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Early Palaeolithic sites on the Taman Peninsula (Southern Azov Sea region, Russia): Bogatyri/Sinyaya Balka and Rodniki

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ABSTRACT

New archaic Early Palaeolithic sites, Bogatyri/Sinyaya Balka and Rodniki, are reported from the Taman Peninsula in southern Russia. The geological setting of the sites as well as the mammal fauna, palynological data, and palaeomagnetic data clearly indicate mid Early Pleistocene, Early Biharian age of the deposits. In many of its typological and technological characteristics, the archaeological assemblages of Bogatyri/Sinyaya Balka and Rodniki are similar to the Oldowan industry, although they show specific local features.

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1. Introduction

In recent years, two new Early Palaeolithic sites, Bogatyri/Sinyaya Balka and Rodniki (Figs. 1 and 2), were discovered in the south of the Azov Sea region, at the northern coast of the Taman Peninsula (western Caucasus, Russia). The sites document the initial stage of the Early Palaeolithic (Bosinski et al., 2003; Shchelinsky and Kulakov, 2007; Shchelinsky et al., 2008). This discovery significantly modifies the age model of the prehistoric occupation of Eastern Europe. Both sites have a clear geological position and are associated with stratified estuarine and shallow marine Early Pleistocene deposits. The site Bogatyri/Sinyaya was originally known as the palaeontological locality Sinyaya Balka, one of the Quaternary key localities in southern Russia. This locality, among the richest and most famous Early Pleistocene mammalian sites in Russia. It is the type locality of the Taman faunal complex (unit) with Sinyaya Balka as the type assemblage (e.g. Belyaeva, 1925; Verestchagin, 1957; Dubrovo, 1963; Lebedeva, 1972, 1978; Baigusheva and Titov, 2008). The stone artefacts found here emphasize the uniqueness of the site. Rodniki is also of scientific interest although it lacks abundant large mammal remains. The joint archaeological, palaeontological, and geological field campaigns at

the Taman Early Palaeolithic sites in 2004–2007 revealed new important materials, briefly described in this paper.

2. Methods

Sediments containing remains of small mammals were screen-washed on sieves with 1 mm mesh size. Bone concentrates were manually picked in the field and in the lab. Palynological samples were processed according to the standard technique in the Laboratory of Quaternary Stratigraphy of the Geological Institute of the Russian Academy of Sciences (Moscow). Palaeomagnetic samples were processed in the Palaeomagnetic Laboratory of the Geological Institute (Moscow) by Dr. V.M. Trubikhin according to the standard technique and subjected to step-wise thermal demagnetisation up to a maximum of +500 °C.

3. Geological setting

The Upper Pliocene and Quaternary deposits, east of the mouth of the Sinyaya Balka ravine (Fig. 3), occur in dislocated positions and are locally affected by mud diapir features. The entire sedimentary sequence exposed in the coastal cliff represents the eastern limb of the Tizard brachyanticline. Mud diapirism and mud volcanic breccias are very common in the Upper Cenozoic deposits in the Kerch-Taman Region (Shnyukov et al., 1992). The chronological position of the sequence has been well established based on the occurrence, in the western part of the exposure, of brackish- and fresh-water molluscan remains of the Late Kujalnik (broadly equals Late

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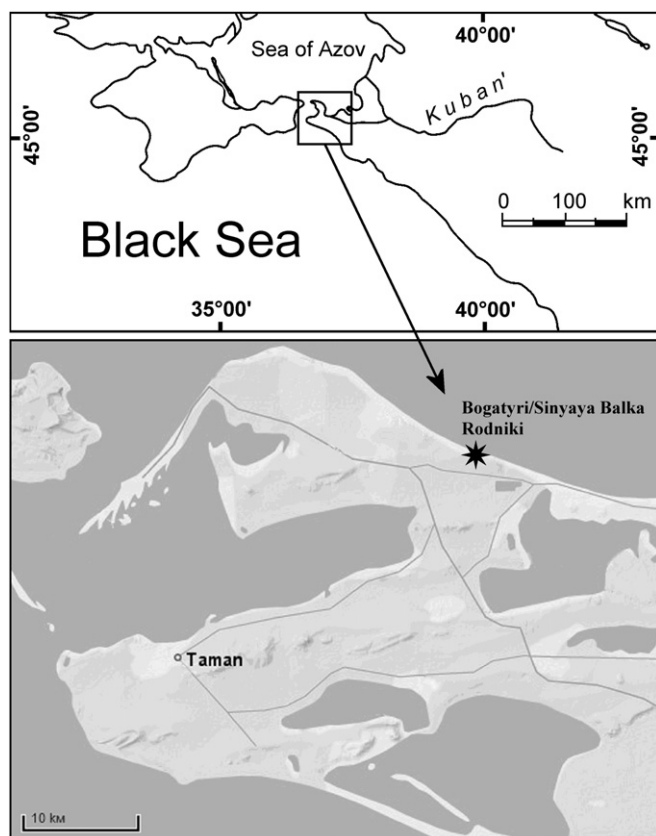


Fig. 1. Location of the Bogatyri/Sinyaya Balka and Rodniki sites. Overview map (above) and schematic map of the Taman Peninsula (below). Asterisks mark the position of the studied sites.

