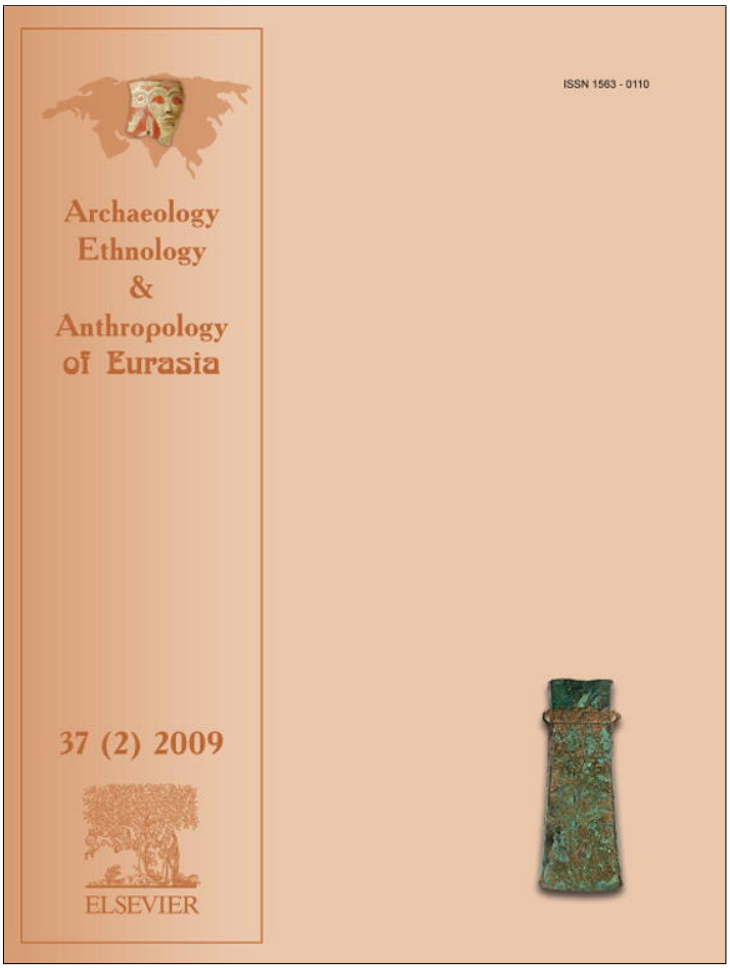

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E-mail: Eurasia@archaeology.nsc.ru

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PALEOENVIRONMENT. THE STONE AGE

A.K. Ocherednoi[1] and E.V. Voskresenskaya[2]
[1]Institute for the History of Material Culture, Russian Academy of Sciences,
Dvortsovaya Nab. 18, St. Petersburg, 191186, Russia
E-mail: mr_next@rambler.ru
[2]Institute of Geography, Russian Academy of Sciences,
Staromonetny 29, Moscow, 119017, Russia
E-mail: kavosk@mail.ru

STRATIGRAPHIC DATA ON MIDDLE PALEOLITHIC SITES IN THE UPPER DESNA BASIN*

The present article constitutes part of a multidisciplinary project focusing on a group of Middle Paleolithic sites situated along a small stretch of the upper Desna in the Bryansk and Zhukovsk Regions of the Bryansk Oblast, Russia. The article describes the stratigraphy of the sites and suggests correlations with sediments bearing the Khotylevo I, Betovo, and Korshevo I and II lithic industries.

Key words: *Middle Paleolithic, stratigraphy, relative chronology, chronostratigraphic correlation.*

Introduction

The Middle Paleolithic sites discovered in the second half of the 20th century by V.A. Khokhlovkina, F.M. Zavernyaev, and L.M. Tarasov on the upper Desna are the northernmost localities in the central part of the East European Plain which are known to date. Large-scale research into the Middle Paleolithic took place in the region from the late 1950s to the late 1970s. During that time, an expedition from the Bryansk Museum of Regional Studies headed by F.M. Zavernyaev conducted excavations at the Khotylevo I group (Zavernyaev, 1978). Sites located near the villages of Betovo and Negotino were excavated by an expedition headed by L.M. Tarasov from the Leningrad Branch of the Institute of Archaeology, USSR Academy of Sciences (1995). Over many years of study, various views have been formulated with regard to the typology of lithic industries and the stratigraphy of each site. Producing a strict division of sediments at local Middle Paleolithic sites into lithological and stratigraphic units and their chronological attribution presents considerable difficulty even today. Cultural horizons are associated with sediments of various origins (slope or alluvial) and differ in state of preservation (some were revealed *in situ*, while others were partially or completely redeposited). The profiles established at ancient slopes have to be correlated to standard profiles with reliable chronological and stratigraphic attribution. Analyses of cultural horizons associated with alluvial sediments have to take into account the time intervals during which the alluvial fans were formed. During the field seasons of 2006 and 2007, several profiles were established along the banks of the Rudnyanka, Betovka, and Gosoma rivers (all are right tributaries of the Desna River). These stratigraphic profiles revealed the structure of the sediment cover that accumulated throughout the Quaternary on the Cretaceous bedrock. Correlating these profiles with those of Khotylevo I and Betovo has made it possible to describe deluvial, alluvial, and fluvio-glacial sedimentation with regard to various topographic features

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of the valley. Based on the comparison of these data with materials obtained by F.M. Zavernyaev and L.M Tarasov in the 1960s–1980s, a tentative scheme for the relative correlation of Middle Paleolithic sites in the upper Desna basin has been elaborated.

