

## New data on the “Mammoth” fauna of the Laptev Shelf Land (East Siberian Arctic)

T.V. Kuznetsova<sup>1</sup>, L.D. Sulerzhitsky<sup>2</sup>, Ch. Siebert<sup>3</sup>

<sup>1</sup> *Paleontological Department, Geological Faculty, Moscow State University, Moscow, Russia - tatkuz@orc.ru*

<sup>2</sup> *Geological Institute, Russian Academy of Sciences, Moscow, Russia - suler@geo.tv-sign.ru*

<sup>3</sup> *Alfred Wegener Institute for Polar and Marine Research, Potsdam, Germany csiebert@awi-potsdam.de*

**SUMMARY.** Rich fossil material of the “Mammoth” fauna was collected during Russian-German expeditions (1998-2000) in southern and southeast parts of the Laptev Sea coast. It enables us to reconstruct the Late Pleistocene and Holocene distribution of mammals in the Laptev Sea surroundings. The analysis of radiocarbon data (218 dates) gives us the possibilities to reveal different changes of population’s composition and to estimate the dynamics of abundance in species in the past. This work presents the results using radiocarbon chronology for the paleoecological reconstruction.

Perennially frozen Pleistocene sediments in Arctic Siberia provide a perfect preservation of organic remains. Findings of the “Mammoth” fauna have been known for more than 200 years from the Laptev Sea surroundings. One of the earliest finding of the almost complete mammoth carcass - the “Adams’ Mammoth” was found in 1799 and came from the thawing cliffs of the Bykovsky Peninsula.

During field work (1998-2000) our Russian-German expeditions in the frames of the “Laptev Sea System 2000” project investigated the Late Pleistocene and Holocene deposits on the southern and southeast coast of the Laptev Sea. The collection and study of paleontological material were the part of multidisciplinary research. More than 2000 fossil mammal bones have been collected on Bykovsky Peninsula and Bol’shoy Lyakhovsky Island. In contradiction to the other collections our one is unique by 100% registration of all bone findings. Such an approach gives the possibility to understand the composition of mammal populations which lived in these areas during the Late Pleistocene and Holocene.

The collection of mammal bones from the

Bykovsky Peninsula includes more than 1000 bones (Kuzmina *et al.* 1999). In general, taxonomic composition of this collection is rather typical for “Mammoth” fauna of northeast Siberia. The woolly mammoth, horse, bison and reindeer are dominate (Fig. 1).

The collection from Bol’shoy Lyakhovsky Island also contains more than 1000 bones (Kuznetsova & Kuzmina 2000). By its size and taxonomic composition, it is comparable with the 1886 year collection by A. Bunge. The famous Russian Novosibirsk Expedition of 1886, led by A. Bunge and E. Toll, collected almost 2000 bones and discovered a great number of species of fossil mammals unknown for this part of Arctic before. Among them such mammals as saiga, a large cave “lion”, woolly rhinoceros and others were described (Cherskiy 1891). However, as reconstructed from Cherskiy (1891), this collection had abnormally low percentage of mammoth bones (1.7%) and high number of hare bones (17.6%), with reindeer bones dominating the sample (39%). That looks like possible bias it is caused by the method of collecting. Our collection to be more comparable with the other known Late

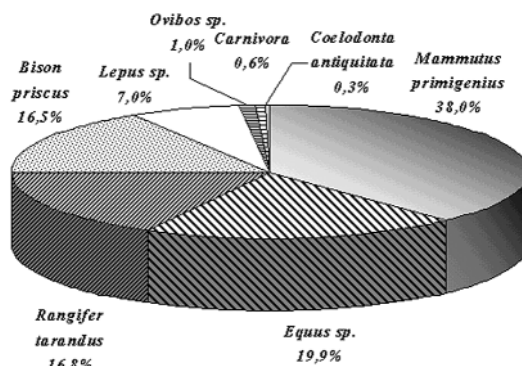


Fig.1 - Composition of mammal bones collection from Bykovsky Peninsula.