Pliocene, Gelasian) marine age of the Black Sea area (Pevzner et al., 1998). Two small mammal localities, Tizdar 1 and 2 (Fig. 3: sites 1 and 2), associated with the Kujalnik deposits, yielded remains of the most primitive rootless arvicoline rodent *Allophaiomys deucalion* Kormos (Tesakov, 2004). Isolated sites (Fig. 3: sites 3 and 4) in the exposed section (eastward) yielded limited samples of small mammals pointing to a latest Pliocene–Early Pleistocene age (Dodonov et al., 2008a).

3.1. Bogatyri/Sinyaya Balka

The excavations of 2004–2008 for the first time provided a clear picture of the Bogatyri/Sinyaya Balka structural position (Figs. 2 and 3). The deposits of the Bogatyri/Sinyaya Balka site occur at 25 m above sea level as a tectonically/gravitationally displaced block (currently ca. 5 by 5 m) overturned to the north and having a tectonic contact with the dark-gray brecciated Kujalnik bedrock clays (Dodonov et al., 2008a). In the past, the unclear geological position of the site caused a variety of chronological and geo-historical interpretations (Nesmeyanov et al., 2008). The unusually abundant mammalian assemblage dominated by remains of the southern elephants and the giant rhino elasmotheres, however, gave a clear age signal of the fauna. The evolutionary level of *Archidiskodon meridionalis tamanensis* Dubrovo, intermediate between Gelasian (Middle Villafranchian) *A. meridionalis meridionalis* (Nesti) and Middle Pleistocene (Cromerian) *Mammuthus trogontherii* (Pohlig) (Belyaeva, 1925; Verestchagin, 1957; Dubrovo, 1963, 1964; Lister and Sher, 2001; Lister et al., 2005), indicated an Early Pleistocene age of the fauna. It is the type assemblage of the

Tamanian faunal complex (unit) in the East European mammal biochronological scheme (Gromov, 1948). The age of the Tamanian unit was bracketed between 0.9 and 1.1 Ma with no firm control of the lower boundary.

Three main layers are recognized in the Bogatyri/Sinyaya Balka exposure (Fig. 3, A). The basal layer (layer 3, 0.4–0.9 m) is formed of clastic products and contains rounded and angular fragments (from 5 to 20–30 cm) of solid sand–detritus conglomerate, encompassing animal bone fragments and teeth, isolated dolomite and siltstone blocks and thin lenses of light-gray sand and silt with shell detritus. It has an uneven tectonic or gravitational contact (showing slickensides) with the underlying dark Kujalnik clays. Layer 2 (2 m) is composed of light-gray and yellowish sand with small lenses of rubble, brown clay balls, rare rock debris, and isolated spheroid sand–carbonaceous concretions with inclusions of bone fragments. Layer 1 (>1.5 m) represents the main bone breccia. It contains an abundance of large and small bone fragments, belonging mainly to *Archidiskodon meridionalis tamanensis* and *Elasmotherium caucasicum* Borissiak. There are many broken but also almost intact skulls, teeth, pelvises, scapulae, vertebrae (often in anatomical articulation), fragments of long bones and ribs. Bones occur in the matrix of sand, small rock debris, including silicified sandstone, siltstone and dolomite fragments, and inclusions of dark gray clay. The contact with the sands of layer 2 is distinct, uneven, with erosional pockets. The top of the sequence is disturbed by slope processes.

3.1.1. Mammals

The large mammal assemblage of Bogatyri/Sinyaya Balka is predominantly associated with the bone breccia of layer 1. The faunal list includes *Trogontherium cuvieri* Fischer von Waldheim, *Castor tamanensis* Verestchagin, *Canis tamanensis* Verestchagin, *Archidiskodon meridionalis tamanensis*, *Elasmotherium caucasicum*, *Equus* cf. *major* Boule, Cervidae gen., *Bison* sp., Tragelaphini gen. (Verestchagin, 1957; Bajgusheva et al., 2008). Excavations yielded bone materials with remains of *Archidiskodon* amounting to 64%, *Elasmotherium*, 32%, *Equus*, 1%, *Bison*, 1%, and cervids, 1%. Scarce remains of small mammals, represented by isolated teeth, were found in layers 3 and 1 of the site Bogatyri/Sinyaya Balka. This fauna includes *Mimomys savini* Hinton, *Lagurodon arankae* Kretzoi, *Cricetus* cf. *nannus* Schaub, *Allactaga* sp. (Shchelinsky et al., 2008). The Bogatyri/Sinyaya Balka mammal assemblage indicates an Early Pleistocene, Early Biharian age of the deposits.

3.1.2. Palynology

The basal part of Bogatyri/Sinyaya Balka (layer 3) yielded pollen spectra dominated by pine. The arboreal group contains notable pollen numbers of *Ulmus* and *Betula* and sporadic occurrences of

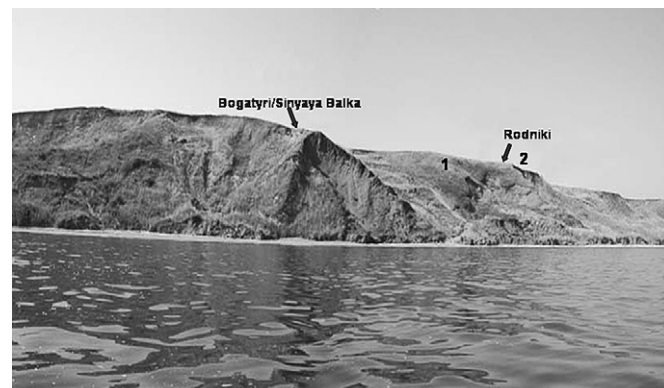


Fig. 2. The sites Bogatyri/Sinyaya Balka and Rodniki viewed from the sea (from the north).

