Building techniques in the Late Upper Paleolithic of the Baikal-Patom Upland according to archaeological data

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Abstract. The article is devoted to the description of the results of the study of key archaeological sites of the Late Upper Paleolithic (19–12 Kyr BP) Bolshoi Yakor I and Kovrizhka II-IV on the River Vitim, in the Baikal-Patom highlands, in such an activity as the organization of living space. We consider evidence from the simplest organization of a fireplace and hearth to the most complex building of dwellings. It is noted that this type of activity had practical and symbolic aspects. The data on chronologically in-depth translation of specific techniques in this area are given. In general, the type of activity on the arrangement of a comfortable living space is characterized as an important part of the adaptive cultural complex aimed at the survival of the ancient population under the conditions of the Last Glacial Period.

1. Introduction

Baikal-Patom Upland and the valley of the River Vitim in its lower reaches have been under systematic archaeological study for over 40 years. There are two stages in the history of the study of key Late Paleolithic sites on the lower Vitim River. The first stage is associated with the research of E.M. Ineshin and A.V. Tetenkin in 1985-2010 of the site Bolshoi Yakor I [1]. The second stage is associated with the study of A.V. Tetenkin and co-authors of the Kovrizhka archaeological ensemble from 1995 to the present [2]. These sites, Bolshoi Yakor I and Kovrizhka I-V, are by far the most researched and representative ones [1, 2]. Together, they give a variety of ideas about the culture and life of the population in the last ice age (Sartan Glaciation, MIS-2). In particular, a variety of data has been accumulated that characterize the activities for organizing a comfortable living environment: choosing a place for settlement, using natural elements of the microlandscape, organizing a hearth, heating stones in a fire and using them as heat accumulators, using digging techniques, superstructures, support, manufacturing stone structural elements, construction of dwellings, etc. These techniques characterize the adaptive cultural complex of the existence of human societies under the conditions of the Last Glacial Maximum - the end of the Ice Age (19-12 Kyr BP, hereinafter calendar, calibrated age), which has the character of both rational and symbolic nature management.

Opportunities for this direction of research in a given region are largely due to the nature of the key archaeological sites - the containment of cultural remains in alluvial deposits of the floodplain facies, which preserved planigraphic contexts of occurrence of archaeological material in conditions close to in situ. The rapid burial by alluvium of seasonal flood waters of the sites of ancient people contributed to the preservation of the living areas without significant disturbances. Another positive consequence is a clear stratification of habitat horizons, which makes it possible to isolate individual episodes of activity situations in a member of culture-bearing deposits. Alluvial multilayer archaeological sites, due to these
favorable circumstances, are the most important sources of knowledge about the culture and activities of the ancient population of Siberia in the Stone Age - Late Paleolithic, Mesolithic, and Neolithic.

2. Materials and methods

In the field of studying the environment of human occupation and the formation of archaeological sites, it consists in attracting various methods of natural sciences. These are methods of geomorphology, neotectonics, mineralogy, glaciology, geophysics, palynology, paleontology, and radiocarbon dating. Actually archaeological methods in the narrow sense of the word are technical-typological, planigraphic, traceological, statistical, cultural-typological methods. The theoretical basis for research is a combination of scientific concepts of processual and cultural-typological archeology, comprehended within the framework of the system-activity approach developed by E.M. Ineshin and A.V. Tetkenin, initially in the studies of the Bolshoi Yakor I, and then Kovrizhka I–V sites [1, 3, 4, 5].

The Bolshoi Yakor site was discovered in 1985 by E.M. Ineshin and V.M. Vetrov. It is located on a 13-14 m terrace. The site contains 21 cultural horizons, of which 16 lower horizons lie in alluvium and date back to ca. 15.0–13.5 Kyr BP [1]. The main planigraphic plot of the lower horizons are hearths with accumulations of cultural remains.

The Kovrizhka II site was discovered in 1995 by A.V. Tetkenin. The site contains 6 cultural horizons, 13.1–9.1 ka BP [6]. Four lower horizons occur in sediments of the floodplain alluvium facies. The lowest, 5th cultural horizon brought about the situation where the hearth was sheltered behind a rocky outlier.

