

## Preliminary Study of a Mummified Woolly Rhinoceros from the Lower Reaches of the Kolyma River

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In June, 2007, a thawing corpse of a woolly rhinoceros (*Coelodonta antiquitatis* Blum., 1799) (Fig. 1) was found on the right bank of the Lower Kolyma River, in a gold field at the upper reaches of the Malaya Filippova River (8 km east of the village of Cherskii of the Nizhnekolymskii District of Yakutia). We studied the burial place on October 10, 2007, and the specimen in March, 2008, as it was brought to the Mammoth Museum of the Institute of Applied Ecology of North, Yakutsk (IPES). Most of the mummified corpse was preserved, including the left half of the trunk, with skin of the head and ear, the skull with the lower jaw, the fore and hind legs (Figs. 1–3). Small bunches of short coarse light brown wool are only preserved on lower sites of legs. The right side of the body and the right legs are lost (apparently, cut off by a bulldozer). Most of the inner organs are lost; however, intestine is probably partially preserved. The same locality has yielded a number of specimens isolated from the trunk, i.e., the right pelvis, the lower part of the right hind leg with soft tissues (Fig. 3b), and bones of the right foreleg (humerus, ulna, carpals, metacarpals, and two ungual phalanges). Horns have not been found. The fragmentary genitals preserved in the specimen show that this is a female.

The body measurements of this individual are rather large, close to those of other adult female woolly rhinoceroses (Table 1) [1]; the specimen weighs about 900 kg; hence, during its life, the animal was about

1.5 tons. The parietal length of the skull is 763 mm, the zygomatic width is 332 mm, the length of the upper tooth row is 217 mm. The mandible from the symphysis to the posterior edge of the articular process is 562 mm long, the tooth row is 212 mm long, the ascending ramus measured from the apex of the articular process is 265 mm high. The teeth have wear signs; the major sutures on the skull are obliterated; the nasal septum is completely ossified. These features, along with the body and skull measurements, strongly suggest that the rhinoceros from the vicinity of the village of Cherskii was an adult.

The locality is situated on the left slope of east exposition at approximately 130 m above sea level. The bone-bearing bed is at a depth of 5–9 m, composed of frozen dark gray loam of the Edoma Formation (glacial assemblage), with ice interbeds. Mostly loose, icy Quaternary deposits at the upper reaches of the Malaya Filippova River form the strata about 15–17 m thick. The burial place is at the junction of the northeastern part of the Kolyma Lowland and hilly spurs of the Anui Plateau, at about 200–630 m above sea level. According to the soil geographical zonation, the area under study is at the boundary of the forest–tundra plain and the Alazeya–Yukagir plateau–tundra–taiga province of the tundra–forest subzone. Recent soils at the upper reaches of the Malaya Filippova River are formed of typical cryogenic and taiga permafrost soils with varying peaty and gleyey admixture. They show a high content of organic matter, loamy particle-size distribution, neutral and subacid reaction, and high enzymatic potential. Vegetation in the area studied belongs to the thin northern larch forest subzone [2]. In elevated sites, this is light larch forest, frequently with continuous mossy–lichen cover, dense undergrowth of five or six willow species, dwarf and Middendorf's birches, in places, Manchurian alder, abundant low shrubs, and with a small admixture of grasses and forbs. Hills are covered with the dwarf stone pine. Lowered areas frequently have marshy moss–frutescent or grass–mossy open woodlands.

Paleoecological conditions in the habitat of the Kolyma rhinoceros was reconstructed based on palynological analysis: the ground sample comes from pri-