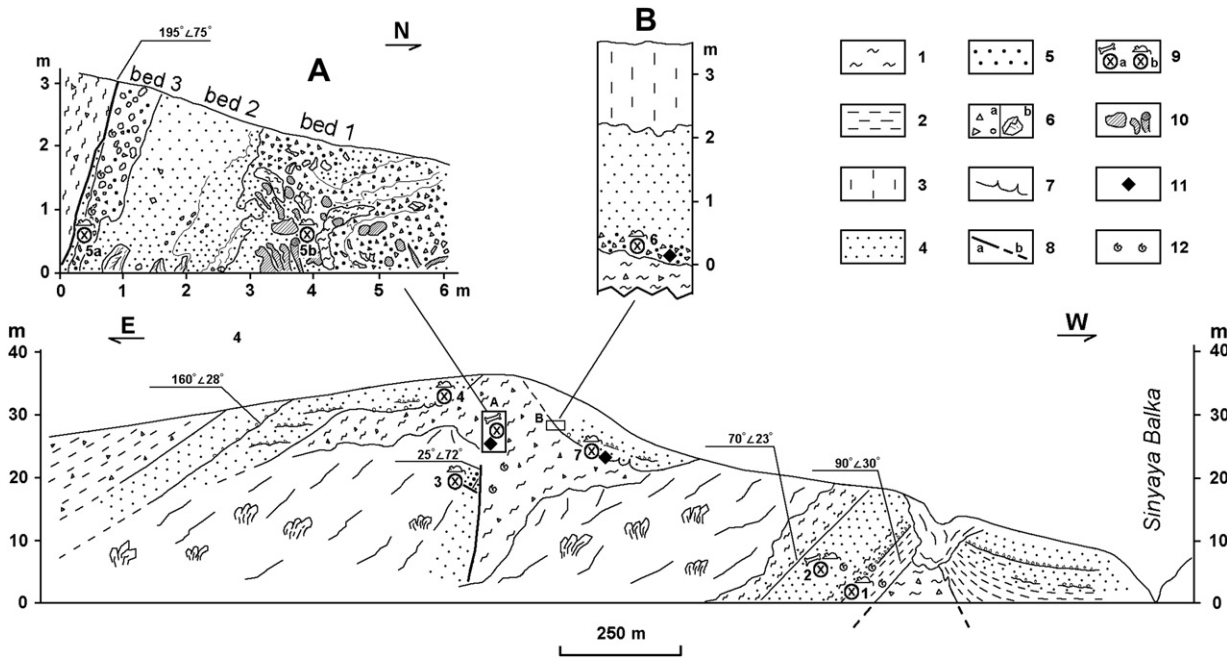


Fig. 3. Geological profile along the seashore in the vicinity of Sinyaya Balka, northern coast of the Taman Peninsula. A. Excavation area with the bone breccia, western wall; B. Archaeological trench (Rodniki-1). Sites of fossil rodent remains: (1) Tizdar-1; (2) Tizdar-2; (3) “fish” lens; (4) Vostochnaya; (5a) Sinyaya Balka, basal layer; (5b) Sinyaya Balka, bone breccia; (6) Rodniki-1; (7) Rodniki-2. 1. Brecciated dark-gray clays; 2. Clays; 3. Loess-like sandy loams; 4. Sands; 5. Gravels; 6. Rock debris and beach gravel (a), rock fragments (b); 7. Lithological boundaries with manifestations of diapirism; 8. Tectonic faults: (a) established, (b) supposed; 9. Bone remains: (a) large mammals, (b) small mammals; 10. Large bone fragments; 11. Stone artefacts; 12. Shells of molluscs.

Tsuga, *Picea*, *Abies*, *Quercus*, *Betula*, *Salix*, *Corylus*, and *Carpinus*. Herbs are represented by Asteraceae, Chenopodiaceae, Caryophyllaceae, and Polygonaceae (Fig. 3: samples 2–4). These spectra indicate a forest-steppe landscape with watersheds dominated by herbaceous plants and Chenopodiaceae, and mixed forests covering the river valleys. The intermediate sandy layer 2 produced sporadic coniferous pollen of *Tsuga*, *Abies*, *Picea*, and *Pinus*, and broad-leaved forms such as *Betula*, *Alnus*, *Salix*, *Ulmus*, *Celtis*, and *Juglans*. The herbaceous group is dominated by pollen of Chenopodiaceae and Plumbaginaceae (Fig. 4: samples 5–13). The spectra indicate meadow-steppe vegetation alternating with patches of mixed forests. The bone breccia (layer 1) contains abundant (up to

90%) re-deposited pollen of Pinaceae, *Podocarpus*, *Cedrus*, *Engelhardtia*, *Carya*, *Platycarya*, and diverse dinoflagellates of Mio-Pliocene age. These spectra also contain pollen of *Tsuga*, Taxodiaceae/Cupressaceae, *Abies*, *Ulmus pumila*, *U. suberosa*, *U. foliaceae*, *Juglans*, *Pterocarya*, *Fagus* and *Tilia* (Fig. 4: samples 14–22). A more reliable and unbiased picture is based on samples from the sediment infillings from the inner cavities of the mammal bones. These spectra (Fig. 4: samples 23, 24) contain a much lower amount of ancient pollen and no dinoflagellates. They document predominantly pollen of *Pinus* and also contain sporadic grains of *Abies*, *Picea*, and Taxodiaceae. The broad-leaved group is dominated by pollen of *Ulmus* and Juglandaceae. Other arboreal forms (*Pistacia*,

