

Interdisciplinary Insights into Early Holocene Life: Recent Archaeological Discoveries at Khutsubani, Kintrishi Gorge

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Abstract. *Khutsubani is one of the most remarkable archaeological sites in the Kintrishi Gorge, offering crucial insights into the mobility of people inhabiting Ajara (Western Georgia) during the Early Holocene period. The site provides valuable information on the paleoenvironment, activities, stone processing techniques, and connections with the Middle East. In 2024, an expedition from the Kobuleti Museum conducted extensive archaeological fieldwork at the Khutsubani settlement. Excavations revealed flint and obsidian tools, remnants of tool production, basalt tools, various types of pits, and more. Through interdisciplinary research, absolute dating was achieved, and the ancient paleoclimatic environment was reconstructed. However, the most important discovery was the artifact connected with fishing and organic remains preserved on it, which indicates the existence of fishing and, presumably, an early stage of weaving in the region, along with hunting.*

Rezumat. *Khutsubani este unul dintre cele mai remarcabile situri arheologice din Cheile Kintrishi, oferind perspective cruciale asupra mobilității oamenilor care locuiau în Ajara (Georgia de Vest) în perioada mezolitică. Situl oferă informații valoroase despre paleomedii, activități, tehnicile de prelucrare a pietrei și legăturile cu Orientul Mijlociu. În 2024, o echipă a Muzeului Kobuleti a efectuat ample cercetări arheologice în așezarea Khutsubani. Săpăturile au scos la iveală unelte din silex și obsidian, rămășițe ale producției de unelte, piese din bazalt, diverse tipuri de gropi și multe altele. Prin cercetările interdisciplinare întreprinse s-a putut data absolut situl, fiind obținute și reconstituiri ale paleoclimatului antic. Cu toate acestea, cea mai importantă descoperire a fost cea a artefactului care atestă practicarea pescuitului. Acesta, împreună cu rămășițele organice conservate, indică nu numai existența pescuitului, dar și, probabil, a unei etape timpurii a țesutului în regiune, alături de vânătoare.*

Keywords: Kintrishi, Khutsubani, early holocene, net sinker, flax.

Introduction

The Ajara region is distinguished by its diverse archaeological sites. Among them, Early Holocene open-air sites hold a special place. Geological data indicate the absence of karst formations in the region, and consequently, no caves-grottos have been discovered. Ajara is mostly represented by sites from the post-Pleistocene glacial period, belonging to the Mesolithic and Neolithic periods. Unfortunately, most of them are damaged and/or lost, which occurred in the second half of the last century due to the development of citrus plantations

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and/or the construction of a road. Topographically, the sites are located on natural hills and terraces in the deep river valley.

Between 2021 and 2024, the Kobuleti Museum Expedition, led by Guram Chkhatarashvili, conducted extensive field excavations in the Kintrishi River gorge, where several significant sites had been identified as early as the 1960s⁶. Through interdisciplinary research and the application of modern methods, the expedition successfully addressed key aspects of the lives of ancient inhabitants of the Kintrishi Gorge, including stone processing techniques⁷, activities⁸, the paleoclimate⁹, raw material procurement strategies for tool production, mobility¹⁰ etc.

This study is based on the analysis of materials obtained from the 2024 archaeological excavations at the Khutsubani site. Through comprehensive research, it presents a typological classification of the stone tools discovered at the site, as well as insights into the ancient residential and subsistence environment, including activities such as hunting, fishing, and weaving. We believe that the results of this interdisciplinary study will significantly enhance our understanding of various aspects of human life in the Kintrishi Gorge during the Early Holocene period.

Geographical location

Khutsubani is situated in the Kobuleti municipality (Ajara region), in the village with the same name. As noted earlier, the site is an open-air type located on a terrace on the right bank of the Kintrishi River, covering approximately one hectare. Currently, the site lies within the homestead of Marine Beridze, where, unfortunately, cultural layers are damaged due to anthropogenic factors. As a result, archaeological material is frequently uncovered on the modern surface.

Geographically, Khutsubani is situated in the Colchis Plain (Figure 1), which extends to the east of the Black Sea. The region is dominated by vegetation characteristic of a subtropical climate. Palynological studies conducted in Khutsubani in 2021 confirmed the widespread presence of heat-loving plants¹¹, which contributed to a favorable living environment. However, it is also important to consider that the Ajara region, particularly the Black Sea coast, experiences high humidity and abundant precipitation. These conditions pose significant challenges for the preservation of faunal and anthropological materials at open-type sites. Consequently, in many cases, the primary surviving evidence of prehistoric human life consists of stone tools, cores, and production waste. Nonetheless, interdisciplinary studies on prehistoric sites in Ajara offered valuable insights into the region's past.

History of archaeological research and exploration

The discovery of Khutsubani is closely linked to the work of archaeologist I. Gdzeliashvili, who, in 1959, conducted archaeological works in the Kobuleti municipality and uncovered 58 flint and obsidian artifacts¹². That same year, several artifacts were also collected in Khutsubani by A. Ramishvili, an employee of the Batumi N. Berdzenishvili Scientific-Research Institute.

⁶ BERDZENISHVILI, NEBIERIDZE 1964; GOGITIDZE 1978; 2008.

⁷ CHKHATARASHVILI, MANKO 2020.

⁸ ESAKIYA *et alii* 2020.

⁹ CHKHATARASHVILI *et alii* 2020.

¹⁰ CHKHATARASHVILI, GLASCOCK 2022; CHKHATARASHVILI *et alii* 2024a,b.

¹¹ CHKHATARASHVILI *et alii* 2024b.

¹² BERDZENISHVILI, NEBIERIDZE 1964, 8.

Between 1960 and 1962, the Georgian Black Sea Archaeological Expedition carried out small-scale reconnaissance in Khutsubani¹³. In 1967-1968, archaeologist Sergo Gogitidze resumed fieldwork at Khutsubani, where he discovered approximately 600 flint and obsidian tool fragments, both on the surface and through excavations¹⁴.

In 2021, with funding from the Kobuleti Municipality City Hall and support from the Kobuleti Museum, archaeological fieldwork continued as part of the Georgian-Ukrainian International Archaeological Expedition. The research findings were published in both Georgian¹⁵ and international scientific journals¹⁶.

