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GEOECOLOGY OF THE MOUSTERIAN IN EAST EUROPE AND THE ADJACENT AREAS

by

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INTRODUCTION

The East-European Plain, Crimea and Caucasia were the areas of active settlement by prehistoric man in the Mousterian. Albeit fragmentated character of data reflecting both our inadequate knowledge and, probably, non-uniform development of the territory by the Mousterian tribes, one can now state that man of that time lived not only in the southern, mostly mountain areas of East Europe and Near East but also penetrated far to the north inside lowland areas, at least up to the upper Dnieper reaches, i.e. up to 55° N.L. (Fig. 1).

NORTHERN MOUSTERIAN SITES IN THE EAST-EUROPEAN PLAIN

The majority of sites in the East-European Plain occur within the Late-Pleistocene periglacial areas and are directly or indirectly related to loess-soil series. Two of such sites , Khotyliovo I (Fig. 2) and Betovo (Desna river, upper Dnieper basin), are located within the central part of the East-European loess area. Here, the loess-soil periglacial series of the time interval under study have the following structure (VELICHKO, 1973; VELICHKO *et al.*, 1984).

The foundation of the Late Pleistocene series is formed by a complex-structure polygenetic soil series named the **Mezin complex**. Its analogue in West Europe is the Stillfrid A, Rocourt complex.

The Mezin soil complex is composed of two phases: the Salyn and the Krutitsa phases. The lower **Salyn phase** is represented by forest soils (paraburozem). Direct relationship of soils of this phase was established with lacustrine-marsh sediments with the typical Mikulino (Eemian) Interglacial palynological spectrum. Attribution to this interglacial is also supported by its facial relationship with the Karangat (Eemien) marine deposits.

The upper **Krutitsa phase** of the Mezin complex is predominantly represented by soils of open steppe areas (soddy-chernozem soils). Soils of this phase are timed as early interstadial of the Valdai (Vistula) Ice Age named **the Krutitsa Interstadial**. It was preceded by accumulation of a shallow loess stratum (intra-Mezin loess, 0.5 m).

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Attribution of the Krutitsa soils to the Early Valdai Interstadial is supported by the stratum of cryogenic deformations (phase a of the Smolensk cryogenic horizon) observed between the Salyn and Krutitsa phases. Of all soil formations of the Valdai epoch, the type of the Krutitsa Interstadial soils is closest to recent soils of the territories under study. Thus, one can suggest, that the Krutitsa Interstadial of the Early Valdai is the warmest of all interstadials of this glacial epoch, and it should be, obviously, correlated to the Brörup Interstadial.

The earlier and cooler Amersfoort Interstadial is not pronounced either in East-European or West-European loess-soil series. One may suppose, that features of soil genesis of that time were absorbed by more intensive soil processes in the Krutitsa (Brörup) Interstadial.

10-15 cm above soils of the Krutitsa Interstadial one can observe a gleyey stratum reflecting, probably the short-term cool interstadial regime (close to the Odderade?). This was followed by a new phase of cryogenesis (phase b of **the Smolensk cryogenic horizon**).

Above, there is a well-pronounced **Khotyliovo loess horizon**. The stage of formation of this loess covers a significant time interval – up to the epoch of the Bryansk interstadial soil formation.

Let us discuss situation of several Mousterian sites. Of great interest is the **Khotyliovo I** site. It is not only the northernmost, but also one of the most ancient Late Pleistocene Mousterian sites. The cultural stratum of the site bearing the Mousterian industry with the Acheulian tradition (ZAVERNIAEV, 1978) occurs in the rear portion of alluvium of the Desna river – left tributary of the Dnieper river; it is redeposited and buried by a loess stratum, having residues of the Mezin complex (the Krutitsa phase?) in its foundation. The palynological analysis of gyttja in aluvium directly overlaying the cultural layer has established the cool tundra-forest spectra here. The fauna is represented by bones of mammoth (early and later forms), woolly rhinoceros (*Coelodonta antiquitatis*), bison, primitive bison (*Bison priscus*), large horse (*Equus* sp.), deer (*Cervus elaphus*), reindeer (*Rangifer tarandus*), brown bear (*Ursus arctos*), wolf (*Canis lupus*), desman (*Desmana* sp.) (VELICHKO, ZAVERNIAEV *et al.*, 1981).

According to available dating of alluvium of large rivers of the East-European Plain attributed to the beginning of the Late Pleistocene, its formation took place in the Mikulino interglacial and in the beginning of the Valdai glaciation. Judging by data of spore-pollen analysis and faunistic definitions, the cultural layer of the site corresponds to cool conditions of the beginning of the Valdai epoch. At the same time, occurrence of the cultural layer in alluvium below the loess stratum with residues of the Mezin soil complex provides the grounds to correlate this site with the period of the initial wave of cooling in the very start of the glacial epoch preceding the Krutitsa interstadial. This period may correspond to the phase a) of the Smolensk cryogenic horizon.

Another Mousterian location studied by L.M. TARASOV (1977) is **Betovo** (Moustérien denticulé); it is situated 10-12 km higher up the flows of the Desna river in the same right bank. Survey of a cross-section of the location carried out by E.I. Kurenkova and the author has brought out that the cultural layer was redeposited over the ancient slope of the valley by solifluction processes in the epoch of activisation of permafrost processes directly after formation of the Mezin soil complex: remnants of the fauna and flint tools are found at depths 3-4 m from the surface within a solifluction packet of complex construction including lenses and interlayers of gleyey loess and the underlaying heavily disturbed Mezin soil complex. Judging by the stratification, one may suppose that the cultural layer corresponds to the phase b) of the Smolensk cryogenic horizon that occured after the Krutitsa interstadial, and to weak oscillation (interstadial) reflected by the gley stratum. The idea of existence of

such cool regimes is not contradicted by data on fossil fauna in the location: mammoth (*Mammuthus primigenius*), wooly rhinoceros (*Coelodonta antiquitatis*), marmot (*Marmota bobac*), pied lemming (*Dicrostonyx torquatus*), lemming (*Lemmus lemmus*), *Ochotona pusilla*, polar fox (*Alopex lagopus*). Palynological data presented by G.M. Levkovskaya explicate a combination of mesophillous and tundra elements in vegetation with minor participation of arboreous-shrub species.

A similar, but probably, somewhat lower chronostratigraphic position is obviously occupied by one more well-known Mousterian site **Volgogradskaya** (Sukhaya Mechetka) in the lower Volga reaches studied by S.N. Zamiatnin and M.N. Grishchenko and later surveyed by the author together with a well-known archaeologist N.D. Praslov. A cross-section of the site location has explicated that it is situated within a gradual slope facing an ancient dry valley and occurs in the lower portion of the Valdai loess thick layer directly above the upper interface of the Mezin soil complex. Proximity of the discoveries to this interface suggests that the Mousterian man settled this area in the epoch of transition from the Krutitsa interstadial to the following cooling.

In the cultural layer bones of the following animals were discovered: mammoth, reindeer (*Rangifer tarandus*), deer (*Cervus elaphus*), European bison (*Bison priscus*), horse (*Equus* sp.), saiga (*Saiga tatarica*), suslik (*Citellus major*), jerboa (*Allactaga jaculus*).

SOUTH-WEST OF THE EAST-EUROPEAN PLAIN

One of the earliest Mousterian sites in this region and in the East-European Plain in general is the **Ketrosy** site studied by N.K. ANISYUTKIN, I.K. IVANOVA *et al.* (see: *Ketrosy. Mousterian site in the middle reaches of the Dnieper,* 1981). It belongs to the interval between the Amersfoort and Brörup interstadials. Palynological studies by N.S. BOLIKHOVSKAYA (1981) have disclosed that the greenish loams underlaying the cultural layer are characterised by the spectra of spruce-pine forests and refer to the Amersfoort interstadial. Rather cool regimes were established for the layer with culture artefacts periglacial forest-steppe with dwarf birch (*Betula nana*), shrub birch (*Betula fruticosa*), shrub alder (*Alnaster*), *Selaginella selaginoides* . The over-layer clearly fixes a warming vast areas were occupied by coniferous forests with participation of broad-leaved species, this level corresponds to the Brörup interstadial.

Faunistic residues in the Mousterian layer belong to mammoth, wooly rhinoceros (*Coelodonta antiquitatis*), bear (*Ursus* sp.), deer (*Cervus elaphus*), *Megaloceros giganteus*, horse (*Equus* sp.), Siberian marmot (*Marmota bobac*).

Of similar dating to Ketrosy site is the site **Vykhvatinskiy naves**. According to archaeological studies by A.P. CHERNYSH (1965) and N.I. ANISYUTKIN (1981), it may be even a little older. However, judging by fossil fauna this site is not older than beginning of the Valdai glaciation: mammoth, early variety; wooly rhinoceros (*Coelodonta antiquitatis*), reindeer (*Rangifer tarandus*), horse (*Equus* sp.), European bison (*Bison priscus*), gigantic deer (*Megaloceros giganteus*), cave bear (*Ursus spelaearctos*), cave hyena (*Crocuta spelaea*), lion [*Panthera (Leo) spelaea*], wolf (*Canis lupus*), fox (*Vulpes vulpes*), goats (*Capra*).

Multilayer Mousterian records are represented by sites Molodova I and Molodova II. A.P. CHERNYSH (1965, 1982) covered by detailed studies of the **Molodova I** site Mousterian layers that belong to the Levalloisian-Mousterian culture. All of them are within the range of depths from 7.5 to 10 m and occur in interlayers of bluish gleyed loams in a packet of particoloured loams underlain by somewhat darker coloured brownish loams. I.K. Ivanova explains emergence of human settlement here in the Mousterian by a cooling, that

took place here directly after the Brörup interstadial. This interpretation is based on a series of paleontological data and, in particular, on palynological investigations by N.S. BOLIKHOVSKAYA and G.A. PASHKEVICH (1982).

Introduction of the Mousterian man was timed to re-aridisation of this territory, domination of the steppic associations and development of microtherms.

