

The North of Eastern Siberia: Refuge of Mammoth Fauna in the Holocene

Gennady G. Boeskorov

Mammoth Museum, Lenina prospekt 39, 677891 Yakutsk, Russia, E-mail: a.g.ponomarev@ibpc.ysn.ru

(Manuscript received October 15, 2002; accepted October 7, 2003)



Abstract

The global climate changes at the end of Pleistocene led to extinction of the typical representatives of Mammoth fauna—mammoth, woolly rhinoceros, wild horse, bison, muskox, cave lion, etc.—on the huge territories of Northern Eurasia. Undoubtedly the Mammoth fauna underwent pressure from the Upper Paleolithic Man, whose hunting activity also could play the role in decreasing the number of mammoths and other representatives of megafauna (large mammals). Archaeological data testify that the typical representatives of Mammoth fauna were the Man's hunting objects only till the end of the Pleistocene. Their bone remains are not usually found on the settlements of Mesolithic Man. Formerly it was supposed that the megafauna of 'Mammoth complex' was extinct by the beginning of Holocene. Nevertheless the latest data testify that the global extinction of the Mammoth fauna was sufficiently delayed in the north of Eastern Siberia. In the 1990s some radiocarbon data testified that the mammoths on the Wrangel Island existed for a long time during the Holocene from 8000 till 3700 y. BP. The present radiocarbon data show that wild horses inhabited the north of Eastern Siberia (the lower stream of the Enisey river, the Novosibirskie Islands, the East Siberian sea-shore) 3000–2000 y. BP. Musk-oxen lived on the Taimyr Peninsula and the Lena River delta about 3000 y. BP. Some bison remains from Eastern Siberia belong to the Holocene. The following circumstances could promote the process of preservation of the Mammoth fauna representatives. The cool and dry climate of this region promotes the maintenance of steppe associations – habitats of those mammals. The Late Paleolithic and Mesolithic settlements are not found in the Arctic zone of Eastern Siberia from the Taimyr Peninsula to a lower stream of the Yana River; they are very rare in the basins of the Indigirka and Kolyma Rivers. So, the small number of the Stone Age hunting tribes on the North of Eastern Siberia was another factor in the long-term preservation of some Mammoth fauna representatives.

Key words: Eastern Siberia, Yakutia, Mammoth fauna, Late Pleistocene, Holocene.

Introduction

In the Late Pleistocene (120 000–10 000 years before present) the territory of Eastern Siberia, as the main part of Northern Eurasia, was inhabited by mammalian fauna of the late variant of the Mammoth complex (or the Upper Paleolithic complex, after Vangengeim, 1977). The composition of this fauna was due to the prevailing of open landscapes – arctic steppes and “tundra-steppes” (Vangengeim, 1961; Yurtsev, 1981; Sher, 1997, et al.). The ‘mammoth’ fauna of Eastern Siberia has been studied for about 200 years and is rather well known (Chersky, 1891; Vangengeim, 1961; 1977; Russanov, 1968; Sher, 1971; Vereshchagin, 1977; 1979; Lazarev and Tomskaya, 1987; Boeskorov, 1998).

The typical representatives of the Late Pleistocene megafauna of Eastern Siberia, which became extinct later, were widely distributed: mammoth (*Mammuthus primigenius* Blum.), woolly rhinoceros (*Coelodonta antiquitatis* Blum.), Lena horse (*Equus lenensis* Russ.),

onager (*E. hemionus* Pall.), Pleistocene bison (*Bison priscus* Boj.), Pleistocene saiga antelope (*Saiga tatarica borealis* Tscherski (=ricei Frick), Pleistocene musk-ox (*Ovibos pallantis* H. Smith), cave lion (*Panthera spelaea* Golf.), etc. Also some modern species of mammals inhabiting now the tundra zones (such as: arctic fox *Alopex lagopus* L. and tundra lemmings *Dicrostonyx* and *Lemmus*) and ecologically adoptable species (such as: brown bear *Ursus arctos* L., wolf *Canis lupus* L., red fox *Vulpes vulpes* L., wolverine *Gulo gulo* L., caribou *Rangifer tarandus* L. and Alpine hare *Lepus timidus* L.) lived in the Late Pleistocene tundra steppes of Eurasia.