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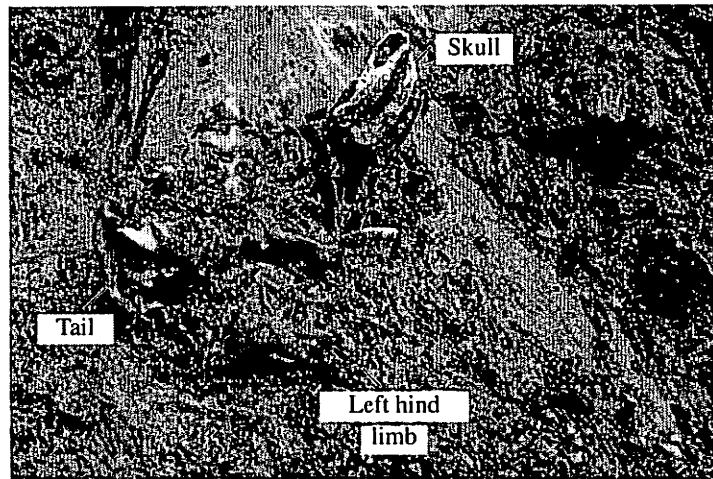


Fig. 1. Kolyma rhinoceros thawed out in the locality at the upper reaches of the Malaya Filippova River.

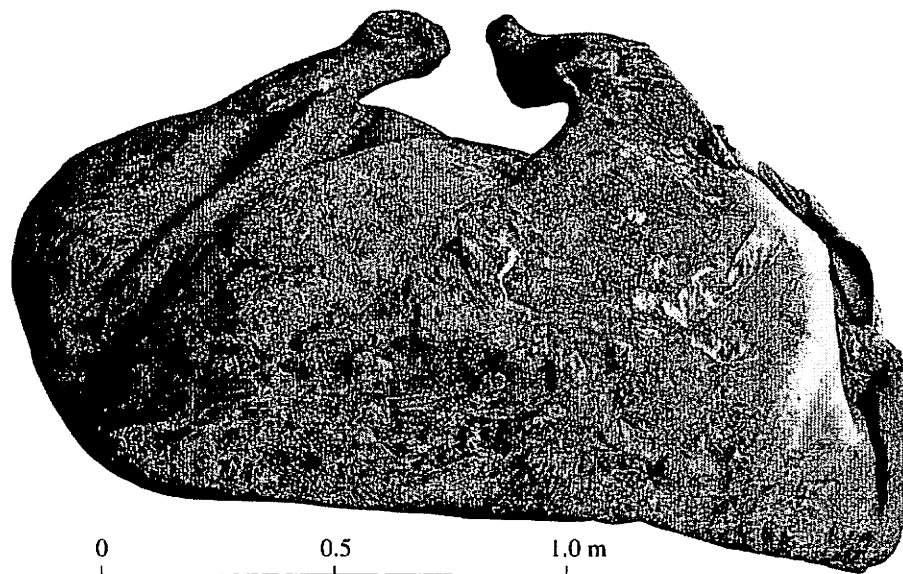


Fig. 2. Left part of the Kolyma rhinoceros.

mary deposits that adhered to the rhinoceros corpse. The sample contains abundant pollen grains (574 in 1 preparation). The taxonomic composition of the pollen assemblage differs from that of the Recent association; it is dominated by grass and bush taxa (61%), with the prevalence of Gramineae (23.9%), abundant wormwoods (15.3%) and Caryophyllaceae (7.3%), and less abundant Cyperaceae (4.9%) and Astereae (1.4%). Forbs are diverse and indicate plant communities characteristic of various environments, i.e., steppe, meadow-steppe, and meadow ecosystems. Tree-shrub plants (23.7%) are mostly represented by small-leaved angiosperms (18.0%), including dwarf birches (9.7%), alder (3.8%), willows (individual specimens), and tall

birches (3.4%, probably allochthonous). Conifers are represented by individual pollen grains of larch and dwarf stone pine. In general, the pollen assemblage corresponds to vegetation of dry, extreme continental climate of the last (Sartanian) glaciation (24–11 ka). Similar palynological assemblages occur in the sections of the glacial period on the seaside lowlands of Yakutia [3–5].

The woolly rhinoceros was a widespread representative of the Mammoth Fauna of Eurasia, which was recorded from the British Isles on west to the Chukchi and Kamchatka peninsulas and Primorski Krai on east [6–8]. Therefore, *C. antiquitatis* is an important bios-

stratigraphic indicator of the Late Pleistocene of northern Eurasia. To date, the distribution of this species in Europe, the Ural Mountains, and most of Siberia has been investigated rather thoroughly, while northeastern Siberia has yielded poor material, including specimens from the Kolyma River Basin and Chukchi Peninsula [7, 8].