Data on the microthermofauna (A.I. AGAJANIAN, 1982) from the most abundant Mousterian layer IV including, as well, remnants of dwellings and fire-places, significantly added to understanding the environmental regimes of that time. Besides the steppic species: meadow mouse (*Lagurus ex gr. Lagurus*), Microtus (*Stenocranius gregalis*), several Arctic species were observed there: pied lemming (*Dicrostonyx ex gr. henseli*), lemming (*Lemmus* sp.), north-Siberian meadow mouse (*Microtus hyperborues*), as well as a small amount of forest elements.

In fossil fauna of large mammals bones of mammoth are the most numerous together with several discoveries of bones of wooly rhinoceros (*Coelodonta antiquitatis*), reindeer (*Rangifer tarandus*), horse (*Equus equus*), bison (*Bison priscus*), elk (*Alces alus*), deer (*Cervus elaphus*), brown bear (*Ursus arctos*), wolf (*Canis lupus*), hare (*Lepus* sp.). Mammoth dominates in more recent Mousterian layers, too.

Radio-carbon datings from the principal Mousterian layer IV have not provided a final figure (more than 44 000 years). I.K. Ivanova suggests, that the Mousterian settlements in the layer IV corresponds to the period 63-61 thous. years.[1] In her opinion, the above-located Mousterian layers 3,2,1 are also close to this interval that probably continues till the Odderade Interstadial.

Similar stratigraphic positions are characteristic for the Mousterian layers (12, 12a, II, IIb) of the **Molodova** V site, located 1 km from the Molodova I site. There, the Mousterian layers also occur in interlayers of greyish gleyed loam inside a packet of particoloured loams (Fig. 3). A.P. CHERNYSH (1965) has compared the main layer II, that also includes residues of a man-made construction of a type of a dwelling, with the main layer IV of the Molodova I site, but dated it as somewhat more recent and occupying an intermediate place between sites of the type of the IV layer Molodova I and those of the type of Staroselye and Ilskaya. In the layer II the observed fossil fauna included: mammoth, wooly rhinoceros (*Coelodonta antiquitatis*), pied lemming (*Dicrostonyx torquatus*), brown bear (*Ursus arctos*), cave lion [*Panthera (Leo) spelaea*]. Such composition of fauna is one more evidence of cool, close to periglacial regimes.

Radiocarbon datings of the layer II Molodova gave figures beyond limits: over 40 300 years and over 45 600 years. The series of Late Paleolithic layers at this site start according to radiocarbon datings, 30 000 B.P. Therefore, a considerable portion of the Middle Valdai interval that was characterised, according to palynological data, by predominantly periglacial forest-steppe landscapes (with fluctuations towards increase of forested areas) is devoid of cultural layers there.

This gap is to a large degree filled by studies of the **Korman** IV site located 6-7 km higher along the Dnestre flows from the Molodova sites. At this site the lower Mousterian layers (12 and 11) are located in the lower portion of the slope series, in the so-called doubled (more precisely, fractured) fossil soil with signs of illuvial processes (GUBIN, 1977). The layer 12 is located in the bottom stratum of the slope pedolith with total thickness

[1] The absolute scale employed by us is correlated with the isotope-oxygen curve for marine sediments and, therefore, has another chronological scale.

1.5 m, and the layer 11 in its upper stratum. In the same packet a large number of carbonaceous formations was registered and it was compared by A.P. CHERNYSH (1977) and I.K. IVANOVA (1977) with the sooty (carbonaceous) interlayer of the Molodova sites. At the Korman IV site coal from the upper pedolith interlayer was dated as 44 400 +2050/-1630 B.P. This dating together with correlation with the carbonaceous interlayer at the Molodova sites gave the foundations to suggest that the layer II of this site was more recent than the Mousterian layers of the Molodova sites and to compare it with the period of weakly pronounced moderation of climate of the Moershofd. It may be supported by a certain increase of concentrations of pine and birch pollen at this depth of the layer (PASHKEVICH, 1977). Still, clearly cold-resistant species dominate composition of the fossil fauna: mammoth, wooly rhinoceros (*Coelodonta antiquitatis*), reindeer (*Rangifer tarandus*), and also horse (*Equus equus*) and deer (*Cervus elaphus*).

At the Korman IV site, above layer II, i.e. within the interval of approximately 45-30 thous. B.P., one can trace three more Mousterian layers. They reflect the process of transition to the Late Paleolithic. The Late Mousterian layers 10 and 9 are also linked with the slope soil formations (pedoliths) and, probably, this was the period of somewhat more moderate climatic regime, as supported both by conditions of occurrence and by absence of cold-resistant elements in composition of the fauna [there are residues of deer (*Cervus elaphus*), elk (*alces alces*), European bison (*Bison priscus*), horse (*Equus equus*), and at this level a small amount of the broadleaved species pollen (*Tilia, Ulmus*) appears]. Probably, this warming corresponds to the Hengelo Interstadial.

However, upward the forested areas shrink, environments become more severe (*Betula humilis* appears), fauna is represented by wooly rhinoceros (*Coelodonta antiquitatis*). At this level the Mousterian layer 8 occurs, with a noticeable role of the Late Paleolithic tools in its stone industry.

The next layer 7 belongs to the Late Paleolithic (Early Aurignacian time, 24500±500 B.P. and 25140±350 B.P. after radiocarbon datings). A.P. CHERNYSH (1977) attributes great importance to development of several features of the Mousterian technology in the stone industry of this site. Thus, at this site, by a series of layers one can trace a transition from the Mousterian to the Late Paleolithic. It is noteworthy that at this level, judging by the palynological data, severity of climate increases, tundra-steppes become dominant, and dwarf birth (*Betula nana*), as well as *Selaginella selaginoides* , appear.

Thus, the data for the Dniester watershed support the idea that in this part of the East-European Plain the Mousterian layers are covering, although non-uniformly, practically all the Mousterian time interval starting by the end of the Mikulino interglacial and ending by the beginning of the Bryanks interstadial. The Mousterian layers are preceded here by the Acheulian locations (for example Vykhvatinskiy naves) and the Late-Mousterian layers are replaced by the Upper Paleolithic ones.

CRIMEA

Another important region of the Mousterian sites is the Crimean peninsula, most of its northern part representing an extension of the East-European Plain, while its southern portion is composed of three low ridges of cuesta type, their steep slopes facing south and complicated by valleys and canyons incised in limestones. In the caves and grottoes that formed in the limestones, a serie of paleolithic sites was discovered at one time, covering the interval from the Acheulian to the Mesolithic (Kiik Koba, Shaitan Koba, Chokurcha, Staroselie and others). However, most of them were studied rather long ago and their geochronological and paleogeographical descriptions are far from being complete.

This gap has to a considerable extent been filled by studies of the sites Zaskalnaya V and VI located in the limestone massive Ak-Kai near the city of Belogorsk (KOLOSOV, 1973; DUSHEVSKIY and KOLOSOV, 1977). The above studies, as well as the complex paleogeographical investigations carried out, although in limited scope, at the Zaskalnaya V site in 1977, made it possible to suggest the following preliminary conclusions (KOLOSOV, VELICHKO *et al.*, 1978).

After Yu. G. Kolosov, 7 cultural layers are identified at the Zaskalnaya V site, that include industry of the two-side Mousterian. They occur inside a four-meter stratum of sandy loam and loam with limestone debris. The main stratum (3 lower metres) was formed in the regime of a grotto, and the upper, coarser portion, after collapse of its arc (Fig. 4).

Palynological studies by Z.P. Gubonina have demonstrated that the fifth cultural layer has been forming in humid conditions under dominance of forest-steppe vegetation with participation of hornbeam forests, i.e. in rather warm regimes.

At the level of the third cultural layer radical changes take place: herbaceous steppic species predominate with participation of the periglacial flora; of the arboreous species the birch pollen is found representing here a glacial relic.

In the epoch of formation of the more recent – the second cultural layer – arboreous vegetation completely disappears.

The phase of humidification corresponds to the epoch of the first cultural layer when forest associations again appear there.

Of great importance for the geochronological hypotheses are data of faunistic identifications made by E.I. Danilova and K.V. Kapelist. Thus, in the most ancient – seventh – cultural layer (i.e. beyond the layer V), bones of mammoth and polar fox (*Alopex lagopus*) were found, pointing at severe periglacial conditions which existed at that time. In the upper layers starting from the fifth (fauna of the layer VI has not been identified), the following representatives of predominantly open cool environments are found: mammoth, saiga (*Saiga tatarica*) and horse (*Equus equus*). In the two upper layers, wolf (*Canis lupus*) is also present and, in the second layer, cave bear [*Ursus (Spelaearctos) spelaeus*] and corsak fox (*Vulpes corsak*).

Comparison of the faunistic and palynological data brings one to the following conclusion. Even the first Mousterian people who settled there (layer VII) found themselves in cold periglacial environments (mammoth, polar fox) of the last Valdai glacial epoch. However, at the level of the Vth archeological layer a phase of considerable warming is identified (approximation to present environments) corresponding most of all in its character to the Krutitsa interstadial (probably, Brörup). More recent Mousterian layers correspond to regimes of increased role of open steppe environments with cold climate. It is only in the epoch of the first archaeological layer that humidification is noticed (conditions closer to the Bryansk interstadial?).

At the **Zaskalnaya** IV site located on the same slope of a small valley approximately 60-70 m from Zaskalnaya V, in the third archaeological layer bone remnants (including jaws) of an adult man and a child. After V.P. Yakimov, judging by anthropological features of these residues, they belong to paleoanthropos very similar to that from Teshik-Tash, and judging by incapability to oppose thumb to hand, they are close to the anthropological discoveries of the Koba site in Crimea.

Although only few paleogeographical data are available for other sites but, taking into account their importance, let us discuss them in brief, too.

In the **Kiik-Koba** grotto in cave deposits 0.8 m thick, G.A. Bonch-Osmolovskiy discovered two archeological layers – a lower Acheulian and an Upper Mousterian. In the upper layer a rather full set of the complex of the Mousterian fauna was found, specific for the region under study: mammoth, wooly rhinoceros (*Coelodonta antiquitatis*), polar fox (*Vulpes lagopus*), saiga (*Saiga tatarica*), European bison (*Bison priscus*), sheep (*Ovis* sp.), horse (*Equus* sp.), Asiatic wild ass (*Equus hemionus*), gigantic deer (*Megaloceros giganteus*), deer (*Cervus elaphus*), brown bear (*Ursus arctos*), wolf (*Canis lupus*), wild boar ((*Sus scrofa*), fox (*Vulpes vulpes*), corsak fox (*Vulpes corsak*), cave hyena (*Crocuta spelaea*). Taking into account proximity of the Mousterian layer to the Acheulian one and presence of representatives of the periglacial fauna in it, one can agree with the opinion of S.N. BIBIKOV (1969) that the Mousterian layer at Kiik Koba corresponds to the beginning of Würm (is close to the seventh layer at Zaskalnaya V?). In this layer a fossil skeleton of a paleoanthropos was also described.

