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The Paleolithic of Central Asia

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The Lower Paleolithic of Central Asia is represented by several sealed and more or less firmly dated Lower–Middle Pleistocene cave and open-air sites in the southeastern part and by more numerous surface occurrences throughout the region. The assemblages assigned to the Lower Paleolithic form two rather distinct groups, one remarkable for well-made handaxes and the other characterized by cores and flakes with no handaxes. The distribution map of pebble industries and industries with handaxes shows that while the latter originate from the western regions of Central Asia, the former are concentrated in the eastern part of the area. The Middle Paleolithic assemblages of Central Asia do not form a single technocomplex. Their variability in time is difficult to assess, but variation in space is obvious. Very few Upper Paleolithic sites in this region are known. At the same time, their stone industries are very diverse and most of them differ sharply from each other and from sites in adjacent regions.

KEY WORDS: Paleolithic; Central Asia; stone artifacts.

INTRODUCTION

"Central Asia" is used here to designate the lands stretching from the Caspian Sea in the west to Tien-Shan in the east and from the southern Ural foothills and the Irtysh River in the north to the Pamirs and Kopetdag in the south. The region under consideration includes the territories of five

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nations (former Soviet republics): Turkmenistan, Kazakhstan, Uzbekistan, Tadzhikistan, and Kyrgyzstan. This is a huge area with highly variable natural conditions, and different parts of it have had different geological and environmental histories. I begin with a brief, geographically arranged survey of the main Paleolithic sites of the region (Fig. 1) and then proceed to a consideration of the most general questions arising from their study. This article represents an abridged and updated English-language version of a recently published book (Vishnyatsky, 1996) where readers competent in Russian can find more details and a nearly exhaustive bibliography.

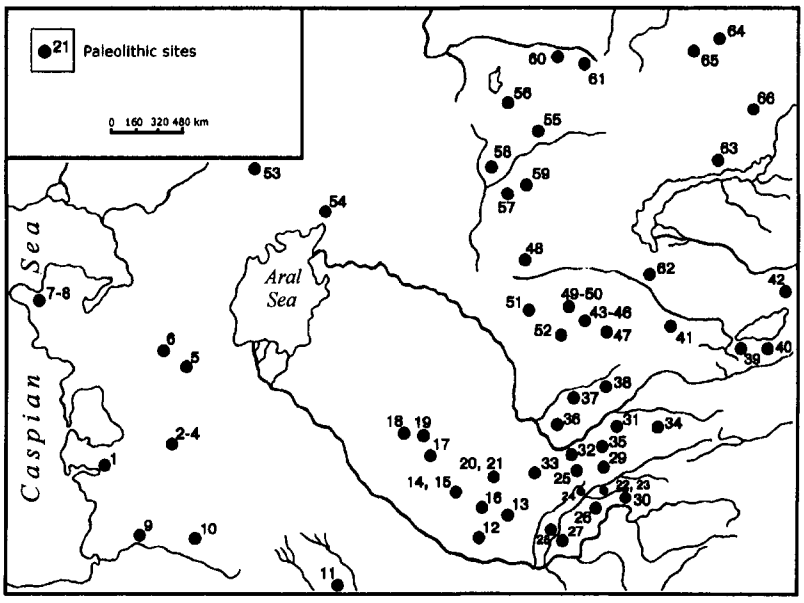

Fig. 1. Major Paleolithic sites of the former Soviet Central Asia and Kazakhstan. 1—Yangadja; 2-4—Ga-Kush, Kizyl-Burun, Alam-Kul; 5—Esen 2; 6—Karakuduk; 7, 8—Shakhbagata, Kumakape; 9—sites of Western Kopetdag; 10—sites of Central Kopetdag; 11—sites of Badghyz; 12—Balakhana; 13—Teshuk-Tash; 14, 15—Kuturbulak, Zirabulak; 16—Aman-Kutan; 17—Uchtut, Baush, Idzhont; 18—Kyzylnura 15 and 16; 19—Kyzylnura 1; 20—Samarkandskaya, Siabcha; 21—Khodjamazgil; 22, 23—Kuldara, Lakhuti 1; 24—Karatau 1; 25—Khudji; 26—Ogzi-Kichik; 27—Kara-Bura; 28—Ak-Dzhar; 29—Semiganch; 30—Shugnou; 31—Sel-Ungur; 32—Kairak-Kumy; 33—Dzhar-Kutan; 34—Kapchigai; 35—Khodja-Gor; 36—Kulbulak; 37—Khodjakent 1 and 2; 38—Obi-Rakhmat; 39—Salamat-Bulak; 40—Tossor; 41—Georgievsky Bugor; 42—Aktogai 1-4; 43-46—Borykazgan, Tanirkazgan, Akkol, Kzylkindyk; 47—Kemer 1-3; 48—Kazangap; 49, 50—Tokaly 1-3, Zhanatas, etc.; 51—Koshkurgan 1-3, Shoktas 1-3; 52—Karasu; 53—Zhalpak; 54—Aralsk; 55—Tuemainak 1; 56—Ak-Koshkar; 57—Jaman-Aibat; 58—Muzbel ; 59—Aidarly 2; 60—Vishnevka; 61—Batpak; 62—Khantau; 63—Semizbugu; 64—Taskuduk 1; 65—Angrensor; 66—Chingiz.

PALEOLITHIC SITES OF CENTRAL ASIA

The Paleolithic of the Desert Plateaus Between the Aral Sea and the Caspian Sea

Arid lands lying in the west of the region under consideration between the Caspian Sea and the Aral Sea are very similar in both their geological history and their geomorphology. These are denudation plateaus covered with a solid stratum of porous, Neogene, marine limestones. The monotony of this flat country is broken either by deep karstic-deflation depressions or by chains of hills and low mountain ranges, often with steep walls. The environmental history of these westernmost regions of Central Asia and Kazakhstan is intimately connected with the history of the Caspian Sea. The alternation of the sea transgressions and regressions, and of the corresponding deposits, provides the basis for the geological periodization of the Late Cenozoic of this region (Fedorov, 1957; Leontiev *et al.*, 1977). Unfortunately, due to the scarcity of available data, it is impossible to provide any detailed paleogeographic reconstructions of this region. In general the late Cenozoic of the Aral–Caspian region, as well as the whole of Central Asia, is characterized by increasing aridity of climate, which is clearly manifest in palynological spectra (Valueva, 1973; Pakhomov, 1973). At the same time both the Pleistocene and the Holocene witnessed some relatively more humid and cold periods which are usually correlated by palynologists with the transgressive stages of the Caspian and are believed to have been accompanied by some expansion of the areas occupied by boreal vegetation (Malgina, 1961; Abramova, 1985). There are only isolated faunal remains from the Pleistocene and these are of little use for paleogeographical analysis. Overall, the scarce paleoenvironmental evidence indicates that, despite the increasing aridity, there could have been at least some periods when the western deserts of Central Asia were less hostile and humans could have lived there. Archaeological data confirm this supposition. At present, Paleolithic sites are known in the following areas: (1) the Krasnovodsk peninsula, (2) the Trans-Uzboi folded area, (3) the Usturt plaleau, and (4) the Mangyshlak peninsula. No stratified (sealed) Paleolithic sites have yet been found in the region. Moreover, since erosion and denudation predominate over accumulation processes here (as they did in the Pleistocene), it is highly probable that surface finds will remain the major or the sole source of information about the Paleolithic over most of this territory.

The Krasnovodsk Peninsula. This peninsula juts out into the Caspian Sea, with the Krasnovodsk gulf to the south and the Kara-Bogaz-Gol gulf to the north. Most of the peninsula is occupied by the plateau of the same

name, and all finds of Paleolithic tools from the region are associated with the southern slope of this plateau (Vishnyatsky, 1989d). The slope faces the sea plain and is deeply cut by many dry channels which originate on the surface of the plateau and descend onto the plain. The remnants of the slope between the channels are mostly rather narrow and represent sequences of well-developed erosional terraces. It is on the surfaces of these terraces that most of the stone artifacts are found. The *Yangadja* site, discovered in the middle of this century by A. P. Okladnikov, represents a very large workshop containing materials dating from at least the Middle Paleolithic to the Neolithic. One of its surface sections has yielded a collection of bifacial tools (no more than 20), with several undoubted handaxes among them (Vishnyatsky, 1989a). From this section, only bifaces, unretouched flakes, and a few irregular cores were collected, while other tools were absent. Though small in number and without firm geological context, these finds deserve special description as they represent a tool type which is very rare in Central Asia.

All of the tools on the site are made from locally available flint. It is worth noting that the surfaces of all the artifacts from the biface complex are covered by intense "desert varnish" which is almost totally absent on the Neolithic tools of the same flint (endscrapers, projectile points, prismatic cores) scattered a few hundred meters away from the place where the bifaces were located. One of the handaxes has lost its base (Fig. 2: 1), evidently as a result of an unhappy effort to refine the medial part of the tool. The distal end is carefully worked by bifacial flaking, which is completed with retouching on some sections of the edge. A second handax also has a fracture on the proximal end (Fig. 2: 2), but this fracture was used afterward as a striking platform for refinement of the base, and hence we can regard the tool as essentially unbroken. In addition, the base of a carefully worked, symmetrical handax was found, as well as two smaller bifaces which are very close to handaxes in their shape and method of manufacture, but one of these is apparently unfinished and the other is heavily damaged. The rest of the bifaces in the collection represent either unfinished handaxes or the blanks for some other unfinished tools. Proceeding, first, from the typological characteristics of the handaxes and, second, from the fact that no bifaces are known in the Middle Paleolithic assemblages of Central Asia (with one exception), I consider it most plausible (but not indisputable) to classify these tools as Acheulean.

The finds of putative Middle and Upper Paleolithic artifacts have been reported from several other localities on the southern slope of the Krasnovodsk plateau (Boriskovsky, 1947; Okladnikov, 1949b, 1956, 1966, Dolukhanov, 1977).

The Trans-Uzboi Folded Area. This region is located in the northwest-

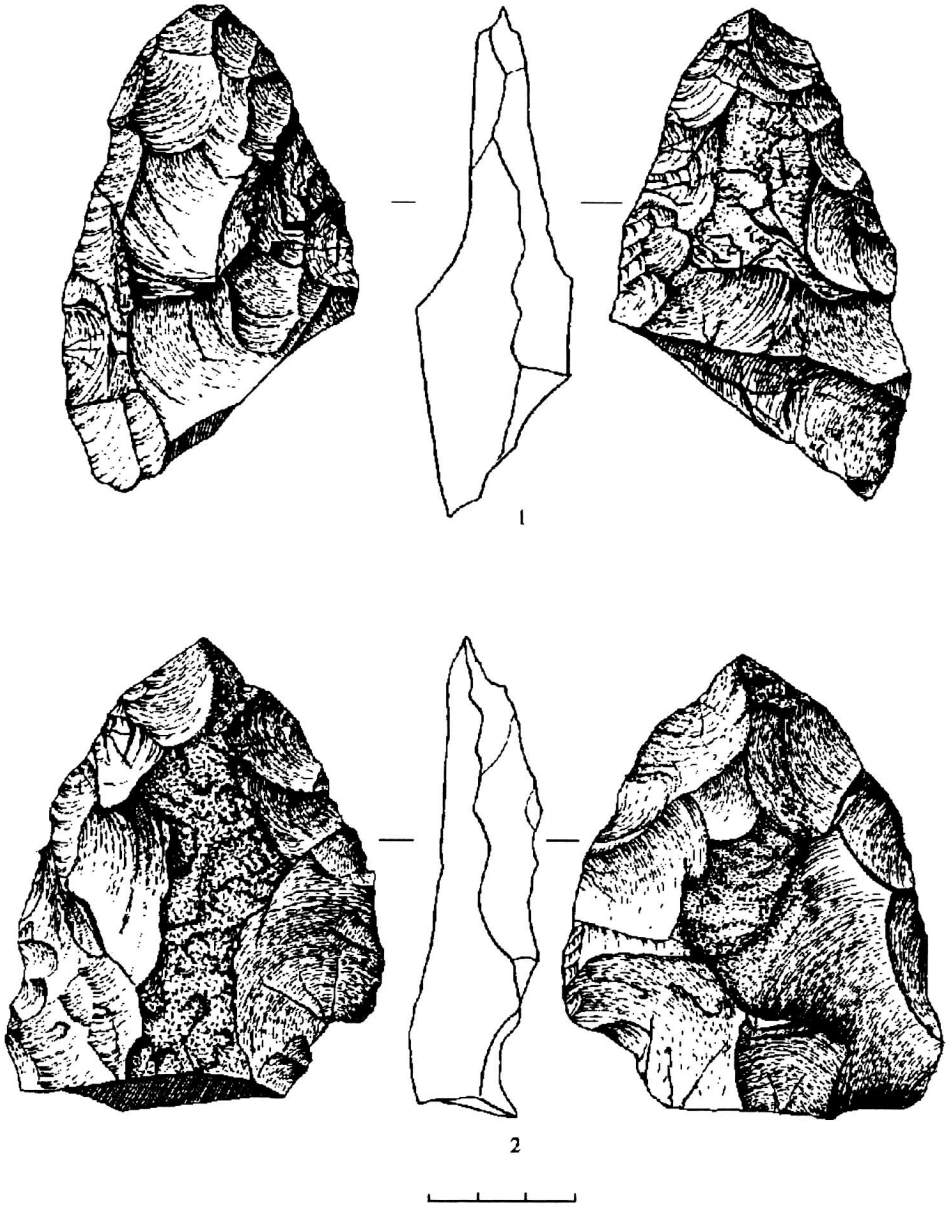

Fig. 2. Handaxes from the southern slope of the Krasnovodsk plateau.

ern part of Turkmenistan, bordered by the Uzboi dry channel to the south and southeast, the Kara-Bogaz-Gol depression and Kemal-Uzboi narrow to the west, and the Usturt precipices to the north. Paleolithic materials come mainly from four localities (*Ga-Kush, Kizyl-Burun, Alam-Kul,* and *Begarslandag*) in the southeastern part, known as the Begarslan-Tekedjik low mountain area (Abramova and Mandelshtam, 1977; Liubin, 1984; Vishnyatsky, 1990). All the finds were collected in similar geomorphological contexts within the limits of a Neogene-Quaternary proluvial plain, so that their geomorphological position yields no information on their age. None of the four locations has clear limits, and isolated artifacts or even small accumulations are widely dispersed over many kilometers.