The primary objective of the 2024 archaeological expedition was to investigate suspicious sites identified through accidental discoveries across the entire site area. In trench № 3 (Figure 2), an undisturbed cultural layer was observed, revealing the following stratigraphy.

- 0 - 5 cm topsoil
- 5 - 20 cm hummus

A large number of modern metal and glass fragments were found in this layer, as well as fragments of ceramics and tiles from a later period.

- 20 - 35 cm blackish layer

The layer was disturbed, likely due to anthropogenic factors. In addition to several fragments of antic period ceramics, flint and obsidian flakes were also discovered.

- 35 - 55 cm brown layer

The layer is undisturbed; in addition to flint and obsidian artefacts, a significant number of basalt stones were discovered.

- 55 - 95 cm light brown layer

This archaeologically rich layer contained significant artifacts, including a fishing net sinker made of basalt stone. Two oval-shaped pits were also discovered. The layer has been dated (Table 2).

- A yellow clay layer appeared from 95 cm (bedrock)

The layer represents sediment from the Pleistocene period, where no artifact was found.

Research methodology

Archaeological work at the Khutsubani site was conducted using standard methods. Control trenches (2×1 m) were excavated in the study area. A thin layer of soil (5 cm) was removed using a shovel and preparation knife. The excavated soil was sieved and washed in a metal mesh (1×1 mm; 2×2 mm). All artifacts were assigned the appropriate inventory numbers and recorded in a field journal. Artifacts found *in situ* were mapped on a general plan, with their depths indicated.

The stone collection was studied using the typological method developed by J. Tixier¹⁷ and Kh. Amirkhanov¹⁸. It involved the categorization of artifacts according to typological characteristics.

¹³ BERDZENISHVILI, NEBIERIDZE 1964, 9.

¹⁴ GOGITIDZE 1978, 32.

¹⁵ CHKHATARASHVILI 2023.

¹⁶ CHKHATARASHVILI *et alii* 2024b.

¹⁷ TIXIER 1974.

¹⁸ AMIRKHANOV 1985.

Palynological samples collected from a net sinker and from the pits were processed at the palynological laboratory of the Georgian National Museum means of a standard method¹⁹.

The Radiocarbon Analysis (C¹⁴ AMS) was conducted in VILNIUS RADIOCARBON. There were studied the 2 samples of charcoal from pits. Radiocarbon dates were calibrated using the online calibration program OxCal 4.4.4²⁰ using atmospheric data from Paula J. Reimer *et alii*²¹.

Results

Stone complex. In 2024, 506 artifacts were found at the Khutsubani site (Table 1), out of which 47 were tools. The main raw materials used for making tools were flint and obsidian. However, basalt stones were also found in considerable quantities.

Techno-typological analysis of the stone collection reveals that a hand-pressing technique was used to produce blades and microblades. Unfortunately, no cores were found, except for a single conical core fragment. Additionally, only a few flakes and chunks and unprocessed blades were present among the finds, further supporting the previously expressed view that tool production did not take place on-site and that the items were likely brought in as finished products.

The majority of the tools collection consists of burins (Figure 3/1-3), primarily made on blades. Most are simple burins, which likely also functioned as multi-purpose tools, as some exhibit signs of notched and retouching.

Retouched blades and flakes hold a significant place among the tools (Figure 3/11-19), distinguished by their diversity. The retouch is generally subtle, with only occasional traces of deep, penetrating retouch. Notched blades, bladelets and microblades (Figure 3/20-24) should be grouped together, as both were primarily crafted from microblades. The recessing was performed from both the ventral and dorsal sides.

Endscrapers are represented by noteworthy specimens (Figure 3/4-9), primarily distinguished by oval and round forms with retouching on the dorsal side. Most scrapers were crafted using flakes.

The chisels are presented as single pieces (Figure 3/10). They are made using a variety of shapes and sizes of flakes.

The tool collection includes the smallest microblades with abrupt retouches (Figure 3/25-34). These were crafted from the medial parts of microblades, with fine retouching along their entire sides. Similar types of tools were used in hunting as projectile inserts.

The basalt stone collection includes axe fragments, spherical and oval stones, mortars etc. A particularly noteworthy item is a flat oval stone with one notched side (Figure 4). The artifact shows traces of a belt on the middle part of its surface, suggesting frequent practical use. Next, the palynological analysis also revealed interesting findings.

Palynology. Sample 1 was collected from Pit 1. Of arboreal, the palynological spectrum of the sample identified small amounts of pollen of spruce (*Picea*), walnut (*Juglans regia*) and common grape vine (*Vitis vinifera*). Of herbaceous plants, pollen clumps and single pollen grains of goosefoot (*Chenopodiaceae*) were encountered. Besides, pollen of aster (*Aster*), cichorium (*Cichorium*), thistle (*Carduus*) and representatives of cereals for sowing (*Poaceae*) were evidenced (Figure 5-6).

¹⁹ MOORE *et alii* 1991; GRICHUK, ZAKLINSKAYA 1948; GRIMM 2004.

²⁰ BRONK RAMSEY, LEE 2013.

²¹ REIMER *et alii* 2020.

Of non-pollen palynomorphs, abundance of residues of tracheal cells of wood, starch grains and phytoliths of plants was defined. Great amounts of crystals of salt and bone salt were identified as well. Volcanic ashes were evidenced in the sample collected from the pit (Figs. 5, 7). Of zoo material, remains of insects and eggs, belonging to a parasite worm *Ascaris* were found. In the same sample, fibers of flax and hemp were also identified (Figure 6, 8).

Palynology. **Sample 2** was collected from pit 2. Of arboreals, pollen of alder (*Alnus*) and hazel (*Corylus*) were defined. Small amounts of pollen, belonging to cereals for sowing, and spores of fern were also found (Figure 5, 9).

Of non-pollen palynomorphs, plenty of tracheal cells of wood, residues of plant phytoliths and starch grains were encountered. Along with spores of unidentified fungi, spore of fungus *Ustilina* (*Ustilina*) was evidenced in the same sample (Figs 5, 10). The identification was performed on the basis of work of van Geel B.²² Plenty of remains of fibers of linen fabric were found in pit 2 (Figure 5, 11).

Palynology. **Sample 3** was collected from the net sinker with organic residues attached to it, being found in the same cultural layer. The net sinker was examined under a scanning microscope. A sample was taken from the material attached to it. Later the sample was studied under the light microscope. Identification of flax fabric fiber in the spectrum of the material in question proved existence of flax thread (Figure 5, 12-13).