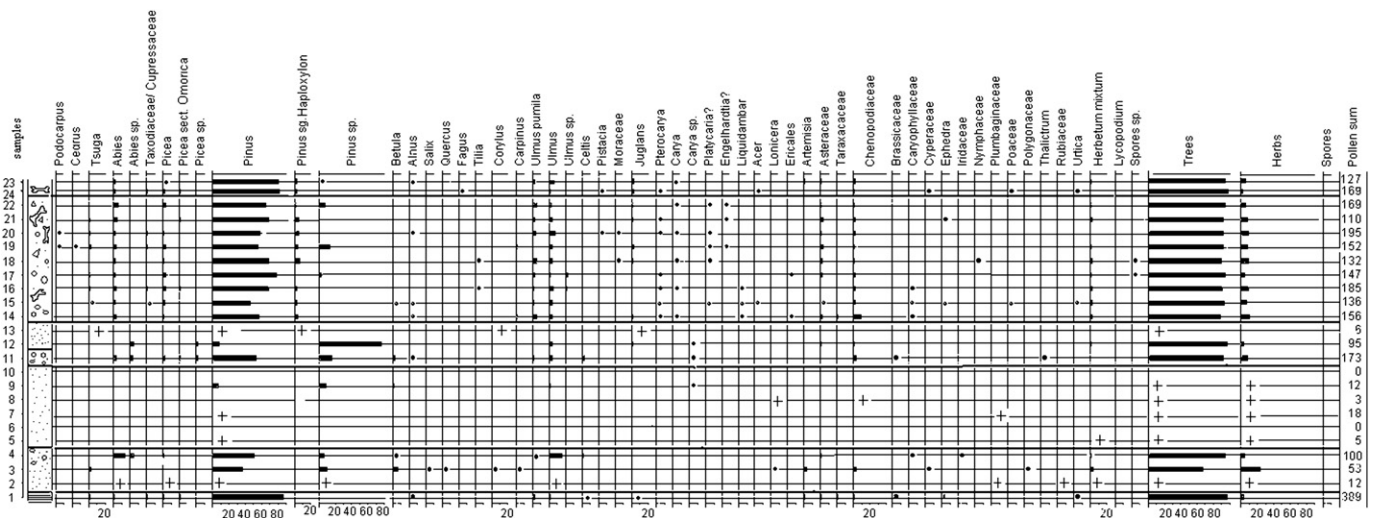


Fig. 4. Pollen diagram of the Bogatyri/Sinyaya Balka section. Samples 23 and 24 represent sedimentary infillings in bone cavities in the middle part of layer 1.

Fagus, *Acer*, and *Alnus*) occur sporadically. The herbaceous group contains *Artemisia*, *Asteraceae*, *Chenopodiaceae*, and *Poaceae*.

3.1.3. Palaeomagnetism

Three oriented samples for palaeomagnetic research were taken from the least disturbed part of the Bogaryri/Sinyaya Balka section directly below the bone breccia at 0.45, 1.1 and 1.9 m above the unconformable contact with the underlying dark-gray clays (Fig. 3). Samples 1 and 2 were taken from the lower and middle part of the yellow, fine-grained poorly cemented sands and sample 3 from the upper part of this layer where the sands grades to light-gray. The original magnetisation of all three samples can be unambiguously interpreted as reversed (Dodonov et al., 2008b).

3.1.4. Archaeology

Cultural remains and animal bones were found in all three layers but in different numbers. The lower level (layer 3) contains only sporadic finds. Layer 2 yielded relatively numerous bone fragments and common stone artefacts. The most abundant mammalian bone material comes from the culture-containing layer 1 where stone artefacts are not much more numerous as compared to the layer 2. Stone artefacts occur between animal bones without any signs of sorting. None of the artefacts show traces of rolling. Excavations at the site confirmed the strong predominance in the culture-containing layers of bone remains of Tamasian elephants (*Archidiskodon meridionalis tamanensis*) and Caucasian elasmotheres (*Elasmotherium caucasicum*). Examination of the bone fractures from all three layers did not provide clear evidence of their artificial or natural origin due to the poor preservation of the bone material. Only some small bone fragments (not belonging to elephants or elasmotheres) may tentatively indicate artificial fracturing. The occurrence of large mammal bones in the culture-containing layers, however, can be an unambiguous indication of hunting and scavenging activity of the Early Palaeolithic people.

