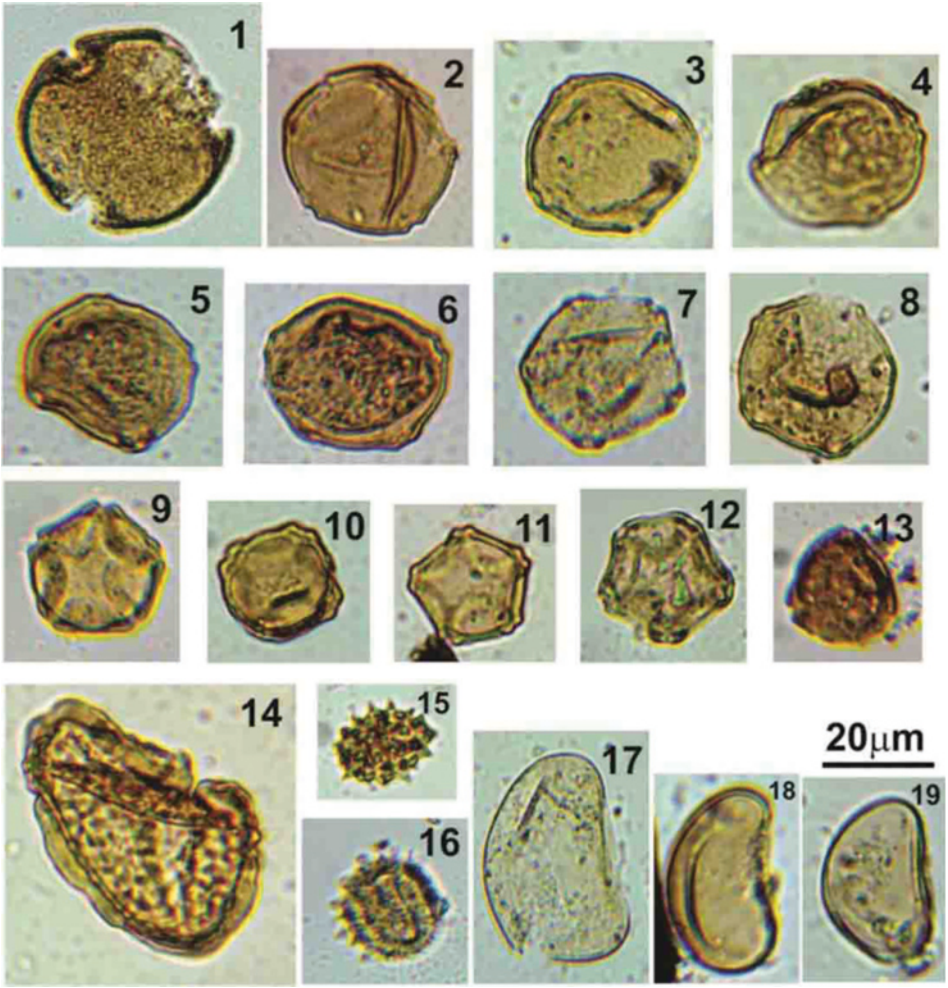

Fig. 5. Pollen grains of the plants and spores of ferns identified in the first sample: 1 – *Tilia* (Lime), 2-6 – *Carpinus* (Hornbeam), 7-8 – *Zelkova* (Zelkova), 9-12 *Alnus* – (Alder-tree), 13 – *Corylus* (Hazel), 14 – *Pteris* (Pteris), 15 – *Aster* (Aster), 16 – *Achillea* (Yarrow), 17-19 – *Polypodiaceae* (photo by M. Chichinadze)

chaeological materials. As for non-pollen palynomorphs, they are rather well represented (Fig. 4).