Radiocarbon. The age of the Khutsubani site was determined to be Early Holocene using relative²³ and absolute²⁴ dating methods. The new absolute dates (table 2) obtained as a result of the 2024 research, precisely determined the chronological framework of Khutsubani site.

Discussion and Conclusion.

Archaeological and laboratory work conducted at the Khutsubani site in 2024 provided us with important information that can confirm some of the previously expressed opinions.

First of all, the oval-shaped pits discovered in the ditch are noteworthy, as they are frequently observed at the Kobuleti site. These are considered to be supporting pits for the pillars of a residential house²⁵. In contrast to the Kobuleti, the study of the pit structure found in Khutsubani (oval, conical depth) and the detailed analysis of the material within it provide a basis for the assumption that we are dealing with the so-called "agricultural pit". This hypothesis is further supported by palynological research.

Relying upon the existence of crystals of salt and bone salt in the first pit, it was supposed that along with plants salted meat was kept in this pit. The identification of an egg of the parasite worm *Ascaris* proved existence of intestinal infections for the period in question. As a rule, the *Ascaris* lives in intestines of vertebrate animals. Humans, consuming meat of such animals, become infected. These data serve as additional evidence, proving that meat was included into the diet of the Khutsubani population during the period in question.

According to the techno-typological analysis of the stone industry, we conclude that the ancient inhabitants of Khutsubani used a hand-pressing technique to obtain blades and microblades. This is confirmed by both the core tablets and the narrow, thin shapes of the blades and microblades.

²² VAN HOEVE, HENDRIKSE 1998.

²³ BERDZENISHVILI, NEBIERIDZE 1964; GOGITIDZE 1978.

²⁴ CHKHATARASHVILI *et alii* 2024b.

²⁵ CHKHATARASHVILI, MANKO 2020.

Among the tools, chisels, retouched and notched blades, and microblades with abrupt retouched occupy a leading position. All of these tools (throwing tools, spearheads) are associated with the manufacture of hunting tools, which closely mirrors the typology of the stone industry found at the neighbouring archaeological site of the Kobuleti. Furthermore, a use-wear-analysis of the tools from the Kobuleti²⁶ reveals that the tools, which are predominantly meat-processing knives show no signs of long-term use. In our opinion, a similar situation likely existed in Khutsubani, which, like the Kobuleti, was a temporary site (camp?) of Early Holocene hunters.

Among the stone materials, special attention should be given to the net sinker with one notched side. An interdisciplinary study of the organic remains preserved on the base confirms that local fishermen used flax thread to weave the nets. Flax (and also hemp) fabric fibres have previously been identified at sites in the Kintrishi Gorge²⁷ and, according to palynologists, these fibres were likely used to make clothing²⁸. The latest discoveries suggest that the people living along the Kintrishi River actively utilized its resources and were engaged in both fishing and hunting.

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Illustration list

Figure 1. Map showing the location of Khutsubani site (Photo by G. Chkhatarashvili).

Figure 2. Trench № 3 of Khutsubani site excavated in 2024 (Photo by G. Chkhatarashvili).

Figure 3. Graphical illustration of stone complexes (illustrated by N. Tskvitinidze).

Figure 4. Photo and Graphical illustration of Net sinker (illustrated by G. Chkhatarashvili).

Figure 5. The quantitative diagram of the palynological and non-pollen palynomorphs (NPP) at Khutsubani.

Figure 6. Pollen grains of plants discovered in pit № 1: 1 - spruce (*Picea*); 2, 5 - walnut (*Juglans regia*); 3-4 - grapes (*Vitis vinifera*); 6 - undiff. pollen (*Undiff. pollen*); 7 - common chicory (*Cichorium*); 8 - thistle (*Carduus*); 9-10 - cereals for sowing (*Cereal*); 11-13 - representatives of the family of goosefoot (*Chenopodiaceae*) (Photo by M. Chichinadze).

Figure 7. Non-pollen palynomorphs (NPP) discovered in pit № 1: 1-3 - tracheal cells of wood; 4 - egg of the parasite worm ascaris (*Ascaris*); 5-7 - residues of volcanic ashes (tephra); 8-9 - salt crystal; 10 - bone salt crystal (Photo by M. Chichinadze).

Figure 8. Fabric fibers discovered in pit № 1: 1-2 - flax (*Linum*); 3 - hemp (*Cannabis*) (Photo by M. Chichinadze)

Figure 9. Pollen grains and spores of plants discovered in pit 2 of trench 3: 1- hazel (*Corylus*); 2-3 - alder (*Alnus*); 4 - fern (*Polypodiaceae*); 5 - cereals for sowing (*Cereal*) (Photo by M. Chichinadze).

²⁶ CHKHATARASHVILI *et alii* 2020.

²⁷ CHKHATARASHVILI 2023; CHKHATARASHVILI *et alii* 2023.

²⁸ KVAVADZE *et alii* 2009; 2010; KVAVADZE 2016.

Figure 10. Non-pollen palynomorphs (NPP) discovered in pit № 2: 1-2 - plant phytoliths; 3-4 - undiff. ascospores; 5-7 - tracheal cells of wood; 6 - spore of *Ustilina* together with cells of charred wood (Photo by M. Chichinadze).

Figure 11. Textile fibers discovered in pit № 2: 1-3 - flax fibers (*Linum*); 4 - hemp (*Cannabis*) fiber (Photo by M. Chichinadze).

Figure 12-13. Fibers of linen fabric (*Flax*) discovered in the sample of net sinker (1-7) (Photo by M. Chichinadze).

Table 1. Stone tools and remnant of production.

Table 2. Absolute dates of Khutsubani site.

