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Small mammals from the Strashnaya cave (Northwest Altai, West Siberia, Russia)



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ABSTRACT

A sequence of small mammal associations has been studied from the Paleolithic site of Strashnaya cave (Altai Mountains, West Siberia, Russia). The total faunal composition includes 45 species of rodents, bats, insectivores, and lagomorphs. The dominant groups in each of 10 layers that included small mammal remains are rock voles, grey voles and zokors. Co-dominating groups are ground squirrel, marmots, steppe lemmings, and red-backed voles. Small mammals from the Strashnaya cave indicate that during Late Pleistocene winters in the region could have been warmer than now. They also suggest highly mosaic biotopes around the cave in Late Pleistocene that includes open steppe, desert, floodplain, and forest. Small mammals show open areas such as steppes, floodplain and meadows in the early Holocene. The modern small mammal fauna confidently indicate taiga forest environments.

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1. Introduction

Quaternary mammal faunas and environmental changes in the Altai Mountains, margin of South-West Siberia, are poorly known. Diverse paleontological and archeological materials recovered from caves that are quite numerous in Altai are an important source of knowledge. Here, we discuss a sequence of small mammal associations that has been recovered from the Late Pleistocene and Holocene deposits of the Strashnaya cave. Small mammals, especially rodents, are a valuable proxy for paleoecological and paleogeographic reconstructions due to their phytophagy and adherence to certain landscapes. Even minor changes in the environments may dramatically transform the composition of rodent fauna.

The Strashnaya cave, a multilayered Paleolithic site, is located in the Northwest Altai, West Siberia, Russian Federation (Fig. 1). The cave has been known as an archaeological site since 1966 (Okladnikov et al., 1973). In 1966–1970 Ovodov conducted preliminary paleontological research. In 1989–1994, pilot archaeological excavations were started by Institute of Archeology and Ethnography (Novosibirsk) and then resumed in 2006–2009 under the leadership of Anatolyi Zenin (Derevianko and Zenin, 1997; Derevianko and Markin, 1999). In 2013, after a brief interruption,

Krivoshapkin continued multidisciplinary research of the cave that included a complex survey of archaeological sites, and the reconstruction of paleoenvironments around the cave.

1.1. Geographic position and stratigraphy of the cave

The cave is situated in the middle reaches of the Inya River (Charysh River basin), just below the confluence of Inya and Tigirek Rivers. At this point, the Strashnoy stream meets the river at its left bank. The name of the stream gives the name to the cave. The place where the Strashnoy stream flows into is located at 470 m above sea level. Strashnaya cave is located on a steep slope of the south-eastern exposure of the left side of the Inya River valley, along a steeply-dipping crack in a massive block of the Lower Silurian bioherm limestone, at the height of 40 m above the water edge. The crack dips at 210° with a dip angle of approximately 75°. The approximately 10-m wide entrance area is bounded on the sides by vertical cliff walls, which makes the cave accessible only from the riverside. The entrance into the cave is a crevice approximately 4 m wide, 6 m high, and turned in the south-east direction. This crevice was developed by the karst and desquamation processes. The cave is characterized by simple horizontal structure and a length of about 20 m. The average width of the passage is around 2–3 m. The width and the ceiling height of the cave increase inside the cave from the entrance. The cave has an earth floor, which is relatively even and gradually lowers towards the entrance.

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Fig. 1. Map of the Siberia region.

The surface of the limestone massif, in the lower part of which the cave is situated (the absolute elevation ranges from 700 to 800 m), is covered by grass and shrubby vegetation, while on the slopes broad-leaved trees and pines grow. From the southwest, the cave is adjoined by a 18–25 m terrace with an abrupt edge. This terrace is separated from the cave by a rock ledge. The terrace is covered mostly by grass with insignificant amounts of shrubs and trees. The Inya and Tigirek River valleys form a wide depression, which is bordered on the north, east and west by steep cliffy mountains, and from the south by northern slopes of the Tigirek mountain range covered with forest. The flat bottom of this depression represents a floodplain surface incised by numerous abandoned channels and covered with deciduous trees.

The research was conducted in the internal part of the cave. The upper portion of unconsolidated deposits up to 5.65 m depth was studied. The stratigraphy of the cave is complex (Fig. 2). 13 lithological layers of Quaternary deposits were originally described in Strashnaya cave. Some were then subdivided into additional layers, totaling 26. Layers № 11, 12 and 13 lack archaeological or/and paleontological materials. The generalized description of the stratigraphic sequence from top to bottom is:

Layer 1. Grey loam, bioturbated and/or human-disturbed. Up to 6 cm thick.

Layer 2. The upper part is a finely layered sandy brownish-brown loam, heavily bioturbated by moles. The lower part is a dense pelitomorphic pale grey loam. Up to 25 cm.

Layer 3_{1a}(I). Brown–yellow sandy loam with fine gravels, heavily bioturbated. Up to 10–15 cm.

Layer 3_{1a}(II). Gravels with loam filler. Up to 20–30 cm.

Layer 3_{1b}. Brown gruss-loam with gravels and bone detritus. About 15 cm.

Layer 3₃. Layered gravels with brown silty loam. Up to 20–35 cm.

Layer 4(I). Grey porous fine-grained sandy loams with isolated fragments of bones (broken carnivorous coprolites) and stone artifacts. Up to 25–30 cm.

Layer 4(II). Dark coarse-grained and medium-grained sandy-to-clay loams with layered gravels of weathered and not weathered limestones. 5–20 cm.

Layer 5. Pale sandy loams with gravels. 5–20 cm.

Layer 5.I. Pale-yellow sandy loams with gravels, includes fragile fragments of bone detritus (coprolites) usually deformed. 5–20 cm.

Layer 5. II. Dense pale-yellow sandy loams with sparse inclusions of fine gravels and crushed stones. A few fragments of ochreous coprolites. Up to 20 cm.

Layer 5. III. Pale sandy loam, loose when dry. Moderately enriched by reddish-yellow gravels, with isolated stone boulders, numerous fragments of coprolites, and large animal bones. Up to 30 cm.

Layer 6. Pale-yellow fine–or medium-grained loams with gravel, large fragments of limb bones, and stone artifacts. Layer 6 is subdivided into 5 archaeological horizons slightly distinct in their lithological characteristics (I, II, III, IV, V). The total layer thickness is up to 60–65 cm.

Layer 7. Light pale-yellow silty sandy loams with fine heavily weathered limestone gravels, fragments of limb bones, as well as large spherical Fe–Mn nodules. The layer is subdivided into 3 archaeological horizons (I, II, III), which have identical characteristics of loam fill. About 25 cm.

Layer 8. Sandy pale-yellow inequigranular loam with gravels. Fine gravel is heavily weathered, silty. Isolated spherical Fe–Mn nodules were noticed at the basal portion of the layer. About 15 cm.

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