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## Natural habitat of early man in Siberia

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**Abstract:** During recent years there has been a number of important Early Palaeolithic sites with remains of pebble artefacts discovered by Russian archaeologists. In particular, the Diring locality of the Lena River (Yakutiya) has become world-renowned. Y. A. MOCHANOV (1988a, b), who first discovered the Diring site put forward the hypothesis about non-tropical human origins. All this work stimulated an attempt to reconstruct the natural climatic conditions of habitat and the timing of the appearance of the first humans in Siberia. During glacials, conditions were most extreme for their activities. Indeed, the vast areas of Western Siberia were repeatedly covered by extensive continental ice sheets. A periglacial superzone was limited to a zone south of the ice sheet front and the Arctic ocean. Plains and plateaus and a significant part of Siberian mountains were occupied by arctic tundra, forest-tundra and tundra-steppe (periglacial steppe). Tundra first appeared in Late Pliocene in the northeast of Russia in the Chukotka peninsula and in the Kolyma River basin. There are data on a significant drop of temperature as early as 2.4 Ma ago. The first cold stage in the south of West Siberia is distinguished by the first appearance of periglacial flora about 0.9 to 1.0 Ma ago.

Severe natural conditions thus became established in Siberia at the time of the first possible appearance of Early Palaeolithic culture in the area. Therefore, it must be assumed that early people could survive in the severe Siberian climate only after having adopted the technique of fire making. According to available data, this may have happened between 600 and 400 ka ago. Therefore, it is assumed that the first Palaeolithic people first came to Siberia not earlier than the Tobol (Holstein) interglacial (400–270 ka BP). Their migration during earlier times seems unlikely.

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### INTRODUCTION

The recent discoveries of Early Palaeolithic sites in northern Eurasia and the hypothesis of early humans' origin in Yakutiya (MOCHANOV 1988a, b) have stimulated analysis of the climatic conditions of natural habitat at the time of the first possible appearance of Palaeolithic cultures in Siberia (ARKHIPOV 1991). The severe Siberian environment is not supposed to have been favourable for our human ancestors. An extreme environment was characteristic of glacial epochs when vast areas of Northern Siberia adjacent to the continental shelf were repeatedly covered by glaciers, as evidenced by enormous belts of end-moraine formations crossing the West Siberian Plain from the Urals to the Yenisey, and extending further to the east across the Central Siberian Plateau to the Laptev Sea. Multiple glaciations developed in the Southern Siberian mountains of the Altai-Sayans, in the Transbaikalian regions and in the mountains of northeast Russia (ARKHIPOV et al. 1986a, b).

The environments that existed in Siberia during glacials have been most completely reconstructed by means of palynological data for the Samarovo (Saale, OIS 8) glacial (VOLKOVA 1977, ALEXEEV 1978, BELOVA 1985, GITERMAN 1985). An extended periglacial superzone, limited by an ice sheet and the Arctic Ocean in the

north stretched from the Urals in the west to the Verkhoyansk Range in the east and further to the Sea of Okhotsk and the Bering Sea including the Chukotka and Kamchatka peninsulas. The southern margin of this superzone probably spread to Mongolia and the Amur River basin. A significant part of the Siberian mountains was covered by mountain glaciers and mountain tundras. Vast plateaus and plains were occupied by arctic tundra, forest-tundra and tundra-steppe (periglacial steppe) (Fig. 1).

During the glaciation, the landscape zones moved to the south, forests disappeared and the subarctic flora migrated to Southern Siberia. According to present knowledge, the southern migration of the flora zones extended 700–1100 km, thus suggesting an annual temperature reduction of 7–8 °C, perhaps up to 9–10 °C (ARKHIPOV et al. 1984, ARKHIPOV - VOLKOVA 1994).