According to assessments of S.N. Bibikov the Chokurcha site is somewhat more recent [mammoth, Saiga (*Saiga tatarica*) are present, but polar fox (*Alopex lagopus*) is absent]. Shaitan Koba belongs to the Late Mousterian.

In the opinion of the same author, the divide between the Late Mousterian and the beginning of the Upper Palaeolithic is represented by the known **Staroselye** site studied by A.A. FORMOZOV (1958). This cave was a long-term shelter for hunters. Composition of the fauna is rather complete and typical for the "Mousterian complex" in the given region: mammoth (*Mammuthus primigenius*), wooly rhinoceros (*Coelodonta antiquitatis*), polar fox (*Alopex lagopus*), reindeer (*Rangifer tarandus*), deer (*Cervus elaphus*), wild boar (*Sus scrofa*), wolf (*Canis lupus*), fox (*Vulpes vulpes*), roe (*Capreolus capreolus*), gigantic deer (*Megaloceros giganteus*), horse (*Equus* sp.), Asiatic wild ass (*Equus hemionus*). The site is also notable due to its anthropological discovery of a child's skeleton with morphological features of a *Homo sapiens*.

CAUCASIA (TRANSCAUCASIA)

Another important and southernmost in the USSR West area of distribution of the Mousterian locations is the Caucasian mountain area. There, the Mousterian stage was part of a single prolonged process of settlement covering practically all the Paleolithic. Most important multilayer sites are found there in caves south of the Caucasian ridge. It is sufficient to remind of a well-known Azykh cave in Azerbaijan containing layers starting from the Pre-Acheulian, then the Acheulian and, above them, the Mousterian layers. Integrated paleogeographical analysis of these layers showed that around the cave significant transformations of landscape situations were taking place, from warm forest lowland environments in the Acheulian to cool environments of high subalpine landscapes in the Mousterian in the epoch of the Valdai glaciation (VELICHKO *et al.*, 1980).

The Mousterian type is well represented by several cave sites in Transcaucasia: Kudaro, Vorontsovo, Akhshtyr and others.

One of the basic sites of the Mousterian is Kudaro I studied in detail by V.P. LYUBIN (1980) with participation of a group of geologists and paleontologists (Fig. 5). The site is located south of the Main (Watershed) Caucasian ridge in its offshoots, 1580-1600 m above sea level.The lower particoloured packet of the four-meter series in this cave contains three Acheulian layers (5a, 5b, 5c).

The Mousterian layers 3a, 3b, 3c and 4 are related to the middle packet represented by loams of grey colours; their industry is identified by V.P. Lyubin as the typical Mousterian.

The paleolandscape conditions of habitat of the prehistoric man may be reconstructed in the most detailed way with palynological data (G.M. LEVKOVSKAYA, 1980). In the epoch of the Acheulian layers 5a and 5b, the cave was located at the lower boundary of the belt of broad-leaved forests i.e. in warmer environments than the present ones. This time correlates with the Mikulino (Riss-Würm) interglacial. This divide represents the beginning of the Valdai Ice Age.

Upper portion of the Acheulian 5c layer, as well as lower part of the earliest Mousterian layer, are characterised by dark-coniferous forest environments with admixture of broad-leaved species. The environments were similar to modern ones. In the opinion of the scholars who studied this site, this period corresponds to a warm interstadial (Brörup?). However, taking into account an interruption of sediments between the above mentioned layers, one cannot ignore the possibility that two interstadials have been fixed there (Amersfoort and Brörup).

Later on such favourable situations have not been restored any more. It is supposed that upper portions of the layer 4 with acute decrease in pollen concentration are correlating with less favourable conditions (landscapes of alpine meadows?).

In the epochs of the Mousterian layers 3a, b, c, the environments were instable, cool but warmer than before (subalpine birch forests, herbaceous associations). Radiocarbon dating of the Mousterian layer 3 gave 44150 +2400/-1850 B.P., providing a very important information for identification of the "coordinates" of the Mousterian layers in the system of periodisation of the Valdai epoch (Kudaro site).

Fauna of the Mousterian layers, after data of N.I. VERESHCHAGIN and G.F. BARYSHNIKOV (1980) is represented by wolf (*Canis lupus*), fox (*Vulpus vulpes*), red wolf (*Cuon alpinus*), cave bear (*Ursus spelaearctos*), marten (*Martes martes*), weasel (*Mustela nivalis*), glutton (*Gulo gulo*), deer (*Cervus elaphus*), roe (*Capreolus capreolus*), goat (*Capra* sp.). Taking into account the ratios of individual representatives of the fauna in individual strata, the authors register climatic fluctuations over the background of some cooling that took place in the Mousterian: the layer 4 correlates with moderately warm humid regimes; the layers 3c, b with cold moderately humid conditions and the layer 3a with moderately cold, drier ones. A complicated system of fluctuations was described for the Mousterian layers of Tsutskhvaty caves (MARUASHVILI, 1978).

Absence of datings of other Mousterian sites makes it difficult to identify their position in the chronological scale. Some indication is provided by archaeological assessments of the age of cultures. Thus, the Mousterian layers in which an upper jaw of a paleoanthropos was discovered in the Sakazhia cave belong to the Middle and Late Mousterian. The palynological spectra there turned out similar to the present ones (NIORADZE *et al.*, 1978). The Tsona cave also refers to that period (second half of the Mousterian).

Still, it is clear that in Transcaucasia the Mousterian cultures existed till the middle of the Valdai. Some locations fix there the replacement of the Mousterian layers by the Upper Paleolithic ones. In view of this, of certain interest is the **Akhshtyr** cave located south of the Main Caucasian ridge in its western portion at 300 m above sea level (VEKILOVA *et al.*, 1978).

In the four-meters fillings of the cave, V.M. Muratov and E.O. Fridenberg identify the same typical packet as the one mentioned above. The five Mousterian layers attributed by E.A. Vekilova as the Mousterien denticulé occur inside the middle packet composed of particoloured predominantly greenish-grey gleyed loams.

Palynological studies by V.P. Grichuk and Z.P. Gubonina have disclosed that, in the

epoch of settlement by the Mousterian man, darkcoloured spruce and fir forests were spread there, now occupying the territories from 1200 to 1900 m. The fauna is also represented, according to identifications of N.M. Ermolova and V.I. Gromov, by forest species: elk (*Alces alces*), wild boar (*Sus scrofa*), deer (*Cervus elaphus*), fox (*Vulpes vulpes*), martel (*Mustela martes*), European bison (*Bison priscus*), cave bear (*Ursus spelaearctos*).

The upper Mousterian layer 3 by the uranium-thorium method was dated 35000±2000 B.P., by stalactites. For the above Upper Paleolithic layer 4 (bottom strata of the upper packet composed of angular rock debris), there is a radiocarbon dating 19800±300 B.P. Thus, the inhabitants of this latest-Mousterian location lived in rather cool humid environments amidst forest landscapes.

In two upmost Mousterian layers a molar and three upper metatarsal bones were discovered that belong, after A.A. Zubov, to a fossil man of a modern type - *Homo sapiens fossilis*.

GENERAL RECONSTRUCTIONS

The above cited data on age of cultural layers of the Mousterian sites explicate the fact that as early as the very beginning of the Valdai Würm Ice Age some regions of East Europe and of Transcaucasia were part of the area of stable settlement by the Mousterian man (Fig. 6).

In the preceding period of the Mikulino (Riss-Würm) interglacial, the territory was predominantly populated by holders of the Acheulian culture. This is supported by "underlaying" of the Mousterian layers by the Acheulian ones in some locations (for example, Kudaro, Kiik-Koba) or by occurrence of the Acheulian sites of the Mikulino (Riss-Würm) interglacial in the same regions as the Mousterian sites (for example, the site Vykhvatinskiy naves in the river Dniester basin).

At the same time, the Mousterian period in the region under study may be rooted down in the Mikulino interglacial. This is, in particular, supported by discovery of a Mousterian mucronate in the marine terrace sediments dated Karangat (Eemian) in Crimea (GVOZDOVER and NEVESSKIY, 1961).

The most recent Mousterian sites are dated, according to their chronostratigraphic position and radio-chronological datings, by the cold period that directly preceded the Bryansk (Denekamp) interstadial, i.e. about 35-52 thous. years ago. It is up to that time that the Mousterian man lived in the west of Europe, as disclosed by the Saint Césaire in France, for example. In view of that, one can hardly agree with some statements that in the east of Europe, the transition from the Mousterian to the Upper Paleolithic is retarded as compared to west of Europe. The available data allow one to state that both in the west and in the east of Europe the last holders of the Mousterian culture survived up to 35-30 thous. B.P. or even up to 26 thous. B.P. as supposed by R. PROTSCH (1986). This, however, should not be understood in a sence that this time level corresponds to transition from the Mousterian to the Upper Paleolithic. This process, in East Europe as well, has started much earlier and had non-homogeneous-diffusional character.

In the region under study the geoecological situation was in general characterised by high instability, variability both in lowland and in mountain areas. However, the characteristics of landscape-climatic regimes in the East-European Plain, on the one hand, and in Crimea and Front Caucasia, on the other hand, were principally different. They may be considered as two different areas with specific characteristics.

In the first area, both the vicinity of the northern limits of the area inhabited by the Mousterians (basin of the upper Dnieper) as well as the southern lowland areas (Dniester watershed) were characterised in the beginning of the Valdai epoch by introduction of tundra elements and development of cryogenic processes.

In the second area – in Transcaucasia – the changes in vegetation composition during the Mousterian were essentially different. In this period, except for several (one-two) short intervals, forest sometimes sparsed vegetation dominated there, composed mostly of coniferous species and with participation of broad-leaved ones, as was highlighted by V.P. LYUBIN (1969). Therefore, the climatic regimes were still humid and rather mild, although becoming cooler.