References

- AMIRKHANOV, K. A. 1987. *Chohskoe poselenie, chelovek i ego kul'tura v mezolite i neolite gornogo Dagestana*. Moskva.
- BERDZENISHVILI, N., NEBIERIDZE L. 1964. Kvis khanis namosakhlari k'int'rishis kheobashi. In A. Inaishvili (eds.), *Samkhret-dasavlet sakartvelos dzeglebi*, I. Sabchota Sakartvelo, Tbilisi, 7-16.
- BRONK RAMSEY, C., LEE S. 2013. Recent and Planned Development of the Program OxCal, *Radiocarbon* 55/2-3: 720-730 <https://doi.org/10.1017/S0033822200057878>.
- CHKHATARASHVILI, G., MANKO V. 2020. Kobuleti Site. The Evidence for Early Holocene Occupation in Western Georgia, *Documenta Praehistorica* XLVII: 28—35 <https://doi.org/10.4312/dp.47.2>.
- CHKHATARASHVILI, G., MANKO, V., KAKHIDZE, A., ESAKIYA, K., CHICHINADZE, M., KULKOVA, M., STRELCOV, M. 2020. South-East Black Sea coast in early Holocene period (according to interdisciplinary investigations in Kobuleti site), *Sprawozdania Archeologiczne* 72/2: 213–230 <https://doi.org/10.23858/SA/72.2020.2.2261>.
- CHKHATARASHVILI, G., GLASCOCK, M. 2022. Obsidian at Kobuleti (Western Georgia): Evidence for early human contact in Western Transcaucasia during the early Holocene, *Archaeological Research in Asia* 29: 1-8 <https://doi.org/10.1016/j.ara.2021.100348>.
- CHKHATARASHVILI, G. 2023. Preistoriuli epokis arkeologiuri dzeglebi pichvnaris shemogarensi. In: A. Kakhidze (ed.), *Pichvnari*, VIII, 9-23, Batumi.
- CHKHATARASHVILI, G., MANKO, V., KHALVASHI, M. 2023. Emergence of Weaving and Early Human activities of South-West Georgia (Accroding to Newest Studies), *Chronos* 4: 211-226.
- CHKHATARASHVILI, G., DAVENPORT, A. J., GLASCOCK, D. M., KHALVASHI, M., ZOIDZE T. 2024a. Reconstructing Neolithic obsidian procurement in Western Georgia through an obsidian characterization study, *Journal of Archaeological Science. Reports* 57: 1-9 <https://doi.org/10.1016/j.jasrep.2024.104663>
- CHKHATARASHVILI, G., CHICHINADZE, M., GLASCOCK, M. D., DAVENPORT, J. A., KHALVASHI, M., ASLANISHVILI, L., RODINADZE S. 2024b. Interdisciplinary investigation of the Khutsubani site (Westen Georgia), *Revista Arheologică. Serie Nouă* XX/1: 171-183 https://doi.org/10.52603/RA.XX.1.2024_09.
- ESAKIYA, K., CHKHATARASHVILI, G., KAKHIDZE, A. 2020. Kompleksnyj analiz kamennogo inventarja rannegolocenovoj stojanki kobuleti, *Tyragetiya, s.n.* XIV[XXIX]/1: 71-76.
- GOGITIDZE, S. 1978. *Samkhret-aghmosavlet shavizghvisp'iretis neolituri k'ult'ura*. Metsniereba, Tbilisi.

GOGITIDZE, S. 2008. *K'int'rishis kheobis arkeologiuri dzeglebi (kobuletis adreneolituri khanis namosakhlari)*. Batumis sakhelmts'ipo universit'et'is gamomtsemloba, Batumi.

GRICHUK, V. P., ZAKLINSKAYA, E. D. 1948. Analiz iskopaemyh pylcy i spor i ego primenenie v paleogeografii. Geografiz, Moskva.

GRIMM, E. C. 2004. *TGView 2.0.2*. Illinois State Museum, Research and Collections Centre, Springfield.

KVAVADZE, E. 2016. Determination of the oldest textile housed in Georgian National Museum with palynology. In: Museum and Cultural Heritage, III, 177-180.

KVAVADZE, E., BAR-YOSEF, O., BELFER-COHEN, A., BOARETTO E., JAKELI, N., MATSKEVICH, Z., MESHVELIANI, T. 2009. 30,000- Wild Flax Year-Old Fibers, *Science* 325: 1359 <https://doi.org/10.1126/science.1175404>.

KVAVADZE, E., BAR-YOSEF, O., BELFER-COHEN, A., BOARETTO, E., JAKELI, N., MATSKEVICH, Z., MESHVELIANI, T. 2010. Response to Comments on "30 000-Year-Old Wild Flax Fibres", *Science* 328: 1634.

MOORE, P. D., WEBB, J. A., COLLINSON, M. E. 1991. *Pollen Analysis*. Blackwell Scientific Publications, Oxford.

REIMER, P. J., AUSTIN, W. E. N., BARD, E., BAYLISS, A., BLACKWELL, P. G., BRONK RAMSEY, C., BUTZIN, M., CHENG, H., EDWARDS, R. L., FRIEDRICH, M., GROOTES, P. M., GUILDERTSON, T. P., HAJDAS, I., HEATON, T. J., HOGG, A. G., HUGHEN, K. A., KROMER, B., MANNING, S. W., MUSCHELER, R., PALMER, J. G., PEARSON, C., PLICHT, J., REIMER, R. W., RICHARDS, D. A., SCOTT, E. M., SOUTHERN, J. R., TURNER, C. S. M., WACKER, L., ADOLPHI, F., BÜNTGEN, U., CAPANO, M., FAHRNI, S. M., FOGTMANN-SCHULZ, A., FRIEDRICH, R., KÖHLER, P., KUDSK, S., MIYAKE, F., OLSEN, J., REINING, F., SAKAMOTO, M., SOOKDEO, A., TALAMO, S., 2020. The IntCal20 Northern Hemisphere Radiocarbon Age Calibration Curve (0–55 cal kBP), *Radiocarbon* 62/4, 725-757 <https://doi.org/10.1017/RDC.2020.41>.

TIXIER, J. 1974. Glossary for the description of stone tools, with special reference to the Epipaleolithic of the Maghreb, *Newsletter of Lithic Technology*. Special Publication 3-40.

VAN HOEVE, M. L., HENDRIKSE, M. 1998. *A Study of Non-Pollen Objects in Pollen Slides: The Types as Described by Dr Bas Van Geel and Colleagues*, Utrecht.