Though the collections are by no means homogeneous and even contain some admixture of post-Paleolithic artifacts (which can easily be distinguished by both morphological criteria and their state of preservation), the study of the material leaves no doubt that most of it is attributable to the Middle Paleolithic. Furthermore, the Middle Paleolithic inventories of different sites look very similar to each other in their typology, raw material, and state of preservation. Altogether they include about 1000 items, most of which are of good-quality, gray flint from local Late Cretaceous deposits. Both intact nodules and large pieces of this flint are readily accessible in the environs of each site. The cores are dominated by the single-platform variety with parallel flake scars and single-or double-sided discoidal cores (Fig. 3: 10, 11). Blades are extremely rare, and flakes usually have plain platforms and dorsal scar patterns corresponding to the character of the cores (that is, either parallel or convergent). Tools are represented by single straight, single convex, double, and convergent sidescrapers (Fig. 3: 1, 2, 4–8; Fig. 4: 1–4), one bifacial sidescraper (Fig. 4: 5), notches (Fig. 3: 3), truncations (Fig. 3: 9), and rare backed knives. About half of all tools are made not on flakes but on natural slabs and other nodules, and this is why many of them are naturally backed.

The Usturt Plateau. The plateau is situated to the southwest of the Aral Sea in western Kazakhstan and Karakalpakia. A characteristic feature of its relief are numerous depressions, which is where all the Paleolithic sites have so far been found. The *Esen 2* site (Bizhanov, 1979; Vinogradov, 1981, pp. 54–56; Vishnyatsky, 1996, pp. 32–34) is located in the southern part of the Barsakelmes depression close to chert outcrops. About 60 bifaces and 150 flakes and chips were collected here from a 90 × 40-m area. True cores and retouched flakes are completely absent. One-third of the bifaces are in the initial stage of preparation, while the rest are nearly or completely finished, but represented mainly by fragments. The morphology of the few nearly intact and finished bifaces and the most representative fragments suggests that their makers sought to produce thin, but wide and rather long

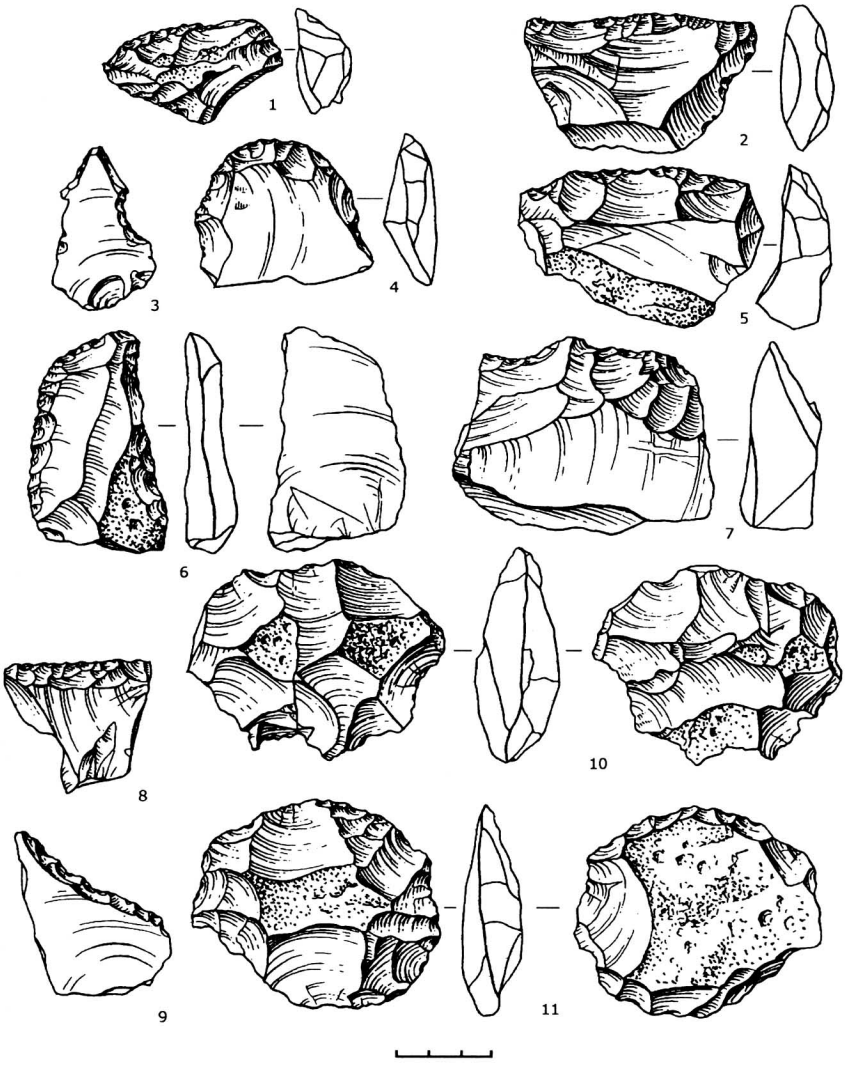

Fig. 3. Middle Paleolithic cores (10, 11) and tools (1–9) from the Trans-Uzboi folded area. 1–3, 5—Kyzyl-Burun; 4, 6–11—Alam-Kul.

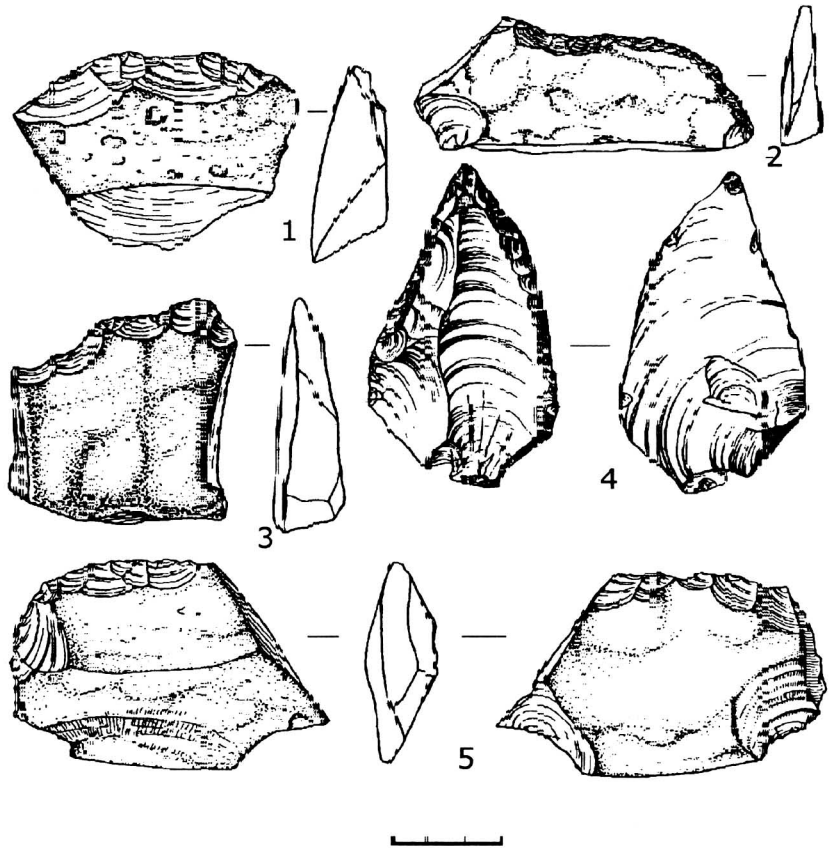

Fig. 4. Middle Paleolithic tools from the Trans-Uzboi folded area. 1, 3, 5—Alam-Kul; 2—Ga-Kush; 3—Begarslandag.

(no less than 10- to 12-cm) tools with pointed ends and sharp edges. This was done by detaching large, flat removals sometimes followed by the retouching of parts of the edge. *Karakuduk* (Bizhanov, 1979) is another large site, located on the northern slope of the Barsakelmes depression. The collection includes over 900 items of silicified limestone, which are mainly nodules exhibiting single removals and primary flakes detached from such nodules. Most interesting are 12 bifaces in different stages of preparation, none of which can be called finished. Probably both Esen 2 and Karakuduk should be considered workshops devoted primarily to the manufacture of bifaces. The age of these sites remains debatable. According

to E. Bidjanov (1983, 1988), the oldest bifaces are Acheulean handaxes, but this appraisal, though credible, is not supported by any solid arguments. It cannot be ruled out that at least some of the finds are of post-Paleolithic age.

The Mangyshlak Peninsula. This peninsula is in the extreme west of Kazakhstan and juts out into the Caspian Sea between the Kara-Bogaz-Gol gulf (to the south) and the Mangyshlak gulf (to the north). Most Stone Age research in the region has been concentrated on the southern shore of the Sarytash gulf (Tubkaragan Peninsula), where flint workshops were found along the dry channels, *Shakhbagata* and *Kumakape,* and in some other locations. There are many flint bifaces and some true handaxes in the collections from Shakhbagata and Kumakape, and the dating problem is now the most important one. According to A. Medoev (1982), who found and collected the material, some handaxes are Acheulean, but in his book, published posthumously, this inference was not firmly substantiated. All the finds are without reliable geological context, which impedes dating of the material. After examining some of the collections from Mangyshlak, I believe that material of different time periods, including the Neolithic, is mixed on these sites but that the presence of some Paleolithic handaxes is incontrovertible (one of these is depicted in Medoev, 1982, Fig. 6).

Paleolithic of the Southwestern Mountain Area (Kopetdag and Badghyz)

Kopetdag. This is the northern range of the Turkmen–Khorasan mountain system, representing a natural border between Turkmenistan and Iran. Its total length is about 500 km. This region, like many others, is still unexplored. No more than 200 objects claimed to be Paleolithic artifacts have been reported, and it is highly probable that some of these are not artifacts. All of them are surface finds collected at different times by different researchers in the western, central, and eastern parts of the range.

All Paleolithic finds in the Western Kopetdag are located in the valleys of the Sumbar (a tributary of the Atrek) and Chandyr (a tributary of the Sumbar) rivers, not far from the town of Kara-Kala. V. P. Liubin collected slightly more than 100 stone artifacts here, which were found, as a rule, on the eroded slopes of the hills among many natural pebbles (Liubin, 1984, pp. 28–31; Vishnyatsky, 1996, pp. 37–43). All the objects are made from local limestone and chert. Unfortunately, there is so far no firm geological basis for dating. On typological grounds, Liubin dated the oldest of them

as Acheulean, but this is questionable, since no bifaces were found. On the other hand, the predominance of large pebble cores, chopper/chopping tools, massive side-scrapers, and crude flakes allows us to regard the Western Kopetdag as an area where pebble industries were present in the past. There are also some tools (including what can be called Levallois cores and either a point or convergent side-scraper) which may be regarded as signs of the existence of a true Mousterian in the region.

Central Kopetdag was briefly investigated by V. A. Ranov and B. K. Luzgin in 1964 (Luzgin and Ranov, 1966). They collected about 30 stone items at three locations (*Tomchi-Su, Otalgyzov,* and *Yablonovskoe*). All the objects thought to be Paleolithic tools were made from soft limestone pebbles, which "has caused the very poor preservation of the artifacts" (Luzgin and Ranov, 1966, p. 90). Nonetheless, Ranov succeeded in defining cores, flakes, side-scrapers, and also "at least 4 chopper/chopping tools among them" (Luzgin and Ranov, 1966, p. 90). Most of these finds were considered Mousterian and the rest either Mousterian or Late Acheulean (Luzgin and Ranov, 1966, p. 93; Ranov, 1971, p. 231). Though no drawings of the chopper/chopping tools have yet been published, the claim of their presence is worthy of note.