The current overall number of stone artefacts from the site includes about 340 objects. The study of 193 artefacts reveals a clear picture of the stone industry of the site. The remaining part of the collection still needs to be described. The studied collection includes 70 flakes, 17 cores, and 106 tools. Artefacts are identical in raw material (solid varieties of brown and gray dolomite and siltstone occurring as plates and platy fragments) and in the degree of patination. The cores represent fragments of plates with either no special preparation at all or minimal preparation of the striking platform. Well pronounced is the technique of fragmentation of slabs and plates with the purpose of obtaining massive blanks for tool manufacture. Noteworthy is the significant role of formed tools (54.9% of the total artefact number in the collection), and their diversity (choppers (Figs. 5 and 6), picks, high massive side scrapers, core-like end scrapers, beaked tools (Fig. 7: 1–4, 6–10), thorned tools (Fig. 7: 11), small thick points, notches, and denticulates). Handaxes are absent. Small, 1–3 cm long tools account for only 11% of the collection. The important feature of the industry is the predominance of tools of plates, though a significant number of tools were produced on flakes (36.8%). The study of main components of this site's industry (technology of primary flaking, compositions of tool types, manufacturing technique and tool shape) indicates its quite strong similarity with the Oldowan industries in Africa, Near East, and Caucasus (Leakey, 1971;

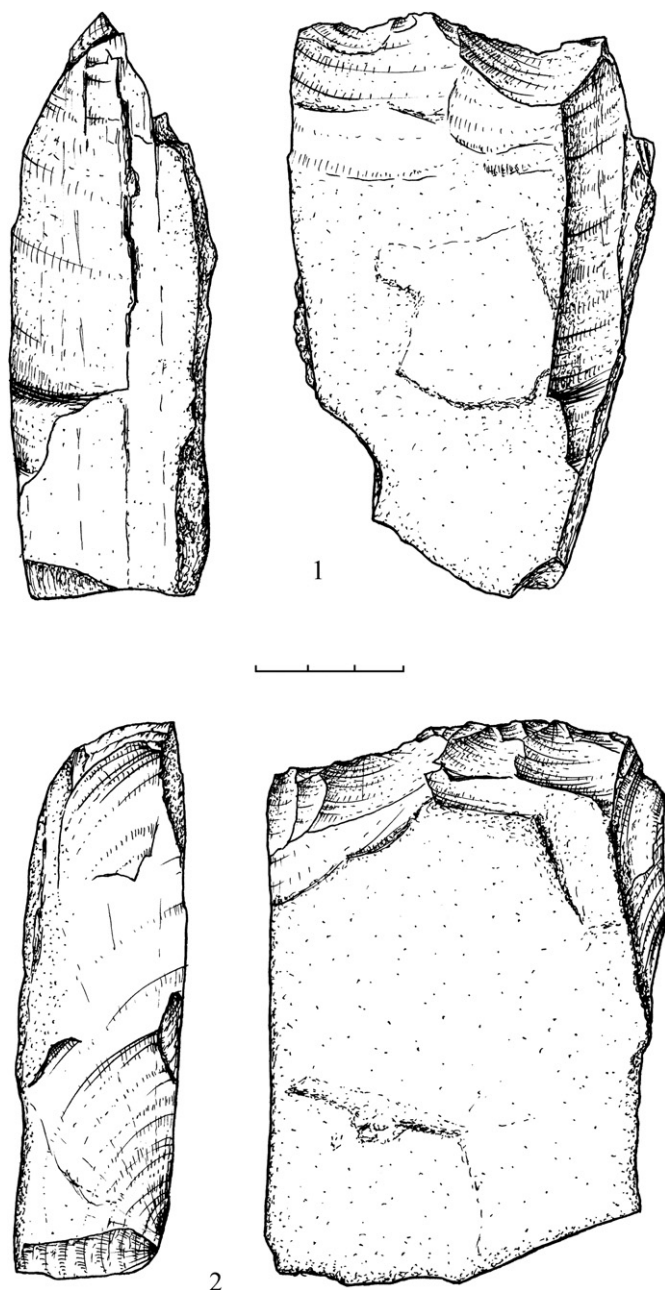


Fig. 5. The site Bogatyri/Sinyaya Balka. Choppers (1, 2).



Fig. 6. The site Bogatyri/Sinyaya Balka. Chopper.

