ANTHROPOLOGIE • XXXVII/1 • pp. 79 – 87 • 1999

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PLEISTOCENE ENVIRONMENTS AND THE DISPERSAL OF PALEOLITHIC GROUPS IN EASTERN EUROPE

ABSTRACT: This paper examined the hominid occupation record of eastern Europe throughout the Pleistocene. Embedding this record within the context of changing climates and environments, it points to a correlation between successful human occupation of this region and specific unique environmental conditions extant during different climatic cycles.

KEY WORDS: Pleistocene climates – Paleoenvironments – Eastern Europe – Human occupation – Paleolithic record

INTRODUCTION

In order to understand the dynamics of human dispersal to eastern Europe, we need to consider it within the context of changing Pleistocene climates and landscapes. Paleogeographic reconstructions of Northern Eurasian environments (Gerasimov, Velichko 1982, Grichuk 1982, 1989, Velichko 1983) permit us to correlate Paleolithic hominid dispersals with major Pleistocene periods, and suggest that changes in cultures were interrelated with the evolution of natural environments (Velichko 1993).

INITIAL COLONIZATION

Documenting initial colonization by Lower and Middle Paleolithic groups is made difficult by the absence of accepted methods for dating the early sites. In addition, there are very few early sites in eastern Europe (Velichko 1988, Velichko *et al.* 1992). All of the known sites are located in the southern periphery of the Russian or East European Plain near the Caucasus and the Crimea mountain ranges (*Figure 1*). The only exception to this is the site of Korolevo, a northernmost early site located in the Carpathian foothills (Adamenko, Grodetskaia 1987).

Some Acheulean and Mousterian materials have been reported from the Pechora Basin and the Northern Urals (Kanivets 1976, Guslitzer, Pavlov 1993). These data are claimed to suggest that the northwestern part of the Russian Plain may have been occupied during the Middle Pleistocene. Mousterian groups first penetrated into the central part of the Plain in the beginning of the Valdai (Würm) glaciation (Velichko 1988, Ivanova *et al.* 1989). This expansion is associated with significant environmental transformations. The Mikulino (Riss-Würm) interglacial woodlands at the beginning of the Early Valdai were replaced by tundra, tundra-steppes, and forest-steppes. During the mid-Pleistocene glaciations, the northern part of the Plain was repeatedly covered by ice sheets which formed numerous lakes and wetlands. These were unstable landscapes which, in the ensuing Mikulino interglacial, were subjected to glacioisostatic processes that brought about a northern transgression of the sea levels (Lavrov 1961, Biske, Deviatova 1965). Such environments were unfavorable for human settlement and call into question the dating of inventories from the Kama and Pechora Basins to the Lower and Middle Paleolithic (Guslitzer, Pavlov 1993). The verification of the antiquity of these

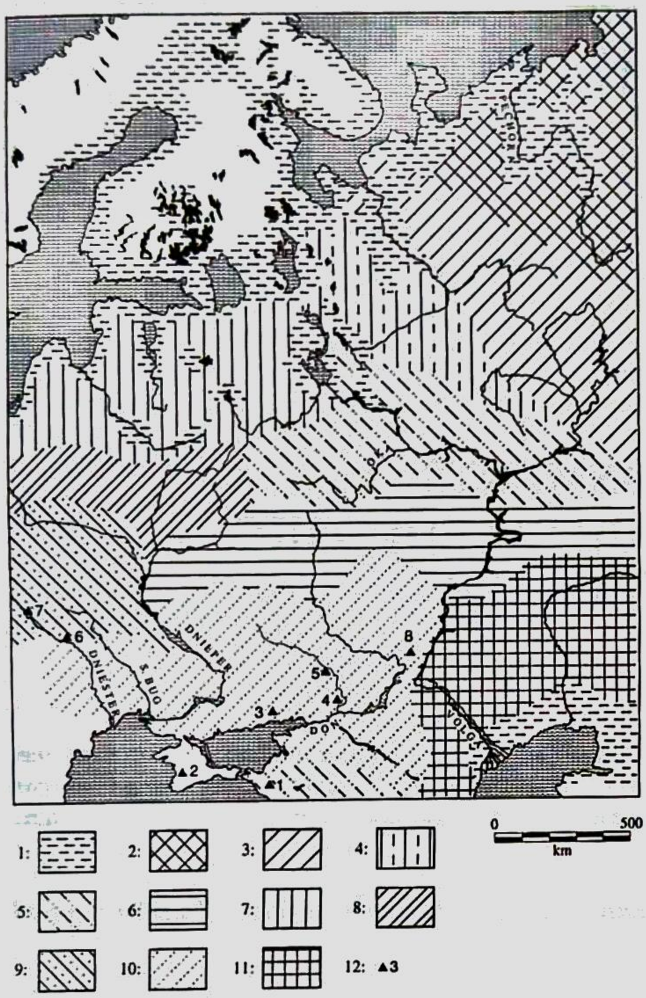

FIGURE 1. Vegetation cover and Palaeolithic sites and localities dating to the Mikulino interglacial.

