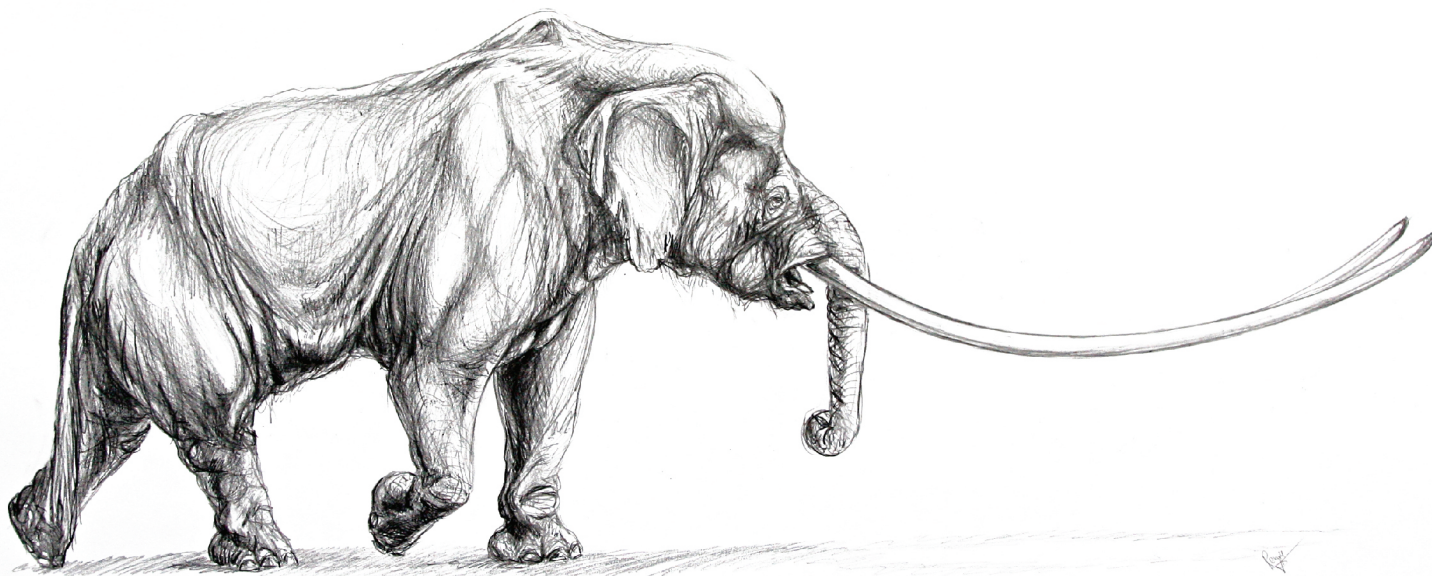




SCIENTIFIC ANNALS of the School of Geology,
Aristotle University of Thessaloniki

SPECIAL VOLUME 102



GREVENA
SIATISTA
GREECE 2014

VIth International
Conference
on Mammoths
and their Relatives

ABSTRACT BOOK

Editors:

Dimitris S. KOSTOPOULOS, Evangelos VLACHOS, and Evangelia TSOUKALA

THESSALONIKI, MAY 2014

Human-inflicted lesion on a 45,000-year-old Pleistocene wolf humerus from the Yana river, Arctic Siberia

Vladimir PITULKO ✉, Aleksei TIKHONOV, Konstantin KUPER, and Roman POLOZOV

In 1884, the Russian Academy of Science dispatched an expedition to explore the Arctic Ocean shoreline in East Siberia around the Lena and Yana Rivers (Bunge and Toll, 1887). It was led by Aleksander Bunge, a medical doctor, and Eduard von Toll, a geologist. In 1885, Toll described a Pleistocene bison skull concentration near a small

unnamed creek entering the Yana River at N 68° 55' 05.2", E 134° 28' 46.2" (Fig. 1A). An assemblage of Pleistocene faunal remains containing mammoth, woolly rhinoceros, bison, and a few bones from other species (Fig. 1B) was collected from this locality (hereafter, the Bunge-Toll site) in 2012. The fauna comes from the upper part of the