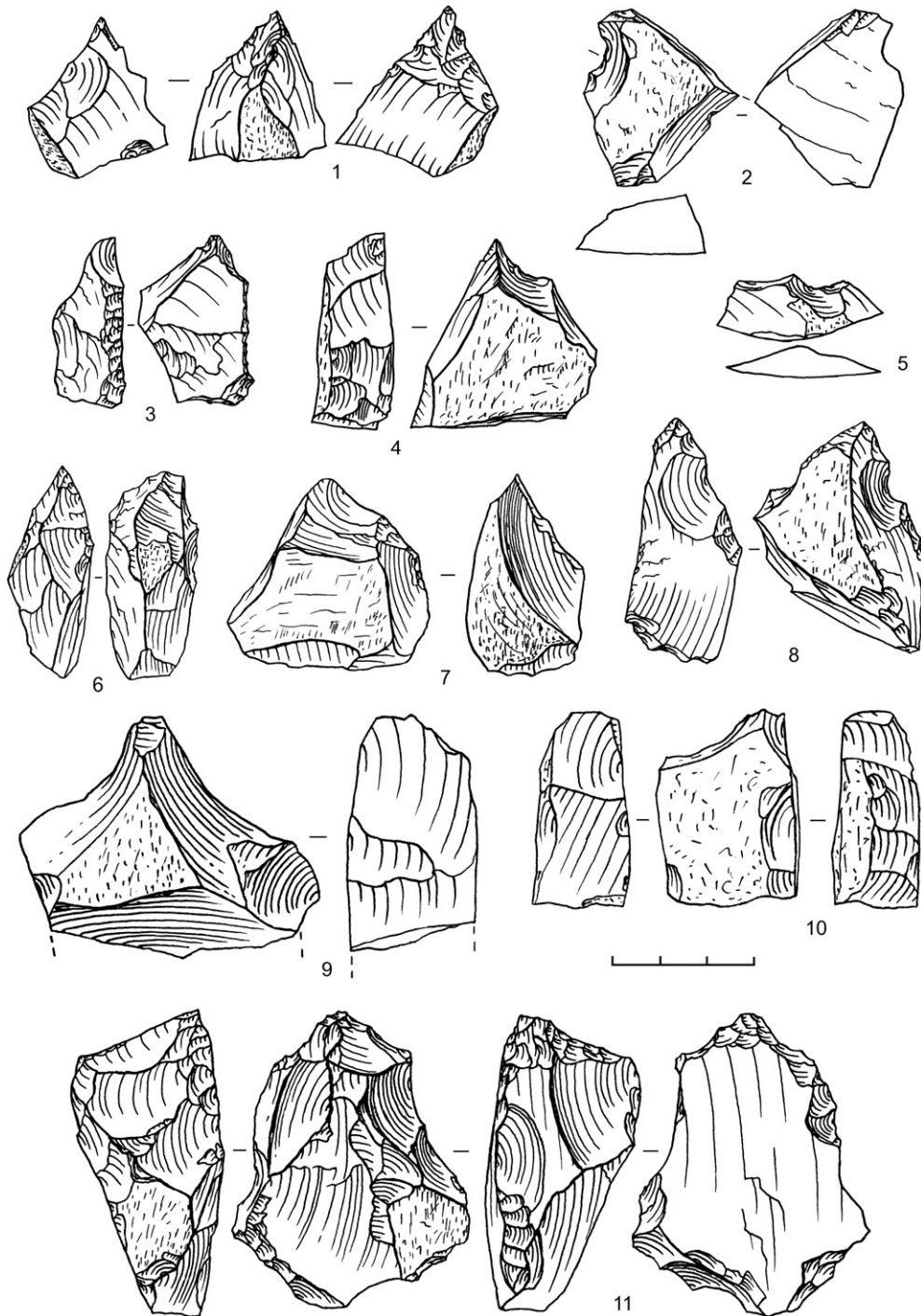


Fig. 7. The site Bogatyri/Sinyaya Balka. Tools. 1–4, 6–10. Beaked tools; 5. Denticulate; 11. Thorned tool.

Grigoriev, 1977; Boriskovskij, 1979; Amirkhanov, 2006, 2007, 2008). It is further important that the assignment of the site to the Oldowan is in full accordance with its geological age. At the same time, this industry has its local, well pronounced specific features too. Most of them seem to have been caused by the character of the raw material.

3.2. Rodniki

Two closely spaced Rodniki sections represent the terrace-like sedimentary sequence exposed in a trench (Rodniki 1) and

naturally exposed (Rodniki 2) situated about 150 m to the west of the Bogatyri/Sinyaya Balka exposures (Figs. 2 and 3). The Rodniki sequence, overlying the Kujalnik clays, occurs nearly horizontally in the upper part of the coastal cliff between 25 and 30 m above sea level.

The Rodniki 1 section shows the following sequence: the bedrock consists of Pliocene clays, 0.4–0.5 m. Bed 1 (0.5 m) is poorly rounded rock debris with siltstone, sandstone, siderite, and dolomite blocks and rarely pebbles with gray sand as a matrix. It is overlain by an interlayer consisting of rubble and rock debris with brown clay rolls and intermittent streaks of gray silt. The top of the

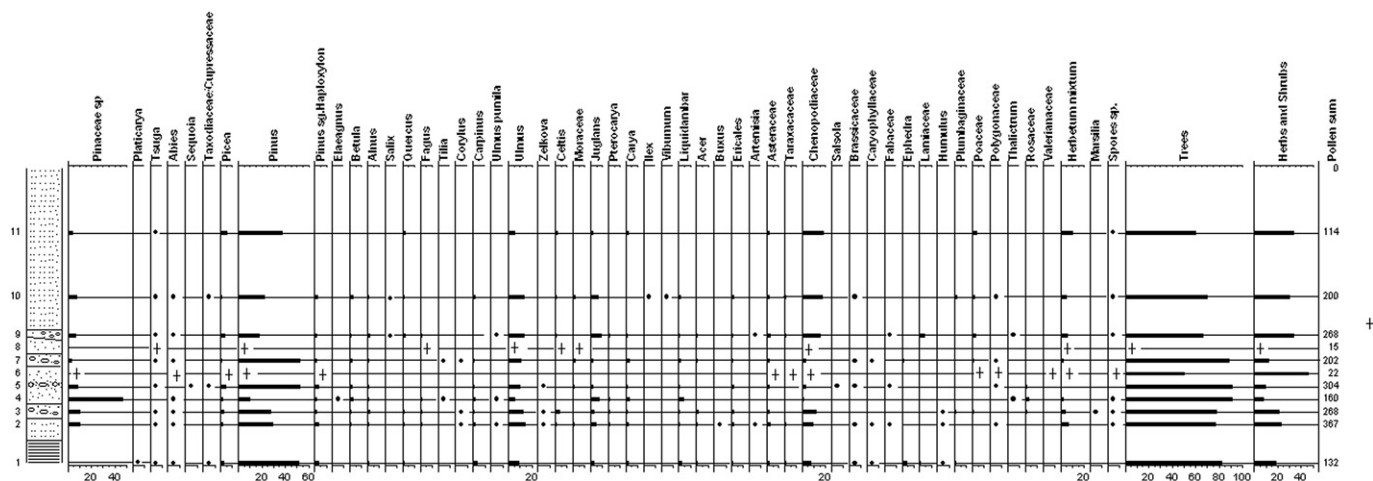


Fig. 8. Pollen diagram of the Rodniki 2 section.