1 – transgressions of the sea level
2 – sparse birch and mixed birch/coniferous forests
3 – spruce and birch forests with oak
4 – spruce and birch forests with oak and hornbeam
5 – deciduous forests
6 – pine/deciduous forests
7 – hornbeam forests with birch and spruce
8 – hornbeam forests with pine
9 – hornbeam forests with lime and oak
10 – forest-steppe
11 – steppe
12 – Lower and Middle Paleolithic sites and localities:

1 – Kudaro	5 – Mikhailovskoe
2 – Siuren'	6 – Molodova I
3 – Rozhok	7 – Vykhvatintsy
4 – Khriaschi	8 – Sukhaia Mechetka

materials must await more detailed stratigraphic and geological analyses.

The stratigraphic positions of the earliest sites on the Russian Plain vary broadly from the Middle to the Late Pleistocene (Adamenko *et al.* 1989, Velichko 1988, Velichko *et al.* 1992). Several localities with Acheulean stone tools indicate that hominids first entered the East European Plain somewhere between the final stages of the maximal Dniepr (Riss) glaciation and the beginning of the last Mikulino (Eem) interglacial (Praslov 1984, Ketraru *et al.* 1986). These materials have been found far south of the maximal extension of the Dniepr ice sheets. This penultimate glaciation brought about radical changes in the surrounding landscapes making them inhospitable for human occupation. Most of the Plain was covered by a network of extended glacial lakes and wide glacial valleys and the region was subject to intensive loess accumulation and cryogenic processes.

The subsequent Mikulino interglacial brought major transformations of the landscapes, especially those in the central and northern parts of the Plain (*Figure 1*). During the interglacial climatic maximum, forests spread over the vast area from the present-day steppe zone to the Arctic coast, including the present-day tundra region, (Grichuk 1982, 1989, Velichko 1983). Some of the Mousterian sites in the south of the Russian Plain may have been occupied during this time period. Most of them, however, appear to correspond to either the Bröerup interstadial or the beginning of the Early Valdai cooling (Ivanova 1982). The distribution of these sites is in the south and there is no firm evidence of human settlement of the northern parts of the Plain. Thus, it appears that the presence of forests, along with marshy topography of the river valleys, served as barriers to human colonization.

HUMAN OCCUPATION DURING THE VALDAI GLACIATION

Successful human occupation of the Plain dates to the beginning of the last Valdai (Würm) glaciation. To date, however, there is no agreement on whether there was an Early Valdai glaciation nor on its extent. Nor is there agreement on how many interstadials occurred during the entire Valdai glaciation. Krasnov and Zarrina (1984) have suggested that the Early Valdai (Kalinin) glaciation was significantly more severe than the last Late Valdai (Ostashkovo) one. Auslender *et al.* (1971), on the other hand, have argued that the Kalinin glaciation was less extensive than the Ostashkovo one. Finally, Chebotareva and Makarycheva (1974, 1982) have argued that the Early Valdai period witnessed cold non-glacial conditions with full glacial conditions extant only in the Late Valdai. Given this diversity of interpretations, the environmental context of the Middle Paleolithic occupation remains unclear. Many of the pertinent sites contain either redeposited material or exhibit complex stratigraphies (Tarasov 1989).

The differences in the number and duration of the interstadials observed in different regions of eastern Europe (Figure 2) are, in all likelihood, due to the specificities of the Early Valdai "paraperiglacial" landscapes (Velichko 1973, 1981, Velichko *et al.* 1992) which featured rapid response of vegetation to even minor climatic changes and resulted in unstable landscapes. These regional