Geological and geomorphological structure of the Desna right bank between the villages of Negotino and Khotylevo

The Middle Paleolithic sites of Negotino, Negotino-na-Rudnyanke, Betovo, Korshevo I and II, and Khotylevo I are situated within a 30 km area in the upper Desna basin (Fig. 1). The sites are located on the high right bank of the asymmetric Desna valley stretching from the northwest to the southeast. Some sites (Khotylevo I, Betovo, and Negotino) adjoin the valley side, while others are associated with the valleys of the tributaries: the Rudnyanka (Negotino-na-Rudnyanke) and the Korshevka (Korshevo I and II). The Desna right tributaries are deeply cut representing transitional forms between gorges and small river valleys. The tributaries have constant water flow along the thalweg and cut soft sediments to the water bearing horizons overlying the bedrocks. The bedrocks of the right bank of the Desna are attributable to the upper division of the Cretaceous system. They are represented by Cenomanian quartz and glauconite green sand with bands of phosphorites and Turonian marl and chalk containing black flint concretions (Pervobytnyi chelovek…, 1997). Upper Desna Paleolithic artifacts have been shown to be made of the same black flint.

During the Quaternary, the relief in this region developed under the impact of interchanging glacial and interglacial periods. The Dnieper Glaciation was the last cold period when glaciers influenced the most part of the Desna basin. The Dnieper ice sheet was located north of the Desna basin. The Desna valley and its tributaries served as drainage channels for glacial water (Velichko, Pisareva, Faustova, 2002; Gribchenko, 2002). The fluvio-glacial sediments of the Dnieper period studied by the present authors are exposed on the banks of the Gosoma and Rudnyanka, the right tributaries of the Desna River. These sediments represent light gray coarse-grained sand interlayered with bands of greenish marl clay and numerous marl, chalk, and flint concretions. Sediments of this sort constitute the parent material of the Mezin pedocomplex, whose early (Salyn) stage corresponds to the Mikulino interglacial and whose late stage corresponds to the Krutitsy interglacial of the Early Valdai period. The soil profile near the right side of the valley shows deformations of the frost and slope origin. The frost deformations of the Smolensk cryogenic stage are represented by small polygonal fissures in the Salyn soil, and solifluction and cryoturbation deformations in the humus horizon of the Krutitsy soil (Velichko, Morozova, 1963). The overlying

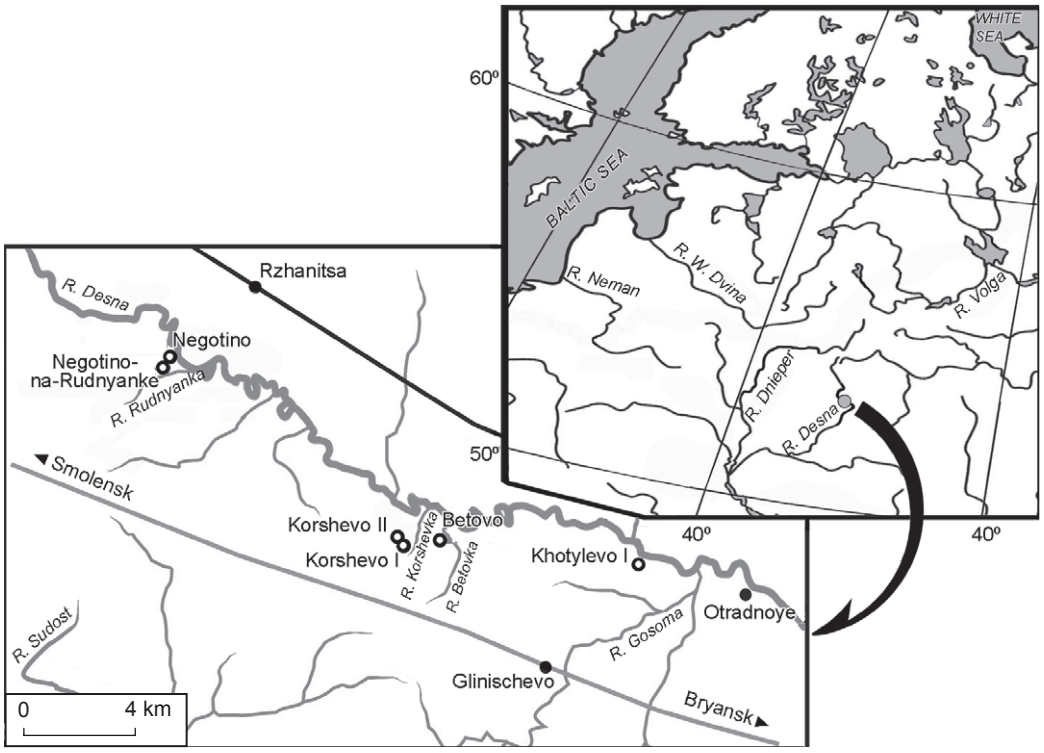

Fig. 1. Map showing the location of Middle Paleolithic sites in the upper Desna basin.