These two areas under study rather clearly differ in fauna composition (Fig. 7). Bone remnants at Transcaucasian Mousterian sites support the idea that the fauna there correspond to that of mountain regions with moderately cool (moderately warm in the Early Valdai) climate with large diversity of landscape situation and indispensable participation of forest elements. Thus, fauna is, as a rule, represented there by elk (*Alces alces*), deer (*Cervus elaphus*), wild boar (*Sus scrofa*), brown bear (*Ursus arctos*).

An important role belongs there, naturally, to representatives of mountain fauna, above all, to cave bear (*Ursus spelaearctos*), mountain goat (*Capra caucasica*), chamois (*Rupicapra rupicapra*), and others.

Returning back to the first area (East-European Plain, northern piedmont of the Caucasus and Crimea), one may register significant changes in composition of the fauna. The main new element is represented by a group of polar-arctic species: wooly rhinoceros (*Coelodonta antiquitatis*), mammoth (*Mammutus primigenius*), reindeer (*Rangifer tarandus*), polar fox (*Alopex lagopus*).

Therefore, one can outline a vast area inhabited by the Mousterian man with specific landscapes characterised by high mosaicity and combination of forests and open herbaceous areas spread along valleys (predominantly coniferous and, during the interstadials, with participation of broad-leaved species) over more elevated places and including tundra elements and microtherms. Use of the term "periglacial" in application to this natural situation without the necessary reservations may result in misunderstanding. This environmental situation can be described as a moderately-polar humid periglacial (paraperiglacial?).

We has already a chance to discuss in our previous publications existence in Europe in the first half of the Valdai of similar cold humid conditions contrary to extra-cryo-arid conditions that were established since 30 thous. B.P. (VELICHKO, 1973; VELICHKO and GVOZDOVER, 1969).

Studies by the Polish and French colleagues (MADEISKA, 1986; LAVILLE *et al.*, 1986; LEROI-GOURHAN, 1986) have made the understanding of these conditions more detailed. Thus, data on caves located in the territory of Poland – Rai, Ciemna – allowed T. Madeiska to underline high mosaicity of the Mousterian landscapes over the general cold background.

Studies by A. Laville, A. Leroi-Gourhan in Périgord, by G.-C. MARQUET (1986) in the west of France have produced a rather detailed picture of climatic and landscape changes: in general it describes environments of middle France as more moderate in the beginning of Würmian and more continental in the middle of the Würmian. But in the arid phases the arboreous elements were still preserved in vegetation patterns (birch-tree), although the arctic-tundra elements clearly pronounced in east-European palynospectra were absent here. In fauna only reindeeer (*Rangifer tarandus*) and, in rare cases, lemming (*Dicrostonyx*

torquatus) represent the polar-arctic group.

Thus, for the Mousterian in Europe one can identify a vast paraperiglacial area of specifically cold landscapes that combined in complicated patterns the forest, grassland-tundra and steppic elements (Fig. 8). It, obviously, may be divided into two provinces. One of them – the eastern province – had continental and severe climate with stable participation of polar-arctic groupings. Vegetation there included dwarf birch (*Betula nana*), *Selaginella selaginoides*. In fauna, one can often meet lemming (*Dicrostonyx torquatus*) and also mammoth, wooly rhinoceros (*Coelodonta antiquitatis*), reindeer (*Rangifer tarandus*). This type of province can be described as **paraperiglacial, humid, polar-temperate**. Judging by distribution of mammoth at the Mousterian sites, it stretched westward up to the present territories of Poland, Czechoslovakia and Rumania (PAUNESCU, 1986).

Further westward the province with milder conditions was spread, the polar-arctic groups were absent in vegetation there and, in the faunistic group of the same type, only reindeer is more or less permanently registered. This was a more oceanic province that may be described as a **paraperiglacial, humid, cold-temperate.**

To the South of this province, the same as in East Europe, there was an area characterised by essentially different landscape-climatic conditions. We have already noted earlier that, at the Mousterian sites of the French Mediterranean area, representatives of moderately-warm fauna are often observed (VELICHKO, 1973). The detailed palynological investigations by J. RENAULT-MISKOVSKI (1986) brought her to an important conclusion: availability of representatives of the typical mediterranean flora with participation of evergreen oak in the spectra of the Early and Middle Würmian prove the fact that the mediterranean south of France was characterised by overall favourable climatic regimes.

Data on the Apennine peninsula (Monte Circeo site, Central Italy; D. ZAMPETTI, 1986) are similar to those discussed above.

One may clearly see that the south-European Mediterranean area had many common features in landscape and climate features with Transcaucasia. Along with a general trend towards to a certain cooling from the beginning of Würmian (Valdai) till its middle part, in both areas during the whole period of the Mousterian population the predominant climatic regime was warm-temperate, although cooler than that of the preceding interglacial, and the biogeocenoses were devoid of (or only rarely included) the polar-arctic elements.

It is, obviously, possible to delineate the second large landscape-climatic latitudinal area (zone?) populated by the Mousterians in the south of Europe and in Transcaucasia. This area (zone) can be described as **mediterranean-transcaucasian humid, temperate**.

Mountain countries in the south of Europe (the Pyrenees, the Central-French massif, the Balkans, the Main Caucasian ridge) created a barrier preventing penetration into these areas of cold air masses from the north.

In a simplified way the climatic processes which produced the Mousterian environments can be considered similar to the present-day situations taking place during coolings. Cold air masses penetrating from the north freely pass through lowland ares down to the northern low mountains of Crimea (and sometimes even pass over them), of Northern Caucasia, Sudets, Central French massif, however, their penetration further south is blocked, as a rule, by high ridges of the Greater Caucasus, Balkans, Alps; therefore, the areas located south of these ridges are not subject to these significant decreases of temperature. However, some latitudinal differentiation was also existing in this area that can be divided into the following provinces: 1) the **Mediterranean province with milder conditions**, and 2) the

Transcaucasian province, cooler regimes.

The southern area (zone) was probably adjoined in the south-east by one more province: 3) the **Neareastern** province. As was demonstrated by M. WEINSTEIN-EVRON (1986) on the basis of isotope-oxygen data for profiles of the Gula valley, the Early and Middle Würmian were characterised there by considerably higher humidity, than the preceding interglacial, despite lower temperatures, especially in the Middle Würmian (isotope-oxygen stage 4). LEROI-GOURHAN (1986) produced data revealing that during this very time interval these regions (Lebanon, Mousterian site Nar Ibrahim and other) had high ratio of forested areas (mediterranean forests), higher than during the recent interglacial.

Thus, in the geoecological aspect European-Near Eastern ecumene of the Mousterian population was regularly differentiated into two major latitudinal areas (zones) with further isolation of provinces. The most severe environments were found in the **East-European paraperiglacial polar-temperate province**.

This differentiation provides additional information on the problem of anthropogenesis and development of the Mousterian material culture.

One can not but notice a certain coincidence of mosaicity of landscape situations in space, their often alternation in time reflecting the complicated transition process from the previous interglacial to maximum cooling in the second half of the Valdai (Würmian) and of high heterogeneity of the Neanderthalian population. However, one should, apparently, refrain from over simplified correlations in this problem. An illuminating example in this respect is the so-called classical Neanderthalian of the La-Chapelle type. Discussion of the problem whether this group represents a stage in evolution of a modern man or not is still going on. But actually, analysis of the process of reconstruction of the morphological characteristics of the prehistoric man in geological scales of time supports the idea that the group of the so-called classical Neanderthalian man deviates notably from the general trend (Fig. 9).

Another conception was also suggested that this morphotype developed as a local isolated group that experienced an especially heavy climatic influence of the advancing Vistula (Valdai) glaciation. This factor is also correlated by some anthropologists with migration of a part of non-differentiated Neanderthalian population from severe periglacial regions to Near East characterised by more favourable conditions for survival in conditions of glaciation.

However, studies of paleogeography of the Quaternary have disclosed that in the first half of the Würmian glaciers occupied rather limited areas in Europe – they did not exceed the limits of Scandinavia, British Isles and the Alpine Highlands. The more so, as explicated by the above data, West Europe was not characterised by extreme severity of climate. Much more severe "glacial" conditions were peculiar, as a matter of fact, to the East-European paraperiglacial province.[2] Still, data on the East-European province give no grounds to suggest that severe environments of this province were a barrier for advancement of the prehistoric society. Anthropological findings of the Mousterian period were made at sites of Crimea and Caucasia and studied by G.A. Bonch-Osmolovskiy, V.V. Bunak, V.P. Yakimov, V.M. Kharitonov, M.M. Gerasimov (GERASIMOVA, 1969; KHARITONOV, 1985). Remnants of an adult man and a child from the Mousterian layer at site Kiik-Koba were studied and referred to typical (classical) Neanderthalians

2 We put "glacial" conditions in inverted commas, because in this period the glacier could not in itself produce direct climatic impact on vast territories. Cooling was due to general climatic factors.

Remnants of the Mousterians were found at sites Zaskalnaya V and VI (a woman at the site Zaskalnaya V, a child from the third layer of the site Zaskalnaya VI and a child somewhat lower than the layer 3). All of them are included into the same group as the Neanderthalians from Kiik-Koba and, by several features (structure of hand), display similarity to the Paleoanthropos found at the Near-East sites Amud and Tabun. One can not but notice that groups of people with features of classical Neanderthalians are registered in the Mousterian layers dated the beginning of the Würmian (Valdai) both in the east and west of Europe within the paraperiglacial belt. However, in the same Crimean region, where the sites Kiik-Koba and Zaskalnaya are located, at the site Staroselye a child's skeleton was discovered with clearly pronounced features of the fossil man of modern type *Homo sapiens*.

The Transcaucasian province has produced paleoanthropological findings of somewhat different character as compared to the Crimean ones. Let us remind that in the Azykh cave the widely known jaw of a Neanderthalian was discovered in the Acheulian layer of the Likhvin (Mindel-Riss) Interglacial. One of discoveries of the Würmian period is a fragment of an upper jaw in the Middle Mousterian layer 3c of the Sakazhia cave (NIORADZE, VEKUA, GABUNIA and MAMATSASHVILI, 1978). After data of these scientists, the paleoanthropos from Sakazhia possessed along with clearly Neanderthaloid features the features of an early Neoanthropos, too (high palatine arch, narrow nose). Apparently, findings of Paleoanthropos at the sites Jruchula and Tsutskhvaty can also be referred to the same group, judging by structure of teeth found there.