unit is formed by a layer of brown clay with sand Bed 2 (8–10 m), fine and medium grained silty, micaceous light gray “zebroid” sand with yellowish ferruginous streaks. Bed 3 (1.0–2.0 m) is slope sandy loams and a weakly developed modern soil.

Rodniki 2 has a very similar structure with a higher thickness of sand Bed 2 (up to 15 m). Bed 1 shows less concentrated rock material evenly distributed in sandy matrix. The bed shows characteristics of shallow water sedimentation and contains shell detritus.

3.2.1. Mammals

Basal beds (bed 1) of Rodniki 1 and 2 yielded remains of small mammals. The more representative assemblage of Rodniki 1 includes *Allophaiomys* cf. *pliocenicus* Kormos, *Lagurodon arankaе*, *Lagurini* gen., *Mimomys* cf. *savini*, *Mimomys* cf. *pusillus* Mähely, *Mimomys* sp., *Borsodia* sp., *Ellobius* sp., *Spermophilus* sp., *Allactaga* sp., *Spalax* sp., and *Allocricetus* cf. *ehiki* Schaub. The site also produced a small piece of elephant dental enamel. Judging from the evolutionary level of *Allophaiomys* (dissected anteroconid, BTQ enamel index = 84), the fauna may date to mid Early Pleistocene with the current age model of 1.6–1.2 Ma.

3.2.2. Palynology

The underlying clays in Rodniki 1 and 2, and Bogatyri/Sinyaya Balka contain predominant pollen of conifers (up to 90%) with pines dominant, and *Tsuga*, *Taxodiaceae*, *Picea*, and *Abies*. Broad-leaved trees are represented by *Juglandaceae*, *Ulmus*, *Carpinus*, *Tilia*, *Fagaceae*, *Moraceae*, *Celtis*, *Liquidambar*, and *Platanifera*. The herbaceous group contains pollen of *Asteraceae*, *Chenopodiaceae*, *Artemisia*, and *Ephedra*. The bedrock clays also yielded diverse dinoflagellates *Deflandrea* spp., *Batiacasphaera* spp., *Gonyaulax digitale*, *Galeocysta etrusca*, *Spiniferites cruciferus*, *Achomosphaera andalusense*, *Systematosphora* spp., and *Hystrichosphaeropsis obscura*. The pollen and dinocyst assemblage is indicative of Miocene and Early Pliocene age (Ananova, 1974; Shchekina, 1979; Munsterman and Brinkhuis, 2004; Filippova, 2005). The clays seem to contain a considerable amount of redeposited pollen and phytoplankton due to reworking and mud volcanic activity.

Spectra from the basal bed in Rodniki 1 and 2 (Fig. 8) are dominated by pollen of *Pinus*, *Ulmus*, *Juglans cinerea*, *Carya*, *Pterocarya*, and *Chenopodiaceae*. The herbaceous group is diverse and contains *Artemisia*, *Asteraceae*, *Salsola*, *Brassicaceae*, *Plumbaginaceae*, *Polygonaceae*, *Thalictrum*, and *Fabaceae*. These spectra indicate widespread forest-steppe landscapes represented by the

combination of mixed mesic forests and meadow-steppe vegetation. Basal beds (bed 1) in Rodniki 1 and 2 are well correlated in pollen composition with increased amount of *Ulmus*, *Juglandaceae*, *Chenopodiaceae*, and *Asteraceae*. These basal spectra in Rodniki are similar with spectra from the basal layer (layer 3) in Bogatyri/Sinyaya Balka in increased content of *Ulmus*, *Chenopodiaceae*, and some decrease in pollen of pines. The sporadic occurrence of walnut pollen in Bogatyri, however, precludes a direct correlation of these beds.

3.2.3. Archaeology

Excavations at the Rodniki site have been started quite recently and the available archaeological collection is still rather limited. Nevertheless, this material is sufficient to draw some preliminary inferences on the stone industry of the site. In both, closely spaced parts of the site (Rodniki 1 and 2) (Fig. 2), the culture-containing layer occurs in situ in the basal bed of beach gravel and rubble deposits, covered by 10–15 m thick sequence of shallow marine sand (bed 1 in the geological section, Fig. 3). The archaeological material of the site includes mainly stone artefacts. Large mammal bones are sporadic. Artefacts are mostly not rolled. The collection



Fig. 9. The site Rodniki (Rodniki 1). Chopper.