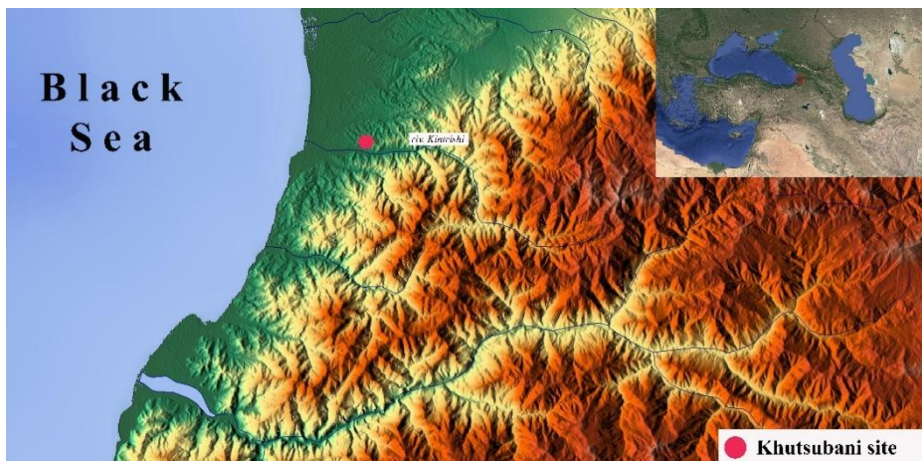


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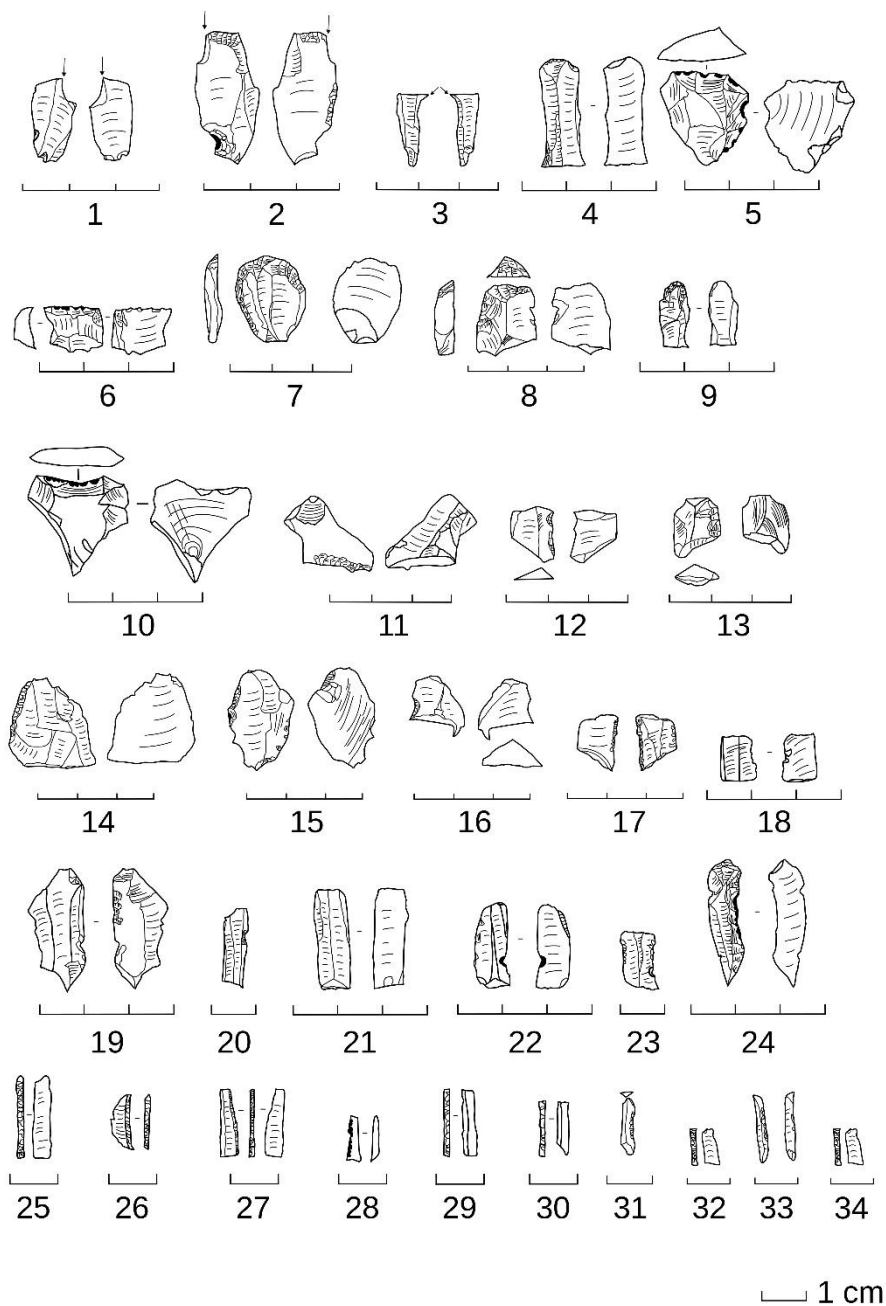


Figure 3. Graphical illustration of stone complexes (illustrated by N. Tskvitinidze).