### PLEISTOCENE CONDITIONS IN SIBERIA

When was the Siberian Pleistocene superzone, as defined above, formed for the first time? According to the Russian chronostratigraphic scheme, the Eopleistocene (1.6 to 0.8 Ma) corresponds to the most of the Lower Pleistocene; the Middle Pleistocene of the international scheme

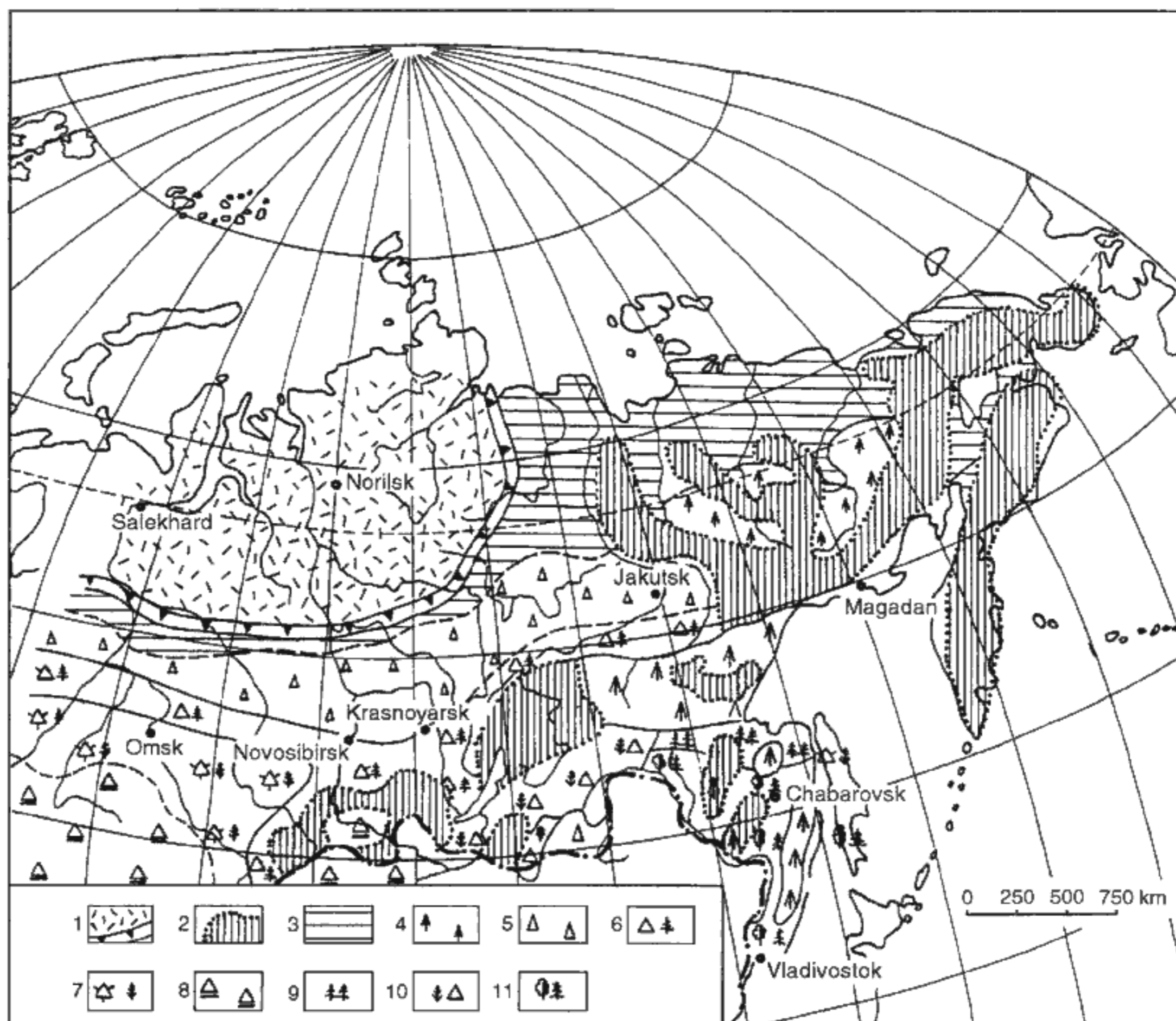


Fig. 1. The Samarovo time periglacial superzone. The sketch-maps (Figs. 1–3) were compiled according to ALEKSEEV (1978), VOLKOVA (1977), BELOVA (1985), GITTERMAN (1985), SHER et al. (1977), VELICHKO et al. 1990, LAUKIIN 1993, 1994, 1995 and others with additions and modifications by the author.