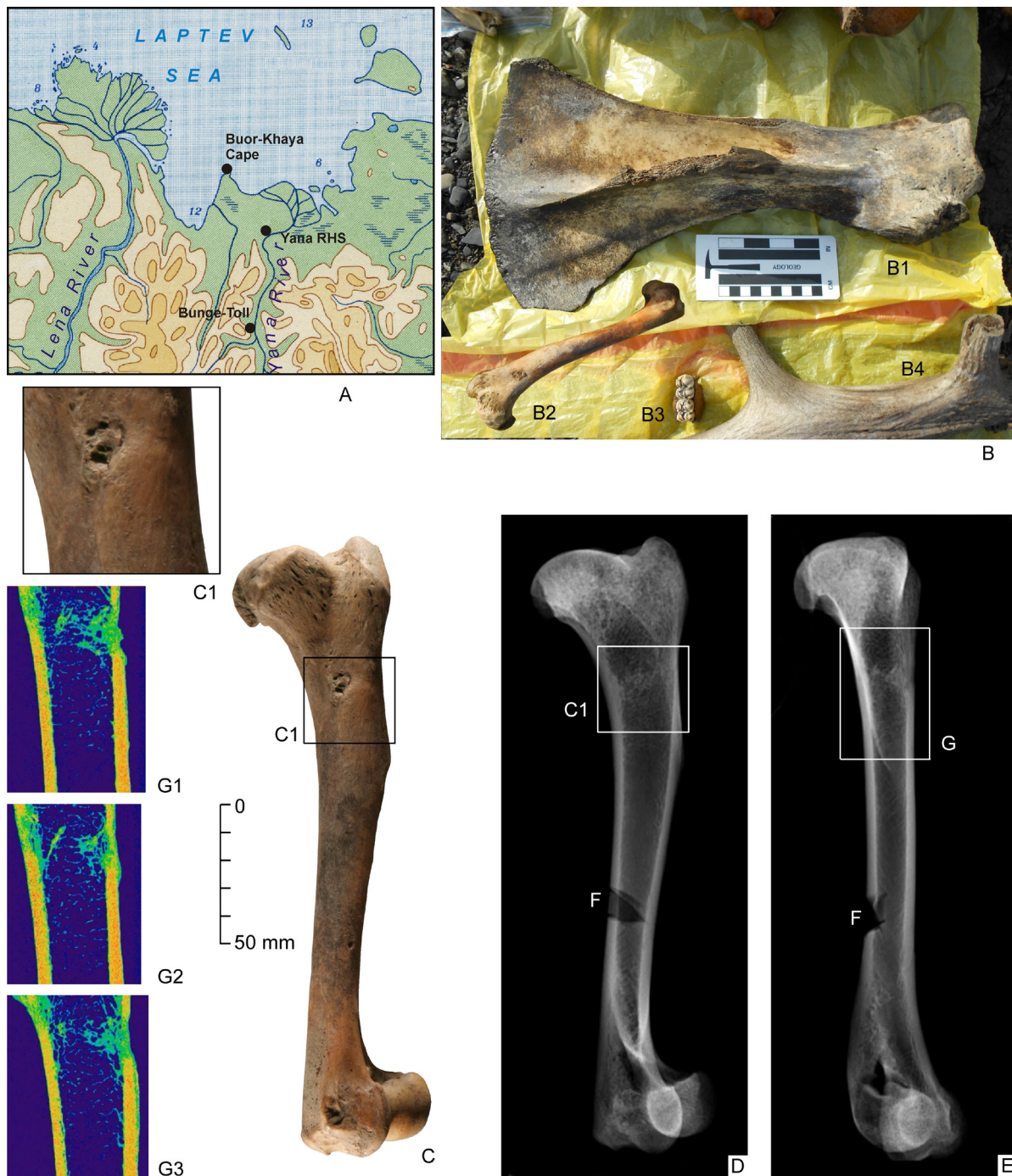


Fig. 1. Bunge-Toll 1885 site. A, site location. B, human-modified (?) bones and red deer antler. B1, woolly rhinoceros scapula. B2, Pleistocene wolf humerus (left). B3, reindeer mandible fragment. B4, red deer antler. C, wolf humerus with pathological changes. C1, close up of studied zone. D, X-ray photograph of the wolf humerus, same side as view (C). E, X-ray photograph of the wolf humerus, profile of the hunting lesion. F, AMS 14C sample cut out. G, X-ray computer tomography zone. G1, G2, G3 – slices on different depth. Note: scale bar for C, D, E is 50 mm.

Table 1. Radiocarbon dates from Bunge-Toll 1885 site (Note: GrA 57022 is AMS ^{14}C).

N	Sample	Dated material	^{14}C age, uncalibrated years before present
	LE 9888	Bison, humerus	36,300 \pm 640
	LE 9889	Woolly rhinoceros, costa	40,500 \pm 1600
	GrA 57022	Wolf, humerus	44,650 +950 /-700
	LE 9887	Woolly mammoth, pelvic bone	47,600 +2600/-2000

permafrost deposits, which fill the depressions in bedrock around 50m above the river level. Radiocarbon dating (Table 1) indicates that water-washing by local residents looking for mammoth ivory likely exposed the upper portions of the Yana River's third (?) terrace sediments. Most of the dates (obtained from bone collagen) are over 40 kya and in two cases the measurement resulted in a skewed distribution.

Archaeological study of the collection revealed that some bones, such as a rhino scapula, display likely evidence of human modification (Fig. 1, B1). In addition, a diagnostic fragment of a smashed reindeer mandible (the tooth row) was found. Zooarchaeological research indicates that such damage is very typical for reindeer bones from archaeological sites, but never caused by natural processes. Individual ^{14}C ages of these bones are unknown.