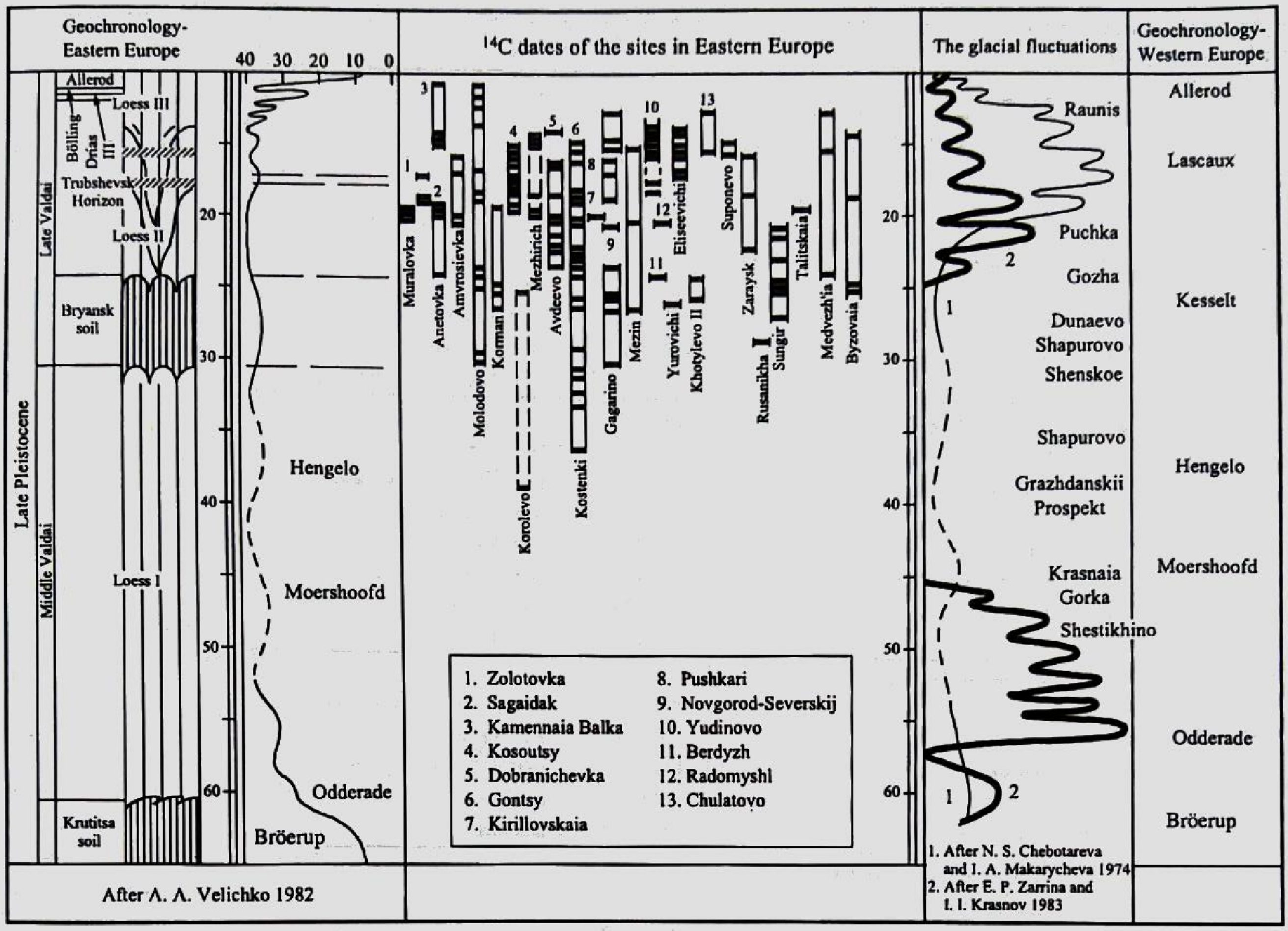

FIGURE 2. Correlation of Late Pleistocene geochronological and stratigraphic sequences from periglacial and glaciated areas of the Russian Plain with the radiocarbon dates for Upper Palaeolithic sites.

asynchronies make it difficult to date the sites stratigraphically.

The Middle Valdai interval was the most long-lasting one. In central and southern parts of the Russian Plain this period saw the deposition of the Khotylevo loess horizon, found between the Mezin pedocomplex and the Briansk paleosol (Velichko, Morozova 1972). This horizon, measuring 1.0–1.5 m in thickness, is found in all areas of the plain where these soils are present.

The northern part of the plain contains lacustrine, bog, and alluvial formations dated to 50,000–22,000 B.P. (*Table 1*) which correlate with the Middle Valdai interval. The accumulation of these lacustrine deposits in some geomorphological contexts continued throughout the entire Middle Valdai and into most of the Late Valdai periods. Pollen data from these deposits indicate several warm-cold oscillations.

Since the formation of the lakes and valleys here date to the last stage of the Dnieper glaciation, the entire north-western part of the Russian Plain may have been unsuitable for human occupation since the Middle Pleistocene. Furthermore, this inhospitable zone expanded further south during the interstadials as well as at the beginning of the last glaciation.

Radiocarbon dates for these deposits, some of which are listed in *Table 1*, show a wide range of ages. This has permitted some scholars to isolate either several interstadials or a complex singular megainterstadial during the early and the late Valdai, which they correlate with the ones identified in various other regions of Europe (*Figure 2*, Zarrina 1991). Since all Valdai interstadials have been identified via radiocarbon and pollen data from lake and bog deposits in the northern part of the plain, it is likely that this area of the "periglacial" zone saw the greatest changes in vegetation (Velichko 1982). These climatic fluctuations, apparently, did not affected the accumulation of Khotylevo loess nor the formation of the Briansk paleosol (30,000–24,000 B.P.) due to the less sensitive nature of these deposits.

Furthermore, there is an incongruity in the stratigraphic and palaeogeographical reconstructions of the Middle Valdai sequence derived from data from the northern and southern parts of the plain. This incongruity possibly reflects the widespread presence of lakes and wetlands in

TABLE 1. Radiocarbon dates of lacustrine and bog sediments from the northern part of the Russian Plain (after Polevoi 1974, Chichagova *et al.* 1988, Zarrina 1991).