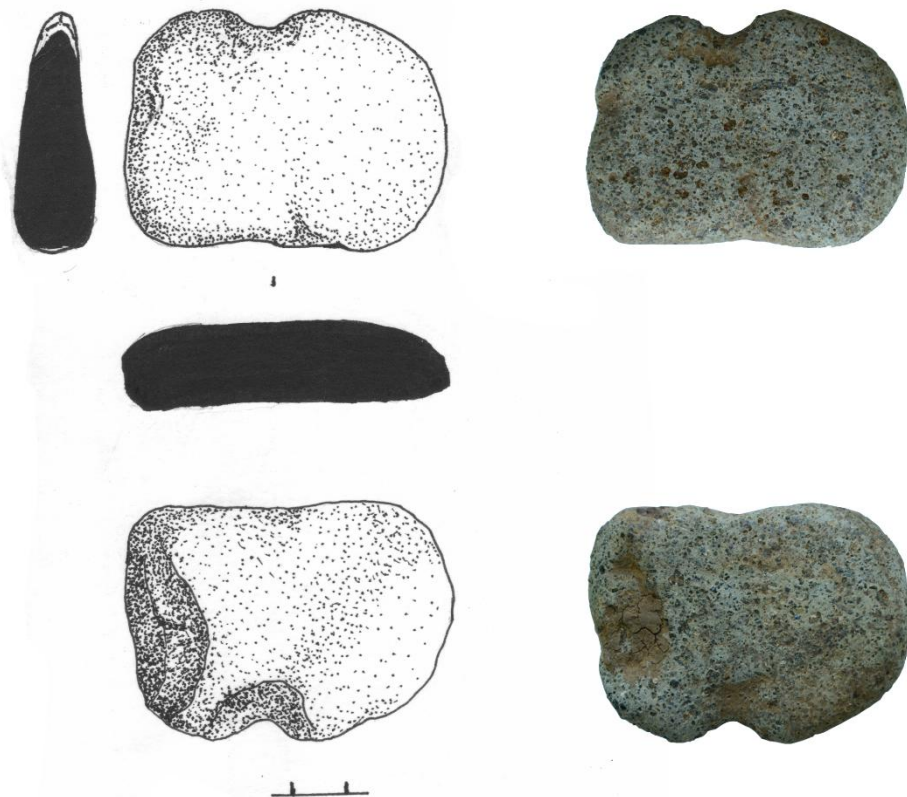


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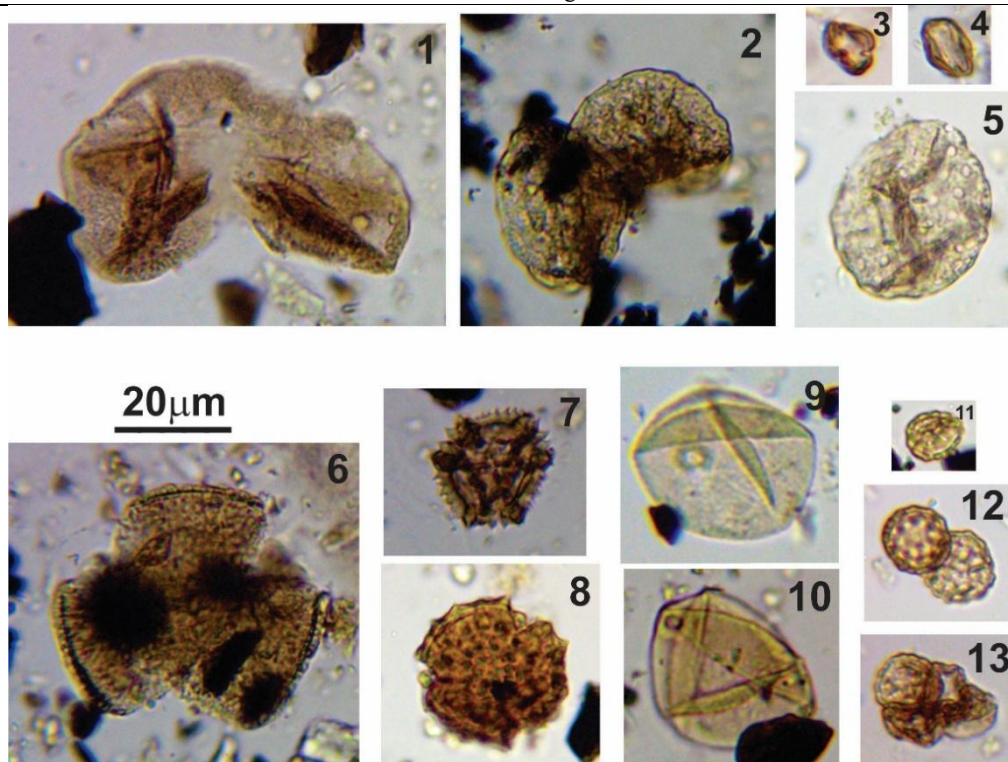


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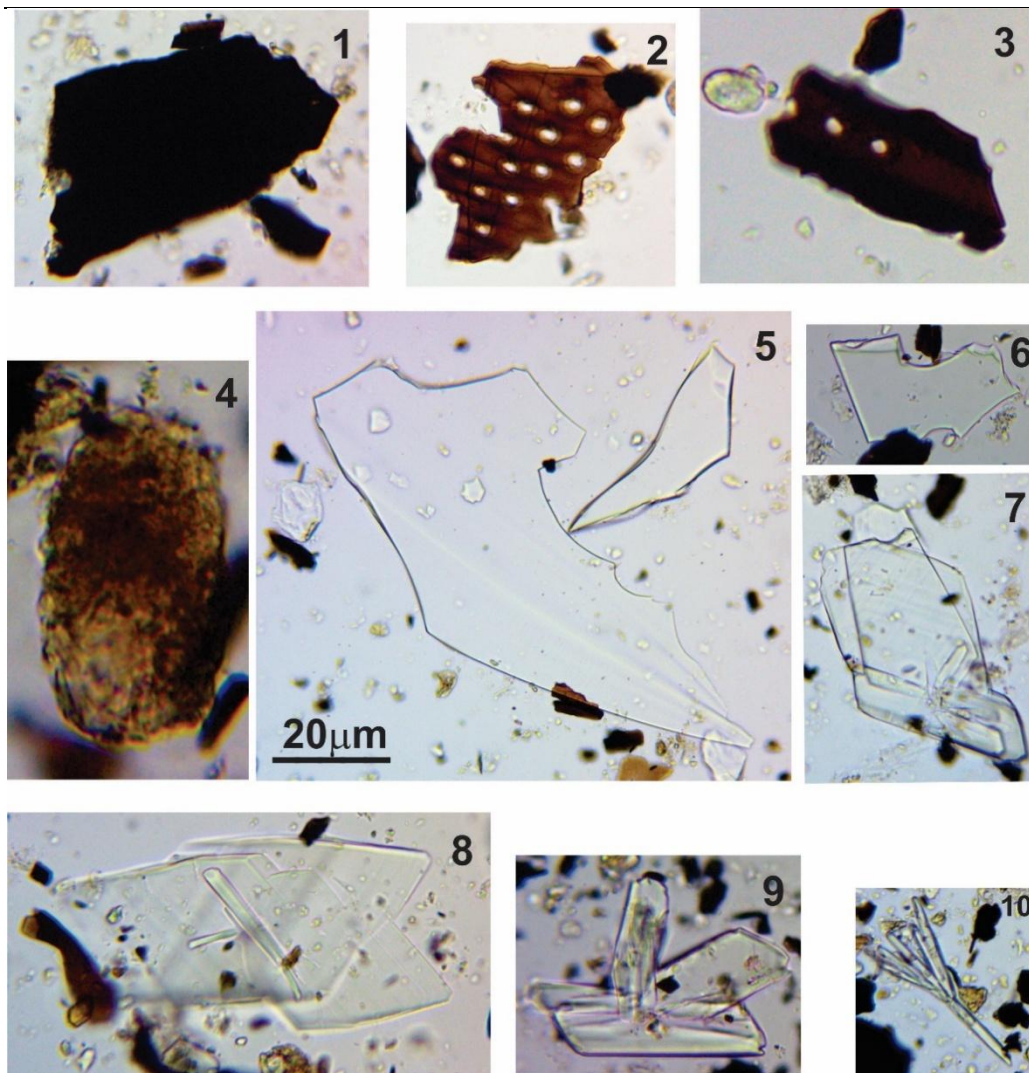