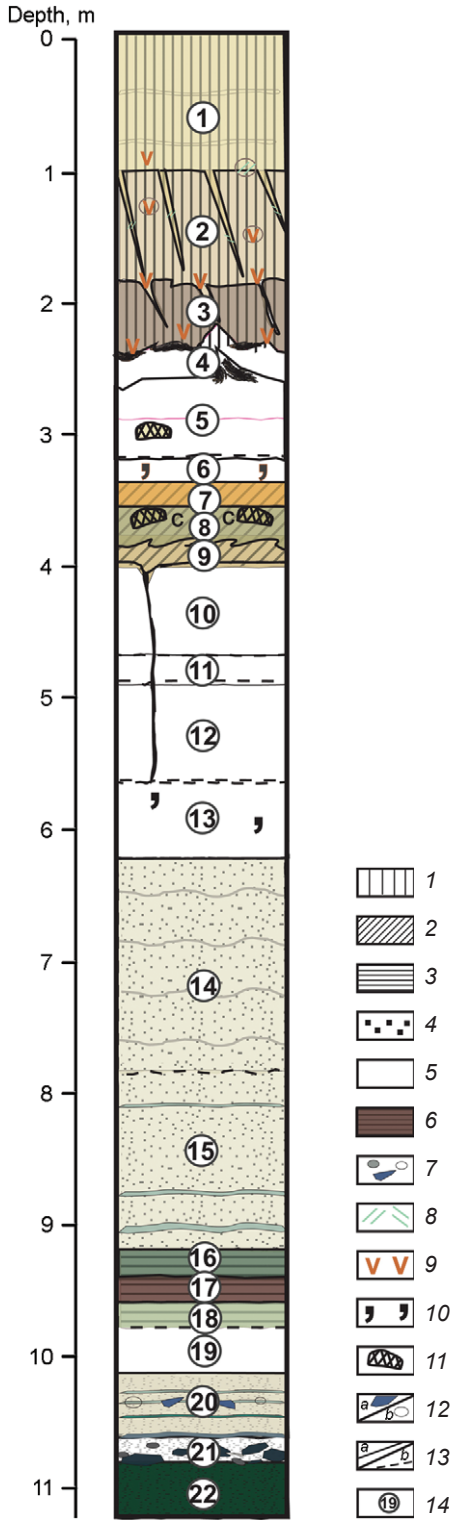

Fig. 2. Khotylevo I lithological column.
1 – loess sandy loam; *2* – loam; *3* – clay; *4* – sand; *5* – thin laminations of siltstone; *6* – gyttja; *7* – sand and pebbles; *8* – traces of gleying; *9* – ferriferous sediments; *10* – organic inclusions; *11* – burrows; *12* – flints (*a*) and phosphorites (*b*); *13* – stratum borders: distinct (*a*) and indistinct (*b*); *14* – stratum number.

thick loess and soil layer was formed in the periglacial zone of the Valdai glacial. The layer consists of three loess horizons which are intercalated with Bryansk buried soil and Trubchevo gley layer, in which frost deformations correlated to the Vladimir and Yaroslavl cryogenic periods have been noted (Pervobytnyi chelovek…, 1997). Hence, the deluvial-slope sediments of the right bank of the Desna, accumulated during the last glacial-interglacial cycle, demonstrate considerable thickness and a complex history of formation. The reference horizons of buried soils within sediments of this type that cover the lower portions of the valley slopes are often discontinuous and represent mostly pedo-sediments. Culture-bearing layers at the sites of Betovo, Korshevo I and II lay within the basal portion of the deluvial-slope sediments on top of Cretaceous rock. The Khotylevo I cultural horizon is associated with the basal alluvial horizon. The period of terrace formation is correlated with the early (second fluvial terrace) and late (first fluvial terrace) stages of the last glaciation. The alluvial sediments of the first and second terraces are included in the so-called buried alluvial complex represented by laminations of light gray from fine to coarse sand interchanged with lenses of greenish clay with an admixture of local and erratic rocks rounded to various degrees. The bottom of the layer of buried alluvium was established at a depth of 20 m from the modern Desna water level, while the roof is 10–15 m above it (Velichko, 1961).

Description of the sites

Khotylevo I. The site is located at the foot of the Desna right bank at an elevation of 22–25 m above the water level. In 2006, two sections exposing artifacts were established at the site (Fig. 2).

Tabular rock pieces (including artifacts fashioned on these stones) and rare fauna remains were recovered from a layer of phosphorite, rounded pebbles of crystalline rocks, and marl debris (Fig. 3) at a depth of 10.39–10.55 m from the surface. This culture-bearing horizon overlies a bed of Cenomanian sand (stratum 22). The cultural layer consists of whitish-gray quarts sand with an admixture of colored and dark sand particles (strata 20 and 21). Sediments overlying the cultural horizon contain alluvial and sub-aerial series (from top to bottom). The alluvial unit is comprised of riverbed, oxbow lake, and floodplain fascias. The artifacts were recovered from the bottom of the riverbed fascia. The oxbow lake sediments occur between the layers of floodplain alluvium. These represent gray clay sediments up to 90 cm thick (strata 16 and 18) containing a lens of laminated dark brown loam with an admixture of organic matter (gyttja) (stratum 17).