The typical representatives of the Mammoth fauna were the main hunting objects of the Upper Paleolithic Man – their numerous remains were found on many sites of that period in Eastern Siberia situated on the basins of Angara, Amur, Lena, Aldan, Olyekma, Vilyui rivers (after Okladnikov, 1968; Mochanov, 1977; Vangengeim, 1977; Alexeev, 1987) (Fig. 1). Probably one of the preferable hunting objects of the Upper Paleolithic Man was the

mammoth – bone remains of this woolly elephant predominate among the bones of other large mammals on some sites. For example, mammoth remains reach 96% on some layers of the Dyuktay cave situated on the Aldan river. The Upper Paleolithic Man also actively hunted on woolly rhinoceroses, bisons, horses, musk-oxen, etc. (Mochanov, 1977; Boeskorov, 1998).

The sharp changing of short periods of falling in temperature and periods of getting warmer were characteristic for the end of the Pleistocene and the beginning of the Holocene. The subsequent progressive warming of the climate and increasing rain- and snowfalls caused a decrease in the northern steppes area and succession for taiga and tundra zones. High snow-cover was the big obstruction for the Late Pleistocene mammals' mobility and feeding. These changes led to extinction of the typical representatives of the Mammoth fauna of the Late

Pleistocene – mammoth, woolly rhinoceros, wild horses, bison, muskox, cave lion, etc.–on the huge territories of Northern Eurasia. Undoubtedly the Mammoth fauna underwent pressure from the Upper Paleolithic Man, whose hunting activity also could play the role in decreasing the number of mammoths and other representatives of megafauna (Vereshchagin and Baryshnikov, 1985; Sher, 1971; 1997).

The archaeological data as well as paleontological data testify that typical representatives of Mammoth fauna were the human hunting objects only till the end of the Pleistocene. Their bone remains are not usually found on the settlements of Mesolithic Man. It was formerly supposed that the megafauna of "Mammoth complex" was extinct by the beginning of Holocene. But now there are some facts that prove the existence of some mammals of the Mammoth fauna in the Holocene of Eastern Siberia.