The Kovrizhka III site was allocated in 2003 by A.V. Tetkenin. It contains 4 cultural horizons dated to ca. 13.2–9.0 ka BP [7]. The cultural horizons lie in the sediments of the slope subaerial genesis. In the 2nd cultural horizon, an original Y-shaped structure of gneiss slabs was excavated. It demonstrates a complex of building techniques.

The Kovrizhka IV site was allocated in 2007 by A.V. Tetkenin [8]. It contains 16 cultural horizons, of which 14 lower ones lie in the sediments of floodplain alluvium and are dated to ca. 19–18 Kyr BP. These are the oldest clearly stratified archaeological components in the River Vitim valley. Remains of dwellings in the 6th and 2D cultural horizons were discovered here. The most ancient objects of art for the Northern Baikal region have been discovered. The phenomenon of the lower components is the widespread use of ocher by the inhabitants.

The sites Bolshoy Yakor I and Kovrizhka II-V demonstrate the situations of multiple settlements of people in the same places. In all cases, these are beachfront coastlines. For the settlements, sites were selected taking into account the seasonal safety from river floods. At Bolshoy Yakor I and Kovrizhka IV, the cultural remains lie directly above each other; there are cases of contact of artifacts with parts of high manuports from the underlying sediments. On Kovrizhka IV, judging by the radiocarbon dates of 2B, 2G, 2D cultural horizons, the age difference could be about 20-40 years. Here, staining with crushed hematite - ocher of the habitat at the very beginning of the activity situation was found. Such factors as the season of the year, the southern exposure, the logistics of access to food and mineral resources, and in the case of Kovrizhka also the presence of a rocky promontory, which creates a wind and river shadow, played a role in the choice of the place of settlement. Both at Bolshoi Yakor I and Kovrizhka IV, archaeological assemblages are of the same culture. Apparently, we can talk about the traditional territorial belonging of each of the sites to the same habitat groups.

The simplest way to organize a comfort zone was a hearth. In most cases, the hearths are alone or by using stones already laid on burning charcoals. The simplest ones are to provide the position of 1-2 slabs, the most complex ones to be laid out in the form of a ring, including those with slabs installed on the edge. Paleomagnetic studies have shown the heating temperature of stones in the hearths from 200 to 450°C [1]. One and multi-hearth complexes have been excavated at Bolshoi Yakor I including two-hearth patterns in the 5th, 6th, and 7th cultural horizons (14.5–14.0 Kyr BP). The undertaken reconstructions showed an earlier appearance in the pairs of one of the hearth and its great tool, and economic role. In the 5th cultural horizon of Kovrizhka II (13.1 Kyr BP), the hearth was arranged directly at the foot of the 1.5-meter wall of a rocky outlier, which acted as a wind and visual shelter [6].
In the 2B cultural horizon of Kovrizhka IV, ca. 18.6 Kyr BP, a large piece of ocher and a large unburnt tubular split along bone were excavated on the periphery of the hearth [9]. Together they seem to indicate a symbolic manipulation of the burned-out hearth on the eve of leaving the site.

At Kovrizhka III, the phenomenon of gneiss slab structures was studied. The most complex structure had a Y-shape with a length of 1.8 m [7]. It was excavated in the 2nd cultural horizon, about 12.7 Kyr BP. During the building, the methods of digging in gneiss slabs, supporting them on the edge, superstructure and groove connection were used. The survived structural elements show the processing of gneiss slabs as a stone building materials. In habitat episode of the cultural horizon 1A, ca. 9.2–9.1 Kyr BP, the exposed part of the structure was built on. In the 1st cultural horizon, ca. 9.0 Kyr BP, a structure was built from an elongated gneiss slab, supported in position on the edge by a crepe in the form of a large rock fragment. The purpose of these structures remains unknown. The fact that they were built cultural horizons in 1, 1A, 2 and a palimpsest of overlapping means a long-term transmission of this cultural tradition for more than 3.5 thousand years. The method of insert of small tiles under large slabs and boulders to strengthen their stability was also met at Kovrizhka IV in the 2B cultural horizon, ca. 18.6 Kyr BP.