The clay layer is overlaid by horizontal bands of medium-grained sand of the floodplain alluvium (strata 14

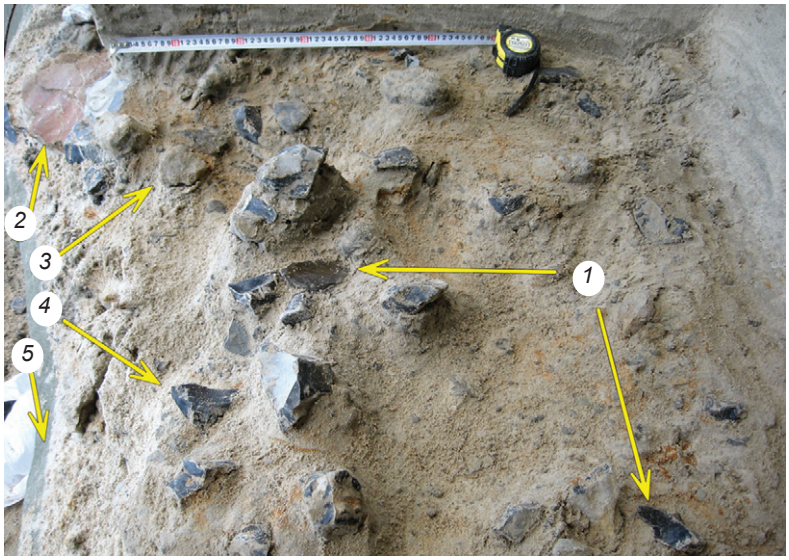

Fig. 3. Distribution of finds at Khotylevo I.
1 – artifacts; *2* – bone; *3* – phosphorite concretions; *4* – flint tabular pieces; *5* – Cenomanian parent sand.

and 15). Above lies a unit of grayish yellow sandy loams 2.3 m thick, probably belonging to the floodplain fascia (starta 10–13). The upper portion of the profile contains sediments of subaerial origin. These sediments represent the redeposited and reformed sediments of the Mezin pedocomplex. Stratum 3 is formed by a loam with a minor admixture of humus. The stratum is split into separate blocks of dark gray and grayish-brown color. This stratum overlies sediments comprised of lenses of black humus-containing loam and ferriferous fine-grained sand and brown sandy loam (strata 4–9). The uppermost portion of the profile contains Late Pleistocene loess deposits (strata 1 and 2).

The Desna right bank gently slopes down to the Gosoma valley downstream of the site. Relief features such as high floodplain areas and the first terrace are clearly visible. The structure of the high bank shows considerable changes upstream. The loess and soil sub-aerial deposits are underlain by sandy chalk in contrast to the complex laminations of alluvial deposits mentioned above. The height of the right bank is likewise approximately 22 m above the water level.

According to F.M. Zavernyaev (1978), the cultural horizon at the site is redeposited or displaced to various degrees. Artifacts recovered from the sites located upstream represent all stages of stone reduction including chips. The noted stage of the surface preservation of the artifacts (lacking traces of rounding or smoothing and likewise signs of fine pseudo-retouch on the margins) suggests that this portion of the site was less disturbed compared to the areas located downstream of it. The alluvial sediments of the floodplain and oxbow lake fascias are replaced by sediments originating from slope and gorge processes. Artifacts and rock pieces were distributed unevenly over profiles at various areas (Ibid.). The Khotylevo I collection is typologically diverse (Fig. 4). It includes a set of bifacially worked implements (68 complete bifaces of various types). The category of tools with partial bifacial and unifacial treatment includes points and various types of scrapers (déjeté, diagonal, transverse, and lateral). Another abundant category contains knife-like tools. The artifact collection includes flint tools and bone implements. According to published data, at least ten bone artifacts were present. Primary reduction in the Khotylevo I assemblage is illustrated by cores of 13 types, including unilateral disc forms which are most numerous. It also includes a small set of tortoise cores. The category of spalls and blanks includes large Levallois flakes.