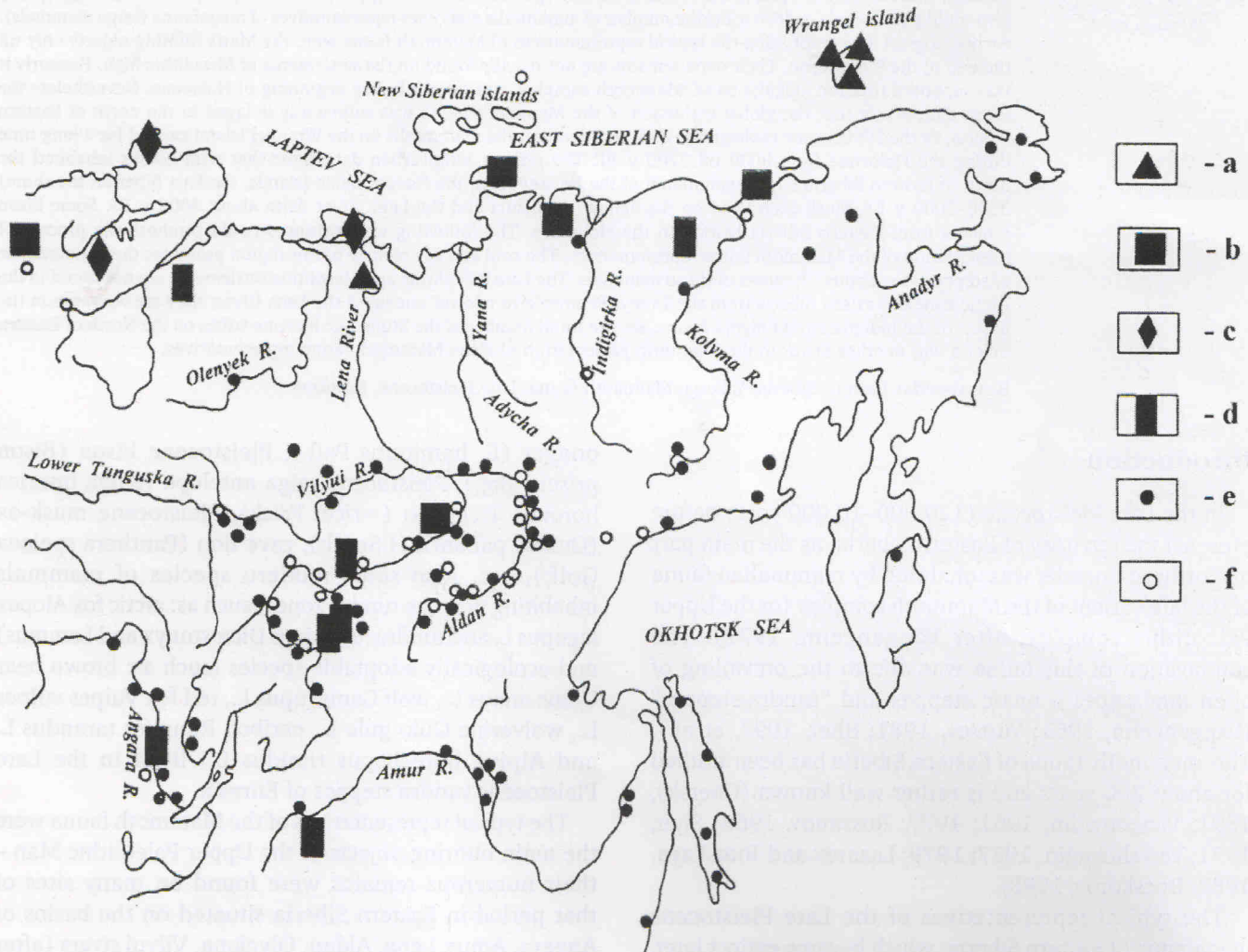


Fig. 1. Preservation of the Mammoth fauna in the Holocene and the human distribution at the final Pleistocene – beginning of the Holocene in the Eastern Siberia and the Russian Far East. Holocene finds of the Mammoth complex mammals: a – mammoth, b – Lena horse, c – musk-ox, d – bison. Human sites: e – Upper Paleolithic (35 000– 10 500 y. BP), f – Mesolithic (mainly for the territory of Yakutia) (10 500–6 000 y. BP).

Mammoth Fauna Representatives in the Holocene of Eastern Siberia

Mammoth

Sufficient decreasing of the *M. primigenius* area took place during the period of the last Sartanian glaciation. The radio-carbon data testify that mammoths lived 14000–12000 years before present on almost whole territory of their Pleistocene area in Northern Eurasia. But mammoth remains younger than 12000 y. B.P. and is found only in the Arctic part of Siberia (Sulerzhitsky, 1995; Sher, 1997). Earlier it was supposed that the mammoths were extinct in Eurasia by the beginning of the Holocene because there were no remains found younger than 9600 years BP. Nevertheless in the 1990s some radiocarbon dates testified that the mammoths existed for a long time in the Holocene on Wrangel Island – from 8000 till 4000 y. BP (Fig. 1, Table 1). It was considered that this island population of mammoth was the last one (Sulerzhitsky, 1995; Vartanyan et al., 1993). However recently the Holocene radiocarbon date obtained on one mammoth bone from a lower stream of the Lena River – 3730 ± 50 y. B.P. (Dr. R. MacPhee and Dr. A. Greenwood, USA, pers. comm.). So, we consider that some mammoth populations existed in Holocene on the mainland part of the north of Eastern Siberia.

Horses

Horses including the Lena horse (*Equus lenensis*) were the most numerous ungulates of the Late Pleistocene of Eastern Siberia. The numerous bone remains of horses were found on many Upper Paleolithic sites. But among several hundreds of the Holocene Man sites in Yakutia, the remains of the horse were found only on the Neolithic site Kulatty near the Yakutsk City (Fig. 1; Garutt, 1950). In our opinion this fact is occasional – as the result of the layers' mixture. It was supposed that the wild horses were extinct on the territory of Yakutia till the beginning of Holocene (Alexeev, 1996). However we consider that this is correct only for the central and southern part of the Eastern Siberia, where the most part of the Holocene settlements were investigated. But there are several Holocene radio-carbon data of wild horses from the north of Eastern Siberia. Part of *E. lenensis* skeleton was found near the Chromskaya Gulf at the Moichoon Lake, its radiocarbon date is 2310 ± 80 y. BP. (Lazarev, 1980). Recently there are new data which show that wild horses inhabited the north of Eastern Siberia 4600–2000 y. BP. (Fig. 1, Table 1). Moreover, it is possible that some populations of *E. lenensis* existed longer on the Extreme North. Horse bone remains were found on the ancient Eskimo settlement on the Big Baranov Cape (western Chukotka, eastward from the Kolyma River mouth) dated