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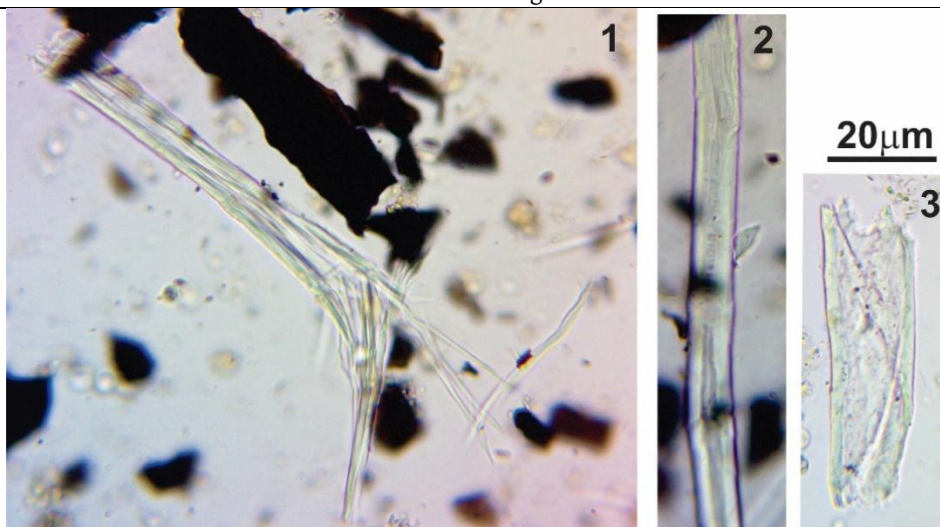


Figure 8. Fabric fibers discovered in pit № 1: 1-2 - flax (*Linum*); 3 - hemp (*Cannabis*) (Photo by M. Chichinadze).

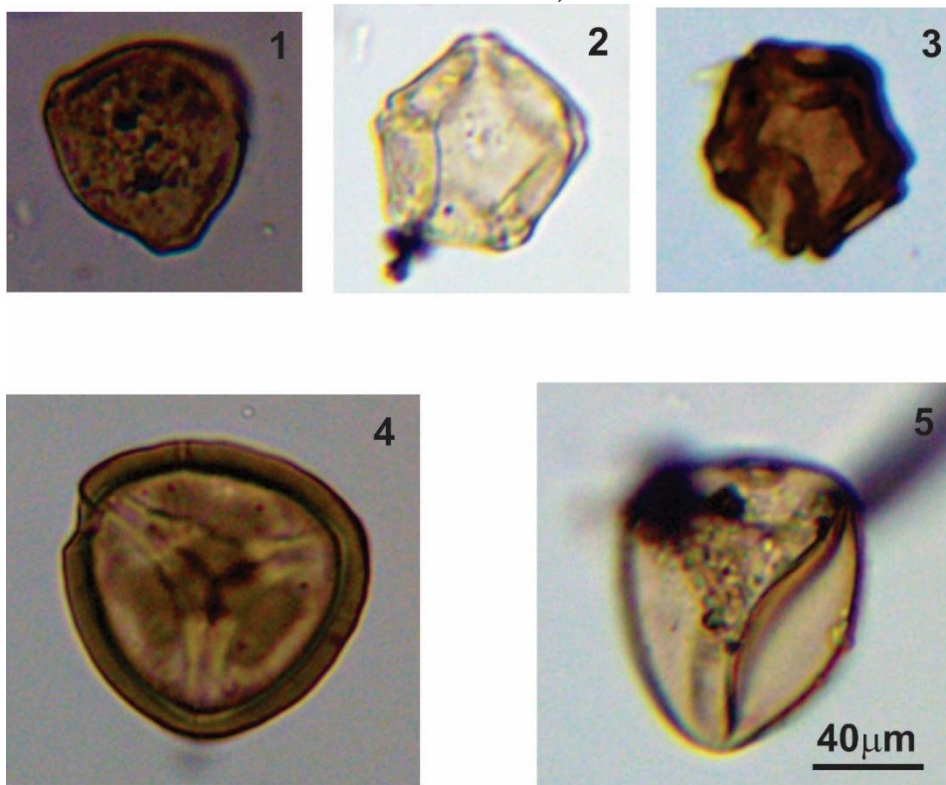


Figure 9. Pollen grains and spores of plants discovered in pit 2 of trench 3: 1- hazel (*Corylus*); 2-3 - alder (*Alnus*); 4 - fern (Polypodiaceae); 5 – cereals for sowing (*Cerealia*) (Photo by M. Chichinadze).