F.M. Zavernyaev does not propose any typological definition of the Khotylevo I artifact assemblage. He suggests that the structure of the site was complex and included various Middle Paleolithic assemblages of varying typology (Ibid.). Most researchers identify Khotylevo I as a workshop (Matyukhin, 2004, 2006). However, because some or all the assemblages are redeposited, the site discovered by Zavernyaev probably represents a cluster of Middle Paleolithic materials accumulated at various periods and stretching along the riverbed, an interpretation proposed by L.M. Tarasov (1995). If further studies support this inference, the Khotylevo I collection formed in the 1960s will no longer be regarded as a single archaeological complex. Rather, the artifacts will be regarded as comparative material appropriate for use in studying the technology and morphology of Middle Paleolithic implements. Among other collections of this type, the artifacts recovered from the multilayered site

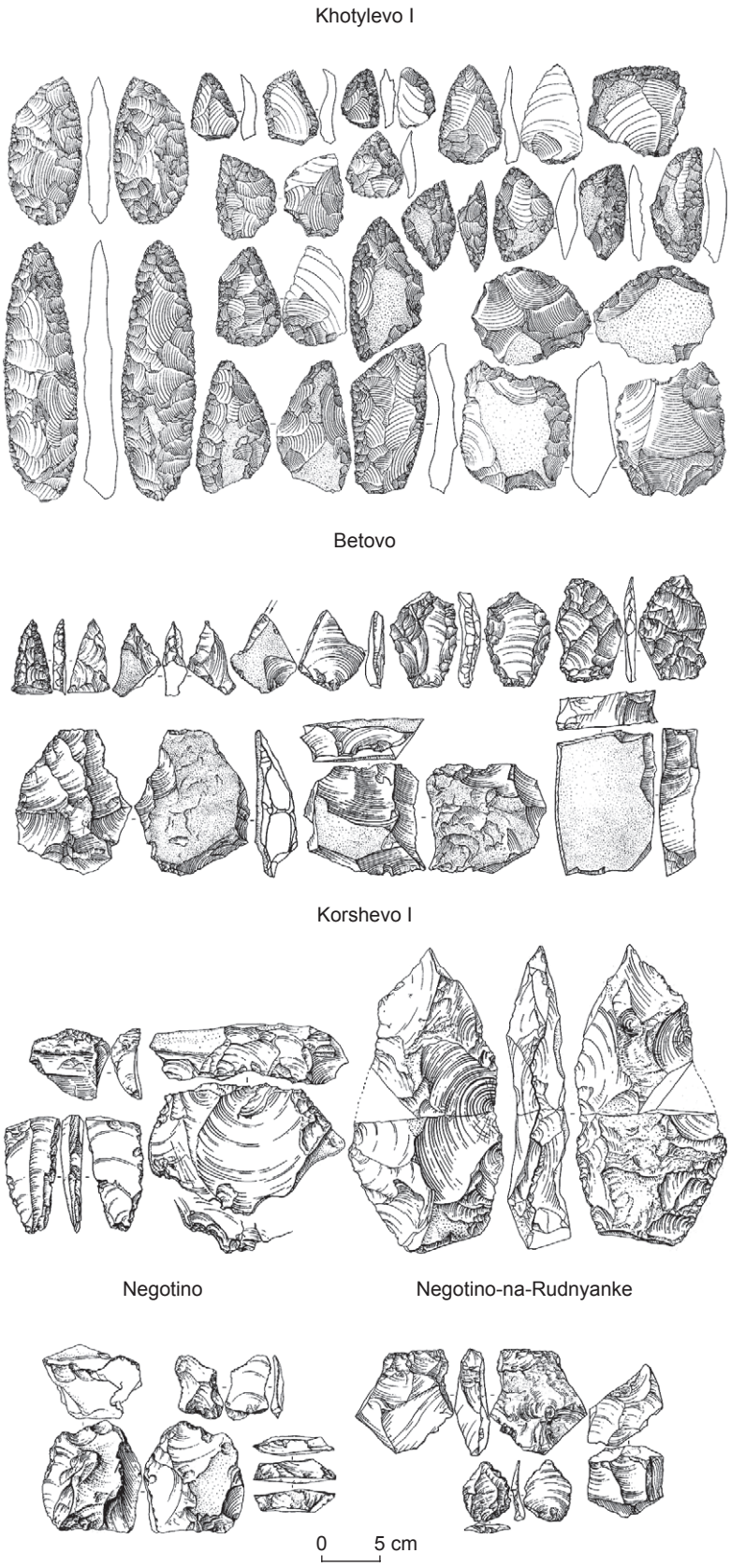

Fig. 4. Lithic artifacts from Khotylevo I, Betovo, Korshevo I, Negotino, and Negotino-na-Rudnyanke.

of Ilskaya I deposited in the Museum of Anthropology and Ethnography, Russian Academy of Sciences, in St. Petersburg (Schelinsky, Kulakov, 2005) represent a set of de-stratified materials, which are nevertheless of particular interest.

Betovo. The site is located on a large promontory formed by the Desna (from the north) and two its tributaries, Betovka and Korshevka (from the west and east). The promontory has an abrupt slope facing the Desna and gentle slopes role down to the two small rivers whose mouths are presently dammed. In the course of dam construction, Quaternary deposits on the right side of the Betovka valley were dug out and the Cretaceous bedrock (weathered grayish-white sandy chalk containing black flint concretions over the Cenomanian sand) exposed.