at eighth-ninth centuries (Vereshchagin and Lazarev, 1977) (Fig. 1). There is an opinion that the modern domestic Yakutian horse is the direct descendant of the Late Pleistocene *E. lenensis* (Lazarev, 1980). We do not agree with this and consider that the Lena horse existed for a long time during the Holocene on the Far North of Eastern Siberia and was extinct or exterminated before the coming here of the Yakuts (cattle-breeders). The genetic study of enzymes polymorphism showed that the modern domestic Yakutian horse (*Equus caballus* ssp.) had no aboriginal origin and it is mostly close to the Central Asian breeds of the domestic horse (Guriev, 1983; Tikhonov et al., 1998). So, the domestic Yakutian horse came to the north of Eastern Siberia during the migration of the Yakuts from the southern regions of Siberia.

Pleistocene musk-ox

The Pleistocene musk-ox was extinct on the main part of its area in Eurasia till the beginning of Holocene. Earlier it was noted that this species existed longer of all on the Taimyr Peninsula – the last population of *O. pallantis* lived there 3000–2700 years ago (Vereshchagin and Baryshnikov, 1985; Sulerzhitsky and Romanenko, 1995) (Fig. 1, Table 1). Recently similar data was obtained on musk-ox bones from the Lena River delta – about 3000 y. B-P. (Kuznetsova et al., 2001) (Fig. 1, Table 1). This data is sufficiently widening the Holocene area of musk-ox in Eurasia.

Pleistocene bison

A small form of the Pleistocene bison existed till the Middle Ages (seventh and even tenth centuries) in the Baikal region (Ermolova, 1978; Vereshchagin and Baryshnikov, 1985) (Fig. 1). Probably, some populations of this mammal lived in Yakutia during the Holocene too. Some bovine bones (probably not belonging to cattle) are found in Neolithic settlements of southern Yakutia (Fig. 1) (Boeskorov, 1998). Some bison remains from the north of Eastern Siberia probably belong to the beginning of Holocene (Sher, 1971; Russanov, 1975; Flerov, 1977; Tomirdiaro, 1982) (Fig. 1). Recently obtained radiocarbon dating of the bison remains from the Taimyr National District and the Popigai River confirms existence of this species in early Holocene (MacPhee et al., 2002) (Fig. 1, Table 1).

Conclusion

Summarizing the above-mentioned facts we could note that the global extinction of Mammoth fauna took place in Northern Eurasia between the Pleistocene and the Holocene and was sufficiently delayed in the north of Eastern Siberia. The following circumstances could

Table 1. Holocene finds of the Mammoth fauna representatives.

| Species | Locality | Absolute age, years before present | Source |
|---|--|------------------------------------|--|
| Mammoth (Mammuthus primigenius) | Wrangel Island | 3730–7710 | Vartanyan et al. (1993); Sulerzhitsky (1995) |
| | Lower stream of the Lena River | 3730±50 | R. MacPhee and A. Greenwood (pers. comm.) |
| Wild horses (Equus sp. and E. lenensis) | Taimyr Peninsula, Bolshaya Balakhnya River | 2150±200 | Sulerzhitsky and Romanenko (1997) |
| | Bolshoy Lyakhovsky Island | 2220±50 | Kuznetsova et al. (2001) |
| | Khromskaya Gulf, Moichoon Lake | 2310±80 | Lazarev (1980) |
| | Eastward to the Enissey River mouth, Agapa River | 3250±50 | Sulerzhitsky and Romanenko (1997) |
| | The Lena River mouth, Bykovsky Peninsula | 4610±40 | Kuznetsova et al. (2001) |
| Pleistocene musk-ox (Ovibos pallantis) | Taimyr Peninsula, Logata River | 2700±70 | Vereshagin and Baryshnikov (1985); Sulerzhitsky and Romanenko (1997) |
| | Taimyr Peninsula, Pronchishcheva Bay | 2900±60 | GIN*-25529 (after MacPhee et al. (2002) |
| | Taimyr Peninsula, Chelyuskin Cape | 2920±50; 3800±200 | Vereshagin and Baryshnikov (1985); Sulerzhitsky and Romanenko (1997, 1999) |
| | The Lena River mouth, Bykovsky Peninsula | 3180±100; 3200±40 | Kuznetsova et al. (2001) |
| Pleistocene bison (Bison priscus) | Taimyr National District, the Popigai River | 8860±40 π | MacPhee et al. (2002) |