On the basis of the available descriptions and drawings, the materials from the Central Kopetdag are very similar to those from the eastern part of the ridge. Here, in the valley of the River Keshefrud, not far from Meshhed, about 60 stone objects (quartzite, quartz and andesite) were collected, which according to Thibault and Ariai are cores, flakes, denticulates, crude side-scrapers, and choppers/chopping tools (Ariai and Thibault, 1975–1977). The supposed geological age of the finds—800,000–1,000,000 years (Ariai and Thibault, 1975–1977, p. 106)—is uncertain and seems to me questionable; in any case, it is in need of additional substantiation.

Badghyz. This deserted hilly land between the Tedgen and the Murgab rivers represents the northern part of the Paropamiz foothills. Today, it has almost no permanent water sources, though the analysis of ancient channels and ravines led some researchers to the conclusion that Badghyz witnessed the appearance of permanent and rather powerful water streams more than once during the Quaternary (Babaev and Gorelov, 1985). Single objects defined as Mousterian cores and flakes were reported to be found in the environs of the *Rakhmatur* spring close to the Iranian border (Luzgin and Ranov, 1966, p. 93; Beregovaya, 1984, p. 48), but neither drawings nor descriptions have ever been published. The same also applies to the somewhat more numerous materials collected by G. V. Ivanov (1979) in the *Pinhan, Dash-Guyu,* and *Egri-Gek* locations in the south-western part of Badghyz and assigned by him to the Mousterian and Upper Paleolithic, respectively.

The Paleolithic of the Southeastern Mountain Area (Tien Shan and Pamirs)

Two great mountain systems in the southeast of Central Asia—the Pamirs and Tien-Shan—form a single mountain country. A considerable part of this country lies above 5000 m and the highest ridges exceed 7000 m. At the same time, there are many depressions and large valleys where friable deposits were accumulating during the Pleistocene which contributed to the conservation of archaeological and accompanying materials. The Paleolithic sites of the Tien-Shan and Pamirs are distributed unevenly: they form several more or less compact territorial groups localized in different geomorphological regions. The description of the sites is given below according to their geographical position: (1) southern Tien-Shan, (2) Tadjik depression, (3) Fergana depression, (4) northwestern Tien-Shan, (5) northern and central Tien-Shan, and (6) Karatau range and adjacent regions of southern Kazakhstan.

Paleogeography. The initial stages of the formation of the present relief of the Pamir and Tien-Shan mountains are believed to date to the middle Miocene, and the major stages occurred during the Late Pliocene and Pleistocene. The rise of the mountains, which became a barrier to the humid air masses coming from the southeast (the Indian subcontinent), had a substantial effect on the climate of the region. The climate became increasingly arid, which led to changes in fauna and flora. Palynological data indicate that each succeeding stage is characterized by poorer vegetation than its predecessor (Pakhomov, 1973), so that in the Late Pleistocene no more than 10–15 floral genera have been reported (even for the most humid periods), while in the Middle Pleistocene their number reached 26 (Nikonov *et al.,* 1989). A great controversy exists regarding the correlation of mountain glaciations with climatic events. While one group of researchers believes that high-mountain glaciations were accompanied by cooling and increasing humidity in lower-lying periglacial areas (Pakhomov *et al.,* 1980; Nikonov *et al.,* 1989; Pakhomov, 1991), the other bases its paleogeographical reconstructions on the assumption that glacial stages were characterized by more arid and continental climates, while interglacials were characterized by increased precipitation and temperatures (Dodonov and Ranov, 1984; Dodonov, 1986). In any case, it is beyond doubt that, despite increasing aridity, there were also more humid periods when humans could live in the region. This is evidenced both by numerous Paleolithic sites dating from different times and by palynological data (Serebrianyi *et al.,* 1980; Nikonov *et al.,* 1989).

Several local geological schemes have been worked out to describe the Quaternary terrace formations. Especially important are those designed

for the Tadjik depression and the Zeravshan valley (Kostenko, 1958) and for West and Central Tien-Shan (Skvortsov, 1949; Vasilkovsky, 1957). The major units distinguished in these schemes can easily be matched with the Lower, Middle, and Upper Pleistocene (Table I). They correspond to lower terrace formations, which usually do not exceed 200–250 m above river level. Higher terraces are dated to the Pliocene and Basal Pleistocene.

Southern Tien-Shan. The Paleolithic sites of southern Tien-San can be divided into two regional groups. The first one is confined to the Hissar range area, and the second to the Zeravshan river valley and the adjacent mountain and desert areas.

The westernmost site is *Balahana,* located in the southwestern part of the Hissar range in the Kughitang mountains (eastern Turkmenistan). Over 200 artifacts made mainly of silicified limestone and fine-grained quartz sandstone were gathered from the surface of dry badland hills (Liubin and Vishnyatsky, 1990). The collection includes various cores (including Levallois), flakes, and a dozen retouched tools. Of interest is a series of scrapers made on massive or thin subrectangular blanks, at least one of which is clearly a truncated–faceted piece (Debénath and Dibble, 1993, p. 123). The whole assemblage is believed to date from the Middle Paleolithic.

Much more abundant materials come from another part of the southwestern spurs of the Hissar range, namely, from the Baisuntau mountains. It is here that the *Teshik-Tash* cave is located—one of the best known Paleolithic sites of Central Asia (Okladnikov, 1949a; Movius, 1953; Bordes, 1955). It is situated 18 km north of the town of Baisun (Uzbekistan) in the middle part of the Zautolosh gorge, at an altitude of 1800 m above sea level (asl) and 6 m above the gorge bottom. The cave is 21 m long, and its width and height at the mouth are, respectively, 20 and 7 m. Excavations were carried out in 1938 and 1939 by Okladnikov, who exposed 137 m^2, that is, "the whole area of the cave which was filled with cultural remains" (Okladnikov, 1949a, p. 9). Okladnikov was able to distinguish five cultural layers separated by sterile strata. The total thickness of the deposits did not exceed 1.5 m, and the upper cultural layer—the thickest and richest one—occurred at a depth of 5–20 cm from the present surface. According to Okladnikov's description, each cultural layer contained two or three

Table I. Terms Used to Describe Quaternary Deposits in Some Parts of Central Asia

General terms	Tadjik depression, Zeravshan, Kashkadaria	West and central Tien-Shan
Holocene	Amudaria complex	Syrdaria complex
Upper Pleistocene	Dushanbe complex	Golodnaya Steppe complex
Middle Pleistocene	Ilyak complex	Tashkent complex
Lower Pleistocene	Vakhsh (Kulyab) complex	Nanai (Sokh) complex

hearths and/or fireplaces, around which most lithics and bones were concentrated. Faunal remains are dominated by *Capra sibirica,* which make up 83% of the whole assemblage (or 99% if rodents are excluded). In addition, there are single bones of horse (*Equus caballus*), deer (*Cervus elaphus*), brown bear (*Ursus* cf. *arctos*), leopard (*Felis pardus*), and, supposedly, cave hyaena (*Hyaena* sp.?) (Gromova, 1949). Rodents are represented by hare, marmot, field vole, dormouse, and several other species. No substantial difference can be observed between layers in faunal remains (see Okladnikov, 1949a, Tables 2 and 3).

Teshik-Tash is famous for the discovery of the remains of a Neanderthal child. In the lowermost part of the first (upper) cultural layer at a depth of 25 cm from the surface, a skull was found that was crushed and flattened in such a way that all the fragments lay almost in the same plane and in natural order. Several more human bones (a mandible, a vertebra, a scapula, clavicles, rib and long bone fragments) were found slightly below the cranium, occurring roughly on the same level, close to each other, but not in anatomical order. According to Okladnikov, the Neanderthal remains were encircled by several (five or six) pairs of goat (*Capra sibirica*) horns; this has served subsequently as the major argument to prove the intentionality of the burial and the existence of a rather complex burial rite (Okladnikov, 1949a, pp. 32–42)

The overwhelming majority of stone artifacts is made of siliceous limestone, which was readily accessible, as it makes up both the mountain and the walls of the cave itself. In addition, there are several jasper and quartzite items. Altogether over 2000 lithics were collected, most of which are crude unretouched flakes and chips followed by trial cores (pieces of rock with single flake scars). True cores are dominated by discoidal and single-platform types exhibiting, respectively, centripetal or parallel removals. Blades and Levallois flakes are extremely rare. Tools are represented nearly exclusively by sidescrapers, often transverse, and retouched flakes. Except for two or three convergent sidescrapers (Fig. 5: 4, 5), all the other tools in this category have only one retouched edge (Fig. 5: 6, 7). There are also several retouched blades (Fig. 5: 1–3) and objects with burin facets, but on the whole the tool set is very poor and monotonous. Contrary to what is sometimes asserted in the literature, neither endscrapers nor handaxes are present among the tools, nor is there any observable difference in inventory composition between layers.

Although from the very beginning it was clear that we are dealing with a Mousterian industry, a great controversy still exists regarding its precise definition. It has been classified as Charentian and Typical Mousterian, considered to be Levallois and non-Levallois, early and evolved, and similar to or different from the other Central Asian Mousterian sites

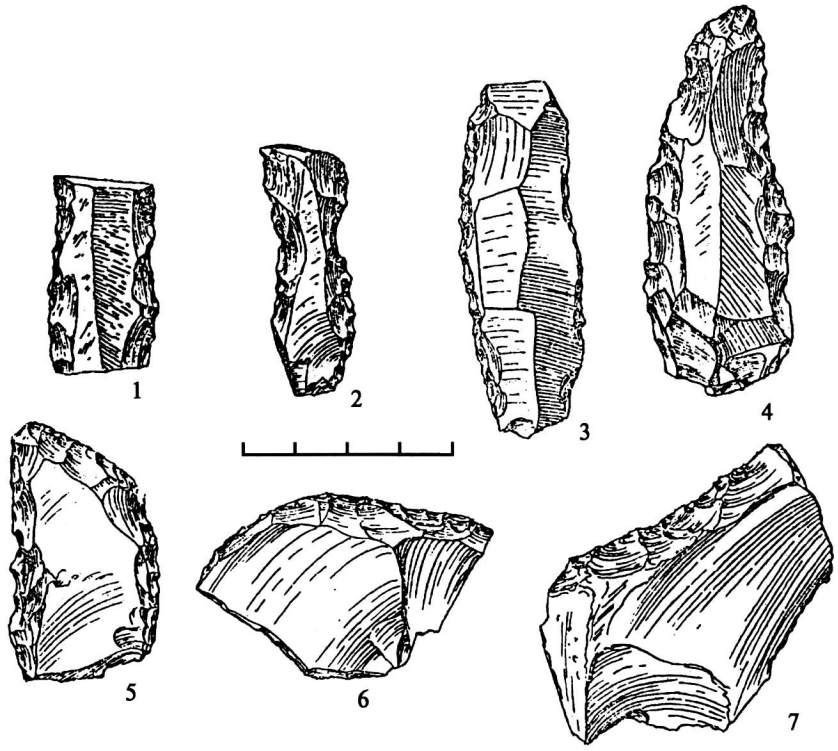

Fig. 5. Tools from Teshik-Tash. (After Okladnikov, 1949a.)

(Okladnikov, 1949a, p. 82; Davis and Ranov, 1979, p. 256; Ranov, 1984, p. 314; Abramova, 1988, p. 4; Gabori, 1988, pp. 289–290). In all likelihood, the character of the industry is determined, first, by the low quality of the raw material and, second, by its abundance. The rarity of tools resulting from repeated resharpening (points, limaces, double and convergent sides-crapers) may be due to the fact that it was more expedient to make new tools than to renew worn ones.

Judging by the similarity of cultural and faunal materials from different layers, the assemblages may be very close in time, but their date remains unknown and no serious attempts have been made to date the deposits. The prevailing view in the literature is that the archaeological and paleoanthropological materials of Teshik-Tash date from the Last Interglacial or early Last Glaciation (Movius, 1953; Okladnikov, 1966, pp. 45–46; Liubin, 1970, p. 27)

Another Paleolithic site discovered in the Baisuntau mountains is the

Amir-Temir shelter 1.5 km north of Teshik-Tash (Okladnikov, 1940). The trench set in the central part of the shelter exposed three cultural layers, the lowest of which occurred at a depth of 1 m and contained *Capra sibirica* bones and a few lithics (including a subprismatic core and a large sidescraper) defined as Mousterian.

Several Paleolithic sites were studied in the middle part of the Zeravshan river basin. The most important of those dating from the Middle Paleolithic is *Kuturbulak,* located near the spring of the same name 100 km west of Samarkand (Tashkenbaev, 1973, 1975; Tashkenbaev and Suleimanov, 1980; Grechkina and Tashkenbaev, 1990; Shimchak and Grechkina, 1996). The first excavations, conducted in 1971–1972, exposed an area of 165 m^2, and since 1995 work has been resumed and the excavation area enlarged. The thickness of the exposed deposits reaches 2.5 m. The site is considered multilevel, but neither the number of cultural layers nor their character (totally redeposited from the upper terrace or only slightly displaced within the limits of the original location) has been truly ascertained (Ranov and Nesmeyanov, 1973, pp. 88–89; Nesmeyanov, 1977, p. 220; Tetyukhin *et al.,* 1978; Tashkenbaev and Suleimanov, 1980, pp. 11–18; Medvedev and Nesmeyanov, 1988, pp. 139–140; Shimchak and Grechkina, 1996, p. 67). Controversy also exists regarding the age of both the terrace and the site itself. Paleolithic artifacts were associated with faunal remains, but only a very general description of the latter is available. The identified bones are dominated by horse (*Equus caballus*), which makes up about half of the assemblage (49.3%). There are also ox (*Bos* or *Bison*), wild ass (*Equus hemionus*), and deer (*Cervus elaphus*).