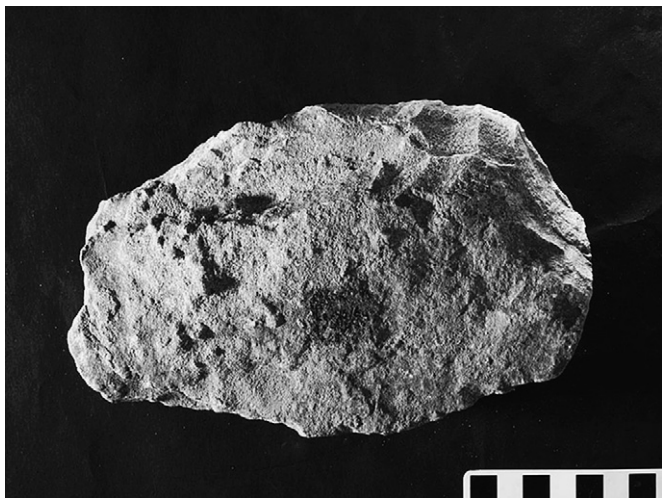


Fig. 10. The site Rodniki (Rodniki 1). Massive side scraper.

from Rodniki 1 includes 87 stone artefacts. They include diverse small and large tools ($n = 63$): choppers (Fig. 9), picks, high massive side scrapers (Fig. 10), core-like end scrapers, beaks, as well as cores (4) and flakes (20). The artefacts are made of the same raw material that was used at Bogatyri/Sinyaya Balka, and from the techno-typological point of view the two industries have much in common. However, the assemblage of Rodniki 1 includes some tools which are missing in the Bogatyri/Sinyaya Balka. Rodniki 2 yielded about 40 stone artefacts, including flakes, cores and variable tools. The first impression is that stone tools of Rodniki 2 show no substantial difference to those of Rodniki 1. It seems highly probable that Rodniki 1 and 2 are parts of the same Early Palaeolithic site, as also indicated by palynological data given above.

4. Discussion and conclusions

Geological and palaeontological information from the new Early Palaeolithic sites Bogatyri/Sinyaya Balka and Rodniki indicate a mid Early Pleistocene age of ca. 1.6–1.2 Ma. The typical mammal assemblage of the Early Biharian European mammal age is especially characteristic. The lower age limit of the fauna appears to be older than the conventional estimate of 1.1–1.2 Ma (see also Sablin, 2008). A detailed biochronological analysis will be given elsewhere.

The obtained palaeomagnetic data can indicate the formation of the deposits during the Matuyama reversed polarity Chron (2.58–0.78 Ma). Chron C1R.2R (1.77–1.07 Ma) is currently the preferred correlation, taking into account the biochronological data.

Biotic proxies indicate a forest-steppe environment. Pollen spectra indicate the presence of elm and walnut forests without underbrush and mixed forests on gully slopes. In general, the predominance of walnuts, including *Juglans cenerea*, is recorded in western Georgia in the Gurian time (Early Pleistocene marine age of the Black Sea basin). In this time interval walnuts became the main arboreal element in broad-leaved mountain forests at medium elevations (Shatilova, 1974).

It is still unclear, however, if the studied sites are synchronous or diachronous within the Early Pleistocene chronological interval. The site Bogatyri/Sinyaya Balka occurs in a dislocated position, although its stratigraphy is generally preserved. Initially, the archaeological material and numerous large mammal bones of the culture-containing layer 1 have been deposited in the off-shore zone of a shallow lake or estuary. Then, they experienced short-distance transportation possibly due to mud volcanic activity as

indicated by abundant reworked ancient pollen in the bone bed. Subsequently, the whole sedimentary sequence was tectonically or gravitationally displaced and overturned.

Distribution, numbers and composition of the stone artefacts assemblage and their co-occurrence with animal bone remains gives some insights in the functional behaviour of the early Palaeolithic people at the Bogatyri/Sinyaya Balka site. Cultural remains and bone material of the culture containing layers 2 and 3 indicate a short-term occupation of the site, with predominant butchering operations. At its initial position (prior to dislocation) layer 1 can be interpreted as a relatively continuously occupied site with intensive butchering activity, the main objects being bodies of elephants and elasmotheres (*Archidiskodon meridionalis tamanensis* and *Elasmotherium caucasicum*).

The Rodniki site is preserved in situ. The culture-containing layer here has a different appearance. It is associated with ancient beach deposits overlain by thick transgressive sequence of off-shore marine sands. Non-rolled stone artefacts occur irregularly in patches or sporadically. This can be evidence of short-term or single-visit seaside sites of the Early Palaeolithic people preceding a regional Early Pleistocene marine transgression. Based on preliminary analysis, the stone industries of Bogatyri/Sinyaya Balka and Rodniki are generally similar with some minor distinctive features. At this stage of study they can be interpreted as a single industry. Characteristic primary flaking, composition and shape of tool types allow its attribution to the Oldowan type. At the same time, the stone industry of the studied sites shows some technological and techno-typological distinctive features. The peculiar non-flint platy raw material determines the specific technology of the primary flaking and manufacturing of a number of tool types. Some technological differences from somewhat earlier Oldowan industries may also have a chronological significance.

The discovery and study of the new Early Palaeolithic sites Bogatyri/Sinyaya Balka and Rodniki on the Taman Peninsula greatly contributes to the knowledge of the Early Palaeolithic in Eurasia. It is becoming more and more obvious that the forest-steppe regions of south-eastern Europe were first populated by people as early as at least in the mid Early Pleistocene. It appears that the initial occupation of the region was facilitated by favourable environmental conditions, which existed here at the beginning of the Quaternary. Therefore, the initial human occupation of south-eastern Europe was almost synchronous with the oldest hominin records in the Caucasus and southern Transcaucasus.

Acknowledgment

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