*GIN – Geological Institute, Moscow.

promote the process of preservation of Mammoth fauna representatives: Cool and dry climate of this region promotes the maintenance of steppe associations, the habitats of those mammals. Some squares of the relic steppes exist now in Yakutia among taiga and tundra zones. The greatest number of Upper Paleolithic and Mesolithic sites are found on the southern and central parts of Eastern Siberia and are very rare on the north of this region (after Mochanov, 1977; Argunov, 1990; Fedoseeva, 1999). The Late Paleolithic and Mesolithic settlements are not found in the Arctic zone of the Eastern Siberia mainland from the Taimyr Peninsula to a lower stream of the Yana River; they are very rare in the basins of the Indigirka and Kolyma Rivers. Obviously this region was poorly settled by Man during the Late Pleistocene and the beginning of Holocene (Fig. 1). So, the small number of hunting tribes of the Stone Age on the North of Eastern Siberia was another factor in the long-term preservation of some representatives of Mammoth fauna.

Acknowledgments

I thank Dr. Robert D. MacPhee, Dr. Alexander Greenwood, Dr. L. Sulerzhitsky, Dr. A. Sher and Dr. Dick Mol for informing about some radio-carbon data on Mammoth fauna mammals.

References

- Alexeev, A.N. (1987) Stone Age of Olyekma. Irkutsk State Univ. Press, Irkutsk, Russia, 126p.
- Alexeev, A.N. (1996) Ancient Yakutia: The Iron Age and the Medieval Epoch. Inst. Archaeol. and Ethnography Press, Novosibirsk, Russia, 95p.
- Argunov, V.G. (1990) Stone Age of the north-western Yakutia. Nauka Publishers, Novosibirsk, 212p.
- Boeskorov, G.G. (1998) On the problem of changing of the Mammal fauna composition in Yakutia from the Late Pleistocene and in the Holocene according to the archaeological data. In: Labutin Yu. (Ed.), Mammals of the Anthropogene of Yakutia. Yakut Sci. Centre Press, Yakutsk, Russia, pp. 126-137.