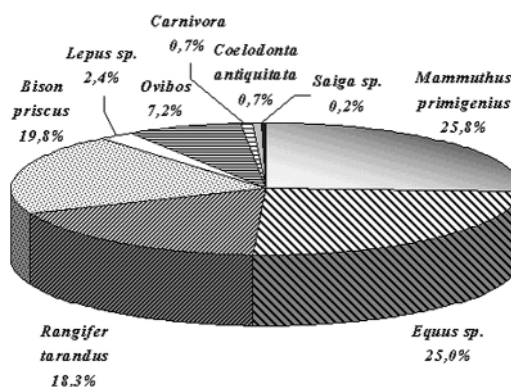


Fig.2 - Composition of mammal bones collection from Bol'shoy Lyakhovsky Island.

Pleistocene local faunas. Mammoth and horse remains dominated (25.8% and 25% respectively) followed by bison (19.8%) and reindeer (18.3%). Unusually high is the number of muskox remains (7.2%). Hare bones are only 2.4% (Fig. 2).

In addition, on the Bol'shoy Lyakhovsky Island the interesting and rather rare finds were collected: a partial skeleton of bison in natural articulation; several bones had some soft tissues preserved (ligaments) and bone marrow inside them. This skeleton was dated  $34,360 \pm 400$  BP. At the site of the earlier finding of partial skin and leg of mammoth (Zimovye River floodplain) we collected fragments of a mammoth skeleton, soft tissues and hair. For this fossil remains the age  $32,500 \pm 500$  BP was determined.

To reconstruct the composition of animal populations and their changes on the Laptev

shelf land during the Late Pleistocene and Holocene an extensive program of  $^{14}C$  bone collagen dating was conducted. At the moment we have 137 dates, 78 dates of them from the Bykovsky Peninsula and 59 dates from Bol'shoy Lyakhovsky Island.

The age distribution of bones from Bykovsky Peninsula is not homogeneous (Fig. 3). The largest amount of dates belongs to the period from 36 to 26.5 ka BP. The other dates concentrate in the period 15 - 12.5 ka BP. There are also two periods with only a few dates: 44.5 - 36 ka BP and 20 - 14.7 ka BP.

The age data distribution from Bol'shoy Lyakhovsky Island differs from those mentioned above. The dates are more numerous in the period between 44 and 33 ka BP, while a reduction in the number of dates is obvious for the period 29 - 16.5 ka BP. Two periods without any woolly mammoth' dates: 37.5 - 28 ka

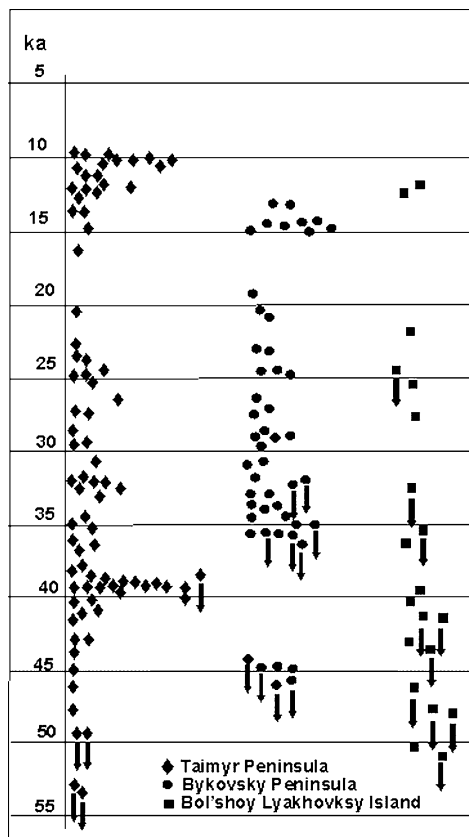


Fig.3 - Age data distribution of *Mammuthus primigenius* remains from the Laptev Sea surroundings.

BP and 22 – 12 ka BP were determined (Fig. 3).