The 2007 section (Fig. 5) was added to the excavation made by L.M. Tarasov in

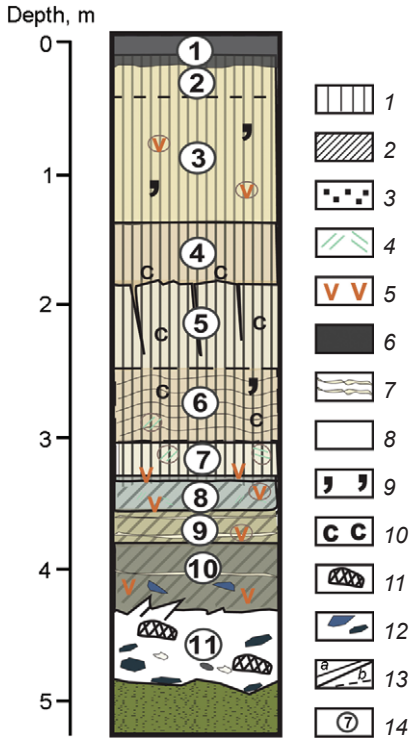

Fig. 5. Betovo lithological column.
1 – loess sandy loam; *2* – loam; *3* – sand; *4* – traces of gleying; *5* – ferriferous sediments; *6* – humus horizon of modern soil; *7* – sand lenses; *8* – humified loam with chalk inclusions; *9* – organic inclusions; *10* – carbonaceous inclusions; *11* – burrows; *12* – flints; *13* – stratum borders: distinct (*a*) and indistinct (*b*); *14* – stratum number.

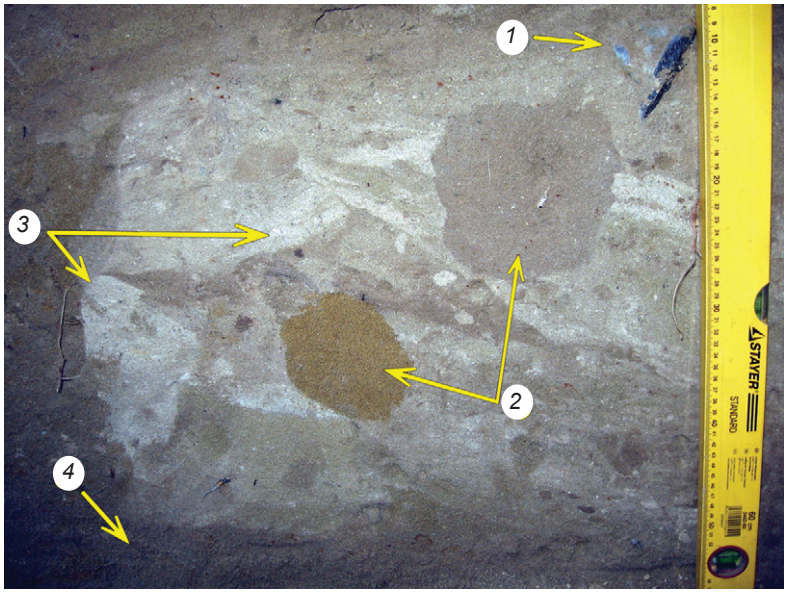

Fig. 6. Distribution of finds at Betovo.
1 – flint concretion fragments; *2* – burrows; *3* – chalk inclusions; *4* – Cenomanian parent sand.

1983. The profile wall shows inclusions of sandy chalk in the culture-bearing horizon. This layer consists of grayish-brown loam with an admixture of humus measuring a total thickness of 1 m. This layer covers bed sediments of greenish-yellow Cenomanian sand (stratum 11). The artifact-bearing horizon (stratum 10) is located at a depth of 3.9–4.9 m; it shows traces of deformation caused by slope processes. The layer has rodent burrows filled with gray humus-containing loam and sand from the underlying layer. This layer demonstrates numerous inclusions of flint plates and phosphorite, especially in its lower portion (Fig. 6). Stratum 9 represents laminar brown loam sediments overlain by a gley horizon (stratum 8). Covering sediments include laminar loess-like loam (strata 3–7) and modern soil (strata 1 and 2).

According to observations made by L.M. Tarasov, the eastern part of the roof of the Cenomanian sand dips towards the Betovka valley. There flint artifacts and bone remains were found deposited over a layer of speckled sediment composed of dark-gray, black, whitish, and reddish-brown lenses. Tarasov (1977) identified this sediment as redeposited material from the Mezin pedocomplex. Excavations at the eastern part of the site and studies of profiles and concentrations of bone remains, knapped flint, and lenses of charcoal suggest that this culture-bearing layer was found *in situ* (Tarasov, 1986). Tarasov also noted important features of the layer such as an abundance of flint plates and natural rock fragments used in lithic tool manufacture (1977).

The homogeneity of the Betovo assemblage together with the non-disturbed sediment sequence that was established at the second stage of works at the site provide evidence that the artifacts belong to a single archaeological complex (Fig. 4). The collection contains tools of various types: side-scrapers, end-scrapers, microscrapers, burins, backed knives, borers, beak-shaped tools, adze- and chisel-like tools, foliate bifaces, points, and chopping tools. Denticulate and notched tools dominate the assemblage; bifaces are few. Cores are mostly represented by discoid forms and flat single and double platform nuclei with a single flaking surface. The set of blanks mostly includes flakes. The Levallois flakes are few representing a specific feature of this collection. The presence of a cup-shaped implement made of mammoth metapodium is also noteworthy. According to Tarasov (1977, 1995), the distinctive feature of Betovo is its large proportion of denticulate and notched tools.