- Chersky, I.D. (1891) Description of the post-Tertiary mammal collection found by New Siberian expedition 1885-1886. Notes of Russian Ac. Sci., v. 65, 706p.
- Ermolova, N.M. (1978) Theriofauna of the Angara river basin in the late Anthropogene. Nauka Publ., Novosibirsk, 220 p.
- Fedoseeva, S.A. (1999) Archaeology of Yakutia and its place in the World Science on the origin and evolution of mankind. Litograf Press, Yakutsk, Russia, 130p.
- Flerov, K.K. (1977) Bisons of the North-Eastern Siberia. In: Vereshchagin, N.K. (Ed.), Mammoth fauna and its environment in the Anthropogene of the USSR. Zool. Institute Press, Leningrad, USSR, pp. 39-56.
- Garutt, V.E. (1950) The Neolithic settlement Kulatty fauna. In: Okladnikov, A.P. (Ed.), The Ancient Lena. The USSR Ac.Sci. Publ., Moscow-Leningrad, USSR.
- Guriev, I.P. (1983) On the origin of Yakutian horse. In: Revin, Yu.V. (Ed.), Theriological researches in Yakutia. Yakut Branch of Sib. Div. Of the USSR Ac. Sci., Yakutsk, USSR, pp. 50-57 (2001).
- Kuznetsova T. V., Sulerzhitsky L.D., Siegert C. and Schirrmeyer L. (2001) New data on the 'mammoth' fauna of the Laptev Shelf Land (Arctic Siberia). In: La Terra degli Elefanti / The World of Elephants. Proc. 1st Intl. Congress, Rome, 16-20 October 2001, pp. 289-292.
- Lazarev, P.A. (1980) Anthropogene horses of Yakutia. Nauka Publ., Moscow, 190p.
- Lazarev, P.A. and Tomskeya, A.I. (1987) Mammals and biostratigraphy of the northern Yakutia late Cenozoic. Yakut Branch of Sib. Div. of the USSR Ac. Sci. Press, Yakutsk, USSR, 169p.
- MacPhee R.D.E., Tikhonov A.N., Mol D., de Marliave C., van der Plicht H., Greenwood A., Flemming C. and Agenbroad L. (2002) Radiocarbon chronologies and extinction dynamics of the Late Quaternary Mammalian megafauna of the Taimyr Peninsula, Russian Federation. J. Archaeol. Sci., 2002. v. 29, pp. 1017-1042.
- Mochanov, Yu. A. (1977) The most ancient stages of the North Eastern Asia colonization by Man. Nauka, Novosibirsk, 246p.
- Okladnikov, A.P. (1968) Siberia in the Old Stone Age. The Paleolithic Epoch. History of Siberia, Nauka Publ., Novosibirsk, v. 1 pp. 37-93.
- Russanov, B.S. (1968) Biostratigraphy of the Cenozoic sediments of southern Yakutia. Nauka Publ., Moscow, USSR, 458p.
- Russanov, B.S. (1975) Fossil bisons of Yakutia. Yakutsk Publ. House, Yakutsk, USSR, 142p.
- Sher, A.V. (1971) Mammals and stratigraphy of Pleistocene of Extreme North-East of the USSR and North America. Nauka Publ., Moscow, USSR, 309p.
- Sher, A.V. (1997) Natural reconstruction in east-Siberian Arctic on the border of Pleistocene and Holocene and its role in the mammals extinction and forming of modern ecosystems. Cryosphere of the Earth, v. 1, pp. 21-29.
- Sulerzhitsky, L.D. (1995) Peculiarities of radiocarbon chronology of mammoth (*Mammuthus primigenius*) in Siberia and north of Eastern Europe. Trudy ZIN RAS, v. 263, pp. 163-183.
- Sulerzhitsky, L.D. and Romanenko, F.A. (1997) Age and period of Mammoth fauna Asiatic Arctic region distribution. Cryosphere of the Earth, v. 1, pp. 12-19.
- Sulerzhitsky, L.D. and Romanenko, F.A. (1999) The 'twilight' of the mammoth fauna in the Asiatic Arctic. Ambio. v.28, pp. 251-255.
- Tikhonov, V.N., Kotran, E.G. and Knyazev, S.P. (1998) Populational-genetic parameters of the aborigine Yakutian horses *Equus caballus* L. Genetica, v. 34, pp. 796-809.
- Tomirdiaro, S.V. (1982) Discussion aspects of biostratigraphy of the Pleistocene sediments of the North-East of USSR. In: Vereshchagin, N.K. (Ed.), Zool. Institute Press, Leningrad, USSR, pp. 57-65.
- Vangengeim, E.A. (1961) Paleontologic basement of antropogene sediments stratigraphy of the North of Eastern Siberia (on mammal fauna). Proc. Geol. Inst. (Moscow), v. 48, 183p.
- Vangengeim, E.A. (1977) Paleontologic basement of antropogene stratigraphy of the Northern Asia. Nauka Publ., Moscow, USSR, 172p.
- Vartanyan S.L., Garutt V.E. and Sher A.V. (1993) Holocene dwarf mammoths from Wrangel Island in the Siberian Arctic. Nature, v. 362, p. 337-340.
- Vereshchagin, N.K. (1977) The Berelekh mammoth 'cemetery'. In: Strobogatov, Ya.I. (Ed.), Mammoth fauna of the Russian plain and Eastern Siberia. Zool. Institute Press., Leningrad, USSR, pp. 5-50.
- Vereshchagin, N.K. (1979) Why mammoth have extincted? Nauka Publ., Leningrad, USSR, 193p.
- Vereshchagin, N.K. and Baryshnikov, G.F. (1985) Mammal extinction in the Quaternary period of Northern Eurasia. In: Vereshchagin N.K. and Kuzmina, I.E. (Eds.), Mammals of Northern Eurasia in the Quaternary period, pp. 3-42.
- Vereshchagin, N.K. and Lazarev, P.A. (1977) Description of the corpse and skeleton remains of the Selerikan horse. In: Strelkov, A.A. (Ed.), Fauna and flora of the North-Eastern Siberia antropogene, pp. 85-185.
- Yurtsev, B.A. (1981) Relic steppe complexes of the North-Eastern Asia. Nauka Publ., Novosibirsk, USSR, 168p.