1 – the Samarovo ice-sheet; 2 – mountain glaciers and tundra; 3 – arctic tundra; 4 – mountain tundra; 5 – tundra; 6 – forest tundra; 7 – southern forest tundra; 8 – periglacial steppe (“tundra-steppe”); 9 – light forest; 10 – mountain light forest; 11 – spruce-larch-birch forest.

is subdivided into the Lower (0.8–0.4 Ma) and Middle (0.4–0.13 Ma) Pleistocene (Tab. 1).

Nine moraines (ARKHIPOV 1989), which could correlate with glacial stages of Oxygen Isotope Stages 2 to 18 of SHACKLETON and OPDYKE (1973), are distinguished in the terrestrial geological record in Siberia. Deposits of the ancient Mansi moraine and overlying horizons have a normal magnetic polarity. The underlying Gornofilino alluvial sediments belong to the Matuyama Palaeomagnetic Epoch. This implies that the Mansi moraine is close to, but somewhat younger than the Brunhes-Matuyama reversal and can be dated to 700–720 ka BP (Tab. 1).

To date, there is little evidence of the earliest (Lower Pleistocene) glacials. Traces of permafrost were found

in the Kolyma River basin in the deposits dated approximately to 2.4 Ma BP (SHER et al. 1977). Here in the northeast of Russia, tundra appeared first, with a gradual geographical broadening (GITTERMAN 1985). In the South of West Siberia, periglacial flora was for the first time palynologically distinguished within the Upper Ubinka deposits (VOLKOVA 1977). These deposits could be dated to 0.9 to 1.0 Ma BP, when the vast periglacial superzone started to form in Siberia (Fig. 2). It is possible that this coincided with the Jaramillo Event. The palaeogeography of the late Ubinka age (about 1.0 Ma BP) has been detailed for Northeast Russia, the southern portion of Western and Central Siberia and partially for Primorje (Fig. 2). Periglacial landscapes occupied enor-