At the same time, paleoanthropological findings from two upper Mousterian layers of the Akhshtyr cave belonged, according to A.A. Zubov, to fossil man of modern type.

Thus, the data on eastern provinces agree quite well with the hypothesis on high heterogeneity of the Mousterian population of the Valdai (Würmian) epoch.

This heterogeneity of population was superimposed over the autochtonous process of development of the Mousterian cultures and of their transformation into the Upper Paleolithic cultures of East Europe. The generally autochtonous character of this process (probably, along with some allochtonous features) is supported by multilayer Mousterian sites related to different time intervals of development of the Mousterian cultures starting from the beginning of the Valdai (Würmian) till transition to the Late Paleolithic.

The process of transition from the Mousterian to the Late Paleolithic was not a one-act event. It was durational, covering a time interval of 10-15 thous. years, and had a non-uniform-diffusional character. Elements of the Late-Paleolithic technology started their evolution deep inside the Mousterian epoch. Thus, A.P. CHERNYSH (1965) noticed that at the site Molodova I in the Mousterian layer IV, i.e. in the period before 44 000 B.P., a group of tools with Late Paleolithic features was found (it is noteworthy that at Bacho Kiro site in Bulgaria a layer with Aurignacian tools was discovered also dated the first half of the Würmian).

Another proof of the autochtonous development is the diffusional character of transition from the Mousterian to the Upper Paleolithic at the site Korman IV. After A.P. CHERNYSH (1965), the layer 8 of this site still belongs to the Mousterian but includes tools of the Late Paleolithic; the next, higher located layer 7 belongs to the Upper Paleolithic already (Early Aurignacian) but maintains some features of the Mousterian technology.

All the above allows to conclude that the relatively severe climatic conditions and instable landscape situations were no hindrance for development there of prehistoric society in the Mousterian. On the contrary, one may suggest that individual groups of the

Mousterians have well adapted to these conditions and, for their mostly hunting-oriented economy, these environments have been preferable.

We have already had a chance to express our opinion that cold impulses and essential transformations of landscape situations played a stimulating role in evolution of the prehistoric society (VELICHKO, 1971; VELICHKO, 1985). These transformations required extreme mobilization of the intellectual and physical capabilities to create protective systems.

One of the most important forms of such protective systems are dwelling constructions at open lowland sites in the paraperiglacial area. A splendid illustration to that has been the findings by A.P. Chernysh of the Mousterian dwellings including a rounded-shape dwelling in the IV layer of the site Molodova I. In its major specific features this dwelling 6-8 m in diameter built mostly of mammoth bones is a prototype of those rounded dwelling that have become the specific element of sites in the Upper Paleolithic – the epoch with really extreme conditions of the east-European periglacial. Clear features of succession in construction of dwellings in the Mousterian and in the Upper Paleolithic provide one more witness for autochtonous character of development of prehistoric society starting from the Mousterian to the Upper Paleolithic in the period of rather severe environments of the east-European paraperiglacial and later on – of true periglacial.

The Mousterian inhabitants of the east-European province, at least their individual groups, display the features that make one suggest a rather high level of development of their intellectual perceptions. In particular, they have already developed a ceremony of burial. At the Kiik-Koba site, the Neanderthal man was buried in a man-made hole in the cave bottom; his body was put sideways and his feet bent in (BIBIKOV, 1969). One should mention that the skeletons in the same position were found in east-European interments but dated the Late Paleolithic (for example, the site Markina gora near the river Don and others).

In the Mousterian in the east-European province one of the first witnesses of art origination in human history was registered. In the Mousterian layer 2 at the site Molodova I, A.P. CHERNYSH (1982) discovered signs of engravings on a mammoth shoulder-blade in black paint. In the central part of the shoulder-blade a silhouette of an animal (a deer?) is clearly seen. It has been supposed that on the shoulder-blade a scene of hunting is engraved.

One may suggest that, under increasingly severe climate from the beginning of the Valdai (Würmian) epoch to its middle period, more progressively organised tribes got more advantage and the groups lacking such characteristics were losing in competition. It is through such mechanisms that the natural-climatic impulses (in this case, the coolings) influenced the patterns of development of prehistoric societies.

It is quite possible that one proof of such processes is provided by the findings of remnants of Neoanthropos people in the Late Mousterian layers at sites of East Europe and Transcaucasia (Staroselye, Akhshtyr) reprsenting more highly organised groups among differentiated populations of the Late Mousterian period.

Naturally, the complicated, and yet inadequately studied process of transition from the Mousterian to the Upper Paleolithic was not without failures. In this period the changes in the type of economy and social organisation were combined with changes in the very type of human being. Even in case only two former factors are active, the process of transition was followed by a certain decline in material culture, by its despecialisation. An illustration to that is provided by the Mesolithic, as a transitional phase from the Upper Paleolithic to the Neolithic. A somewhat similar situation took place, probably, in the period of transition from the Mousterian to the Upper Paleolithic culture. Let us remember that the Early Mousterian archaeological layers include complicated and diversified complexes of material culture, i.a. with features of settled (or semi-settled) ways of life (as, for example, at long-time sites

Molodova I and V). As for the Late Mousterian sites at the same Dniester sites, they are either poor or weakly localised. One can not except that transformation of the state of landscapes – their progressive deforestation, increased severity of climate and of the tundra-steppe elements-produced changes in the modes of food production (depletion of vegetation elements, disappearence of a significant portion of forest species from the scope of hunted animals). It became necessary to follow herds of animals and to specialise mostly on hunting. All this persuaded to abandon some already adopted economic practices and to adopt anew and with difficulty the practices that did not play a leading role before.

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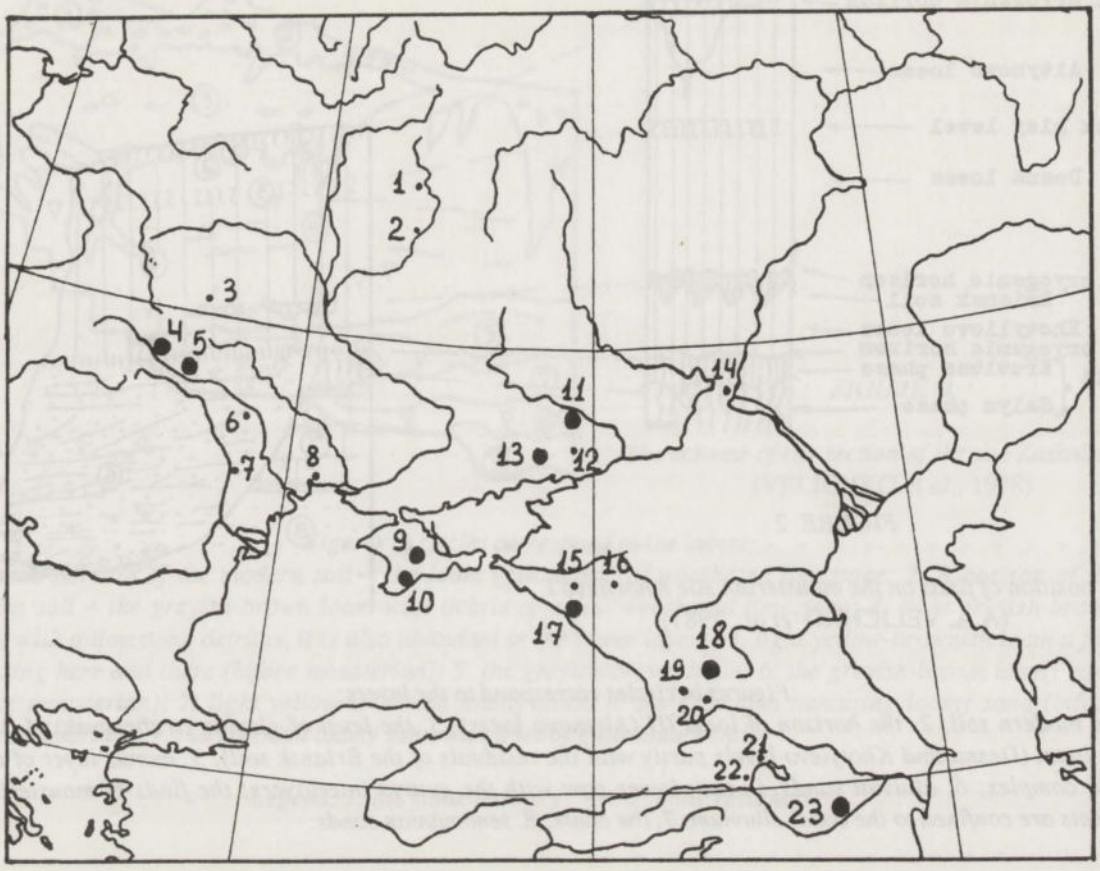

FIGURE 1

Mousterian sites of European part of the USSR and the Caucasus

1. *Khotylevo 1*
2. *Yazvi, Arapovichi, Chulatovo*
3. *Zhitomirskaya*
4. *Bukivna, Kasperovtsy, Stinka I-II*
5. *Molodova I, V; Korman*
6. *Vykhvatintsy*
7. *Starye Duruitory*
8. *Ilynka*
9. *Chokurcha, Volchy Grot, Kiik-Koba, Shaitan-Koba, Staroselye*
10. *Zaskalnaya V-VI*
11. *Derkul, Krasny Yar, Kalitvenka*
12. *Lysogorka, Novoklinovka*
13. *Rozhok I-II, Nosovo I, Gerasimovka*
14. *Sukhaya Mechetka (Volgograd's site)*
15. *Ilskaya*
16. *Monasheskaya, Gubski Naves n 1*
17. *Caves near Sochi: Akhshtyrskaya, Khostinskaya, Navalishenskaya, Vorontsovskaya, Kepshinskaya, Heivany*
18. *Kudaro I-III, Tsonskaya*
19. *Ortwali*
20. *Jruchula*
21. *Lusakert*
22. *Erevan's site*
23. *Azikh, Taglar*