The arboreal group is represented by pollen grains of eight taxa (Figs 5 and 6). Nearly all of them are thrive in warm climate and moist soil. Among them are: hornbeam (*Carpinus betulus*), lime (*Tilia*), maple (*Acer*), walnut (*Juglans regia*), hazel (*Corylus*), and zelkova tree (*Zelkova*). As for the zelkova tree, it represents a Tertiary relict. In the present-day Georgia it grows only in warm locations at low altitudes, being preserved in the Alazani

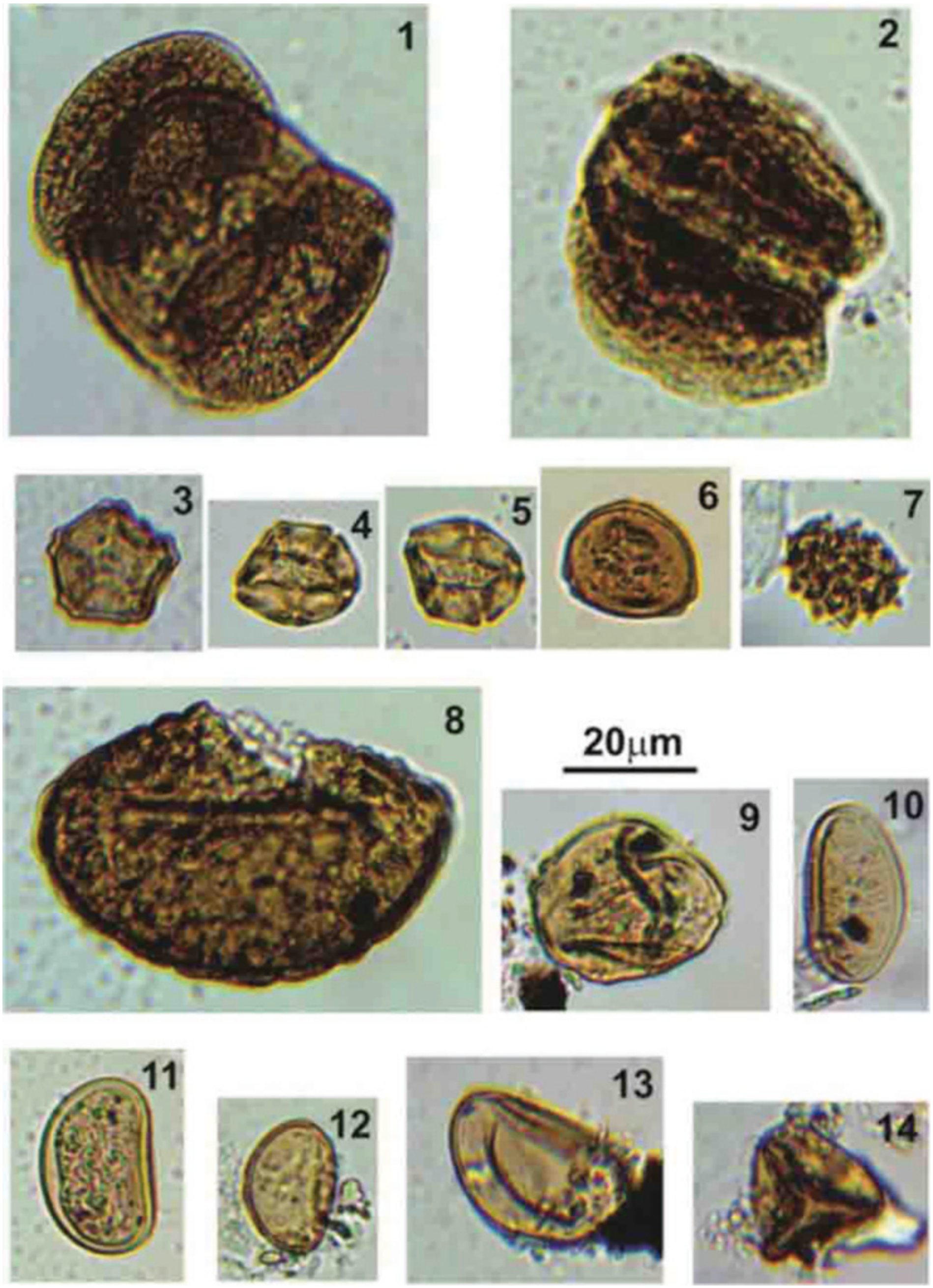

Fig. 6. Pollen grains of the plants and spores of ferns identified in the second sample: 1-2 – *Pinus* (Pine), 3-5 – *Alnus* (Alder-tree), 6 – *Corylus* (Hazel), 7 – *Aster* (Aster), 8, 10-14 – *Polypodiaceae*, 9 – *Carpinus* (Hornbeam) (photo by M. Chichinadze)