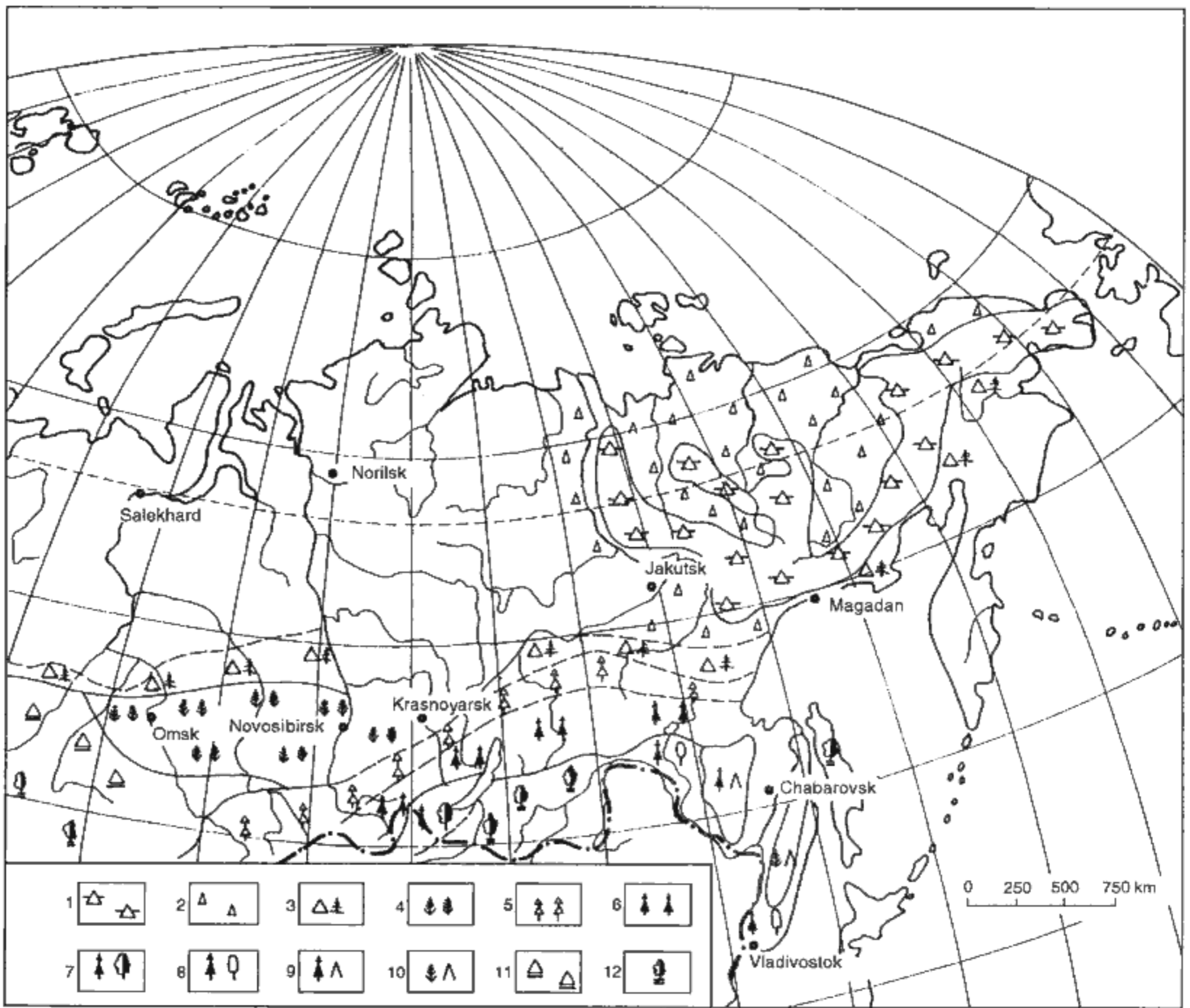


Fig. 2. Sketch map of the vegetation of the late Ubinka time about 1.0–0.9 Ma BP.

1 – mountain tundra; 2 – tundra; 3 – forest-tundra; 4 – light forest; 5 – northern taiga; 6 – middle dark coniferous taiga; 7 – southern taiga; 8 – mixed taiga-broad-leaved forest; 9 – mountain mixed dark coniferous broad-leaved forest; 10 – mountain taiga-forest; 11 – periglacial steppe (“tundra-steppe”); 12 – forest-steppe.

750 ka BP, were associated with the Matuyama/Brunhes reversal. The more progressive *Sinanthropus pekinensis*, that existed in the time interval of 600–200 ka BP, provides at the first definite evidence in the form of ash and charcoal fragments of cultural fire making. Sphegne grains burnt by the “Beijing Man” provided, from the ash layer 10, a date of  $462 \pm 45$  ka BP (fission track method cf. ITHARA et al. 1985). It is noteworthy that the Chinese *Pithecanthropus* was younger than the Javanese hominids (*Pithecanthropus modjokertensis*) whose remnants were found below the B/M reversal and are estimated to 0.9 Ma BP. *Homo erectus* from Sangiran is in turn 0.4 to 0.5 Ma BP younger than the early form of *H. erectus* from Africa, dated at Koobi-Fora (Olduvai bed II) to 1.5–1.6 Ma BP. The observed age sequence probably reflects the migration of early humans and a gradual extension of their oecumena as also indicated by the archaeologi-

cal evidence dated from 1.5 to 0.16 Ma BP (BYE et al. 1987) and represented by the Acheulian culture in Africa, Europe and Asia, respectively.

In Central Asia, there are chronological differences in the evolution of palaeolithic cultures between the western and eastern regions. In West Kazakhstan and South Tadzhikistan, the evolution is traced from the Proto-levallouis-Acheulian and the “pebble tool” Karatau culture, starting at ca. 800 ka BP (RANOV 1990, AUBEKEROV 1990). In Northeast Kazakhstan, along the Irtysh River valley and north of the Balkash Lake, the first cultural evidence appears later, with the more recent Levallouis-Acheulian facies corresponding to the Middle Pleistocene (AUBEKEROV - ARTUKHOV 1990), beginning at ca. 400 ka BP (ARKHIPOV 1989).