Locality	Radiocarbon dates		Deposits
1. Vologda Region			
Puchka	21,410±150	(LU-18B)	peat from lake sediments
Annenskoe	23,570±70	(LU-12)	lake sediments
Irkhino	26,610±220	(LU-1616)	peat from lake sediments
Tomasha	34,030±810	(LU-1257)	lake deposits
Barskoe	> 34,000	(LU-47)	lake deposits
Kirillov	35,000	(LU-17A)	peat from lake sediments
Selische	40,880±1909	(LU-94)	lake-bog deposits
Iumizh	45,210±1430	(LU-1206)	peat from lake sediments
2. Upper Volga			
Kashin	30,500±900	(LU-60)	lake deposits
Kashin	40,490±870	(LU-15A)	peat from lake sediments
Shenskoe	31,470±590	(LU-107)	lake deposits
Shenskoe	32,650±720	(LU-339)	lake deposits
Kileshino	23,800±570	(LG-46)	peat from lake sediments
Viatskoe	36,800±400	(GIN-261)	lake deposits
Dolgopolka	41,290±320	(LU-181)	lake deposits
3. Western Dvina			
Gozha	22,950±440	(LU-89)	peat underneath lake sediments
Gozha	25,100±250	(LU-90)	lake alevrites
Dunaevo	25,440±270	(LU-28c)	peat from lake deposits
Drichaluki	23,630±370	(LU-97)	alluvium
Mikhalinovo	33,100±850	(LU-1149)	lake deposits
4. Dnieper Basin (Briansk paleosol)			
Arapovichi	24,000±300	(IGAN-46)	
Arapovichi	31,500±1400	(IGAN-55)	
Mezin	21,500±600	(IGAN-198)	
Mezin	24,210±270	(IGAN-89)	
Mezin	24,300±370	(IGAN-88)	
Mezin	24,430±480	(LU-503)	
Mezhirich	25,150±740	(IGAN-337)	
Zheleznogorsk	24,180±900	(IGAN-338)	
Briansk	22,760±410	(IGAN-492)	
Krasnoselka	29,400±1000	(IGAN-170)	

the northern part of the Plain which may have formed there between 50,000 and 22,000 B.P. after the retreat of the Kalinin (Early Valdai) ice.

Similarly, there is a wide range of dates obtained from the lacustrine deposits under the moraines in the western and the eastern part of the plain for the last glacial maximum, which range from 39,000 to 18,000 B.P. In addition, the same period in Karelia seems to have witnessed the Grazhdanskiy Prospekt warming (*Figure* 2, Faustova 1984, Faustova, Velichko 1992). On face value, these data suggest that human colonization in the north-east followed the retreating ice whereas in the west it moved towards the ice sheet. The sum of these data suggest that the history of the Fennoscandian glaciation here, especially from 40,000 to 10,000 B.P., at present is far from clearly understood.

The progressive deterioration of the climate during the late Pleistocene created unique hyperzonal periglacial landscapes on the plain (Velichko 1973, 1982). This period also saw an increase in human occupation of the plain which peaked at the end of the middle and especially in the late Valdai. Based on their stratigraphy and radiocarbon dates, most of the earliest Upper Palaeolithic sites here date to the very end of the middle Valdai warming (30,000–24,000 B.P.). Their occupation corresponds to the formation of the Briansk paleosol (Velichko, Morozova 1972, 1982).

A. The First Stage of Upper Paleolithic Occupation

Paleogeographic, stratigraphic, and geochronological data from the sites suggest that human settlement during the Upper Paleolithic occurred in several stages. The