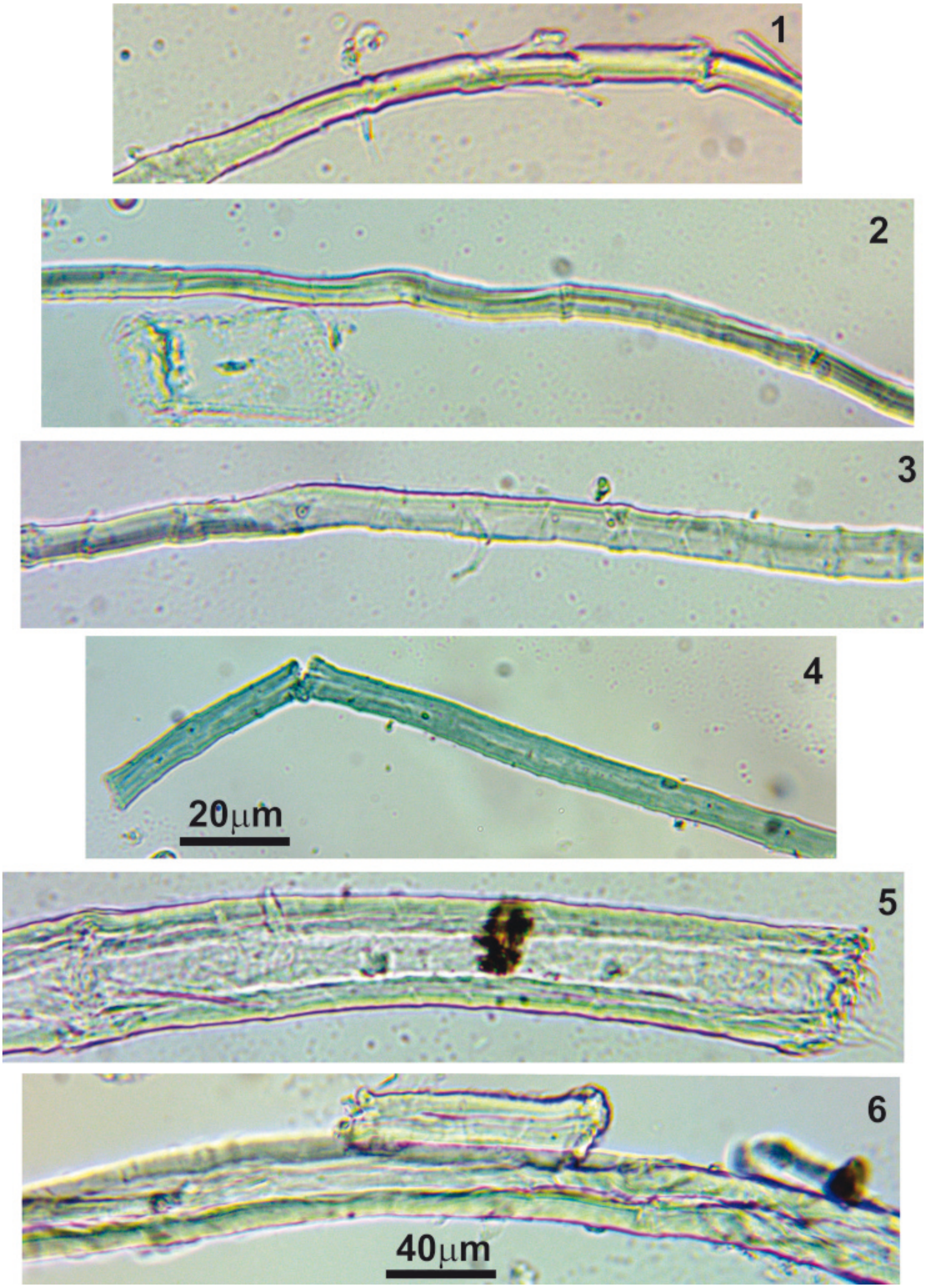

Fig. 7. Flax (Linen) fabric fibers discovered in all three samples.
1-3, 5-6 – flax fibers, 4 – dyed linen fiber (photo by M. Chichinadze)

Valley and the Colchian coast (Kvavadze, Connor, 2005). Common alder (*Alnus barbata*) and adder's tongue (Ophioglossum vulgatum) are also indicators of a warm climate.