Korshevo I and II. These sites are located on a promontory projecting into the Desna valley formed by the Korshevka and its small tributary, 800 m south of the Korshevka confluence with the Desna. The artifacts forming the lower (Middle Paleolithic) culture-bearing horizons have been recovered from a layer of brownish-gray loam containing humus at a depth of approx. 2 m from the surface. The layer contains carbonaceous formations and chalk inclusions. Below the chalk layer, Cenomanian parent sand was recorded at a depth of 2.79–3.22 m from the surface (Tarasov, 1986).

Notch-denticulate tools constitute the most numerous tool category at Korshevo I. The tool group also includes various types of side-scrapers (with transverse and longitudinal working edge), backed knives that have been described as morphologically indistinct, microscrapers,

borers, chisel-like tools, and a beak-shaped implement. Four implements bearing traces of bifacial working are particularly noteworthy (Fig. 4). Tarasov compared the morphology of Korshevo I bifacial tools with Betovo and Korshevo II bifaces in his typological description of the collections. The category of cores includes transverse and narrow-faced varieties and a few radial and sub-prismatic cores. The category of spalls is dominated by flakes; Levallois flakes are absent as is the case in the Betovo lithic collection. The Korshevo tools like the Khotylevo I and Betovo tools were made from fragments of flint tabular rock (Ibid.).

The major difference between the lithic assemblages found in the lower layer of Korshevo I and II lies in the morphology (and possibly typology) of bifacial tools. The Korshevo II collection includes thick backed tools with traces of edge working on both surfaces. In addition, a small pit with a typical hearth fill was found in the chalk layer which Tarasov interpreted as a hearth. Large tools with signs of bifacial working were concentrated around the hearth-pit (Tarasov, 1995). No fauna remains were found at Korshevo I and II.

Negotino and Negotino-na-Rudnyanke. In 1939, V.A. Khokhlovkina discovered lithic artifacts in the vicinity of Negotino village. The artifacts occurred in the cobble and pebble layer filled with coarse-grained sand and fine loam. This culture-bearing horizon measuring 1 m thick was traced at the foot of the Desna right bank. The horizon was underlain by a bedrock of Cenomanian sand. A layer of gray from coarse- to medium-grained sand 11 m thick was noted above the culture-bearing horizon (Khokhlovkina, 1947). The total thickness of sediments excavated by Khokhlovkina measures approx. 25 m. In the 1970s–1980s, Tarasov continued excavations in the lowest portion of the section. The sediments of this culture-bearing horizon consist of lamellar lenses of coarse-grained sand with a considerable admixture of rock debris intercalated with discontinuous laminations of light brown loam. These overlay the Cenomanian sand layer located 4.5 m above the Desna water level.

The Negotino-na-Rudnyanke site is located approx. 300 m south of Negotino, on the left side of the Rudnyanka valley. In the early 1980s, Tarasov made small trenches and exposed a sediment sequence up to 3 m thick. A layer of light coarse-grained sand (from several cm to 50 cm thick) containing rock debris overlay the Cenomanian sand bed. Several artifacts were found among pieces of local black tabular flint. A somewhat different sequence of layers was revealed by A.A. Chibur and V.V. Minenko (2006) in the section made in 2000, 250 m west of Tarasov's excavation, upstream of the Rudnyanka. Artifacts occurred in a 0.1–0.45 m thick lens of tawny sandy loam filling a depression in the Cenomanian sand. The lens wedges outwards beyond the depression and is replaced by gray and white alluvial sand with an admixture of debris (including flint flakes) in the lower portion of the layer. The total thickness of sand layers reaches 0.6 m. Further up the section, the sands transit into slope sediments represented by yellowish brown lamellar loam with lenses of medium-grained sand and inclusions of chalk and flint fragments. At the present time, the Negotino-na-Rudnaynke localities are submerged by dammed water.

The Negotino artifact assemblages accumulated over a long period of time, do not form a single archaeological complex (Fig. 4). Tarasov's Negotino collection contains flakes, notch-denticulate tools, an implement with a bifacially worked edge, a microscraper, an adze-like tool, and backed implements. Judging by the description, the collection is morphologically heterogeneous. Indistinct hammerstones found together with tabular flints may, however, be regarded as indirect evidence of stone splitting practiced at the site (Tarasov, 1992).

Tarasov's collection of artifacts from Negotino-na-Rudnyanke differs from his collection from Negotino in the presence of cores and relative diversity of tool types. The category of cores includes disc cores with one flaking surface, flat core with one flaking surface, and a cube-shaped core. Levallois flakes are absent with the exception of one atypical specimen. Forty-three implements demonstrate signs of secondary working: side-scrapers, a small series of notch-denticulate tools, a backed knife, a beak-shaped chopper, implements bearing a burin spall made on a tabular piece of rock and on a flake, end-scrapers, microscrapers, borers, and implements fashioned on small fragments and rock chips. The main typological feature of the Negotino-na-Rudnyanke collection lies in the presence of tools with signs of bifacial treatment on one of the transverse edges. The prepared transverse edges demonstrate considerable use-wear signs. A quartzite hammerstone completes the collection (Tarasov, 1987).