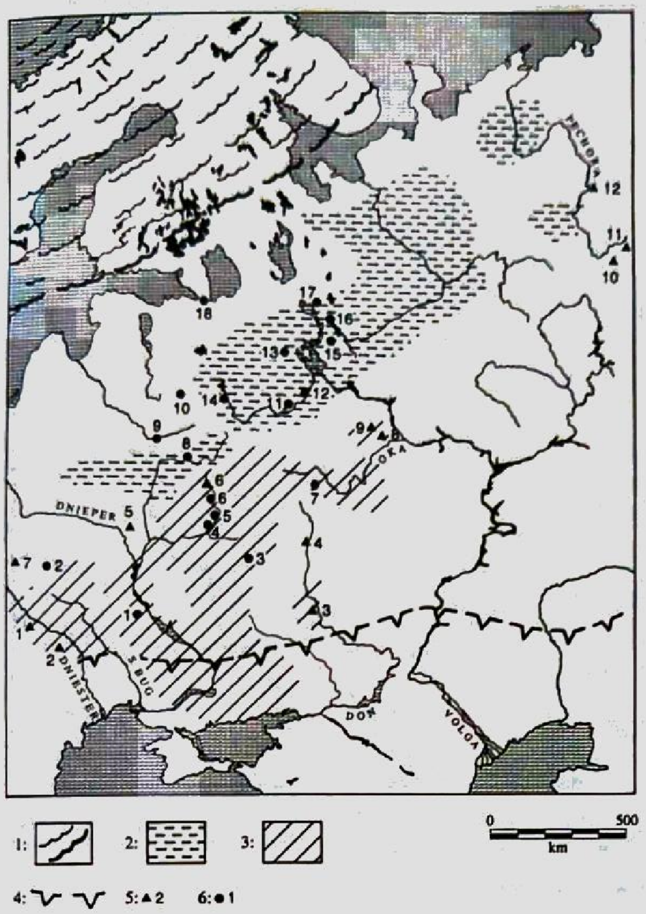

FIGURE 3. Upper Palaeolithic sites dating between 30,000 and 24,000 B.P.
1 – glaciated areas
2 – lakes
3 – areas of distribution of Briansk paleosol formed on loess deposits
4 – boundary of permafrost
5 – radiocarbon dated sites:
- 1 – Molodova V
- 2 – Korman'
- 3 – Kostenki
- 4 – Gagarino
- 5 – Iurovichi
- 6 – Khotylevo II
- 7 – Korolevo
- 8 – Rusalinka
- 9 – Sungir'
- 10 – Medvezh'ia
- 11 – Studenaia
- 12 – Byzovaia

6 – dated locations of Middle Valdai sediments and Briansk paleosols:
- 1 – Mezhirich
- 2 – Krasnoselka
- 3 – Zheleznogorsk
- 4 – Mezin
- 5 – Arapovichi
- 6 – Briansk
- 7 – Fat'ianovka
- 8 – Kuchino
- 9 – Drechaluki
- 10 – Dunaevo
- 11 – Kashin
- 12 – Shestikhino
- 13 – Shenskoe
- 14 – Kileshino
- 15 – Puchka
- 16 – Kirillov
- 17 – Annenskoe
- 18 – Grazhdanskij Prospekt
- 19 – Dolgopolka

earliest stage lasted from >30,000 to 22,000 B.P. Most sites in this stage date to the later part of the interstadial (*Figure 3*). Since their cultural layers are found on top of the Briansk paleosol, their occupation appears to correspond to a period of deteriorating climate and transformation of landscapes from interstadial to stadial conditions. The only exceptions to this are found at sites in the Kostenki-Borschevo region and at Molodova, where sites dating earlier are in evidence. This period also saw expansion of human groups into Siberia (Velichko, Kurenkova 1990).

The sites dating to this stage of human colonization are found in both central and north-eastern parts of the Plain (*Figure 3*). Palaeogeographical data on human occupation in the Desna (Velichko *et al.* 1977a), Seim (Gubonina 1977), Don (Maliasova, Spiridonova 1982), Dnieper (Velichko, Kurenkova 1990), and Pechora (Kanivets 1976, Guslitzer, Pavlov 1993) basins, indicate that similar environmental conditions existed across the entire Plain. During this period, erosional processes decreased in intensity and land surfaces stabilized which, in the context of widespread permafrost, resulted in the formation of a thick soil profile (Gerasimov, Velichko 1982).

This period came to an end about 23,000–22,000 B.P. with the advent of the last Glacial Maximum between 20,000–18,000 B.P.

B. Human Occupation around the Last Glacial Maximum

The transitional period between 22,000 and 20,000 B.P. evidently featured unstable climates and environments in the central and northern parts of the plain. The north saw the formation of numerous glacial lakes and wetlands, while the south underwent intensive loess accumulation. These processes transformed both the topography and the landscapes, and resulted in the significant reduction of areas suitable for human occupation—a phenomenon mirrored in the considerable decrease in number of sites on the central part of the plain (Velichko, Kurenkova 1990). At the same time, several large sites were occupied in the southern part of the plain (Stanko *et al.* 1989).

Progressive cooling during this period increasingly destabilized the landscapes. Climatic deterioration and the expansion of Scandinavian ice sheet brought about (1) the expansion of the permafrost zone, (2) intensification of the slope processes and of loess accumulation, and (3) the transformation of the river channels. The accompanying changes in the landscapes greatly affected human subsistence practices and resulted in a southward demographic shift.

Data from lacustrine, alluvial, and bog sediments from the northern and central parts of the plain dating to this time (*Table 1*), suggest that significant changes in hydrological pattern accompanied the glacial expansion in the western part of the plain. In the permafrost zone here, even minor increases in moisture led to the emergence of extended lakes and wetlands which diminished the areas suitable for human occupation.

C. Human Occupation 20,000–18,000 B.P.

The cold conditions, which were initially accompanied by an increase in moisture and then progressive aridization, lasted for several millennia (Grichuk 1982, Velichko 1973,