Thus, the earliest human appearance close to the Siberian territory occurred at about 800 ka BP, and near its

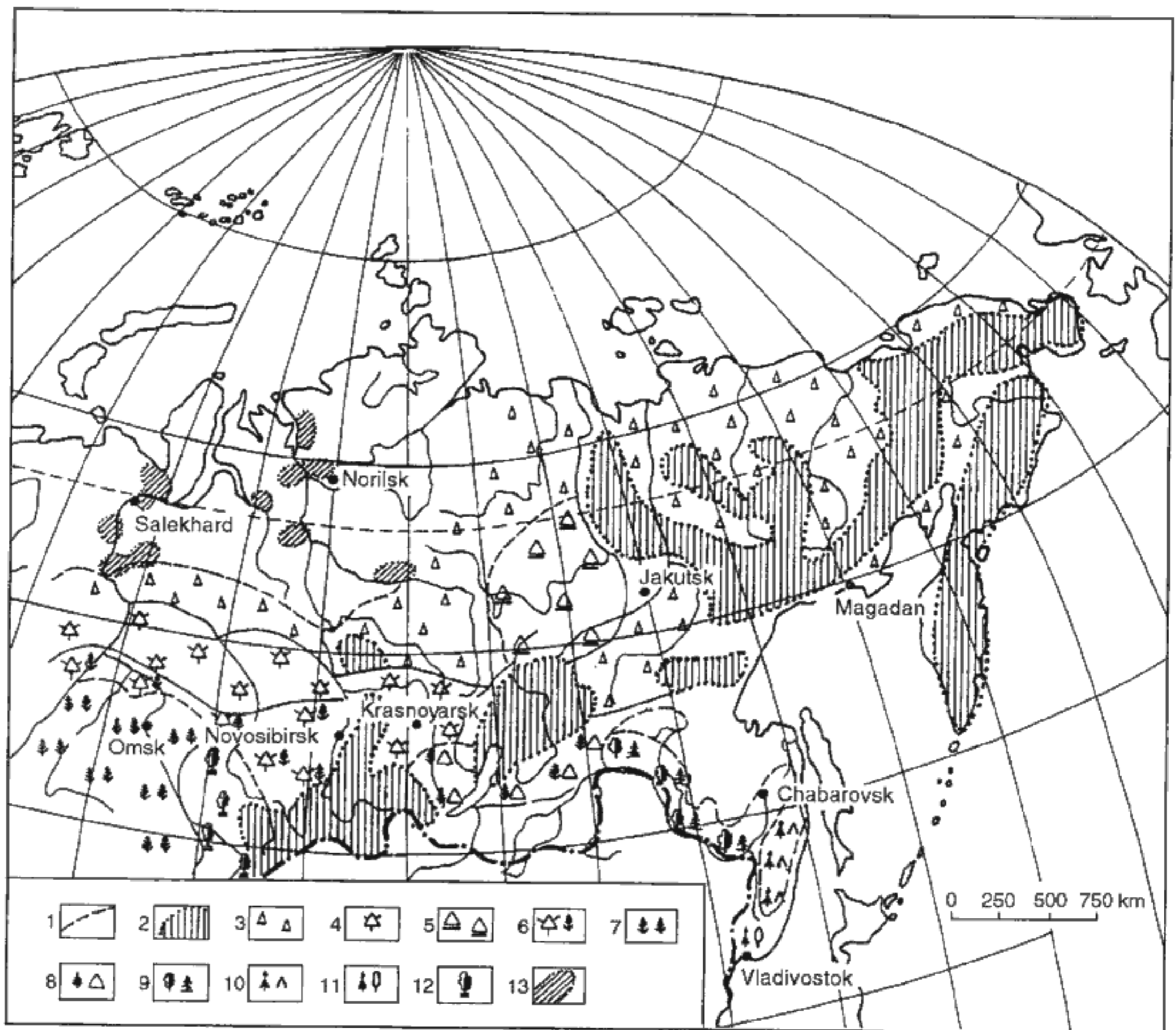


Fig. 3. Sketch map of the vegetation for the Shaitan Glacial (600–400 Ka BP).

1 – supposed Shaitan ice-sheets boundary; 2 – mountain glaciers and tundra; 3 – tundra; 4 – northern forest-tundra; 5 – periglacial steppe; 6 – southern forest-tundra; 7 – light forest; 8 – mountain light forest; 9 – spruce-larch-birch forest; 10 – mountain mixed dark coniferous broad-leaved forest; 11 – mixed taiga dark coniferous broad-leaved forest; 12 – forest-steppe, 13 – Shaitan till fields.

borders (on the Irtysh River) at about 400 ka BP. The first signs of fire making by *Sinanthropus* date to the period of 500–400 ka BP. All these data suggest that the first migration to Siberia may have occurred in the Tobol (Holstein) interglacial. This is fixed on the palaeoclimatic curve as a rather long (400–270 ka BP) and a quite favourable time period, corresponding to the Oxygen Isotope Stage 9, with average annual temperatures by 3–4 °C higher than the present ones.