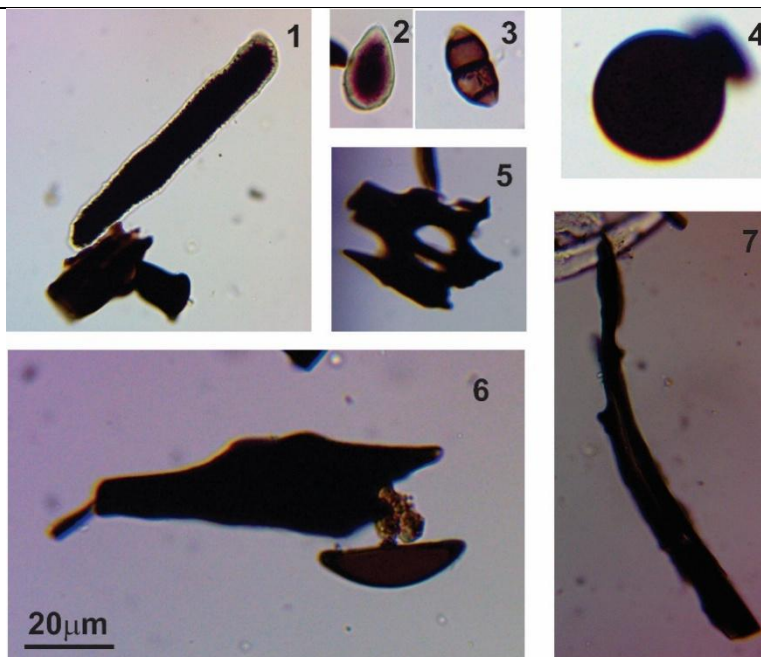


Figure 10. Non-pollen palynomorphs (NPP) discovered in pit № 2: 1-2 - plant phytoliths; 3-4 - undiff. ascospores; 5-7 - tracheal cells of wood; 6 - spore of *Ustilina* together with cells of charred wood (Photo by M. Chichinadze).

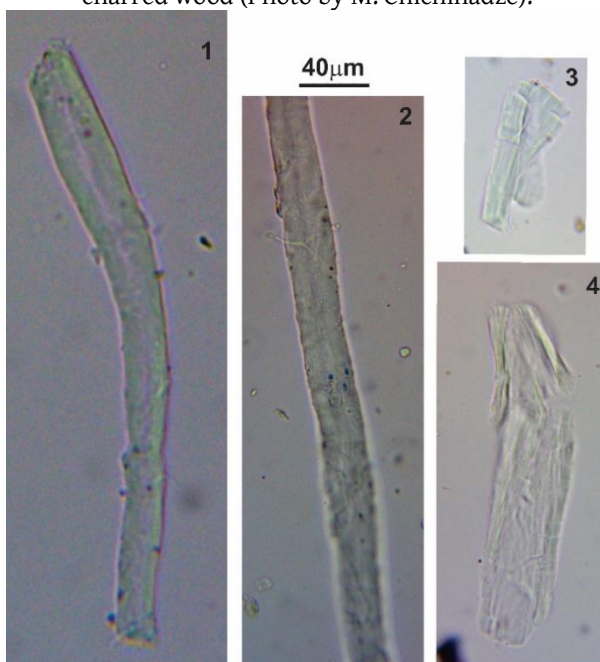


Figure 11. Textile fibers discovered in pit № 2: 1-3 - flax fibers (*Linum*); 4 - hemp (*Cannabis*) fiber (Photo by M. Chichinadze).

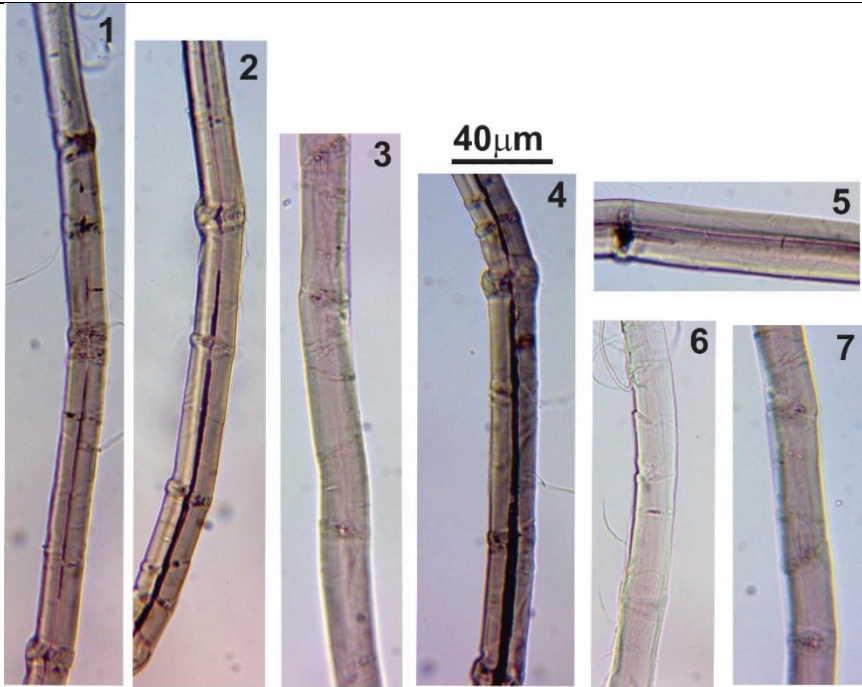


Figure 12. Fibers of flax fabric discovered in the sample of net sinker (1-7) (Photo by M. Chichinadze).



Figure 13. Fibers of linen fabric (*Linum*) discovered in the sample of net sinker (Photo by M. Chichinadze).

Table 1. Stone tools and remnant of production.

Stone complexes	Flint	Obsidian	Total
Core	0	0	0
Tablets	1	0	1
Blades	1	0	1
Proximal parts of blades	3	1	4
Medial parts of blades	3	5	8
Distal parts of blades	2	1	3
Bladelets	1	2	3
Proximal parts of bladelets	4	6	10
Medial parts of bladelets	5	7	12
Distal parts of bladelets	1	1	2
Microblades	3	5	8
Proximal parts of microblades	5	10	15
Medial parts of microblades	7	15	22
Distal parts of microblades	2	3	5
Primary flakes	5	0	5
Secondary flakes	80	55	135
Chunks	11	0	11
Cheeps	156	59	215
Burin spalls	2	1	3
Tools	11	35	47
Burins	2	11	13
Scrapers	2	2	4
Retouched Blade	5	0	5
Retouched Bladelet	1	7	8
Retouched microblades	0	4	4
Notched bladelet	0	1	1
Notched microblade	0	1	1
Chisels	0	1	1
Retouched flakes	0	2	2
Backed microblades	1	6	7
Basalt Net sinker	0	0	1
Total	303	202	506

Table 2. Absolute dates of Khutsubani site.

Nº	Layer	Dates (BP)	Dates 95.4 % (BC)	Dates 68.3 % (BC)	Lab. Index	Sample	Reference
¹	Pit №1	9491±42	9121-8635	9113-8712	FTMC-ZS22-1	Charcoal	First published
²	Pit №2	9534±45	9146-8737	9120-8769	FTMC-ZS22-2	Charcoal	First published