Legend: • – *site*
● – *group of sites*

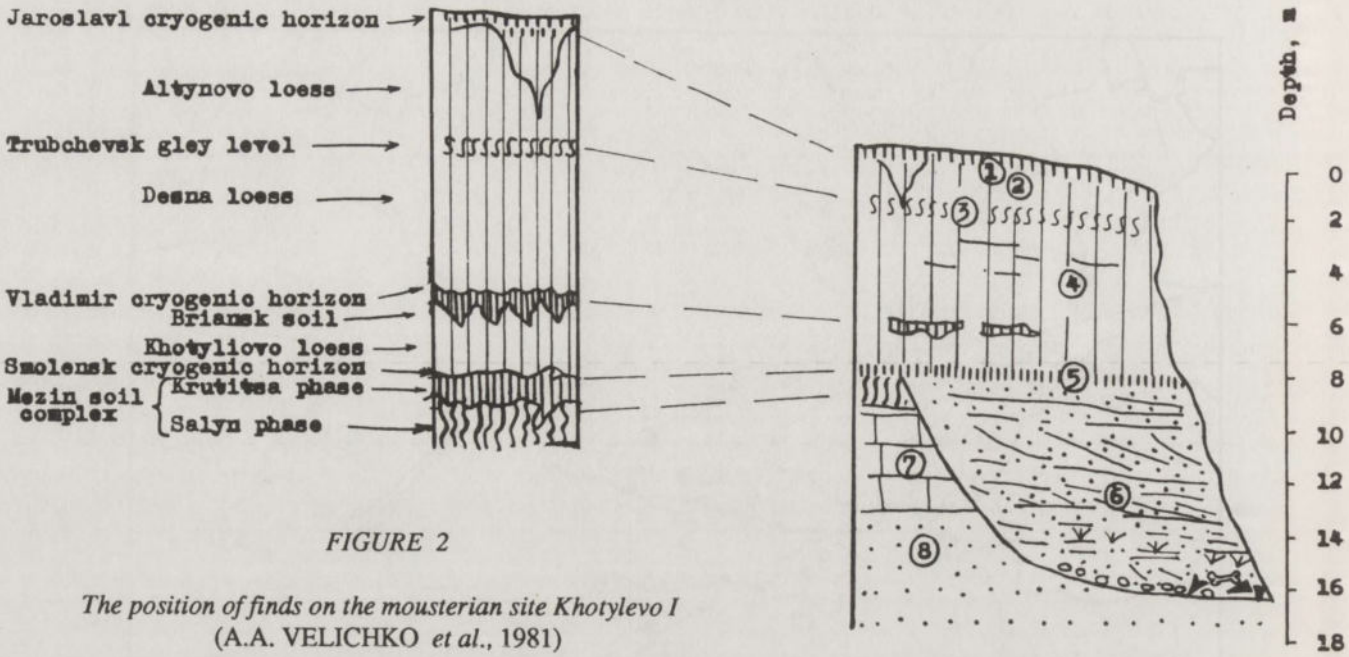

FIGURE 2

The position of finds on the mousterian site Khotylevo I
(A.A. VELICHKO *et al.*, 1981)

Figures in circles correspond to the layers:
1. the modern soil; 2. the horizon of loess III (Altynovo loess); 3. the level of gleying (trubchevsk); 4. the loess loam (Desna and Khotylevo levels partly with the residuals of the Briansk soil); 5. humus layer of the Mezin complex; 6. alluvial sands, in they lower part with the gyttiya interlayers; the finds of mousterian artefacts are confined to the basal alluvium; 7. the chalk; 8. senomanian sands.

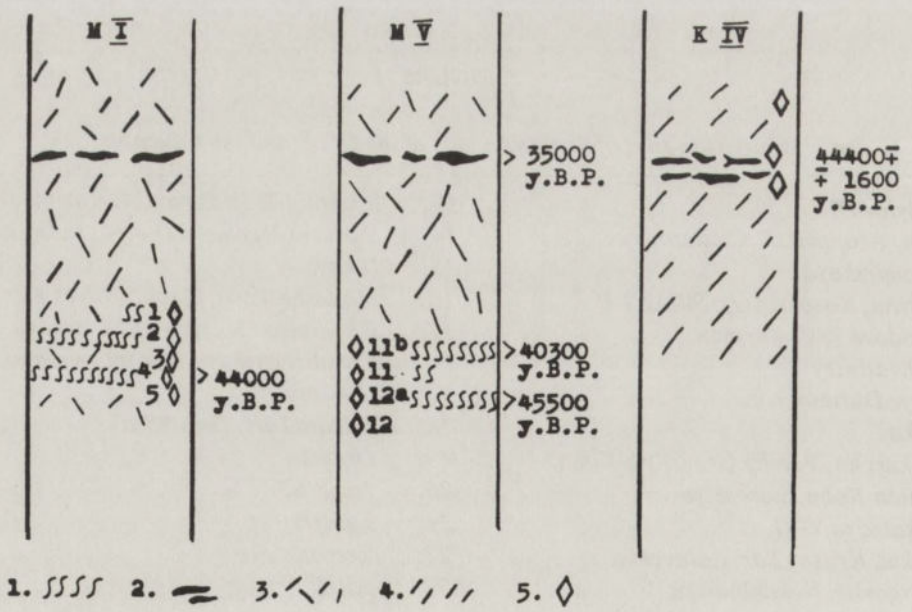

FIGURE 3

The elements of attitude of the mousterian layers in the sites Molodova I (MI), Molodova V (MV), Korman IV (KIV) in the Dniester basin (after IVANOVA, 1982)

Legend: 1. the green gleying loams; 2. the coal interlayer; 3. the variagated loams; 4. yellow-brownish loams; 5. the mousterian layers

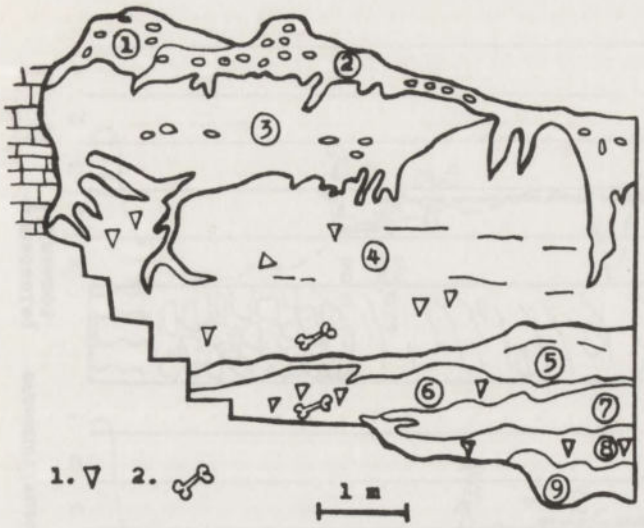

FIGURE 4

The scheme of the section of the site Zaskalnaya V
(VELICHKO *et al.*, 1978)

Figures in circles correspond to the layers:
1. humus horizon of the modern soil – the loam with debris of weathered limestone; 2. B horizon of the modern soil – the greyish-brown loam with debris of a few weathered limestone; 3. light greyish-brown loamy with a limestone detritus, it is also abundant in the lower layers; 4. light yellow-brownish loam a few humusing here and there (biface mousterian); 5. the greyish-brown loam; 6. the greyish-brown loamy sand (biface mousterian); 7. light yellow-brownish loamy sand; 8. the brownish humusing loamy sand (biface micromousterian); 9. the greenish loamy sand with a lot of glauconite sand.

Legend: 1. the stone industry – 2. bone residuals

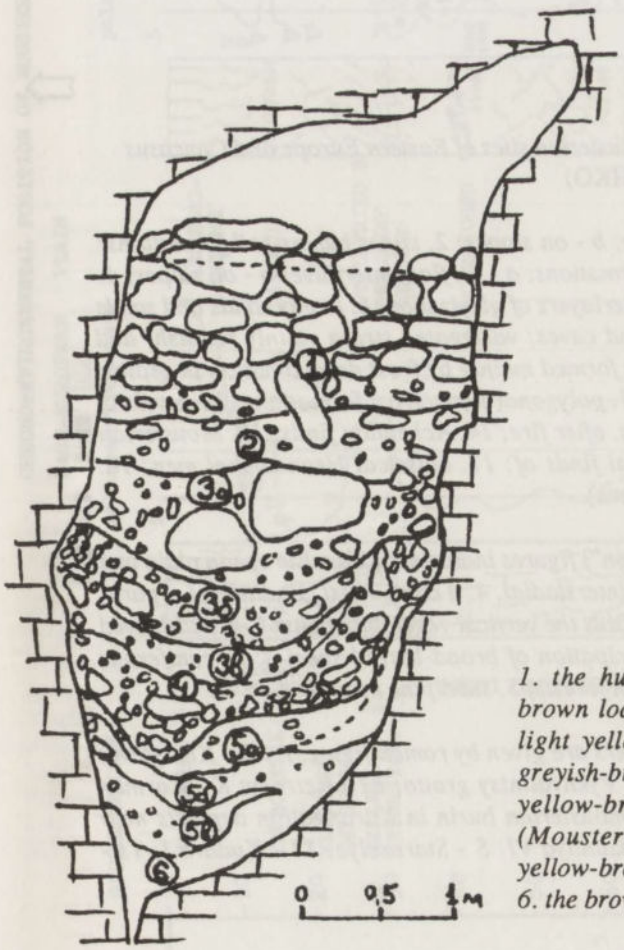

FIGURE 5

The scheme of stratigraphy of layers in Kudaro I cave
(after V.P. LYUBIN, 1980)

Figures in circles correspond to the layers:
1. the humusing loam with blocks of limestone; 2. the greyish yellow-brown loam with limestone debris (Late Palaeolithic, Mesolithic); 3a. the light yellow-brownish loam with limestone debris (Mousterian); 3b. the greyish-brown loam with little debris of the limestone (Mousterian); 4. the yellow-brownish, here and there green loam with limestone debris (Mousterian); 5a. the yellow-grey loam (Acheulian); 5b. the light yellow-brownish loam (Acheulian); 5c. the yellow-brown loam (Acheulian); 6. the brown yellow clay (without archaeological finds).