All the presented data indicate that the Siberian Early Palaeolithic cultures can be correlated with the Tobol interglacial, the subsequent Shirta (Interriss) and the Kazantsevo (Eemian) warm periods. The classical Mousterian period was initiated during the Kazantsevo interglacial (GLADILIN et al. 1990, RANOV 1990). At that time, the early human habitat was a part of the entire

biosystem with migrational fauna and flora flows directed into Siberia during the interglacials and moving out to the southern regions with onsets of glacials. Earlier migrations seem less likely. During recent years, new evidence on a very early human occupation of Siberia has been provided from the Kurtak archaeological region (Berezhekov site, Fig. 4), where artefacts similar to Acheulian variants have been found in coarse alluvial sandy gravel with some loamy detritus (DROZDOV et al. 1990, CHEKHA - LAUKHIN 1992, CHILACHULA et al. 1998). Stratigraphically documented archaeological horizons lie on alluvial gravelly deposits cutting into colluvial loams with carbonate concretions and buried hydromorphic soils. In both of the stratas, ZAZHIGIN and KRUKOVER (pers. comm.) have found Eopleistocene (Lower Pleistocene) micromammals such as *Microtus (Pitymys)*

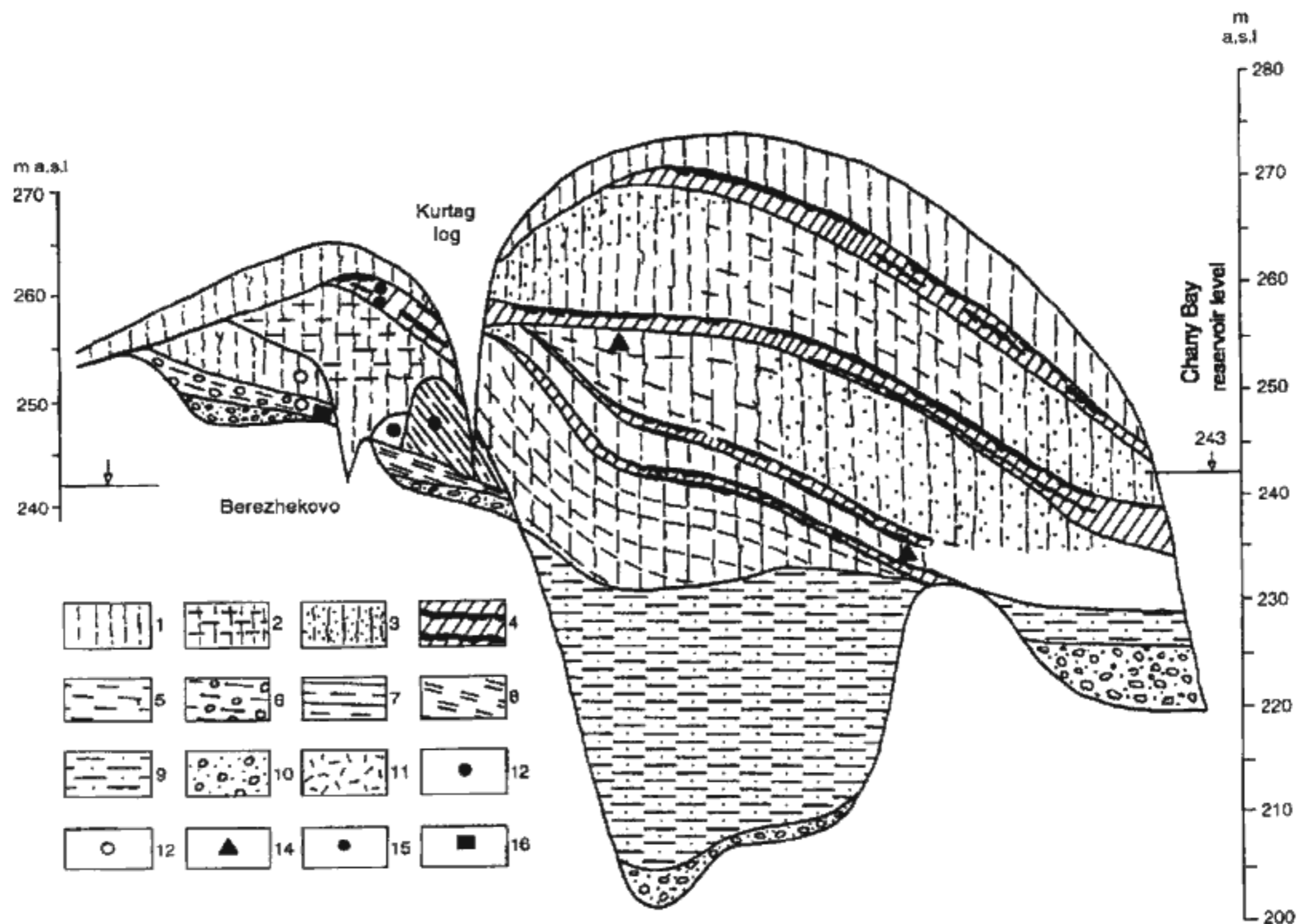


Fig. 4. Kurtak archaeological region. Geological profile along the left bank of the Krasnoyarsk reservoir (Yenisey River). Berezhkovo-Kurtak gully-Chany Bay. (According to DROZDOV et al. 1990 and ARKHIPOV et al. 1992).  
 1 – loess, loam and loamy sand; 2 – laminated loessic deposits; 3 – loam-sand lamination; 4 – loam with paleosols (pedocomplexes); 5 – clay; 6 – loam and loamy sand; 7 – loam with carbonate concretions; 8 – clay and loam with paleosols; 9 – silt; 10 – gravel; 11 – erosion crust; 12 – finds of Eopleistocene (Early Pleistocene) small fauna; 13 – finds of the Middle-Late Pleistocene small fauna (not older than the Tobol-Bachta Interval, see Table I); 14 – TL-dates; 15 –  $^{14}\text{C}$  dates; 16 – archaic artefacts resembling "Acheulian" variants.

