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The early Upper Palaeolithic of the Tunka rift valley, Lake Baikal region, Siberia

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ABSTRACT

This paper presents recent results of geological and archaeological research at Late Pleistocene sites in the Tunka rift valley (Lake Baikal region, southern Siberia), including new radiocarbon dating of the Palaeolithic layers at Bol'shoi Zangisan, Slavin Yar and Tuyana. The sites range in age from ~26 to 45 ka ^{14}C BP and represent the earliest evidence of human habitation in the area. Numerous faunal remains have also been identified in the archaeological horizons from which palaeoenvironmental conditions can be reconstructed. These data also provide important new information about the age, context, and development of an early microlithic industry in the Tunka-Pribaikal'e region during the late Karginskii interstadial, attributed to Marine Isotope Stage 3 (MIS3). Although further research is needed to verify the reconstructed site age models, archaeological evidence recovered at Tuyana and Bol'shoi Zangisan represent among the oldest known occurrences of microcore-microblade technology in North Asia.

1. Introduction

The Tunka rift valley extends sub-latitudinally for ~200 km from the southwestern tip of Lake Baikal in Siberia to Lake Hovsgol in Mongolia, forming a tectonic topography made up of a series of upland basins wedged between two high mountain ranges – the Eastern Sayan and the Khamar-Daban (Fig. 1). In this tectonic trough of the Sayan-Baikal belt, the basins are occupied by low and wide (up to 30 km) plains where the taiga of Pribaikal'e and the steppe landscape of Mongolia converge. Given this geographical setting of the Tunka valley, which forms a major natural migration corridor in continental East Asia, this part of Pribaikal'e has long been considered a highly promising area in terms of archaeological research, particularly for the Palaeolithic era.

Until recently, however, excavations in the Tunka valley had revealed only one stratified Palaeolithic site, Bol'shoi Zangisan (Fedorenko, 1985, 1987; Lbova et al., 2005). Subsequent work by archaeologists from Ulan-Ude and Irkutsk proposed further archaeological zoning of the area and adjacent parts of the Eastern Sayan based on new discoveries and compiled data (Lbova et al., 2005), including three sites reported to have yielded Pleistocene artifacts (Fig. 1): 1) Shabartai – quartzite flakes and pebbles exhibiting flake removal scars recovered from an exposed eluvial surface; 2) Zaktui – split pebbles, flakes and debitage found within loess-like sandy loam deposits; and 3) Bol'shoi Zangisan – stratified lithic artifacts dated to the Karginskii interstadial (MIS3) by associated palynological data, including evidence for a developed microlithic industry.

In this paper, we present results of new litho-stratigraphic studies of Late Pleistocene sedimentary sequences in the Tunka valley which have also yielded diverse and well-preserved faunal remains co-occurring with Palaeolithic artifacts. These data include new ultrafiltered direct AMS radiocarbon determinations on fossil bone recovered from archaeological horizons which allow us to refine the chronostratigraphic framework of the earliest human occupation yet discovered in the investigated area.

2. Geographic setting of the Tunka rift valley

2.1. Modern climate and environment

The location of the Tunka rift valley, situated in the center of the Asian landmass, produces the sharp continental character of the local climate. The diverse and complex relief of the area, with

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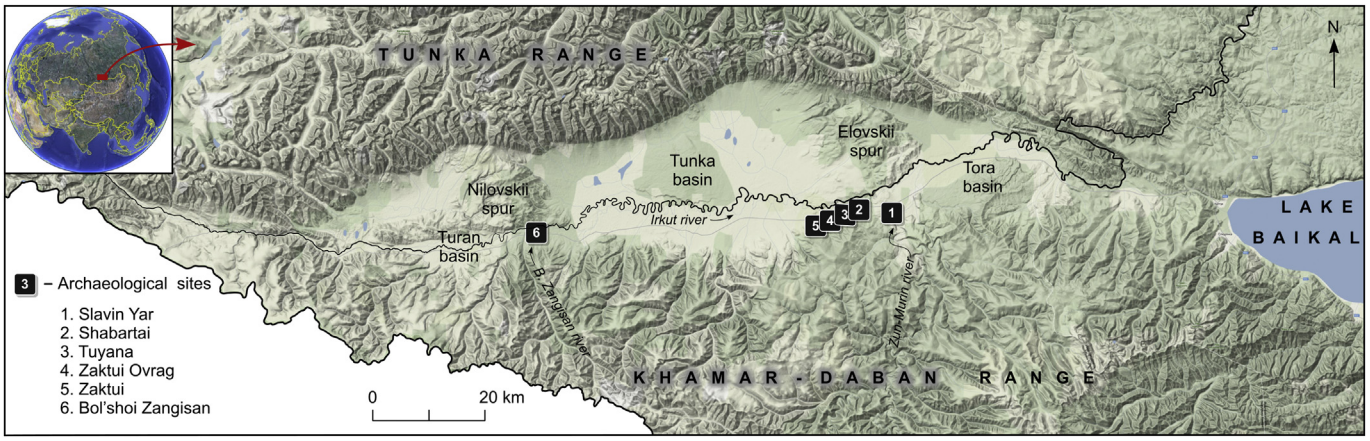