The most complex building techniques and the most complex structures were found in cultural horizons 6 and 2G of Kovrizhka IV (19.0–18.6 Kyr BP), where the remains of dwellings were excavated [10, 11]. In both cases, a winter habitat season is suggested. In the horizon 2G, the reconstructed scenario consists of sprinkling the habitat area with crushed hematite - ocher, heating by a fire with raking hot coals over the area, calcining stones in the fire and organizing the hearth layout and structure as a furnace, possibly a warm seat, then building a frame-type dwelling like a ‘chum’ with a diameter of 5 m with strengthening of poles, or covering material with large, sparsely lying stones on a part of the perimeter. In the construction of the near hearth furnace-seat, the technique of installing a rock fragment on small tiles was used to maintain the blowing on the hot coals under it. The largest boulder was heated to a temperature of about 400 °C. The spatial specialization of tool activity and food consumption relative to the hearth is noted.

A dwelling with a diameter of approx. 4.5 m with one fireplace in the center and one fireplace at the entrance was discovered in the cultural horizon 6 [10, 12]. The fireplace at the entrance had a thick charcoal lens, approx. 6 cm and burned for a long time, creating a heat curtain. The fireplace in the center of the dwelling burned at least twice and was covered with sand. It can be assumed that its covering with sand was intended for a warm floor. The last manipulation of this hearth included covering it with black aleurite brought from somewhere to the site. A similar black aleurite was found near the hearth of the cultural horizon 2B. Versions of both utilitarian and symbolic purposes of “black staff” have been put forward. The outer lining of the dwelling consisted of 12 slabs and boulders, of which 6 lay in pairs in a combination “boulder + slab”, at an obtuse angle to each other, facing the center. Single stones repeated the "boulder - slab” sequence. The main version of their explanation lies in the plane of the symbolic organization of the dwelling. The boulder and tile lay on opposite ends of the fireplace in the center of the dwelling. The tile was heated twice, first to a temperature of 550–600 °C, and the last time to a temperature of no more than 250 °C. In the right and left halves of the dwelling, work with household tools (end-scrapers, side-scrapers, knives) and the activity of splitting the microblades and refilling the blades of insert hunting tools with them are separated. The connection of these halves with the male and female zones of spatial specialization was suggested.

In total, the studies of dwellings on Kovrizhka IV give us an idea of the organization of dwellings by people of the Late Upper Paleolithic under climatic conditions of the Last Glacial Maximum, in an environment dominated by shrub tundra-steppe landscapes [13]. The technical methods of the building of the chums were both rational and symbolic.

Earlier, in the study of the planigraphic contexts of the cultural horizons 3B, 7 and 8 of Bolshoi Yakor I, versions of the interpretation of the three hearth complexes as the remains of light dwellings of the chum type were also proposed [1]. The reason was either the almost complete absence of cultural remains around the hearth, or a contrastingly saturated spot of the remains with an almost empty periphery.
The collected evidence of the building activity of the people of the late Upper Paleolithic - the Last Glaciation characterizes this adaptive cultural aspect not only of the population of the lower Vitim and the Baikal-Patom highlands. The achieved level of research allows us to consider Bolshoi Yakor I and Kovrizhka II-IV as reference and representative sites for the entire Northern Baikal region as a whole. Such features as the remains of dwellings find analogies in the Paleolithic context of Eastern Siberia. Typologically, they were correlated with the dwellings of Studenoe-1,2, Ust-Menza-1,2, Kosaya Shivera-1,2 in Transbaikalia and Makarovo I on the upper Lena River in the Baikal region [15]. However, the phenomenon of the Kovrizhka dwellings is the wide and varied use of ocher. For the first time for Siberian Paleolithic dwellings, was obtained information on the heating temperatures of hearth stones. On this basis, we can reasonably judge such an adaptive technique, in fact, technology, as the accumulation of heat in boulders and slabs and the use of the latter as heat batteries in heating the living space.

Direct analogs of the gneiss construction from Kovrizhka III are also absent in the wide Paleolithic context of Eastern Siberia. Evidence of the processing of gneiss elements of this feature for the first time in the Paleolithic of Siberia demonstrates the existence of an aimed type of activity for the processing of building materials from stone.

Various options for choosing a microlandscape for settlement and the use of local natural relief elements show the flexibility and skill of ancient people in the choice and organization of living space.

The combination of rational and symbolic actions in some objects, primarily dwellings and hearths, is also characteristic. Today we distinguish between these two activities. However, there is hardly any doubt that the symbolic and ideological meanings of the living space were taken seriously by the ancient inhabitants, and in this regard, the attitude towards them was no less rational.