cf. *hintoni* KRETZ. and others. This cultural layer at Berezhkovo is characterized by fossil mammal remains, the most important of which are those of a large horse form of the *Equus caballus chosaricus* GROM. type. This form has been named by I. V. FORONOVA as *Equus* ex gr. *mosbachensis-germanicus* to emphasize the phylogenetic and morphological similarity both with *E. mosbachensis* REICH. and *E. germanicus* NER. (DROZDOV et al. 1990). The timing of this horse existence is dated on the international time-scale to the second half of Middle Pleistocene, i.e. the Siberian Tobol-Bachta time (Holstein and Saale, see Tab. 1). This evidence corroborates data of micromammals (rodents): *Citellus undulatus* PALL., *Ellobius* ex gr. *talpinus* PALL., *Lemmus obensis*, *Eolagurus* sp., *Lagurus lagurus* PALL., *Microtus (Stenocranius) gregalis* PALL., *Microtus* sp., *Myospalax myospalax* LAXM., etc. (DROZDOV et al. 1990). The same faunal assemblage has been found in the overlying loess of Ermakovo (early Weichselian) age. The Karginisk loessic sediments dated by  $^{14}\text{C}$  to  $29\,410 \pm 320$  yr. BP (SOAN-2806) and  $30\,000$  yr. BP (SOAN-2807) are overlain by the Sartan

(Late Weichselian) loess. In an adjacent section of Kurtak (the gully site – Fig. 4), deposits with a similar fauna are represented by a unit of loess-like loams interbedded with sands. A pedocomplex consisting of 2–3 palaeosols occurs at its base. Artefacts in situ have not been identified in the unit, but are found on the present beach at the foot of an erosional terrace formed by the rise of the Krasnoyarsk reservoir (243 m a.s.l.) An abundant fauna originates from the palaeosol and the overlying loams. The horse remnants of *Equus sanmeniensis* TEIL. et PIV. type, but with more progressive skeletal features (FORONOVA – pers. comm. 1993) have been found in association with tooth fragments of *Mammuthus primigenius* BLUM. of an early form similar to *Mammuthus fraasi* (DROZDOV et al. 1990). The loams, underlying the palaeosol (the interval from Mansi to Nizjamian; see Tab. 1) are TL-dated to  $540 \pm 12$  ka BP (SHELKOPLYAS – pers. comm.). This date implies that the overlying soil is Tobol (Holsteinian) in age.