It should be noted that the date's composition of such large collections could be strongly biased by the local geological situation, by taphonomic conditions, and other random factors. The heterogeneity of bone distribution probably reflects that different numbers of animals lived in this region. In addition we have a great database from the Taimyr Peninsula – 81 data (Sulerzhitsky 1995; Sulerzhitsky & Romanenko 1997). The paleontological collection from the Taimyr Peninsula differs from two previous collections. It contains bones collected from the different locations on this vast peninsula. In this case the local geological situation and taphonomic conditions did not so strongly influenced on the distribution of dates.

In the database from Taimyr Peninsula dates

concentrate in two periods: 42 – 36 ka BP and 13.5 – 9.5 ka BP and there is one period 20 – 15 ka BP with only a few of the woolly mammoth' dates (Fig. 3).

Data of *Ovibos* sp. and *Equus* sp. are the special interest. Two very young muskox' dates from Taimyr Peninsula (2920±50 and 2700±70 BP) (Sulerzhitsky & Romanenko 1997) and two dates from Bykovsky Peninsula (3200±40 and 3180±100 BP) show a wide muskox' distribution in the Late Holocene on the southern coastal land of the Laptev Sea. Unexpected data we got on horses. In spite of a low number of horse dates (15 dates from the Bykovsky Peninsula and 11 date from Bol'shoy Lyakhovksy Island) there are two very important dates for Holocene horses from this region. One bone from the Bykovsky Peninsula is 4610±40 BP and another from the Bol'shoy Lyakhovksy Island is 2200±50 year old. This data proves that wild horses had lived during the second part of the Holocene in the coastal land of the Arctic Ocean.

#### CONCLUSIONS

A new professional approach to the collection of bones and an extensive program of <sup>14</sup>C bone collagen dating give the possibility to reconstruct the composition of animal populations during the Late Quaternary. Woolly mammoth bones dominate in all our collections from the Laptev Sea coast (25-40%), while horse and bison follow the next (15-25% each). The abundant database indicates a heterogeneous contribution of bones by different localities. This can depend on the geological composition of outcrops and taphonomic conditions. However, the period between 20 and 15 ka BP, seems to be a time the less favourable environmental condition for woolly mammoths in the whole southern coastal area of the Laptev Sea. Received dates by bones of muskox and horse prove that these large grazing mammals had lived during the Late Holocene on the vast territory in the East Siberian Arctic.

#### ACKNOWLEDGEMENTS

We thank all the German and Russian colleagues who took part in the Lena Delta Expedition under the Program "Laptev Sea System-2000" for their active help, especially A. V. Sher, S. A. Kuzmina, L. Schirrmeister, H.-W. Hubberten, V. V. Kunitsky. We are also thankful to Otto Schmidt Laboratory and the Russian Foundation for Basic Research for the partial support of this work (project 01-04-48930).

#### REFERENCES

- Cherskiy, I.D. 1891. The description of the collection of post-Tertiary mammals, collected by the New Siberian expedition of 1885-86. *Zapiski Imper. Akademii Nauk (Prilozhenie k LXV tomu)* 65, 1: 1-707 (In Russian).
- Kuzmina, S., Kuznetsova, T. & Sher, A. 1999. Paleontological research on the Bykovsky Peninsula. *Reports of Polar Research. Berichte zur Polarforschung* 315: 179-187, 233-259.
- Kuznetsova, T. & Kuzmina, S. 2000. Paleontological research at the southern coast of Bol'shoy Lyakhovsky Island. *Reports of Polar Research. Berichte zur Polarforschung* 354: 151-161, 223-258.
- Sulerzhitsky, L.D. 1995. Characteristics of radiocarbon chronology of the woolly mammoth (*Mammuthus primigenius*) of Siberia and north of Eastern Europe. *Russian Academy of Sciences. Proceedings of the Zoological Institute St. Petersburg* 263: 163-183 (in Russian).
- Sulerzhitsky, L.D. & Romanenko, F.A. 1997. Age and distribution of the "Mammoth" fauna of the Polar Region of Asia. *Earth*