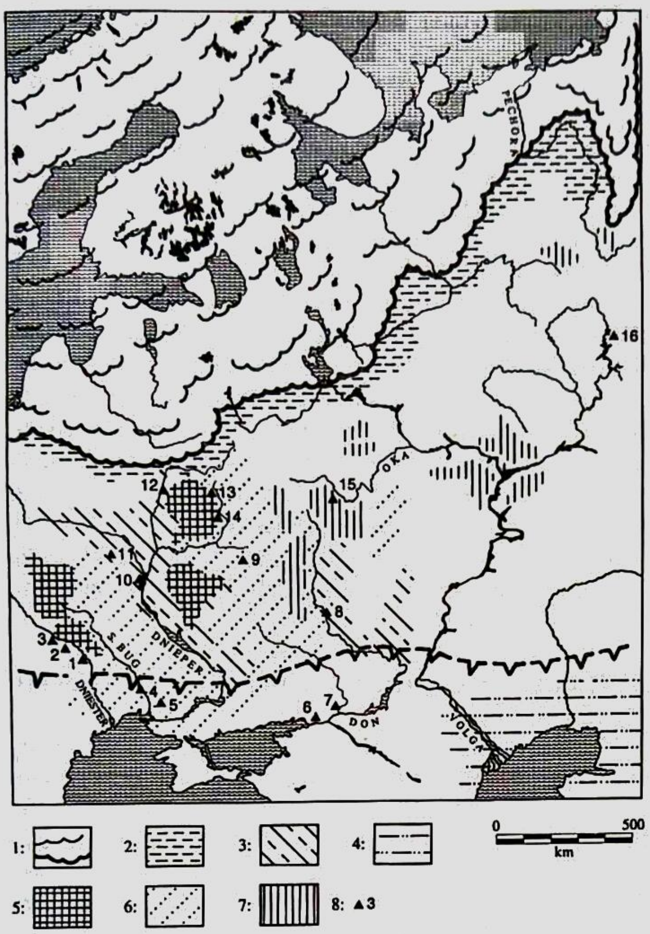

FIGURE 4. Distribution of Upper Palaeolithic sites dating to Last Glacial Maximum 20,000–18,000 B.P.
1 – boundary of glaciated areas
2 – glacial lakes
3 – alluvial plains
4 – shore-lines and transgressions
5 – areas of intense (more than 5 m deep) loess accumulation
6 – areas of moderate loess accumulation
7 – areas of discontinuous loess deposits
8 – archaeological sites:

1 – Molodova V	9 – Avdeevo
2 – Korman' IV	10 – Kirillovskaia
3 – Kosoutsy	11 – Radomyshl'
4 – Anetovka II	12 – Berdyzh
5 – Sagaidak	13 – Novgorod-Severskij
6 – Muralovka	14 – Pushkari
7 – Zolotovka	15 – Zarajsk
8 – Kostenki	16 – Talitskogo

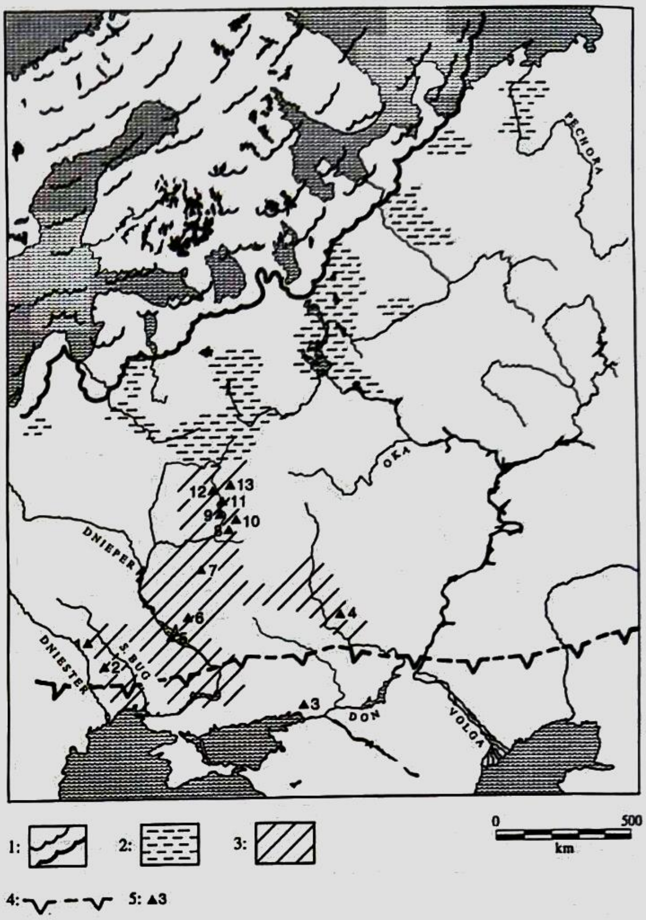

FIGURE 5. Sites dating to 16,000–15,000 B.P.
1 – boundary of glaciated areas
2 – lakes
3 – loess accumulation and slope processes
4 – reconstructed boundary of permafrost distribution
5 – archaeological sites:

1 – Molodova V	8 – Mezin
2 – Kosoutsy	9 – Iudonovo
3 – Amvrosievka	10 – Chulatovo
4 – Kostenki	11 – Suponevo
5 – Mezhirich	12 – Eliseevichi
6 – Dobranichevka	13 – Timonovka
7 – Gontsy	

1981). This cooling reached its maximum about 20,000–18,000 B.P. At that time, human groups had dispersed from the Dnieper Basin to the Urals over an area dominated by fairly stable tundra and tundra-steppe landscapes. The sites dating to this interval are found in the northern part of the periglacial zone immediately adjacent to the paraperiglacial area with extended lakes and glacial valleys (*Figure 4*). It appears that actively forming and dynamic landscapes rather than severe climate served as a primary constraint to human dispersal farther north.