The uppermost part of the unit, overlain by the Kazantsevo (Eem) pedocomplex with two palaeosols,

was TL dated to ca.  $130 \pm 10$  ka BP. Palaeomagnetic studies indicated that artefact-bearing beds are of the Brunhes age. The Kazantsevo pedocomplex includes the Blake Episode in its upper part (ARKHIPOV et al. 1992). Thus, the stone industry of the Kurtak archaeological region, similar to the Acheulian ones, has been found in layers dated between ca.  $540 \pm 12$  ka BP and  $130 \pm 10$  ka BP, corresponding to the time interval between Tobol (Holsteinian) and Kazantsevo (Eemian) interglacials.

The age of another principal Siberian site, Diring, with definite early Palaeolithic tools similar to those from Olduvai, however, is more in doubt. The Diring site was discovered by A. MACHANOV (1988), who suggested an intriguing hypothesis, according to which ancient human ancestors lived in Central Yakutia from 3.2 to 1.8 Ma BP (MOCHANOV et al. 1992). However, a number of other competitive age estimations has appeared, e.g. 0.8 to 1.0 Ma BP (ALEXEEV et al. 1990), 250–300 ka BP (RANOV - TSEITLIN 1991), up to the Late Pleistocene (KUZMIN - KRIVONOGOV 1994). Recent TL dating indicates that the Diring cultural horizon is older than 250 ka BP and its lower limit is probably about 400–450 ka BP (WATERS et al. 1995, Y. KUZMIN - pers. comm.).

Sites containing pebble artefacts similar to those found at Diring have been recently discovered in other places of Siberia and even on Chukotka. An exact determination of their age is, however, impossible due to the complex geological setting of these sites. All of them are approximately dated to between the second half of the Middle and the beginning of the Late Pleistocene (DIKOV 1993, LAUKHIN 1994, 1995).

It is noteworthy to emphasize the similarity between the geological and geomorphological positions of the Kazakhstan and Siberian localities of "pebble-tool" industries. They are usually confined to interfluvial areas on hills and higher river terraces. The age of coarse alluvia is approximately assigned to the Late Pliocene and Early Pleistocene. However, the artefacts could be much younger. These open-air sites are covered by aeolian deposits and most likely represent temporary workshops. Pebble and cobble artefacts show a strong eolian abrasion; the Palaeolithic material from Siberia furthermore contains signs of frost corrosion.

It is believed that *Homo sapiens neanderthalensis* occupied for the first time a large part of territory in Siberia due to his knowledge of fire making. The neanderthal people came from Central Asia where the Mousterian culture appeared during the Early Würm after 70 ka BP (RANOV 1990). However, their origin in the area may date back to the penultimate glacial at about 300 ka BP. A coexistence of the late Acheulian and early Mousterian cultures has been established in Europe, whereas in Siberia the first findings of the Mousterian artefacts are confined to the Kazantsevo (Eemian) interglacial. At present, it is impossible to reconstruct the general mi-

gration pathways of the Early and Middle Palaeolithic colonization in the Siberian territory, because of the sparsity of archaeological data over the vast areas.

Only the "classical" Neanderthals seem to be culturally fully adapted to the local harsh environment. Nevertheless, only the late Palaeolithic people began gradually and permanently to occupy his severe land, expanding from South Siberia further north and east at about 35–30 ka BP (LAUKHIN 1994, VELICHKO et al. 1990).

## CONCLUSIONS

- A formation of the Siberian periglacial superzone in the periglacial areas characterized by extremely severe conditions took place at about 0.9–1.0 Ma BP.
- The earliest prehistoric migrations to Siberia were possible only during interglacials and still more likely after mastering the technique of fire making.
- At the Southwest border of Siberia on the Irtysh River, the Palaeolithic people probably appeared about 400 ka BP when there is the first evidence of use of fire by *Homo erectus*.
- Larger areas of South Siberia are supposed to have been colonized during the Tobol (Holstein) interglacial. Later traces of extensive migrations are confined to the last interglacial (Kazantsevo, Eem) and the part of the last glacial in association with the Mousterian tradition.
- Siberia became more permanently occupied from the Karginsk interstadial (Middle Weichselian) with appearance of Upper Palaeolithic cultures.

*Recommended for print by V. Šibrava*

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