Among herbaceous plants, yarrow (*Achillea*) and other Asteraceae, often used as medicinal plants (Martkoplishvili and Kvavadze 2015; Martkoplishvili 2017; Martkoplishvili and Kvavadze 2017), were distinguishable (Figs 5 and 6). Spores of the Pteridophyta, growing only in wooded areas, were also found. Charred parenchymal cells of timber prevail in the group of non-pollen palynomorphs, presumably representing traces of hearth fire.

Linen cloth fibers (Kvavadze *et al.* 2010a; 2010b; Chichinadze and Kvavadze 2013; Kvavadze and Chichinadze 2020), including dyed fibers, were found in all three samples (Fig. 7). They represent microscopic fabric residues of clothing belonging to ancient humans. Small quantities of cereal phytoliths, moss remains, salt crystals of animal bones, hairs, and the epidermises of insects were found.

Thus, the discussed palynological spectra indicate that a wooded landscape surrounded the archaeological site. Presumably, deciduous species like lime, hornbeam, walnut, and zelkova trees were growing there in warm and moist soil, while hazel and common alder were part of the brushwood. Plenty of ferns also grew in these woods, facilitated by the wet climate. Great numbers of starch and cereal phytoliths demonstrate that edible plants occupied a great portion of the diet of ancient humans. Linen fibers, and especially those dyed in various colors, prove the existence of clothes made of linen fabric.

As for the climatic conditions of the period in question, it was rather warm. This was due to the global warming that took place after the last Würm glaciations, at the beginning of the Holocene, i.e. 10 000 years ago (Roberts 2014; Shatilova *et al.* 2011).

CONCLUSION

According to our interdisciplinary archaeological research, we can make several conclusions. The typological analysis of the tools showed the important role of hunting. It is worth noting that the stone industry evidenced at Kobuleti has analogies at archaeological sites of the Mle'faat (Near East) culture (Hole 1977; Dittermore 1983; Howe 1983; Chkhatarashvili and Manko 2020), dated to the Late Pleistocene-Early Holocene periods. The main feature of this industry is the use of the pressure flaking technique to obtain bladelets and microblades from conic and pencil-like cores, as well as the use of microblades with abrupt retouched and truncated bladelets. This circumstances enable us to consider a unified culture, which was created as a result of a migration from the Near East; The described complex of stone artifacts is also known at other sites in Western Georgia: Bavra, Bavra I, Bavra II (Gabunia 2001; Gabunia and Tsereteli 2003), Bavra-Ablari (Varoutsikos *et al.* 2017), and Anaseuli I, II (Nebieridze 1972). The indicated complexes have been dated by the radiocarbon method. The dates show that the Kobuleti industry existed in the Preboreal and at the beginning of the Atlanticum. It is interesting that the early stage of the

Kobuleti flint industry developed synchronously with the Trialetian sites, dated from the Preboreal to the beginning of the Boreal (Meshveliani *et al*. 2007). The Trialetian industry was characterized by the absence of the pressure technique and the development of a geometric complex with asymmetric triangles. The coexistence of two archaeological cultures in Western Georgia at the beginning of the Holocene sheds light on the difficult demographic situation in the region.

Based on the use-wear analyses, we can state that, functionally, the majority of the tools were made for processing meat, wood and leather; The palynological analysis enabled us to reconstruct with relative accuracy the paleoclimatic environment of the Early Holocene. The climatic conditions were warm. Attention should be paid to the discovery of the flax fibers, which provide the oldest evidence at Ajara stone age sites for the use of flax fibers for making cloth. The chronology of the Kobuleti site had previously been vague, but thanks to the use of natural science methods, we were able to determine the exact age of the site.

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