The 1971–1972 collection includes about 8000 stone artifacts made primarily of diorite (fine-grained quartz sandstone) and quartzite pebbles abundant in the river floodplain 6 km north of the site. The quartzite assemblage differs sharply from the diorite and looks much more rough and archaic. There are no quartzite blades and few tools (these are mainly irregularly retouched flakes and notches), and most core-like pieces exhibit only single flake removals. Since the quartzite artifacts have not yet been characterized in any detail, the following short description relates to the nonquartzite assemblage only. The latter includes more than 600 cores (Fig. 6: 8, 13, 14, 16), about half of which are one-sided discoidal cores with centripetal flake removals. Many of them are small and exhausted and represent, probably, the final stage of core reduction sequence. Double-platform bipolar cores and single-platform cores with parallel flake scars are also very common. Blanks are dominated by flakes, but blades are fairly numerous (27% of blanks excluding chips and primary flakes). Most blades and many flakes are retouched, so that the assemblage is notable for its high percentage of tools (Fig. 6: 1–7, 9–12, 15, 17), which may

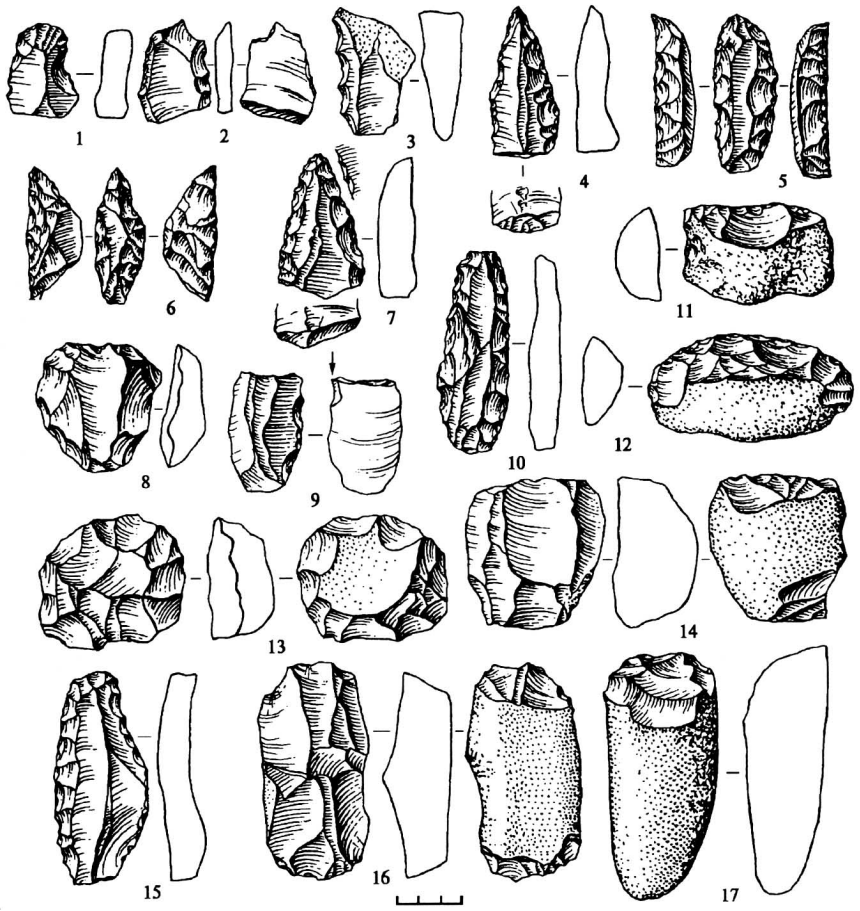

Fig. 6. Kuturbulak. Tools (1–7, 9–12, 15, 17) and cores (8, 13, 14, 16). (After Tashkenbaev and Suleimanov, 1980.)

constitute half or more of the nonquartzite items. They include retouched points, rare but well-made limaces, single and double sidescrapers made on split pebbles or on elongated flakes, rather small notches and denticulates, infrequent but clear endscrapers, burins and perforators, and hundreds of retouched blades and flakes which cannot be defined more precisely. In addition, there are about a hundred flaked pebbles defined as choppers and chopping tools, but many of them may actually be trial cores or precores. Some tools are truncated–faceted pieces. The great number of retouched artifacts, including many intensively resharpened tools, the fact that even

many small, amorphous flakes bear traces of retouch or utilization, and finally, the abundance of heavily reduced, exhausted cores indicate that the Kuturbulak hominids used fine-grained raw materials very economically. This, along with the location of the site (near a spring, in the rear part of a terrace) allows us to consider it a place of long-term occupation.

Another Middle Paleolithic site called *Zirabulak* is located 1 km east of Kuturbulak, also near a spring (Tashkenbaev and Suleimanov, 1980, pp. 61–66; Tashkenbaev, 1987; Grechkina, 1990). In historic times, the site was seriously disturbed by building works, and the Paleolithic artifacts found both on the present surface and at a depth of over 2 m were mixed with medieval ceramics. The collection includes about 1000 lithics. Typologically this material is very similar to that of Kuturbulak, and the same kinds of raw materials were used.

Middle Paleolithic materials were also discovered in several caves in the western horns of the Zeravshan range. The most important and well known of these is *Aman-Kutan,* 45 km east of Samarkand (Lev, 1949; Bibikova, 1958; Tashkenbaev and Suleimanov, 1980, pp. 66–68; Djurakulov and Mamedov, 1986, pp. 56–57). The cave is 1.5 m wide and 0.9 m high at the mouth, and inside it widens to 2.5 m and its vault reaches a height of 2.6 m. The altitude is about 1300 m. Excavations carried out by Lev in the middle of the century left no deposits in place so that no further work is possible. Stone tools and animal bones are reported to occur in tufas and clays, where traces of hearths and fireplaces were also found. No distinct layers were observed, and the total thickness of the artifact-bearing deposits varied from 0.25 to 1.5 m. Bones are represented mainly by small fragments, more than half of which are not identifiable. Identifiable bones are dominated by wild sheep (*Ovis orientalis;* at least 116 animals). Brown bear (*Ursus arctos*), Siberian deer (*Cervus elaphus canadensis*), roe deer (*Capreolus pygargus*), wild goat (*Capra sibirica*), cave hyaena (*Crocuta spelaea*), fox (*Vulpes vulpes karagan*), wild ass (*Equus hemionus*), rodents, birds, and steppe tortoise (*Testudo horsfieldi;* represented by 843 bones, at least 105 individuals) were also present. The collection of stone artifacts consists of slightly more than 200 items of flint, siliceous limestone, diorite, and quartzite. It is said to include cores, flakes, points, endscrapers, perforators, and even some leaf-shaped tools, but the latter are depicted differently in different publications and they could be accidental forms (see, however, Gabori, 1988, pp. 288–289). The small size of the cave and the fact that the number of bones is almost 80 times as high as the number of lithics lead to the conclusion that the site served as a hunting camp (Liubin, 1970, p. 36). The dating problem remains unresolved, as is the case with the overwhelming majority of the Central Asian Paleolithic sites.

In the horns of the Nurata range, 200 km northwest of Samarkand,

there are several workshop locations (*Uchtut, Vaush,* and *Idzhont*) devoted primarily to the extraction of raw materials from the local flint and silicified limestone outcrops (Kasymov, 1972a). Among the tens of thousands of objects which have been collected here over many years (since 1958), there are undoubtedly some Middle Paleolithic artifacts, as well as Upper Paleolithic and post-Paleolithic objects.

In the Zeravshan basin, several Upper Paleolithic sites have been discovered, the most important of which, *Samarkandskaya,* is located within the limits of Samarkand (Lev, 1965; Djurakulov, 1987; Nesmeyanov, 1980; Ivanova and Nesmeyanov, 1980; Tashkenbaev and Suleimanov, 1980, pp. 86–91). The site has been under investigation since 1939, and the total area exposed by excavations is around 1000 m^2. The cultural remains are confined to the deposits of two terraces on the right bank of the Chashmasiab ravine. Originally the excavations were carried out on the lower terrace only (10 m above the ravine bottom), where three cultural layers were thought to occur in dark loams, but subsequently cultural remains have been found in the sediments of the upper terrace (15–17 m) too. The stratigraphy of the site is extremely complicated. The geological investigations conducted by Nesmeyanov have shown that the traditional treatment of the site as composed of three layers is a simplification resulting partly from inadequate excavation and recording techniques. In fact, these are not true cultural layers but rather levels of most intensive habitation, each of which includes several lenses saturated with lithics, bone fragments, pieces of charcoal and ocher. Nesmeyanov distinguishes four such levels for the lower terrace and three for the upper one, considering them partly coeval.

More than 3000 bones and bone fragments proved to be identifiable. Half of these are horse (*Equus* cf. *przewalskii*), followed by the Pleistocene ass (*Equus hydruntinus*) and aurochs (*Bos primigenius*). Remains of camel (*Camelus knoblochi*), deer (*Cervus elaphus bactrianus*), steppe sheep (*Ovis arcal*), gazelle (*Gazella subgutturosa*), wild boar (*Sus scrofa*), wolf (*Canis lupus*), and wild ass (*Equus hemionus*) were found in lower frequencies. There are also barely identifiable long bone fragments that can be attributed to either elephant or rhinoceros. The human bones found on the site and ascribed to anatomically modern humans (Ginzburg and Gohman, 1974) are of somewhat unclear provenance and their association with the Paleolithic sediments is under question (Nesmeyanov, 1980, p. 43).

The stone inventory is very rich (thousands of items), diverse, and original, though no data regarding the number and composition of artifacts or their distribution have ever been published. Raw materials dominated by flint and including also chalcedony, diorite, quartz, quartzite, and siliceous limestone are of relatively poor quality. Most cores are split pebbles and have usually one or two striking platforms and, respectively, unidirectional

or bipolar parallel scar patterns. One-sided discoidal cores are also present. True prismatic cores are absent though some forms similar to wedge-shaped cores occur. Blades are not numerous and most of them are intensively retouched (Fig. 7: 7–16). Some of the latter can be defined as elongated points. Endscrapers of various types are the most numerous kind of tool (Fig. 7: 1–6). Sidescrapers on rather small flakes with slightly convex working edges (Fig. 7: 17, 18), angular (*déjeté*) scrapers (Fig. 7: 19, 20), and chisel-like tools are also common. In addition, the tool kit includes perforators, retouched bladelets, objects with burin facets, pebble (chopper/chopping) tools, and objects defined as indentors and anvils. Both the cultural affinities of the site and its chronological position have yet to be ascertained. Traditionally, the archaeological assemblage has been considered a single and homogeneous one, although this assumption may be wrong. In my view, it cannot be ruled out that Samarkandskaya represents a palimpsest of occupational episodes widely spaced in time (from the middle to the final Late Pleistocene) and associated with different cultural traditions.

The Upper Paleolithic materials having seemingly much in common with those of the Samarkandskaya site, though not as rich and described in much less detail, come from another couple of locations in the Zeravshan basin. One of these (*Siabcha*) is in the northern part of Samarkand (Tashkenbaev and Suleimanov, 1980, pp. 80–86), and the other (*Khodjamazgil*) is 75 km southeast, at the western foot of the Turkestan range (Tashkenbaev and Suleimanov, 1980, pp. 76–79; Tashkenbaev, 1987).

Some surface occurrences dated to the Middle Paleolithic are known in the southwestern part of the Kyzylkum desert abutting on the southern ranges of South Tien-Shan. Most important of these are *Kyzylnura 1, 15,* and *16* in the Karasygyr depression (Vinogradov and Mamedov, 1969; Vinogradov, 1981).