Most of the sites dating to this period are in the central part of the Russian Plain. This area experienced the most intensive accumulation of loess deposits in relatively arid tundra-steppes (Velichko *et al.* 1969, 1977b). The only exceptions to this are found in the Kostenki-Borschevo region as well as at the northernmost Talitskogo site. These sites are located in the areas of discontinuous loess-like loam deposits.

Other coeval sites existed in the southern part of the plain. During this period, the northern and the southern

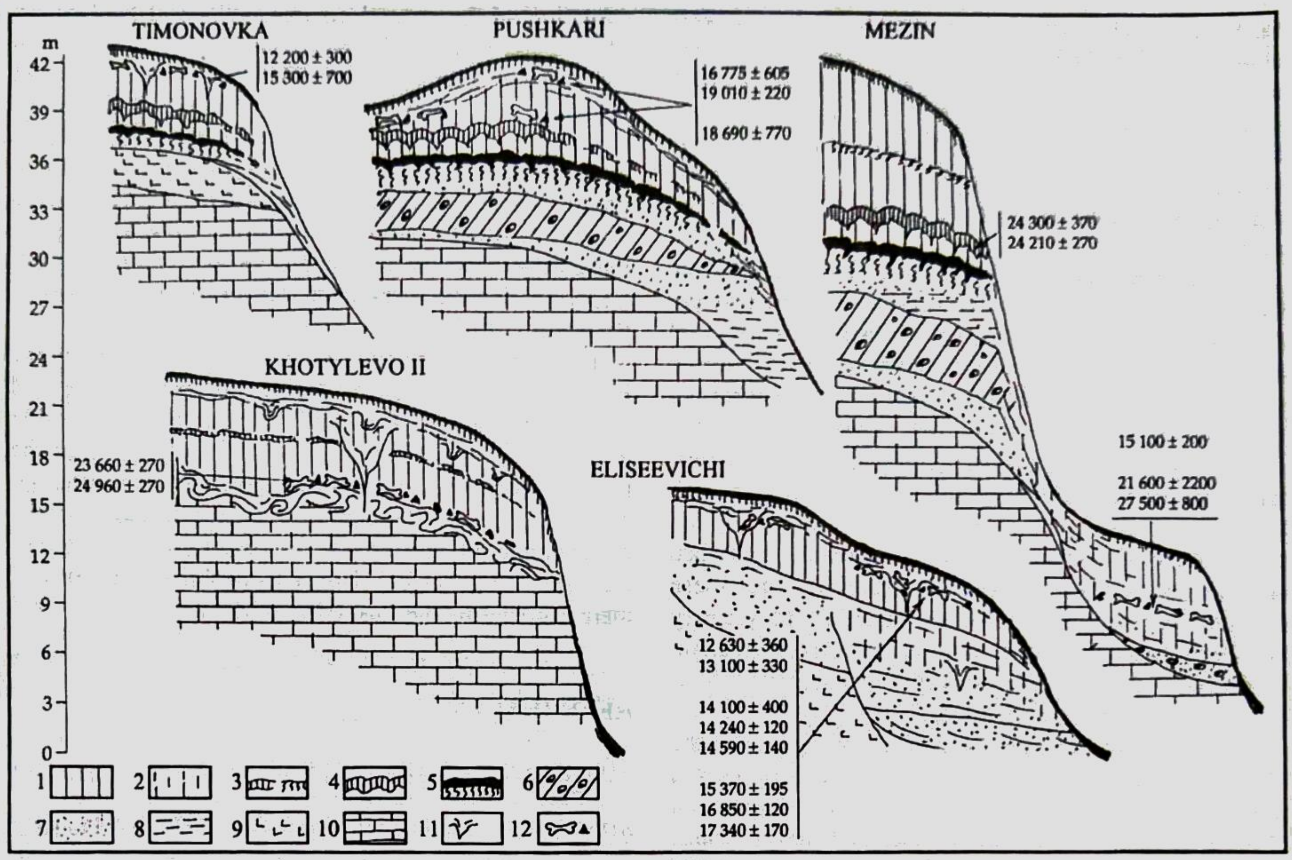

FIGURE 6. Geomorphological and stratigraphic positions of the Upper Paleolithic sites in the Desna Basin (after Velichko *et al.* 1977a, 1977b, 1981).
1 – loess, 2 – loess-like loam, 3 – gley horizon with evidence of embrionic soil formation, 4 – Briansk paleosol, 5 – Mezin pedocomplex, 6 – moraine of the Dnieper glaciation, 7 – sand, 8 – lacustrine loam, 9 – gaize and marl, 10 – chalk deposits containing flint nodules, 11 – permafrost deformations, 12 – cultural layer.

sites were separated by the boundary of continuous permafrost (Velichko, Nechaev 1984). The location of the sites both to the north and to the south of this zone suggests that its climate and landscapes were quite unstable during the last Glacial Maximum (*Figure 4*).