Since the woolly rhinoceros is recorded less frequently than many other animals of the Mammoth Fauna, the mummified rhinoceros from the vicinity of the village of Cherskii is a rare paleontological object of great scientific and museum significance. To date, only four specimens of this sort have been found. In Yakutia, complete corpses of the woolly rhinoceros were found in the vicinity of the town of Verkhnevilyuisk (1771) and on the Khalbui River (1877); however, they are only represented by heads and legs [9]. Two mummified corpses were found in 1907 and 1929 in ozokerite deposits of the Starunia locality (Galicia, western Ukraine) [1]. New woolly rhinoceros specimens supplement the knowledge of morphology and measurements of these animals.

The woolly rhinoceros, along with other typical members of the Mammoth Fauna (woolly mammoth, Lena horse, primeval bison, musk-ox, saiga, etc.) mostly inhabited periglacial landscapes rich in open spaces and characterized by the combination of cold-resistant and xerophilous plant species. Extensive low-grass pastures in river valleys and partly on interfluvies provided favorable conditions for herbivorous mammals of the Mammoth Fauna [10, 11]. In northeastern Asia, most of rhinoceros specimens come from plateaus and mountain river valleys [8, 10]. Since the woolly rhinoceros is a herbivorous animal [12, 13], it apparently inhabited these areas, using them as feeding grounds. At the same time, natural traps, such as interstices formed by thawing ice lenses, thermoerosion

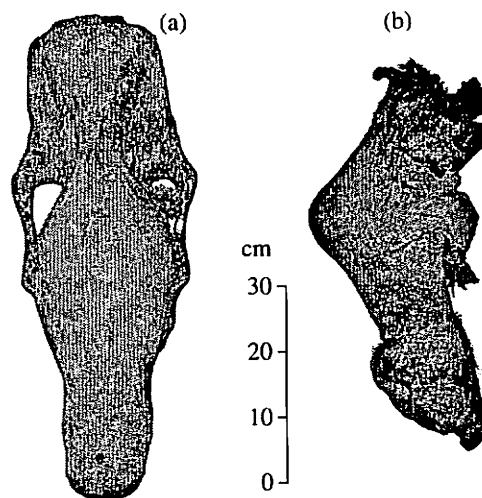


Fig. 3. Kolyma rhinoceros: (a) skull and (b) right hind leg fragment.

scours, marshy shores of thermokarst lakes and creeks, etc., were dangerous to such a short-legged and heavy animal. The rhinoceros studied probably fell into a trap, stuck in the mud, and sunk. This is supported by the in situ position of the corpse in the icy Edoma beds on the left side, with its head extending upwards (Fig. 1). The left part of the trunk was probably held by viscous liquid thixotropic ground of thawing Edoma strata; as the rhinoceros was suffocated in the muddy trap, it raised the head. Some corpses of animals of the Mammoth Fauna were found in similar positions [6].

At present, the corpse of the Kolyma rhinoceros is stored frozen in Yakutsk for further thorough comparative anatomical, molecular, histological, and microbiological studies.

#### Body measurements of the woolly rhinoceroses, cm

Parameter	Yakutia		Rhinoceroses from Staruni, Western Ukraine (Nowak et al., 1930)	
	lower reaches of Kolyma, Malaya Filippova River, part of a corpse adult female	Lena-Aldan interfluvie, village of Churapcha, skeleton of adult female*	1907, young female	1929, adult female
Body length from tail base to head end	about 350	323	355	358
Height at withers	145	155-165	153	153
Ear length	18-20	-	-	28
Tail length	47	-	-	49
Hind foot length	41	39	-	-
Anteroposterior diameter of hind sole	14.5	15.2	-	-
Transverse diameter of hind sole	15.7	about 16	-	-
Manus circumference in the middle	39	39	-	-

\* In rhinoceros from Churapcha, the lower part of the right hind leg is preserved with soft tissues.

## ACKNOWLEDGMENTS

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