The Tadjik Depression. The vast tectonic depression in the south of Tadjikistan is bordered by the high-mountain structures of the Tien Shan in the northeast and the Pamir in the southeast. The Paleolithic locations known in this region are represented by cave sites, sealed open-air sites, and surface occurrences. The materials from the Quaternary loess-soil formations of the Tadjik depression are very important. These formations cover both interfluvial surfaces and slopes of midaltitude ranges at a height of 2000–2500 m. Their thickness reaches 200 m, and they consist of alternating layers of loess and buried soil horizons. It is thought that the primary loess sediments were formed by eolian processes under cold and dry climatic conditions, while more humid and warmer conditions transformed the accumulating dust into paleosols (Dodonov, 1986; Forster and Heller, 1994). The Paleolithic finds are associated with brown and red-brown buried soils, which can easily be seen against the background of yellow loesses. The

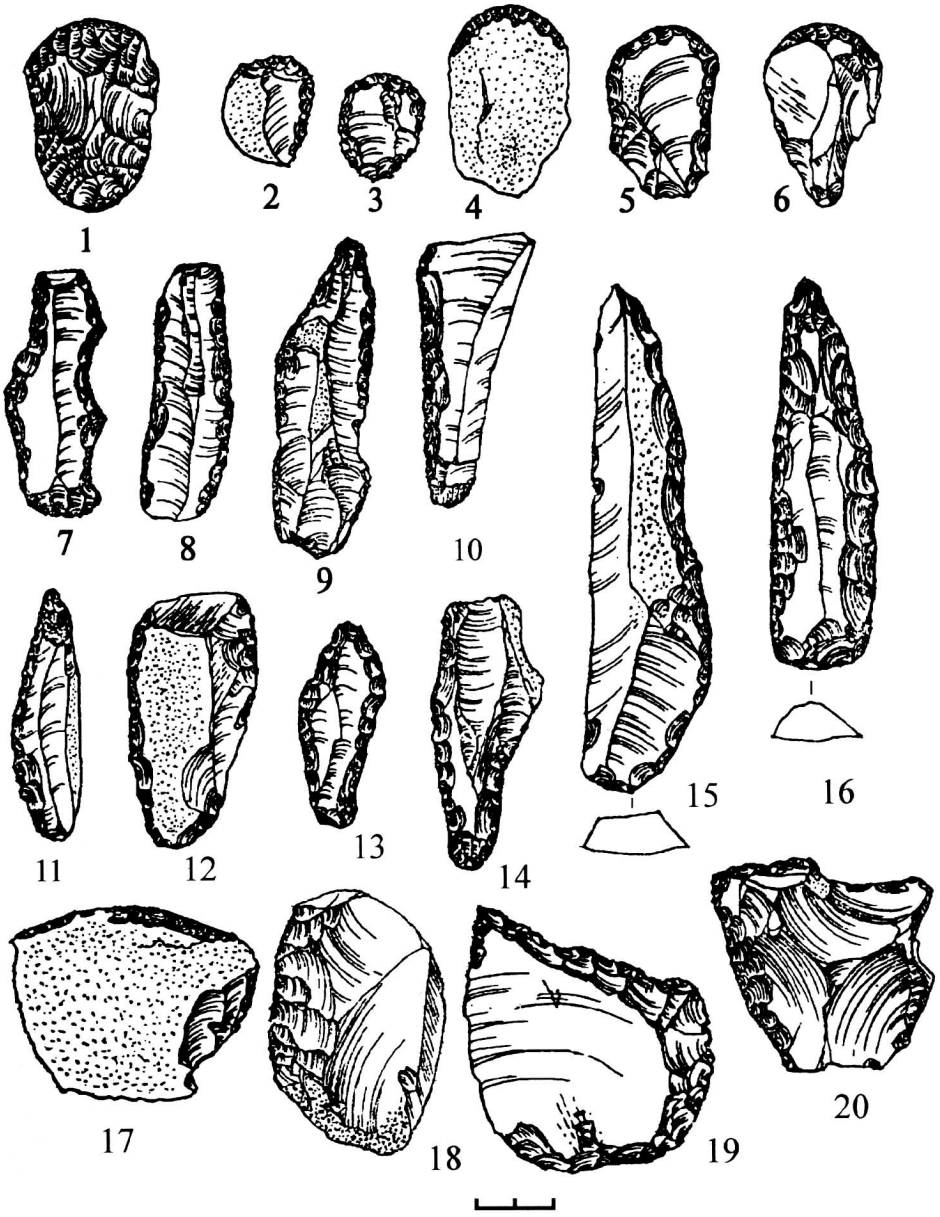

Fig. 7. Samarkandskaya. Endscrapers (1–6); retouched blades (7–16); sidescrapers (17–20). (After Djurakulov, 1987.)

thickness of the soil horizons is 1–2.5 m, and the thickness of pedocomplexes (PC), which may include two or three close horizons, can reach 5–6 m. Loess horizons separating the soil complexes are 10–12 m thick (Dodonov, 1986, p. 16; Lazarenko, 1990). The Paleolithic artifacts found in the paleosols do not form true cultural layers or horizons, nor are they associated with faunal remains, hearths, etc., which suggests that, at least in most cases, the material has been redeposited. On the other hand, the fact that many loess exposures are still being studied in detail by geologists and are being dated by TL and other methods allows us to hope that the archaeological materials coming from here can be placed on the time scale with some degree of confidence. However, the original TL-based chronology which had been widely accepted before 1994 has recently been rejected in favor of much older dates (Bronger *et al.*, 1995; Shackleton *et al.*, 1995; Schafer *et al.*, 1996) and the whole issue still remains highly controversial (Ranov and Laukhin, 1998).

The oldest finds come from the *Kuldara* location, where they were connected with paleosoils 12 and 11 (Ranov *et al.*, 1987, 1995). These strata are below the Brunhes/Matuyama boundary (which was found between PC 9 and PC 10) but above the Jaramillo subchron and hence can be securely dated to the time period of 800–900 kyr ago. Four years of excavations have led to the discovery of 40 artifacts made of pebbles and slabs (quartzite and other rocks). Most worked objects are 2–5 cm long, which might be due to the small size of the pebbles found on the site. The overwhelming majority of objects is typologically very difficult to define because of their amorphousness. Ranov distinguishes two cores, a fragment with signs of bifacial flaking, sidescrapers, endscrapers, perforators, chips, and flakes (including three citrus slices). He attributes this industry to the so-called Karatau pebble culture.

Only isolated artifacts were found between PC 11 and 6 (Ranov, 1987a, p. 55). According to the old scheme their age would range from 480 to 280 kyr ago (Ranov, 1987a, p. 56), but the new chronology suggests that they are older than 600 kyr.

Most finds come from PC 6 and 5, which were TL-dated to 200 and 130 kyr, respectively, but now are correlated with isotope stages 15 (i.e., around 600 kyr ago) and 13 (around 500 kyr ago). Two locations of primary importance are *Karatau 1* (PC 6) and *Lakhuti* (PC 5). Karatau 1 is situated on the watershed of the Yavansky Karatau range, 54 km southeast of Dushanbe, at a height of 1700 m asl (Lazarenko and Ranov, 1977; Dodonov *et al.*, 1978; Davis *et al.*, 1980; Lomov and Ranov, 1984; Ranov and Amosova, 1990; Ranov, 1995). The excavation area of about 500 m^2 yielded slightly more than 600 artifacts made mainly of metamorphic pebbles and dominated by chips, fragments, and crude flakes (including several citrus slices)

with smooth or natural (cortex) platforms. Prepared cores and bifaces are completely absent, and tools are represented by several tens of choppers, a dozen scrapers on massive pebble flakes, and various irregularly retouched pieces and fragments. The assemblage is defined as a Lower Paleolithic pebble industry and attributed to the Karatau culture. The Lakhuti site lies on the loess exposure of the same name situated on the right bank of the Obimazar river 80 km east of Karatau (Dodonov and Ranov, 1976; Davis *et al.,* 1980; Dodonov *et al.,* 1982; Lomov and Ranov, 1984; Ranov, 1986, 1987b; Schafer *et al.,* 1996). The excavation area of over 200 m^2 yielded about 500 artifacts accompanied by rare and unidentifiable bone fragments. Most items are of quartzite sandstone, hornstone, and other pebbles available in the Obimazar valley. The industry, though somewhat less archaic than that of Karatau 1 (it contains several prepared cores and two blades), has much in common with it and represents probably a derived variety of the same tradition. An even later manifestation of the same tradition may be seen in the inventory of the *Obi-Mazar* locality (PC 4), believed to date to around 400 kyr ago (Dodonov *et al.,* 1995; Schafer *et al.,* 1996).

A number of very important Middle and Upper Paleolithic sites in the Tadjik depression were also found in geological settings unconnected with the loess-soil formations.

The open-air site *Khudji* (Nikonov and Ranov, 1978; Ranov and Amosova, 1984) is 40 km west of Dushanbe at 1200 m asl. The excavation pit and trenches set on the right bank of the Khudji brook exposed an area of about 230 m^2. Cultural remains were found in loess loams of the Dushanbe complex. Unfortunately, only the lowermost part of the cultural layer is preserved, with most of it destroyed in the course of road construction before the archaeological work. The thickness of the preserved part of the layer is 15–20 cm (30–50 cm in hollows). In the excavators' opinion, the layer is *in situ.* Most finds (both lithics and bones) were concentrated within and around three large and rather clear hearths. The faunal assemblage (3667 bones) has not yet been described in detail, but according to the preliminary report it is dominated by wild goat and wild sheep (*Capra* and *Ovis*), followed by deer (*Cervus* sp., Cervidae), horse (*Equus* sp.), and tortoise (*Testudo* sp.). Single bones of porcupine (*Histrix* sp.), ox (*Bos* sp.), bear (*Ursus* sp.), wolf (*Canis* sp.), and elk (*Alces* sp.?) were also found. Palynological data suggest that the cultural layer was formed under rather cold conditions. A radiocarbon date of 38,900 B.P. ± 700 years (GIN-2905) was obtained from a charcoal sample from the cultural layer.

The collection of stone artifacts includes 7642 items made mainly of fine-grained quartz sandstone and alevrolite, both of which are available at the bottom of the neighboring gorge. A few objects are made of flint and silicified slate, which are not present in the environs of the site. Cores

(67) are diverse, often amorphous, without clear signs of special preparation, and most of them do not fit readily into conventional types. At the same time, intact blades (392) outnumber intact flakes (375) and display more regular morphologies than the latter, which, together with the fact that more than a half (56.6%) of the total number of retouched tools (136) are on blades, leads to the conclusion that the technology was aimed at the production of elongated blade blanks. Most of the retouched blades are described as sidescrapers (single, double, and convergent) and points (Fig. 8: 1-14). A series of six small subtriangular tools with beveled, abruptly retouched distal ends is defined as truncated points. The rest of the tools are retouched flakes, notches, denticulates, single burins, and putative endscrapers.

The cave site *Ogzi-Kichik* (Ranov and Nesmeyanov, 1973, pp. 79–82; Ranov *et al.,* 1973; Ranov, 1975, 1980) is located 20 km northeast of the modern settlement of Dangara in the western horns of the Vahsh range, at 1200 m asl and 11 m above the bottom of the Chakyrbulak gorge. The bulk of the material comes from an excavation of 200 m^2 in front of the cave mouth. The cultural remains were associated with loamy deposits rich in detritus. No true cultural layers were detected, and it is possible that both lithic and bone assemblages have some later admixture (Abramova, 1984, p. 142). The latter also applies to the charcoal samples, which gave radiocarbon dates as young as 15,700 B.P. ± 900 years (LE-1050) and 30,000 B.P. (GIN-2906). The bone assemblage includes over 15,000 items, the overwhelming majority of which is fragments. Most bones belong to the tortoise (*Testudo horsfieldi*). Among the mammals, wild sheep or goat (*Capra* and *Ovis*) are best represented, with horse (*Equus caballus*), red deer (*Cervus elaphus*), Pleistocene ass (*Equus hydruntinus*?), and porcupine (*Histrix* sp.) following. Two tooth fragments were defined as belonging to the woolly rhinoceros (*Coelodonta antiquitatis*?).

Stone artifacts (about 10,000 items) are of flint, silicified limestone, jasper-like rocks, porphyrite, and other pebbles. Cores are represented mainly by heavily reduced, bifacial discoidal forms which do not correspond to the character of the majority of blanks—blades and elongated flakes with parallel dorsal scar patterns. (Such a discrepancy has already been noted for Kuturbulak and accounted for by the intensive and economic use of raw material. I believe that the same goes for Ogzi-Kichik, all the more so because here, too, the majority of blades and flakes underwent retouching and often resharpening.) Tools are rather diverse and most of them are on blades. The tool kit is dominated by single and double side-scrapers. Many of the former are either naturally or artificially backed, while among the latter there is a group of alternately retouched scrapers. There are also convergent sidescrapers, retouched points (Fig. 8: 15–24),