D. Sites dating after 17,000 B.P.

The degradation phases that followed the last glacial maximum did not significantly affect the landscapes in the central and southern areas (Arslanov *et al.* 1981, Chebotareva, Makarycheva 1982, Serebriannyj 1978). The loess profiles here contain evidence of short and relatively warm episodes correspondent to the phases of degradation. These appear as slightly humisized and gleyey horizons which reflect the short periods of decreasing loess accumulation and stabilization of the surface which occurred between 17,000 and 15,000 B.P. (Velichko 1973, Velichko *et al.* 1972, 1992). Correlation of these horizons with the cultural levels at the sites of Eliseevichi, Iudinovo, Mezin, and Mezhirich suggests that these sites were occupied during these periods of surface stabilization.

Upper Palaeolithic groups occupied several major areas during this period (*Figure 5*). These include the Dniester, Don, Desna, and Middle Dnieper basins and the northern part of the Sea of Azov region.

The last stage of the Upper Palaeolithic human dispersal across the Russian Plain took place between 17,000 and 15,000 B.P. The boundary between the earlier and the later stages of human occupation, however, is purely provisional since Palaeolithic groups inhabited the plain for the entire Late Valdai (see *Figure 1*).

All sites representing this last stage of Upper Palaeolithic human occupation are associated with the river valleys and located on either elevated parts of the interfluvial slopes or on low river terraces (*Figure 6*). When the former is the case, they are always found close to limestone outcrops which contain flint nodules used as raw materials for the manufacture of tools. Many of the sites found on the first and the second river terraces, on the other hand, are located further from the lithic raw material sources. Cultural layers at these sites contain numerous large mammoth bones used for construction of dwellings and other features. The location of these sites on the elevated terrains above marshy floodplains could be related to the proximity of natural mammoth "cemeteries" from which the bones were obtained (Soffer 1985, 1993). Some of the mammoth bones from these sites (e.g. Mezhirich, Iudinovo, Mezin) have radiocarbon dates prior to 17,000 B.P. These dates are coeval with the terminal accumulation of the alluvia underlaying the cultural layers at the sites, which suggests that the dated bones were brought to the sites from older deposits.

Glacial degradation after 17,000 B.P. changed the hydrological regime in the Desna and Middle Dnieper basins. This period saw the cessation of alluvial accumulation on the first terraces and some areas witnessed the degradation of permafrost. These processes were not triggered by climatic change but rather related to the lithology and hydrology of the different geomorphological levels. Upper Palaeolithic groups chose to settle in such topographically "uncomfortable" seasonally flooded settings on the floodplains and near interfluvial slopes when such locations offered particular benefits. Since these locations were devoid of lithic raw materials, people may have been attracted by either more stable surfaces underlain by permafrost, or by the availability and accessibility of naturally buried mammoth bones.

The final stage of Upper Palaeolithic occupation of the Plain lasted from 15,000 to 14,000 B.P. This period saw a slight reduction in the area occupied and a concentration of the sites in the Desna and the Middle Dnieper basins. At the same time, sites continued to exist in the Dniester basin and in the Kostenki-Borschevo area along the Don. Unlike in the Dniester and in the Kostenki-Borschevo regions, however, almost no multilayer sites have been found in the Dnieper area. Most of the sites from this final stage are located on the low terraces which had formed just before people appeared there.

The youngest Upper Palaeolithic sites in European Russia and Ukraine date to 13,000–12,000 B.P. This interval witnessed rapid degradation of the permafrost and intensive loess accumulation accompanied by active slope processes. This increased instability of the land surfaces probably was responsible for the abandonment of occupied locations (Velichko *et al.* 1977a,b). Many sites with mammoth-bone structures in the Desna basin show evidence of periglacial deformation. This suggests that human groups abandoned the sites primarily due to radical climatic changes which brought about rapid degradation of the permafrost and modification of the landscapes. This was accompanied by the emergence and a rapid expansion of a continuous forest zone across the central part of the Russian Plain which, during the Younger Dryas, became quite extensive (Grichuk 1982).

CONCLUSIONS

In eastern Europe, archaeological and paleogeographical data on hand demonstrate the interrelationship between the dispersal of the Upper Palaeolithic groups and the evolution of the natural environments and landscapes. Middle and Upper Palaeolithic people first appeared on the plain during the colder Late Pleistocene periods. Human groups appear to have continuously occupied the central part of the Plain from the second half of the Briansk interstadial on. The densities and adaptations of these groups changed during the transitions from interstadial to stadial to post-stadial conditions. Overall, Upper Palaeolithic groups occupied open periglacial tundra-steppes within the permafrost zone or the cold steppes to the south.

The north-western part of the plain was covered by the Fennoscandian ice sheet during the penultimate and ultimate glaciations. This made it extremely inhospitable to human occupation from the Middle to the end of the Late Pleistocene. The north-east, however, was different. There more favourable environments existed in the foothills of the northern Urals. This was especially so at the end of the Briansk interstadial. Upper Palaeolithic sites existed there even during the Last Glacial Maximum.

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