Chronology of the Middle Paleolithic sites

Thus far, all Middle Paleolithic sites in the Desna basin have been viewed as independent archaeological sources, whose cultural attribution has been defined in the most general of terms. However, geological and archaeological facts suggest that these sites form a distinct group evidencing the human colonization of Eastern Europe at the beginning of the last glacial. Similarities can be traced in the lithological and stratigraphic sequence of sediments containing Middle Paleolithic artifacts. Such artifacts have been noted at sites with similar geomorphological location as well as in the morphology and typology of artifacts. At the present time, the assemblages from Korshevo I and II and Betovo are regarded as being closest in typology (Tarasov, 1995). In addition, all the collections

under discussion contain evidence of bifacial working represented by spalls resulting from bifacial flaking and by tools proper. Implements of Levallois forms and some other types of artifact have certain characteristic features in common. The Khotylevo I collection contains possible typological and chronological correlations with all other stratified Middle Paleolithic sites in the upper Desna basin. The Khotylevo implements posses all morphological features typical of artifacts from Betovo, Korshevo I (stratum 3) and II (stratum 3), Negotino, and Negotino-na-Rudnyanke.

Accurately determining the stratigraphic position of the sites and establishing a correlation between them poses difficulties due to varying depositional contexts and different states of preservation of the culture-bearing horizons. Khotylevo I, Negotino, and Negotino-na-Rudnyanke were completely redeposited and displaced; the Betovo cultural horizon was partially redeposited. Judging by the published data, only Korshevo I and II were found *in situ* (Tarasov, 1976, 1995). Based on the analysis of the 1960, 1970, 2000, and more recent field records, the stratigraphic position of Khotylevo I, Betovo, and Negotino can be assessed.

Some analogies can be traced in the location of the Negotino and Khotylevo I sites (excavations 1–3). The culture-bearing horizons at these sites show similar positions with respect to the modern Desna water level. The artifacts were recovered from the layers of the basal alluvium pebbles that overlie the Cenomanian parent sand and underlie thick sediments of gray coarse-grained sand. The chronological period, during which the lower portion of the alluvial sand at Khotylevo I was deposited, can be established by fauna remains attributable to the mammoth complex (including the early mammoth type). V.P. Grichuk (1969) defined pollen spectra constructed on samples from the gyttja lamination at Khotylevo I as transitional from the Mikulino to the Early Valdai plant communities. The chronological interval within the Early Valdai, when a comparatively fast deposition of artifacts in the basal alluvium horizon proceeded at Khotylevo I, can be tentatively correlated with the cold stage and periods of active erosion and deluvial-solifluction processes. This cold period followed the Krutitsy integlacial warming when the Krutitsy soil was formed.

Khokhlovkina and Tarasov correlate the Negotino artifact-bearing horizon with the washed out Riss moraine and on these grounds attribute the site to the Early Mousterian or even pre-Mousterian period.

However, tentative stratigraphic parallels between the two sites indicate that intense alluvial sedimentation at both Negotino and Khotylevo I occurred during the Early Valdai stage. If this is the case, then it is unlikely that the sites with typologically indistinct assemblages (Negotino, Negotino-na-Rudnyanke, and "amorphous" Khotylevo I) date to the pre-Mikulino stage. The suggested correlation of the Negotino Middle Paleolithic moraine deposits with the recovered artifacts should also be reconsidered.

At Betovo, Korshevo I and II, and, possibly, excavations 5 and 6 at Khotylevo I, the artifacts were incorporated into the loam of the deluvial-slope genesis overlying the Cretaceous bedrock. Watershed surfaces, valley slopes, and nets of small gorges associated with the Desna right bank may have been affected by the process of solifluction-deluvial redeposition of humified loam. This process coincided with periods of slope process activity in the interval between the end of formation of the Mezin polygenetic complex and the Middle Valdai megainterstadial. The Early Valdai age of the sites is supported by the data of pollen analyses conducted by G.M. Levkovskaya on samples from the Betovo culture-bearing horizon. Levkovskaya's reconstructions suggest that the site environs were mostly occupied by grass meadow with some mesophilic and tundra elements, and a minor admixture of arboreal and shrub taxa. The general fauna composition, established by N.M. Ermolova and I.M. Gromov on bone remains from the cultural horizon, is also typical of open spaces with steppe and tundra plant communities (Tarasov, 1977).

Conclusion

Stratigraphic correlations between the Middle Paleolithic sites with special reference to sedimentation and redeposition processes suggest that all these sites fall within Marine Isotope Stages 5d–4. Parallels concern both geomorphological position and the typology of lithic artifacts. The analysis of published data on the upper layers of Khotylevo I makes it possible to correlate its sediments with those of Betovo and Korshevo I and II. Parallels between the lower layers of Khotylevo I and Negotino suggest that the latter site is no earlier than the Early Valdai. Subsequent geomorphological and archaeological studies will hopefully assist in specifying both the absolute dates of the Middle Paleolithic sites of the upper Desna and their relative chronology.

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