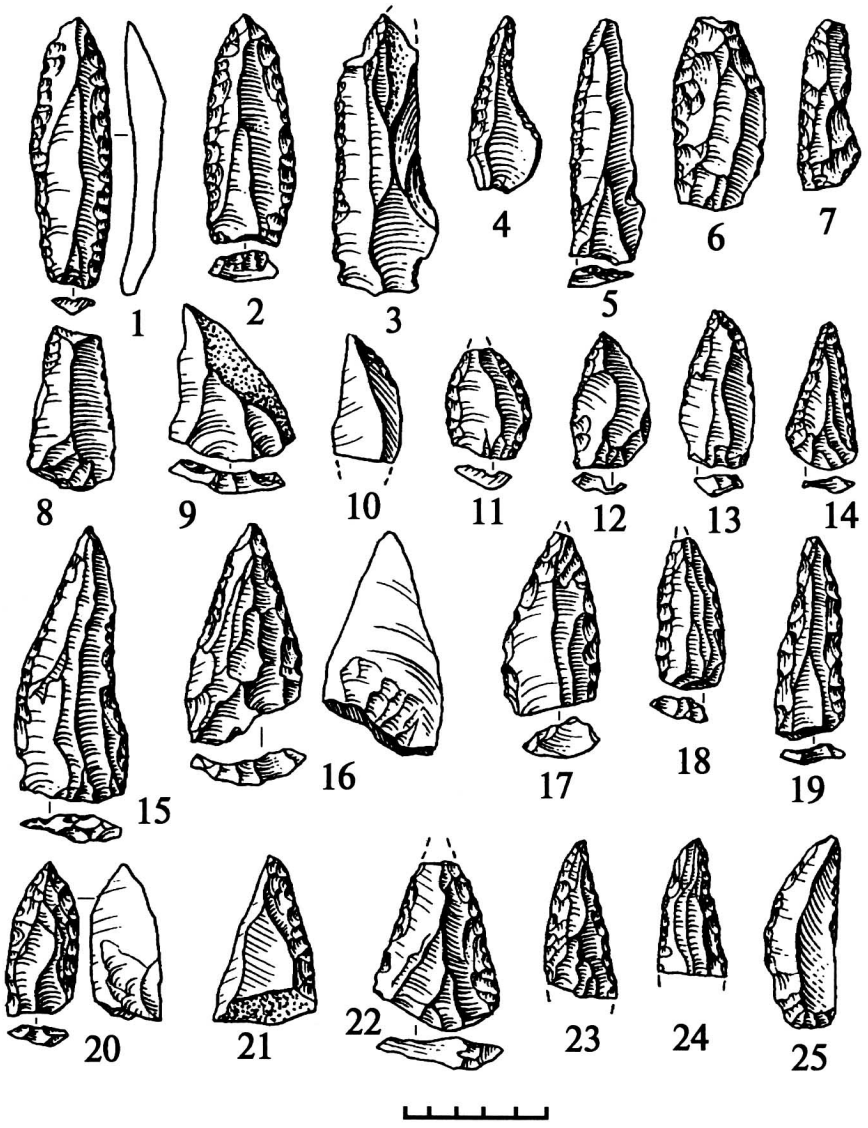

Fig. 8. Khudji (1–14) and Ogzi-Kichik (15–25). Tools. (After Ranov, 1984.)

many retouched blades, endscraper-like forms, single objects with burin facets, and one or two tools resembling Chatelperronian knives (Fig. 8: 25).

Within the limits of the Tadjik depression there are also several surface occurrences which have yielded materials dated to the Middle Paleolithic. The *Kara-Bura* site is 37 km southwest of the town of Kurgan-Tube on the left bank of the Vahsh river (Krylkov and Ranov, 1959; Ranov, 1965). The collection includes about 3000 lithic artifacts, most of which are made of porphyrite pebbles and represent one-sided discoidal cores (often with platforms prepared on the rear side), flakes, chopper/chopping tools (although some of these should rather be considered cores in initial stages of reduction instead), and infrequent but characteristic tools on flakes and blades (a series of carefully worked retouched points, a tool resembling Chatelperronian knives, irregularly retouched blades and flakes). The site of *Ak-Dzhar,* approximately 10 km northwest of Kara-Bura on the right bank of the Vahsh (Kostenko *et al.,* 1961; Ranov, 1965, pp. 80–81), has yielded an assemblage similar to that of Kara-Bura. The *Semiganch* site, near the village of the same name 30 km east of Dushanbe (Ranov, 1972), contained over 300 artifacts, most of which are of typically Mousterian aspect (blades and elongated flakes, double and transverse sidescrapers, three limaces, notches, denticulates, one endscraper, etc.).

According to a widely accepted view, the Upper Paleolithic in the region is best represented by the materials from the four lowermost layers of the *Shugnou* site (Ranov, 1973; Ranov and Nesmeyanov, 1973, pp. 83–86; Ranov *et al.,* 1976) in the upper reaches of the Yakhsu river, at a height of about 2000 m asl and 55–70 m above the river. The materials were associated with the loess sediments of the third (Dushanbe) terrace. Over 5000 m^2 was exposed, containing five cultural horizons (20–40 cm thick) occurring at depths of 3–11.5 m and separated by sterile strata (the upper layer, or Horizon "0," is believed to date to the Mesolithic). Identifiable bones are rare throughout the whole sequence (horse, ox, wild goat or sheep, marmot, turtle). The palynological data suggest that the beginning of human occupation (Horizon 4) coincided with an expansion of boreal vegetation and a general fall in temperature, and the later Paleolithic levels were also deposited under rather cool conditions. A radiocarbon date of 10,700 B.P. ± 500 years (GIN-590) was obtained for Horizon 1. Most stone objects are of porphyrite, but slate, silicified limestone, and, less frequently, flint, were also used. The assemblages from Horizons 1 (>1700 lithics) and 2 (>1800 lithics) are dominated by artifacts characteristic of the Upper Paleolithic (bladelets and large blades, various endscrapers, various types of points including some similar to Gravette points, perforators, retouched blades, etc.), while also containing some discoidal and Levallois (Horizon 2) cores. The collections from Horizons 3 and 4 (about 300 and 200 items,

respectively) are dominated by "large flakes of Mousteroid appearance" and contain also single notches (retouched) and sidescrapers. In my view, this material should be considered Middle rather than Upper Paleolithic. In all likelihood, both layers from the lowermost part of the Dushanbe loess and associated with cold palynological spectra may be roughly correlated with the cultural layer of Khudji and dated to a time >30,000 and even >35,000 B.P.

The Fergana Depression. The flat part of the depression is formed by the Syrdaria River floodplain and terraces. However, the most important Paleolithic site is the *Sel-Ungur* cave in the Sokh river valley, at a height of 2000 m asl (Islamov, 1990; Islamov *et al.,* 1988; Velichko *et al.,* 1990; Islamov and Krahmal, 1992). The cave is 120 m long, and its width and height at the mouth are 34 and 25 m, respectively. The excavators distinguished five cultural layers (0.2–0.4 m thick) said to be separated by sterile strata (0.3–1.0 m thick) and lying at a depth of 2.5 to 6.5 m. Mammal bones are represented by more than 4000 fragments, most of which are rather badly preserved. The faunal assemblages of the two upper layers (1 and 2) are dominated by wild sheep (*Ovis* cf. *ammon*), wild goat (*Capra sibirica*), deer (*Cervus* cf. *elaphus bactrianus*), and cave bear (*Ursus spelaeus*). The third and fourth layers yielded aurochs (*Bos primigenius*), rhinoceros (*Dicerorhinus* cf. *kirchbergensis*), sheep, and goat. In addition, bones of wolf (*Canis* cf. *lupus*), fox (*Vulpes vulpes*), cave hyena (*Crocuta spelaea*), cave lion [*Panthera (Leo)* cf. *spelaea*], Pleistocene ass (*Equus hydruntinus*), and horse (*Equus* sp.) were also found in different layers. Rodents are represented by 10 species, most important of which are members of the subgenus *Neodon,* including *Microtus juldaschi,* and *Ellobius tancrei,* followed by *Cricetulus migratorius, Alticola argentatus, Meriones libycus,* and *Ochotona rufescens.* According to the paleozoologists, such a composition of rodents (which does not undergo any significant change from layer to layer) is indicative of the existence of mountain steppes with patches of woods and shrubbery in the environs of the cave. The permanent steppe conditions are evidenced also by palynological data. The latter, together with faunal materials, point to a Middle Pleistocene age for the deposits (Velichko *et al.,* 1990, pp. 78–79; Baryshnikov and Batyrov, 1994), which is quite in line with the uranium–thorium date of 126,000 B.P. ± 5000 years (LU-936) obtained on a travertine sample taken from the stratum overlying the upper cultural layer.

Besides of the animal bones, the cave deposits contained some human and putatively human remains: teeth, a humerus fragment, and a fragment of what could have been an occipital bone. The paleoanthropologists who have studied these finds consider the Sel-Ungur hominids as exemplifying a local specialized variant of *Homo erectus* possessing some advanced traits (Islamov *et al.,* 1988, p. 48).

No precise data have ever been published regarding the number of stone artifacts collected from different layers, but altogether there must be at least 1500 items. Most artifacts were produced from jasper and slate pebbles, and rarely from pebbles of volcanic rocks. A cursory examination of part of the collection leaves the impression that the material is rather homogeneous. Most conspicuous are short massive flakes with wide smooth platforms. There are almost no blades and very few flakes which could be called Levallois. Cores are not numerous and most are heavily reduced. Tools include choppers, simple straight or convex sidescrapers, notches and denticulates, retouched flakes, and fragments. In addition, at least one cleaver can be identified. The handax, which is often said to be present in the collection, is morphologically vague and, in my view, should be considered a core instead. The excavators of Sel-Ungur are inclined to regard the industry as Acheulean , but the absence of true handaxes, on the one hand, and the presence of clear analogies with the Tadjik depression pebble assemblages, on the other, make such a definition very vulnerable to criticism. It can be argued that there are better grounds to attribute Sel-Ungur to the group of the Lower Paleolithic pebble industries of Central Asia (Vishnyatsky, 1989d, p. 15; Ranov, 1990, p. 264, 1993, p. 6, 1995, p. 378).

Middle Paleolithic materials in the region are represented by surface finds only. Slightly more than 1000 artifacts were gathered in the mid-1950s at the *Kairak-Kumy* site. This site comprises numerous surface occurrences along 70 km between the towns of Khodjent and Naukat on both banks of the Syrdaria (Okladnikov, 1958; Litvinsky *et al.,* 1962, pp. 29–88; Ranov, 1965, pp. 16–29). Most objects are of porphyrite and chert pebbles. The collection contains discoidal, single-platform, and bipolar cores, numerous and well-made blades, several tens of sidescrapers, and retouched points, most of which are also on blades or elongated flakes. Another important Middle Paleolithic site, *Dzhar-Kutan,* is 5 km south of the town of Shahristan in the westernmost part of the depression (Ranov and Nesmeyanov, 1973, pp. 40–42; Ranov, 1965, pp. 30–49). The material (670 objects) was collected from two terraces of the Tashkent complex and includes rather large single- and double-platform cores with negatives of parallel flake removals, symmetrical elongated blanks also revealing parallel dorsal scar patterns, retouched blades, and various sidescrapers, all made of sandstone. Finally, numerous artifacts thought to be Middle and Upper Paleolithic were collected from the *Kapchigai* workshops located near flint and quartzite outcrops 40 km south of Fergana (Okladnikov *et al.,* 1964; Kasymov, 1972a, pp. 12–14, 18–36).

The bulk of the material from the *Khodja-Gor* site in the Isfara River is believed to date from the Late Paleolithic (Okladnikov, 1958a, pp. 64–66). One part of the finds comes from the surface, and the rest from the excava-

tions (about 200 m^2), where the artifacts were associated with a pale-yellow loam layer thought to be redeposited from an upper terrace. All the artifacts are made of flint and include prismatic cores, blades, numerous endscrapers on blades (including double ones), perforators, and retouched bladelets. Okladnikov and Ranov sought for analogies to this assemblage among the Capsian industries.

Northwestern Tien-Shan. This is a high-mountain region to the north of the Fergana depression. Several stratified cave and open-air sites are known, as well as many surface occurrences. One of the most interesting and enigmatic sites in the region and, indeed, in Central Asia as a whole is *Kulbulak,* at the spring of the same name on the southeastern slope of the Chatkal range (6 km west of the town of Angren) at a height of 1042 m asl (Kasymov, 1972b; Kasymov and Grechkina, 1994; Anisutkin *et al.,* 1995). By the beginning of the 1990s, an area of over 600 m^2 had been exposed, and one of the test pits in the central part of the site reached a depth of 19 m. It is probable that the lower-lying deposits which have not yet been excavated also contain archaeological material. The stratigraphy is very complicated and poorly understood; some levels appear undisturbed but it is possible that a considerable part of the archaeological material is redeposited (Ranov and Nesmeyanov, 1973, pp. 92–94; Nesmeyanov, 1978, pp. 106–107; Medvedev and Nesmeyanov, 1988, p. 139). Kasymov, who excavated the site from its discovery (1962) until the late 1980s, distinguished 49 cultural layers separated by sterile strata, but many of the former yielded only 20–30 stone artifacts (or even less), scanty or no faunal remains, and no traces of hearths, fireplaces, etc. The palynological and faunal data described in brief preliminary reports are very scarce and do not allow for even rough estimates of the age of the deposits. The animal bones from the lower layers (45–12a) are said to be horse (*Equus* sp.), deer (*Cervus elaphus*), ox (*Bos primigenius*), wild goat (*Capra sibirica*), wild boar (*Sus scrofa*), and hare (*Lepus tolai*). The upper layers contained the same species plus wolf (*Canis lupus*), cave hyena (*Crocuta spelaea*), and others. Kasymov and Godin attributed the lower layers to the early Pleistocene, but this conclusion has not been substantiated (Ranov, 1995, p. 380).