FIGURE 6

The scheme of the chrono-palaeogeographic position of mousterian sites of Eastern Europe and Caucasus (by A.A. VELICHKO*)*

Legend: 1. the humus-soil formations: a - on flats interfluve; b - on slopes; 2. slight humus-soil formations: a - on flats interfluve; b - on slopes; 3. forest illuvial-soil formations: a - on flats interfluve; b - on slopes; 4. loesses: a - on flats interfluve; b - on slopes; 5. layers and interlayers of gleyization; 6. loamy sands and sands in grottos; 7. green- and grey- colored loams in grottos and caves; variegated strata mainly reddish- and grey-brownish-colored, in grottos and caves; 9. rock debris formed mainly by frost desquamation in grottos and caves; 10. marine sediments of Karangatian terrace; 11. polygonal permafrost formations; 12. levels of solifluction; 13. interlayers and lenticles of carbonised mass, after fire; 14. Acheulian finds; 15. Mousterian finds; 16. Upper Palaeolithic finds; 17-19. anthropological finds of: 17. classical Neanderthal men; 18. Palaeoanthropes; 19. fossil men of modern type (Homo sapiens).

In the heading "Paleoenvironment" ("Degree of palaeosituation") figures indicate: in East-European plain and Crimea: 1. an interglacial, 2. a warm interstadial, 3. a cool interstadial, 4. a cold, moist conditions (a para-periglacial), 5. cryoarid conditions (a periglacial). For Caucasus the vertical vegetation belts: 1. broad-leaved forests of low-mountain; 2. coniferous forests with a participation of broad-leaved species; 3. coniferous forests with a participation of birch forests; 4. subalpine birch forests; 5. subalpine meadows.

Abbreviations of sites (for multi-layered sites numbers of layers are given by roman figures): Kh - Khotylevo; B - Betovo; Vo - Volgograd's site (Sukhaya Mechetka); V - Vykhvatintsy grotto; Kt - Ketrosy; K - Korman IV; MI - Molodova I; MV - Molodova V; Sd - a find of a mousterian burin in Karangatian deposits near Sudak city; Kk - Kiik-Koba; ZV - Zaskalnaya V; ZVI - Zaskalnaya VI; S - Staroselye; KI - Kudaro I; Ts - Tsonskaya; Sk - Sakajia; I - Ilskaya; A - Akhshtyrskaya.

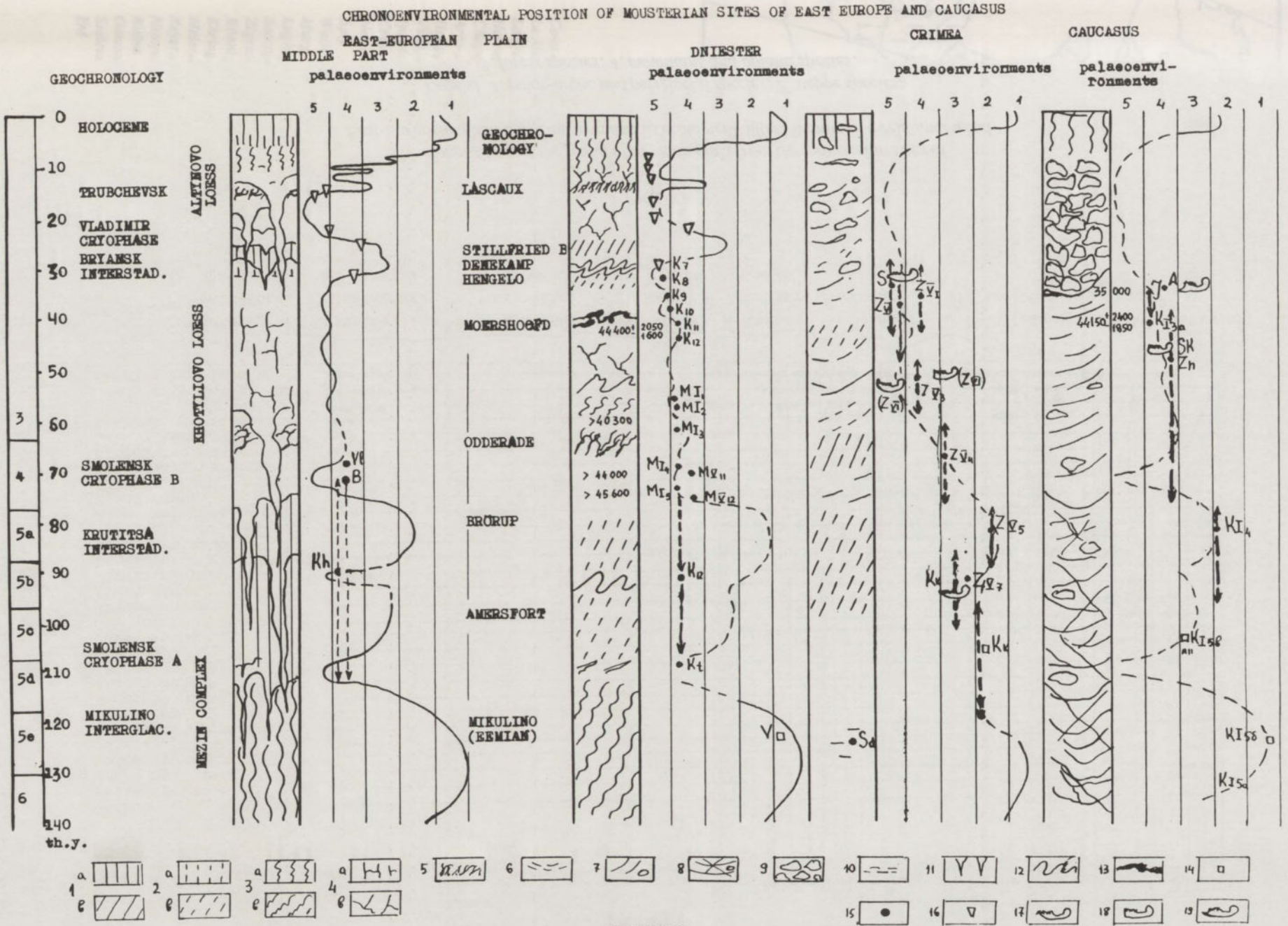
CHRONOENVIRONMENTAL POSITION OF MOUSTERIAN SITES OF EAST EUROPE AND CAUCASUS
EAST-EUROPEAN PLAIN
MIDDLE PART
CRIMEA
CAUCASUS
GEOCHRONOLOGY
palaeoenvironments
DNIESTER
HOLOCENE
TRUBCHEVSK
VLADIMIR CRYOPHASE
BRYANSK INTERSTAD.
SMOLENSK CRYOPHASE B
KRUTITSA INTERSTAD.
SMOLENSK CRYOPHASE A
MIKULINO INTERGLAC.
ALTYNOVO LOESS
KHOTYLIOVO LOESS
MEZIN COMPLEX
LASCAUX
STILLFRIED B
DENEKAMP
HENGELO
MOERSHOOFD
ODDERADE
BRÖRUP
AMERSFORT
MIKULINO (EEMIAN)
th.y.

FIGURE 6

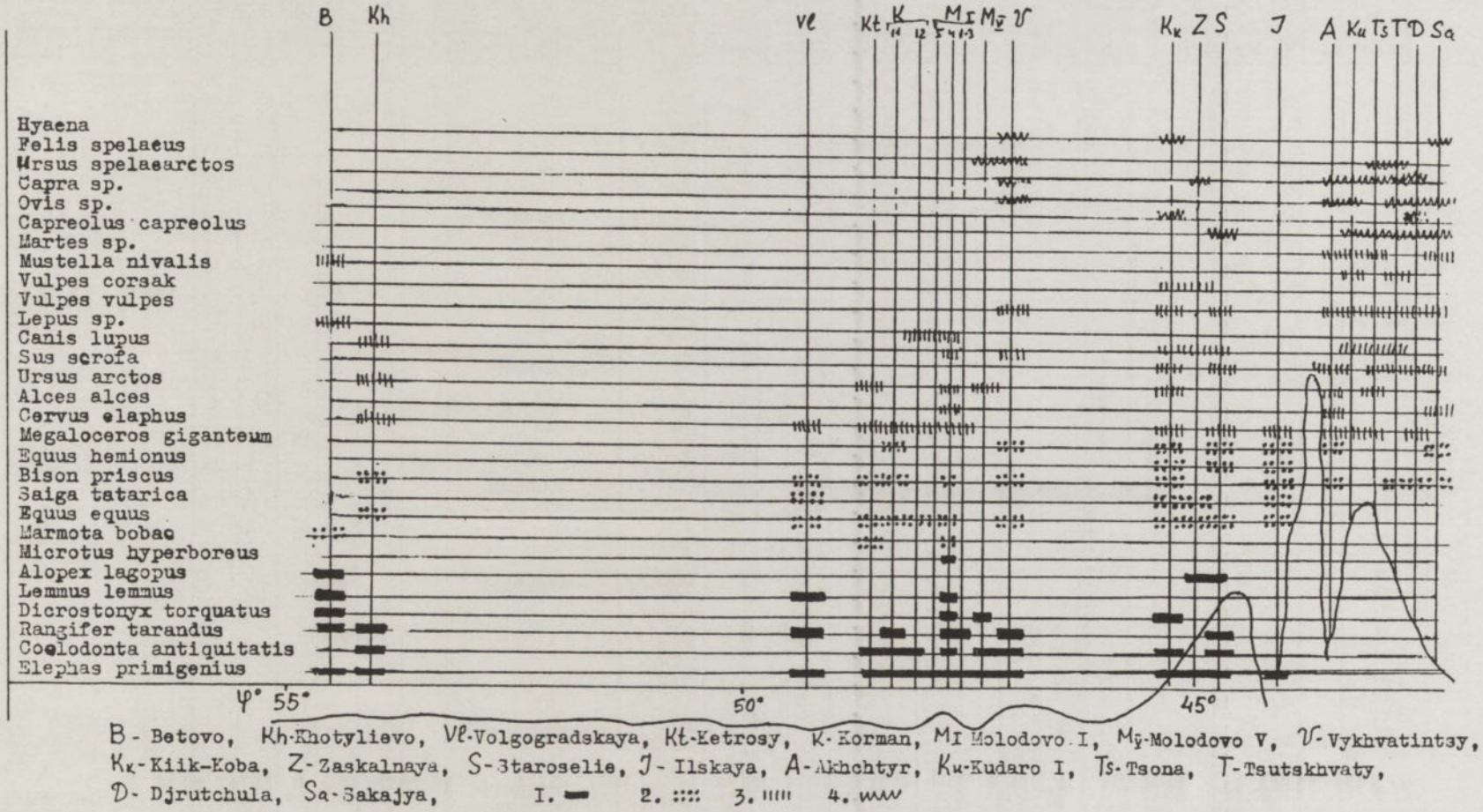

FIGURE 7

The composition of the fauna of big mammals from the mousterian sites of East-European plain and Caucasus and its ecological differentiation in meridional trend

Legend: 1. polar-arctic and periglacial species; 2. steppe species; 3. forest species; 4. mountains and upland species.