Archaeologically, the most interesting find is a left humerus of a mid-sized adult Pleistocene wolf (Fig. 1, B2, C). Its individual ^{14}C age was obtained from a diaphysis fragment drilled out for the analysis (Table 1, Fig. 1, F). Even in the field photos, some bone pathology on the upper third of the proximal end's lateral surface is visible (Fig. 1, B2, C, C1).

To clarify the character and nature of the injury, two x-ray methods were used: (1) regular X-ray at the Saint Petersburg State Pediatric University Clinic (Fig. 1, D, E) and (2) X-ray computed tomography (XCT) at Budker Institute of Nuclear Physics RAS SB, Novosibirsk. The latter was applied to the bone sample with the use of synchrotron radiation (SR) from the VEPP-3 storage ring (Novosibirsk, Russia) at the X-Ray microscopy and tomography beamline station (Fig. 1, G1, G2, G3). Each scan consisted of 360 back projections with an angular step of 0.5° (from 0 to 180°).

The methods described above show that the proximal third of the humerus (the metadiaphysis zone) contains a round break in the cortical plate with a porous structure, 12 x 8 mm in size. There is no bone deformation or bone tissue excess, which is common when a displaced bone fracture heals. Hence, this injury probably represents a fracture of a limited area of the bone.

X-ray images of two projections show slight changes in the cortical plate structure of a limited area in the metadiaphysis zone of the proximal third of the humerus. A sclerosis zone, with approximately triangular borders, covers the entire width of the bone. XCT images (Fig. 1, G1, G2, G3) show signs of cortical plate lesions; some of the cortical plates appear pushed inward (Fig. 1, G2). Inside the bone, the bone tissue is altered. A limited, irregularly-shaped area is characterized by uneven thickening of bone tissue (sclerosis), spread to the opposite cortical plate, which does not show these modifications as clearly. We can conclude that this evidence points to efficient natural regeneration of the animal's bone tissue in the location where an atypical fracture occurred. The puncture-cut damage was probably caused by a sharp

wounding object, which was used with impressive force and punctured the bone 10mm deep, stopping before the bone was penetrated all the way through. The shape of the object, based on the 3D reconstruction from the XCT data, can be described as very pointed and thinned. Post-trauma alterations in modern animal bones, similar to the ones seen on the Bunge-Toll 1885 site humerus, occur approximately 6 months or more after the trauma.

This puncture-cut wound on the wolf's left humerus, caused by a sharp object with great force, could only have been inflicted by a human. The weapon shape reconstruction indicates it was a rather sharp implement, most likely a projectile point made of mammoth bone or ivory. Hence, the Bunge-Toll 1885 site find represents indirect evidence of human presence in Northern Siberia around 45 kya, long before the Yana site was occupied. It is not clear to what extent the other bones from the Bunge-Toll 1885 site are associated with human activity; however, the entire complex dates to no younger than 36 kya. Interestingly, the closest radiocarbon date to the age of the wolf humerus (44,650 +950 /-700) in the Bunge-Toll 1885 collection comes from mammoth remains (47,600 +2600/-2000). Clearly, wolves were not a prey category, but it is easy to imagine some kind of a conflict between this animal and humans.

Such an early human presence has not previously been observed in Arctic Siberia, the Yana site (Pitulko et al., 2013) and the Buor-Khaya mammoth "graveyard" (Pitulko et al., 2014) being slightly younger than 30 kya. Sites chronologically comparable to the Bunge-Toll 1885 site (dating to 40-45 kya) are very rare in Siberia in general. However, their list could be expanded significantly by including indirect evidence, such as paleontological remains of Pleistocene animals, which are encountered much more often than Paleolithic sites. Some of this fauna could have still been hunted by humans, and the Bunge-Toll 1885 site provides a good example for Arctic Western Beringia.

References

- Bunge, A., Toll, E., 1887. Bericht über die Expedition nach den Neusibirischen Inseln und dem Jana-Lande. Beitrag Zur Kenntniss des Russischen Reiches 3, 63-411.
- Pitulko, V., Nikolskiy, P., Basilyan, A., Pavlova, E., 2013. Human habitation in the Arctic Western Beringia prior the LGM. In: Graf, K.E., Ketron, C.V., Waters M.R. (Eds). *Paleoamerican Odyssey*. CSFA, Texas A&M University Press, College Station, pp. 13-44.
- Pitulko, V., Yakshina, I., Strauss, J., Shirmmeister, L., Kuznetsova, T., Nikolskiy, P., Pavlova, E., 2014. A MIS 3 Kill-Butchery Mammoth Site on Buor-Khaya Peninsula, Eastern Laptev Sea, Russian Arctic. Abstract Book of the Vth International Conference on Mammoths and their Relatives. Special Volume 102.

✉ pitulkov@gmail.com



Citation:

Pitulko, V., Tikhonov, A., Kuper, K., Polozov, R., 2014. Human-inflicted lesion on a 45,000-year-old Pleistocene wolf humerus from the Yana river, Arctic Siberia. Abstract Book of the Vth International Conference on Mammoths and their Relatives. S.A.S.G., Special Volume 102: 156-157.