The archaeological collection of Kulbulak includes about 70,000 items, the overwhelming majority of which is made of flint. The rest are of siliceous limestone, quartz, quartzite, chalcedony, etc. All these raw materials are readily available in the environs of the site. The most conspicuous features of the lithic assemblage are, first, the high percentage of objects which seem to have been retouched and, second, the abundance of notched and denticulated pieces. The inventory of the pre-Upper Paleolithic layers (45–5, according to Kasymov), which shows few changes throughout the sequence, is also characterized by an abundance of short massive flakes,

the rarity of regular elongated blanks, and the presence of numerous tools made on chunks and chips. Cores are rather diverse (discoidal, single platform, multiplatform, etc.) and often heavily reduced; some of them were retouched and used as tools. The tool kit (Fig. 9) is dominated by notches and denticulates but also includes various sidescrapers, rare retouched points, at least one limace, and, of particular interest, a group of bifacially

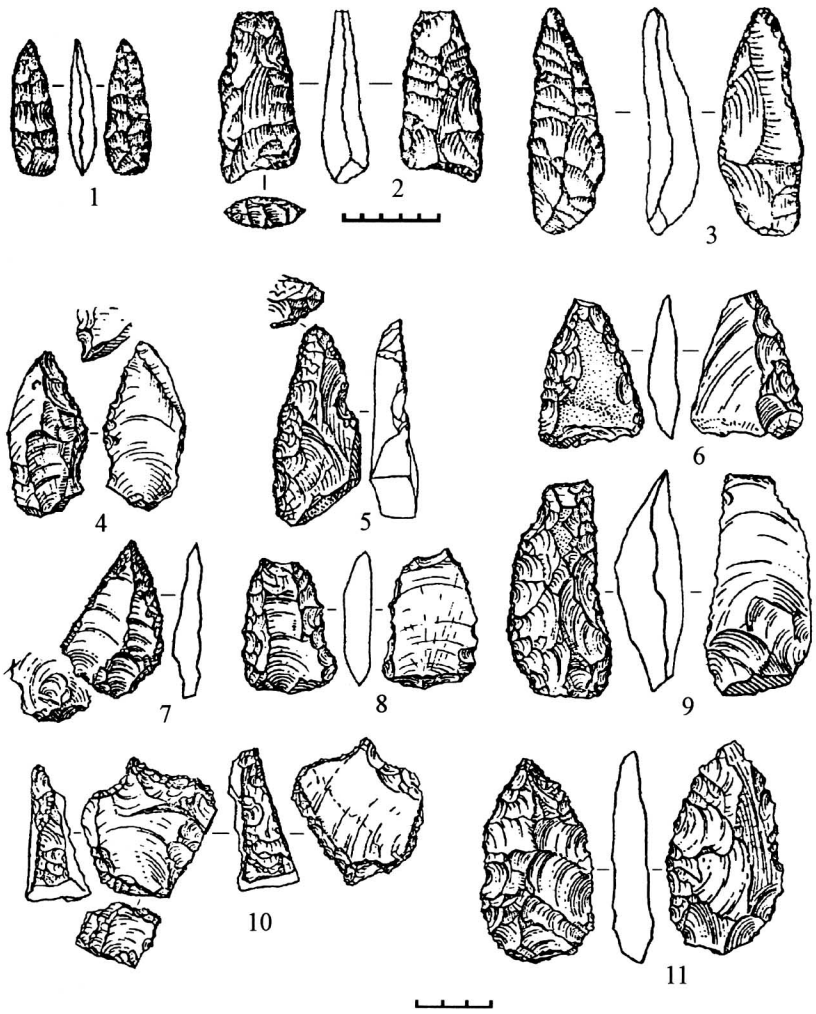

Fig. 9. Kulbulak. Tools: 7—layer 4; 10, 11—layer 5; 4–6, 8, 9—layer 6; 1, 2—layer 27; 3—layer 28. (After Kasymov, 1972a.)

worked objects, one of which (Fig. 9: 11) can be defined as a handax (found in the fifth, i.e., undoubtedly Middle Paleolithic, layer) and the rest of which (three or four objects) are leaf-shaped points (Fig. 9: 1–3). The presence of the latter sharply distinguishes Kulbulak from the other Central Asian sites. Kasymov regarded the material from the 22 lowermost layers as Acheulean, the 24 intermediate layers as Mousterian, and the 3 uppermost layers as Upper Paleolithic (see below), but while the presence of Middle and Upper Paleolithic assemblages is apparent, the existence of an Acheulean component has never been demonstrated and remains questionable.

All the other stratified sites in the region are caves and rock shelters. The *Obi-Rakhmat* shelter (Suleimanov, 1972) is 100 km northeast of Tashkent, close to the confluence of the Chatkal and the Pskem rivers at 1250 m asl. Its width and height at the mouth are 20 and 12 m, and it is 9 m deep. This shelter, on the fourth terrace of the Chatkal, is said by geologists to have formed during the first half of the Golodnaya Steppe period and to have been filled by loam and detritus (10 m thick) during the second half of that period. Excavations conducted in the mid-1960s exposed an area of about 60 m^2, but the bottom was exposed only in 2 m^2. Neither true cultural layers nor sterile layers were identified, and the material has been described by lithological units. The faunal assemblage (after Vangengeim) is dominated (60% of identifiable bones) by wild goat (*Capra sibirica*), followed (30%) by red deer (*Cervus elaphus* cf. *bactrianus*). It also includes rare bones of sheep (*Ovis* sp.), marmot (*Marmota* sp.), boar (*Sus scrofa*), and, supposedly, cave lion. Two U-series dates of 125,000 ± 16,000 and 44,000 ± 1000 years were obtained on bone (Cherdyntsev, 1969, p. 290), but it is unclear with which part(s) of the sediments they are associated.

The Paleolithic inhabitants of Obi-Rakhmat made their tools from the raw materials available in the environs of the cave. Most of the approximately 30,000 stone artifacts are of silicified limestone, which could have been obtained from nearby outcrops, while the rest are of quartz and quartz sandstone pebbles. The bulk of the material comes from the middle part of the cave deposits, while the lowermost and uppermost layers yielded very rare (if any) finds. The industry is characterized by an abundance of long blades (according to Suleimanov, Ilam is 60) with even, sharp edges, which were struck from single-platform or bipolar cores with convex flaking surfaces (Fig. 10: 15). True prismatic cores are absent. Discoidal cores are rare and heavily reduced (Fig. 10: 12). Tools (Fig. 10: 1–11, 13, 14, 16, 17) are represented mainly by blades retouched along one or both edges. A number of the latter can be considered elongated points, and one is indistinguishable from Chatelperronian knives. Sidescrapers on flakes are relatively rare and usually have one straight or slightly convex working edge. There are also some burin spalls and burins, as well as endscrapers, but both types

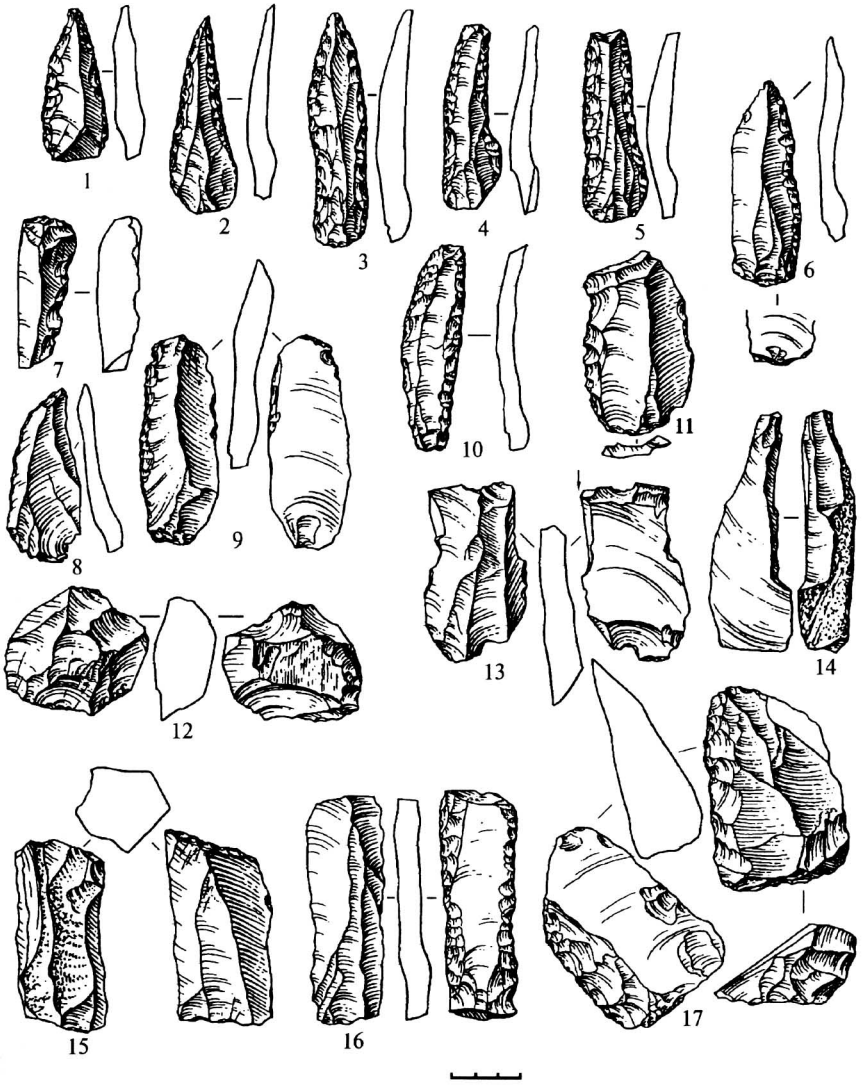

Fig. 10. Obi-Rakhmat. Tools (1–11, 13, 14, 16, 17) and cores (12, 15). (After Suleimanov, 1972.)

are far from Upper Paleolithic standards and may be called atypical. Some authors regard the entire industry or the material from the upper levels as exemplifying the process of the Middle/Upper Paleolithic transition (Suleimanov, 1972; Ranov, 1984, p. 320; Gabori, 1988, p. 291; Derevianko *et al.*, 1998, p. 128), while others see no substantial difference between the

cores and tools from different levels (Abramova, 1984, p. 142). Based on the study of a considerable part of the collection, I consider the material Middle Paleolithic and lacking any pronounced typological or technological features anticipating the Upper Paleolithic.

Excavations of two rock shelters in the *Khodjakent* village, 75 km northeast of Tashkent on the left bank of the Chirchik River (Okladnikov, 1961; Nasretdinov, 1962), and of the *Paltau* cave, also located in the upper reaches of the Chirchik (Omanzhulov, 1982), also yielded Middle Paleolithic materials, albeit less numerous than at Obi-Rakhmat. The shelters (Khodjakent I and II) are adjacent to each other and contained very similar assemblages of several hundred artifacts of siliceous limestone (single-platform and discoidal one-sided cores, flakes, retouched blades, etc.). The Paltau cave yielded about 60 items of siliceous limestone and slate including several sidescrapers and a retouched point. In addition, Middle Paleolithic materials (tens or hundreds of artifacts) were collected from a number of surface occurrences, but these have not yet been published in any detail.

The Upper Paleolithic is represented by the material from the top part of the Kulbulak sequence (Layers 1–3 according to Kasymov). It is worth noting that, here, prismatic cores and various endscrapers coexist with tool types characteristic of the underlying Middle Paleolithic levels, such as notches/denticulates (which continue to predominate numerically) and sidescrapers.

Central and Northern Tien-Shan. This area remains little explored and neither cave nor sealed open-air sites have yet been found. However, in the Issyk-Kul lake basin there are several surface occurrences where Middle Paleolithic artifacts were collected. The *Salamat-Bulak* site is located on the west shore of Issyk-Kul, 3 km south of the town of Rybachee (Yunusaliev, 1978, 1981). The collection includes several hundred porphyrite flakes and chips, about half of which retain primary cortex. The *Tossor* site is situated at 1700 m asl on the bank of the Tossor river flowing into the lake from the south (Kostenko *et al.,* 1969; Ranov and Yunusaliev, 1975). Over 3000 objects of siliceous slate, jasper, and other rocks were collected here from the surface of the Late Tashkent terrace. These are discoidal, single- and double-platform cores, flakes, and infrequent retouched tools (sidescrapers, notches, denticulates). The third and largest site, named *Georgievsky Bugor,* is in the Chu River valley about 20 km north of Bishkek (Ranov and Nesmeyanov 1973, pp. 101–103). Here, too, the Paleolithic finds (several hundred) were gathered from the surface of the Late Tashkent terrace. The assemblage contains numerous pebble cores exhibiting irregular flake removals, flakes, rare blades, and about 200 tools. The latter are said to include various sidescrapers (simple, double, convergent, angular),

notches and denticulates, knives, endscrapers, burins, and pebble tools. Finally, 200 Middle Paleolithic artifacts have recently been collected in the Charyn River valley at four locations named *Aktogai 1–4* (Artyukhova, 1992).

The Karatau Range and Adjoining Areas of Southern Kazakhstan. Karatau is a horn of Tien-Shan extending northwestward for about 400 km. Most of the Paleolithic sites known in the region are confined to its hilly southeastern part. These are surface occurrences (*Borykazgan, Tanirkazgan, Akkol, Kemer I–III, Tokaly I–III,* and so on), each of which has yielded tens or hundreds of lithics once claimed to be Acheulean and Mousterian handaxes, disks, unifaces, chopper/chopping tools, flakes, and flake tools (Alpysbaev, 1979). In fact, however, neither true handaxes nor typical flake tools are present (Medoev, 1982, pp. 31–32; Abramova, 1984, p. 138). What the collections do include are basically precores, cores, flakes (often large and massive), and choppers. The materials from the various locations are quite similar in both the raw materials used (boulders of a Lower Carboniferous siliceous rock) and the morphology of the artifacts. Proceeding from the composition of the finds and the fact that in almost all collections more than 50% of flakes retain pebble cortex, one can suppose that the sites were workshops devoted mainly or exclusively to the procurement and reduction of local raw materials. The period of the assemblages might be both Lower and Middle Paleolithic, but the presence of a more or less considerable later admixture is also possible.