Various aspects, such as multiple settlements in the same places, the repeated stereotype of ocher staining of residential areas, the bringing and use of blackaleurite powder identical in different horizons in the manipulation of the fireplace, the construction and renovation of gneiss structures for more than 3000 years testify to a chronologically deep transmission of various traditions in the culture of the population of the lower Vitim at the time in question.

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References
[1] Ineshin E M and Tetenkin A V 2010 Human and environment if the North of Baikalian Siberia in the Late Pleistocene Archaeological site Bol’shoy Yakor’1
[2] Tetenkin A V 2018 Archeology of the Late Upper Paleolithic and Mesolithic of the Lower Vitim and the Baikal-Patom Highland Bulletin of AltSU Historical sciences and archeology 2 (100) pp 182–7
[3] Ineshin E M and Tetenkin A V 2003 Category ”artifact” in the system-activity approach in archeology Reports of the Laboratory of Ancient Technologies 1 pp 34–49
[4] Tetenkin A V 2003 On the question of choosing a method for presentation an object of archaeological research Reports of the Laboratory of Ancient Technologies 1 pp 26–33
[5] Tetenkin A V 2020 What's behind the types? Lev Klein Collection of articles in memory of Lev Samuilovich Klein ed E I Matyash and M T Kashuba pp 129-44
[6] Tetenkin A V 2010 Research data of the ensemble of archaeological sites Kovrizhka on the Lower Vitim (1995-2009) Reports of the Laboratory of Ancient Technologies 8 pp 64-134
[7] Tetenkin A V 2016 Multilayered archaeological site Kovrizhka III Stratrum plus 1 pp 265–315
[8] Tetenkin A V 2017 Late Paleolithic of Vitim valley based on the data of the multilayer site Kovrizhka-IV (Baikal-Patom highlands, Eastern Siberia) Proc. of the V (XXI) All-Russian
Archaeological Congr. in Barnaul-Belokurikha 1 pp 101–5
[9] Tetenkin A V 2019 Planigraphic analysis of the hearth feature of the cultural horizon 2B of Kovrizhka IV site: reconstruction of the activity situation Multidisciplinary Research in Archeology 2 pp 26–51
[10] Tetenkin A V, Henry A and Klement’ev A M 2017 Kovrizhka IV: Late Paleolithic component of the 6th cultural horizon Archaeological News St. Petersburg: Institute of History of Material Culture of the Russian Academy of Sciences 23 pp 33–55
[11] Tetenkin A V, Demonterova E I, Kaneva E V, Henry A and Gauvrit Roux E. 2020 Ocher in Late Paleolithic contexts at the Kovrizhka IV site, the Baikal-Patom highlands Archeology Ethnography and Anthropology of Eurasia 48 pp 33–42
[12] Tetenkin A V, Zhmur O V, Demonterova E I, Kaneva E V and Salnaya N V 2018 Ivory figurines and the symbolic context of a Paleolithic dwelling at the Kovrizhka IV on the Lower Vitim River, Eastern Siberia Archeology Ethnography and Anthropology of Eurasia 46(4) pp 3–12
[13] Henri A, Bezrukova E V, Teten’kin A V and Kuz’min M I 2018 New data and climate reconstruction in the Baikal-Patom Highland (Eastern Siberia) in the Last Glacial Maximum and Early Holocene Reports of the Academy of Sciences 478(5) pp 584–7
[14] Samoilenko E V and Peshkov V V 2020 IOP Conf. Ser.: Mater. Sci. Eng. 880 012018
[15] Konstantinov A V 2001 Ancient dwellings of Transbaikalia: Paleolithic, Mesolithic
[16] Konstantinov M V 1994 Stone Age of the eastern region of Baikal Asia (Ulan-Ude – Chita)
[17] Konstantinov A V and Filatov E A 2016 Study of the Paleolithic dwelling at the Kosaya Shivera-2 site (Western Transbaikalia) Ancient cultures of Mongolia, Baikal Siberia and North China: Proc. of VII Int. Sc. Conf. 1 pp 59–66
[18] Razgildeeva I I 2018 Planigraphic analysis of dwelling complexes of the Upper Paleolithic of Transbaikalia (Chita: Transbaikalian State University)
[19] Aksenov M P 2009 Paleolithic and Mesolithic of the Upper Lena (Irkutsk: Publishing house of ISTU)