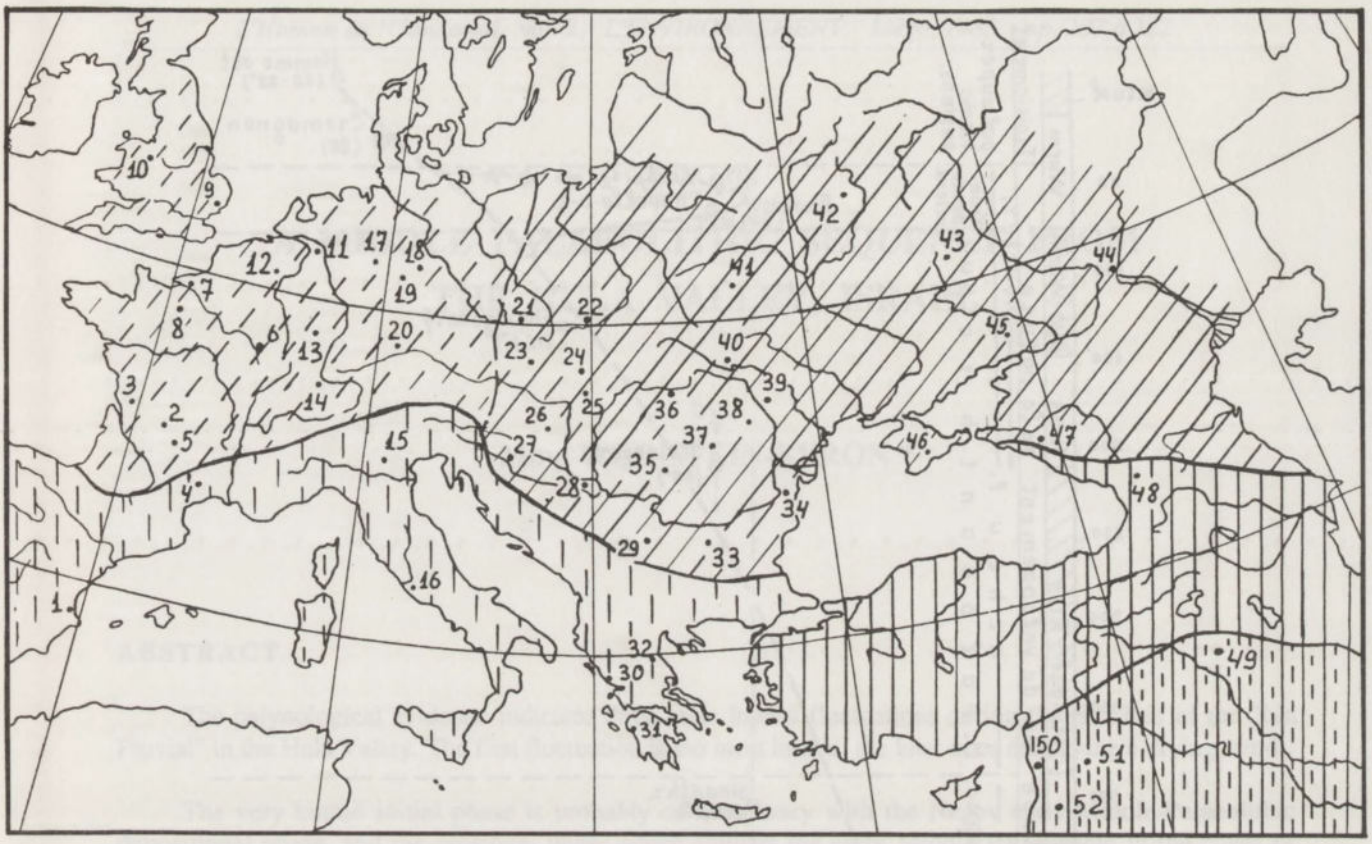

FIGURE 8

Geoecological division of Europe and Near East for the mousterian epoch

The main mousterian sites:

1. *Cova Negra*
2. *Le Moustier, La Ferrassie*
3. *La Quina*
4. *Hortus*
5. *Chapelle-aux-Saints*
6. *Arcy-sur-Cure*
7. *Houppvilles*
8. *Villejuif*
9. *Ipswich*
10. *Creswell Crags*
11. *Neanderthal*
12. *Spy*
13. *Wallertheim*
14. *Murg*
15. *Lughezzano*
16. *Saccopastore*
17. *Zigenheim*
18. *Könnigsaue*
19. *Ehringsdorf*
20. *Meiendorf*
21. *Reyersdorfer Höhle*
22. *Netoperzowa*
23. *Kulna*
24. *Ganovce*
25. *Szeleta*
26. *Erd*
27. *Krapina*
28. *Rissovaca*
29. *Ocilata*
30. *Kokkinopilos*
31. *Palaiokastron*
32. *Larissa*
33. *Bacho Kiro*
34. *Cheia*
35. *Ohaba Ponor*
36. *Onokovtsy*
37. *Pestera*
38. *Ripiceni-Izvor*
39. *Starye Duruitory*
40. *Molodova I, V; Korman*
41. *Rikhta*
42. *Khotylevo*
43. *Dubovka*
44. *Sukhaya Mechetka (Volgograd's site)*
45. *Rozhok*
46. *Chokurcha*
47. *Ilskaya*
48. *Kudaro*
49. *Shanidar*
50. *Kzar Aksa*
51. *Jerf-Ailla*
52. *Yabrud*

Regions and provinces:

I. Paraperiglacial region (zone):

Ia. Easteuropean, paraperiglacial, polar-temperate

Ib. Westeuropean, paraperiglacial, cold-temperate

II. Mediterranean-transcaucasus temperate-cold region (zone):

IIa. Mediterranean-European

IIb. Transcaucasian-Anatolian

IIc. Neareastern

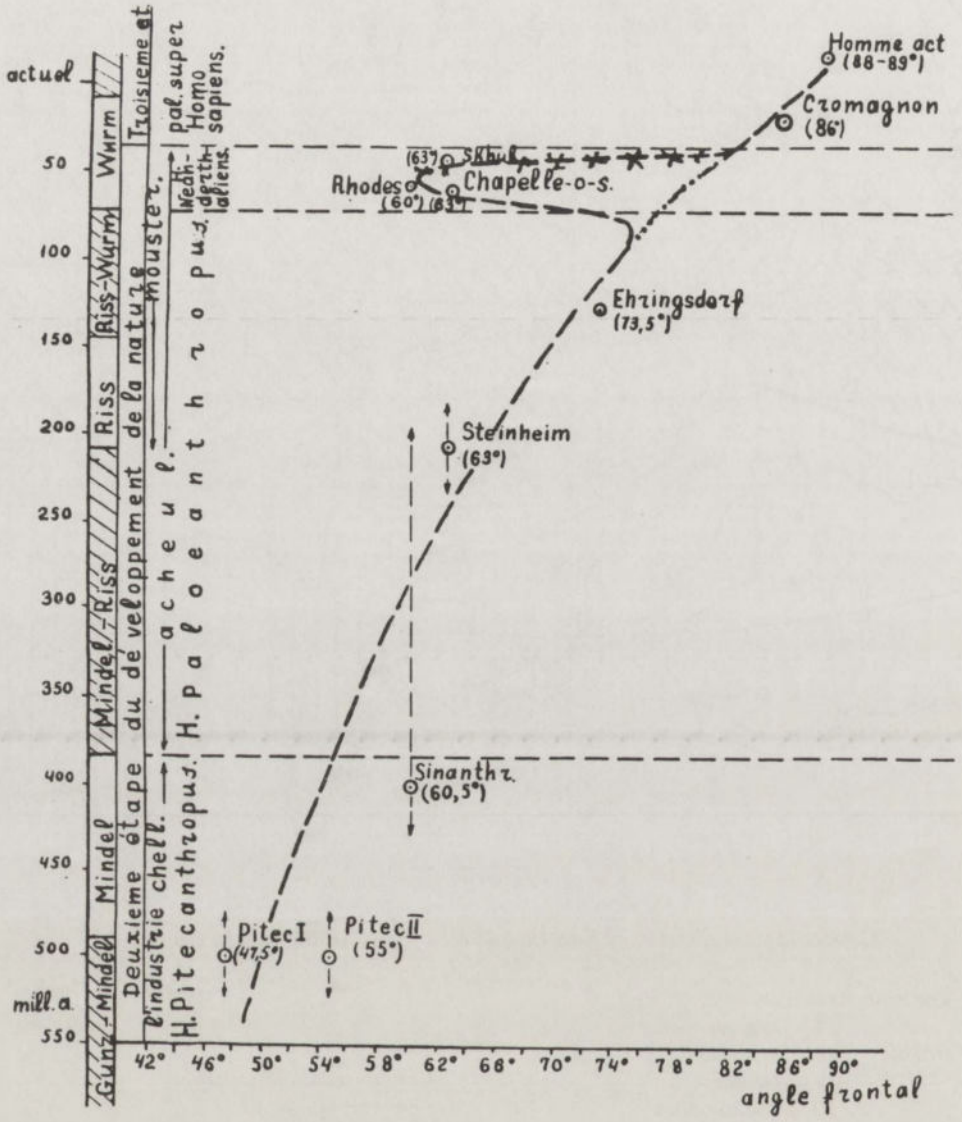

FIGURE 9

The curve of correlation between the age of different groups of humids and the frontal angle