Fig. 1. Schematic map of the Tunka rift valley illustrating the location of archaeological sites mentioned in the text.

elevation ranges spanning more than 2 km, also has a strong influence on the formation of different micro-climates of local significance. On the whole, the region is characterized by comparatively cold temperatures and a highly uneven distribution of average annual precipitation, with little snow during winter and relatively dry condition during spring and the first half of summer, in contrast to a rainy second half of summer. Average minimum precipitation totals (less than 300 mm) occur along the valley bottoms, whereas precipitation values reach 500 mm on the windward slopes of the mountains (Zhukov, 1960). Average annual air temperature is below freezing (from −1 to −9 °C) (Zhukov, 1960), which is significantly lower than in regions situated at similar latitudes in western Siberia and the Far East. Maximum air temperature can reach up to 40 °C in July and August, with minimal temperatures in January (to −45 °C).

Due to this topographic and climatic variability, vegetation cover of the Tunka valley is quite diverse, with mountainous tundra in the west (upper Irkut River and Lake Il'chir area, elevation 1950 m), forest-steppe and steppe in the high Mondi depression (elevation 1400 m), and plains taiga in the east (elevation 600–700 m). Moss-lichen tundra prevails in the higher mountains (elevations above 2000 m) with thin forests of Siberian cedar (*Pinus sibirica*, Siberian stone pine), Siberian larch (*Larix sibirica*) and dwarf forms of Siberian fir (*Abies sibirica*) dominant at elevations between 1800 and 2000 m. In the upper part of the forest belt (below 1800 m) Siberian cedar and Siberian fir are widespread. Lower foothills are covered with mixed forests of Siberian larch, Scots pine (*Pinus sylvestris*) and birch (*Betula* sp.). Siberian spruce (*Picea obovata*) and poplar (*Populus* sp.) occur in the valleys of the rivers and floodplains are occupied by thick shrubs (predominantly willow, *Salix* sp.) and water-logged meadows and marshes.

2.2. Geomorphological context of Palaeolithic sites in the Tunka-Pribaikal'e

The relatively small number of Late Pleistocene archaeological sites currently known in the Tunka valley is due largely to the low modern population density and relatively remote and rural setting, as well as local neotectonic and associated sedimentary processes. The internal structure of the rift shows intense tectonic subsidence resulting in enlargement and deepening of the basins whose bottoms include low-lying accumulative plains and lake systems subject to deposition and burial by younger sediments (Shchetnikov et al., 2012). The rate of tectonic subsidence of the Tunka rift basin is exemplified by the occurrence of late Holocene artifacts, namely remains of wooden structures built with an iron axe, found at a depth of more than 12 m beneath alluvium on a low floodplain (L'vov, 1924). However, active tectonic development of the Tunka rift in particular areas is complicated by local uplifts and linear erosion and exhumation of pre-Holocene sediments, occurring against the backdrop of general subsidence of basement blocks (Ufimtsev et al., 2003, 2009; Shchetnikov, 2008). Such inverted parts of the Tunka rift, where basin accumulation processes changed to denudation, occur primarily along basin margins where they intersect with the foothills of the Khamar-Daban Range and inter-basin spurs.

The majority of the Palaeolithic sites which have been identified in the Tunka valley occur within one of these locally uplifted areas, near the antecedent valley (i.e., narrow river gap) of the Irkut River and Elovskii spur (Fig. 1): cross-section of Slavin Yar, locality of Shabartai, near the settlement of Zaktui and the cross-section of Zaktui Ovrag, and the newly discovered site at Tuyana. These sites are all situated on the right bank of the Irkut River along the lower slopes of Barashek Mountain, which rises above the antecedent valley from the Khamar-Daban and forms the distinctive orographic center of the local area. The relatively high concentration of sites in the area is attributed to the narrowing of this part of the Tunka valley, which offered both a commanding view of the surrounding landscape and acted as a 'bottleneck' for migrating game, thus making the area a potentially rich hunting ground for Palaeolithic groups of hunter-gatherers. A geomorphologically similar complex of Palaeolithic sites occurs further upstream near the confluences of the Bol'shoi and Malyi Zangisan rivers with the Irkut River, where they intersect the conjunction zone between the Khamar-Daban Range and Nilovskii spur which separate the Turan and Tunka basins (Fig. 1).

3. Palaeolithic sites of the Tunka rift valley

3.1. Bol'shoi Zangisan

The first stratified Upper Palaeolithic site identified in the Tunka valley, known as Bol'shoi Zangisan, was discovered during excavations from 1983 to 1986 by a team from Irkutsk State University led by A.B. Fedorenko, the results of which were published only in short conference abstract form (Fedorenko, 1985, 1987; Lbova et al., 2005). The site is located at the base of the Nilovskii inter-basin high on the left bank of the estuary of the river of the same name. The Bol'shoi and Malyi Zangisan rivers flow from the Khamar-Daban Range and join the Irkut River three kilometers