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INFLUENCE OF LATE QUATERNARY PALEOENVIRONMENTAL CONDITIONS ON THE DISTRIBUTION OF MAMMALS IN THE LAPTEV SEA REGION

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Understanding of the paleoenvironment is only possible through multidisciplinary studies of terrestrial deposits from the shelf land. Perennially frozen sediments along the Laptev Sea coast and New Siberian Islands contain various bioindicators of the past environment including mammal bones, fragments of insects, mollusk shells, remains of plant macrofossils, diatoms, pollen, ostracods etc. The study of these indicators, supplemented by ¹⁴C dating, provides excellent archives of past life and Pleistocene environmental conditions.

In the frame of the joint Russian-German "Lena Delta Expeditions" (1998-2002), carried out under the umbrella of the Russian-German cooperation "System Laptev Sea 2000", we investigated Late Pleistocene and Holocene deposits on the Laptev Sea coast, southwest coast of the East Siberian Sea and New Siberian Islands. Our collection of large mammal bones contains more than 3000 samples. It is unique because all bone findings were collected and registered, in contrast to former collections. Such an approach combined with radiocarbon dating of bone collagen (more than 300 dates) makes it possible to bring out some important aspects of date distribution of large animals in the studied area during the Late Quaternary. It is the first time that we have had such complete and well-dated material from the Arctic region.

A large part of the collection consists of *Mammuthus primigenius* bones (nearly 38%) and mammoth dates in our database are predominant (about 200 dates). The distribution of the bone ages is heterogeneous, especially for the mammoths. All dates may be divided into three groups. The first group consists of dates from ca 50 ka BP to 35-34 ka BP with a maximal number of dates around 40-38 ka BP. The second group (33 ka BP - 23-22 ka BP) has two periods with maximum numbers of dates: 33-32 ka BP and 25-24 ka BP. The last large number of dates belongs to the period from 15 ka BP to 9 ka BP with a maximum number of dates around 11-10 ka BP.

The distribution of radiocarbon dates probably reflects periodic changes in the size of mammal populations that was determined by alterations of environmental conditions. Increases in mammoth fossil bone numbers and their subsequent decreases indicate favorable and less favorable environmental conditions for woolly mammoths during periods of amelioration and deterioration of climate, fluctuations in the population size and/or migrations of the mammoth herds (Schirmer *et al.*, 2002). We have attempted to compare our “mammoth” periods with climatic periods by analysis of pollen remains.

The ca 50 ka BP - 35-34 ka BP period corresponds to the Middle Weichselian (Early Karginisky) Interstadial. It was the beginning of climatic warming, drainage of lakes and active development of ice complex formation on the Taymyr Peninsula (Siegert *et al.*, 1999). Pollen data from the southern Taymyr indicate the presence of open *Larix* forest with *Betula nana* and *Alnus fruticosa*. Pollen-based climate reconstruction shows that it was a rather warm and wet period with temperatures 0.5-1.5°C warmer and precipitation 25-75 mm higher than today (Andreev *et al.*, 2002b). On the contrary, pollen data from the Laptev Sea coast (Bykovsky Peninsula and Bol'shoy Lyakhovsky Island) indicate treeless vegetation and rather cold and dry climate (Andreev *et al.*, 2002a).

The second “mammoth” period (33 ka BP - 23-22 ka BP) is correlated with the Late Karginisky interval reflected in pollen records from the northern Taymyr Peninsula and Laptev Sea coast (Andreev *et al.*, 2002a, 2003). According to pollen spectra, open steppe-like herb communities dominated vegetation. Environmental conditions were rather severe (with temperatures 2-5°C colder and precipitation 50-100 mm lower than today).

The last “mammoth” period is from 15 ka BP to 9 ka BP with a maximum number of dates around 11-10 ka BP. The 11.5-10 ka BP interval is characterized by a rapid increase of warm and wet elements in pollen spectra. It can be interpreted as amelioration of climatic conditions (Andreev *et al.*, 2002a, b, 2003). The reconstructed temperatures were 1.5° warmer and precipitation was ca. 25 mm higher than today. It is also a period with the largest number of woolly mammoth dates during the Late Pleistocene. This may indicate that it was a period with the most favorable environmental conditions for the mammoths.

The period of the most unfavorable environmental conditions was probably between 22 ka BP and 15 ka BP as only a few dates from woolly mammoth bones were obtained (Kuznetsova *et al.*, 2001). It is interpreted as an extremely cold and dry period during the Late Pleistocene. The lack of mammoth dates for this period does not indicate the total absence of mammoths in the Laptev Sea region, but it reflects a relative decrease in their numbers.

Muskox and horse bone ages prove that these large grazing mammals lived during not only the Pleistocene and the Early Holocene, but also during the Late Holocene in the East Siberian Arctic. Three muskox dates between 3-2.7 ka BP from the Taymyr Peninsula (Sulerzhitsky and Romanenko, 1997) and two recently obtained dates (3200±40 and 3180±100 yr BP) from Bykovsky Peninsula reveal a wide muskox distribution in the Laptev Sea region during the Late Holocene. There are also two new horse Holocene dates: 4610±40 yr BP from the Bykovsky Peninsula and 2200±50 yr BP

from the Bol'shoy Lyakhovsky Island. This is in contrast to the previous opinion that wild horses had not lived during the Holocene in the Siberian Arctic.

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