Another group of sites lies between the southwestern slope of Karatau and the Syrdaria river, 18 km northeast of the town of Turkestan. In the 1950s, a rich travertine location of Pleistocene fauna was found near Koshkurgan village. This was the basis for identifying the so-called Koshkurgan Faunal Complex, thought to be of the same age as the Tiraspol Complex of Eastern Europe (Bazhanov and Kostenko, 1962). The bones were associated with stone artifacts, which led archaeologists to begin to work at the site (*Koshkurgan I*) (Artyukhova and Aubekerov, 1988). Different parts of the lithic assemblage (altogether about 3000 objects) were then studied by two scholars (O. Artyukhova and V. Voloshin) who independently came to the same conclusion: that here we are dealing with a Typical Mousterian industry possessing a number of original features. The assemblage is characterized by the diversity of raw materials used in tool manufacture (jasper, flint, chalcedony, quartz, sandstone, mainly pebbles), the small size of the overwhelming majority of objects (no bigger than 4–5 cm), and the abundance of heavily retouched tools, including numerous and varied sidescrapers, some points, and denticulates (Voloshin, 1989; Artyukhova, 1994). The geological age of the finds is unclear, as is also how they came to be associated with a fauna considered to be of the Lower–Middle Pleisto-

cene age. Hopefully, these and other questions will be clarified by the study of several newly discovered sites near Koshkurgan I. All of these (*Koshkurgan II and III, Shoktas I–III*) are travertine locations, reported to have yielded an archaic microindustry similar to that of Vertesszölös and Bilzingsleben and dating from the Middle Pleistocene (Derevianko *et al.,* 1997).

The question of the archaeological and geological age of the *Karasu* (*Valikhanov's*) site, on the right bank of the upper reaches of the Arystandy river about 140 km north of Chimkent (Alpysbaev, 1979, pp. 152–176; Taimagambetov, 1990) is also very complicated. The cultural layers of the site are associated with the loams of the third river terrace and contain lithics, faunal remains, and traces of fireplaces. The faunal remains are dominated by horse, followed by bison, saiga, and red deer. The available palynological data also indicate steppic conditions for the period when the culture-bearing deposits were formed (Chupina, 1963). Recently, a radiocarbon date of 24,800 B.P. ± 1100 years has been reported for the upper cultural layer (Taimagambetov and Aubekerov, 1996, p. 24). In the original reports, the site was mentioned as three-layered; the same section is now treated as containing five cultural layers and the material has been described as five distinct assemblages. The lithics include about 6000 items made of chalcedony (the source of chalcedony nodules is only 1 km from the site). The cores and flakes from all five layers could be considered Middle Paleolithic (very few blades, very few or no prismatic cores), but the character of the retouched tools leaves no doubt that this is an Upper Paleolithic industry (at least for the four upper layers). Endscrapers make up more than half of the tools and are mostly symmetrical, carefully retouched tools on blades and elongated flakes with thin cross sections. The rest of the tool kit consists of burins, retouched flakes, and rare sidescrapers and points.

Paleolithic of Northern, Central, and Eastern Kazakhstan

Although relatively numerous, the known Paleolithic sites of northern, central, and eastern Kazakhstan are poorly studied and very few of them have been described in detail. Since the amount of reliable data from these regions is extremely limited, they will be considered together here, although their environmental and geological histories are quite dissimilar.

In the western part of the area, some putative Lower and Upper Paleolithic finds were collected from surface occurrences in the upper reaches of the Emba River (Aubekerov, 1990) and on the northern shore

of the Aral Sea (Artyukhova, 1986). All the artifacts are of quartz sandstone and there are several handaxes among them. Several tens of sites (mostly surface occurrences) are concentrated in the central part of the area. *Tuemainak I* contained about 2000 porphyrite artifacts (including leaf-shaped points) considered to be Mousterian and Upper Paleolithic (Voloshin, 1990). Several thousands of quartzite and porphyrite objects (including large bifaces), the oldest of which are dated to the Lower Paleolithic, come from the *Ak-Koshkar* site south of Lake Tengiz (Voloshin, 1981). The *Jaman-Aibat 4* site, 150 km southeast of Djezkazgan, yielded over 800 sandstone objects, including a number of handaxes on flakes and nodules 10–14 cm long. The assemblage has been considered Late Acheulean (Klapchuk, 1976). A putative pebble industry (choppers and flakes of quartz sandstone) was reported to have been found at *Muzbel I* on the right bank of the Sarysu river east of Djezkazgan (Klapchuk, 1970). Finally, sites such as *Aidarly II* (over 500 items of jasper, including discoidal cores and small handaxes) and *Perederzhka* (over 2000 sandstone objects) have been regarded as Mousterian (Klapchuk, 1969).

Farther to the north and northeast, numerous occurrences of what are believed to be Lower, Middle, and Upper Paleolithic artifacts were found in the upper reaches of the Nura and Ishim rivers (*Vishnevka, Batpak, Mizar,* etc.) and in the basin of the Irtysh close to Ekibastuz and Pavlodar (*Kudaikol, Taskuduk, Angrensor,* etc.). The only sources of information about most of these sites are very brief preliminary reports (e.g., Klapchuk, 1964, 1969; Medoev, 1982; Voloshin, 1981, 1987) from which it is not possible to judge the character or chronological position of the stone industries. However, the presence in many of the assemblages of large bifacial tools, including true handaxes, is beyond doubt and it seems plausible that some of them (e.g., Vishnevka 3) might date from the Acheulean (Voloshin, 1988). These conclusions apply equally to the materials collected from sites on the western and northern shores of Lake Balkhash (*Khantau, Semizbugu,* etc.) and north of the lake (*Chingiz*). These are porphyrite, alevrolite, and flint industries classified as Acheulean, Middle Paleolithic (including MTA), and Upper Paleolithic (Medoev, 1982; Derevianko *et al.,* 1993).

In the easternmost part of Kazakhstan, which represents a continuation of the Altai-Sayan mountain area, all the Paleolithic sites are connected to the Upper Irtysh basin. These are both surface occurrences (*Kanai, Svinchatka,* and *Narym*) believed to date from the Middle or Upper Paleolithic (Chernikov, 1951; Krylova, 1969; Taimagambetov, 1987) and sealed open-air (*Novonikolskoe* and *Shulbinka*) and cave (*Peshera na Buhtarme*) sites dating from the Upper Paleolithic (Chernikov, 1956; Gohman, 1957; Taimagambetov, 1987). They are probably comparable with western and southern Siberian sites of the same age.

MAJOR PROBLEMS IN THE STUDY OF THE PALEOLITHIC OF CENTRAL ASIA

The Initial Colonization of the Region and Problems of Chronology

It is clear from these descriptions that the overwhelming majority of Central Asian Paleolithic locations can be dated only within very wide chronological limits. This applies not only to surface occurrences, but also to most stratified sites. Therefore, if depicted on a chronological scale, the Paleolithic of this region would not look like a continuous vertical line but, rather, like a punctuated line consisting mainly of question marks (Fig. 11).

The oldest known assemblage, Kuldara, can be securely dated to the

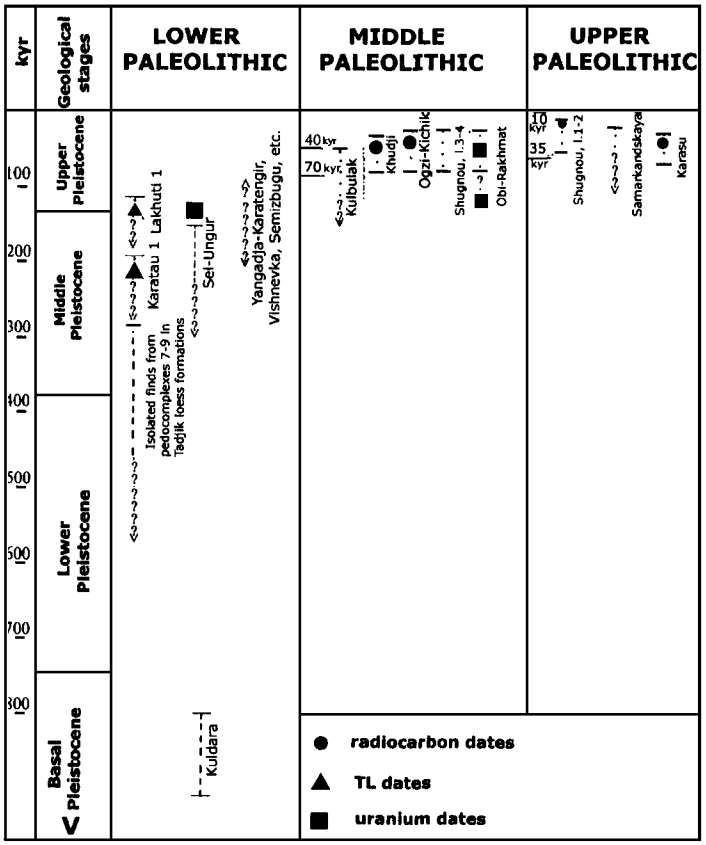

Fig. 11. Supposed chronological position of the most important sites mentioned in the text.

end of the Lower Pleistocene (around 800,000–850,000 years ago), which means that the first humans appeared in the region no later that 800,000 years ago. This date seems quite plausible in light of the available data on the chronology of the earliest archaeological sites in Asia. Most claimed dates of more than 1.5 mya (million years ago) or even 2 mya for hominid bones or putative artifacts from China, Indonesia, India, and Pakistan have not stood the test of time. The same may be the case for the latest such claims (Verma, 1989; Dennell *et al.,* 1994; Swisher *et al.,* 1994), which have been criticitized for the dates themselves (e.g., Storm, 1995, pp. 126–127) or for the reality of the artifacts. Nevertheless, there are few doubts that by at least the end of the Lower Pleistocene, South and East Asia had already witnessed one or more penetrations of human beings. The oldest indisputable traces of hominid presence in China (Gongvangling, Dongutto, Xiaoshangliang) are believed to date from ca. 1 mya (Schick and Zhuan, 1993; Keates, 1994; Huang and Wang, 1995; Pope, 1995), and in India and Pakistan they may be as old as 0.67 mya or older (Rendell and Dennell, 1985; Mishra *et al.,* 1995).

Kuldara seems to be the only Lower Pleistocene site in the region. Single isolated finds from paleosols 9–8 of the Tadjik depression, which, according to the new chronology, may be older than 0.6 mya and are certainly older than 0.28 mya, fill the gap between Kuldara and the assemblages dating from the middle or the second half of the Middle Pleistocene, such as Sel-Ungur Cave, Karatau 1, Lakhuti, Obi-Mazar (if we accept the new chronology proposed for the Tadjik loess locations), and, perhaps, the lower layers of Kulbulak and some complexes from Koshkurgan and Shoktas. It is possible that some of the surface occurrences in Kazakhstan and West Turkmenistan also date from the latter period, but this cannot be confirmed. Most of the known Paleolithic sites, including probably all the Mousterian and certainly all the Upper Paleolithic ones, date from the Upper Pleistocene. Judging by the available geological and palynological data, as well as a few absolute dates, assemblages such as Obi-Rakhmat, Khudji, Ogzi-Kichik, and Layers 3 and 4 of Shugnou may be relatively young (50,000–35,000 B.P.), and the same is also possible for the other Mousterian sites though no conclusive evidence has yet been obtained. The precise chronological position of the Upper Paleolithic sites within the late Upper Pleistocene also remains poorly known. On the basis of a single radiocarbon date, the upper layer of Karasu appears to date from about 25,000 B.P., while Layers 2 and 1 of Shugnou are probably somewhat younger, and Khodja-Gor should be younger still, on the basis of typological criteria. Samarkandskaya and the upper layers of Kulbulak may be older (at least the earliest assemblages of both sites), but much more reliable data are needed to substantiate this supposition.

Movius Line and the Lower Paleolithic of Central Asia

According to Movius (1944, 1948), the entire territory inhabited by hominids during most of the Pleistocene was divided culturally into two districts: the western, where bifaces and Levallois technology predominated (Africa, Middle East, Western Europe), and the eastern, where less sophisticated core-and-flake or "pebble" industries characterized by choppers, simple cores, and crude flakes prevailed (Northern India and Pakistan, East and South-East Asia). Since then, many new data relevant to the problem have appeared, and it is now clear that core-and flake ("pebble") industries are not exclusively an eastern phenomenon, while handaxes are not necessarily confined to the western zone. However, this by no means implies that Movius's ideas should be abandoned, as some of his critics have claimed (Boriskovsky, 1971, p. 50; Larichev, 1977, pp. 31–33). On the contrary, the reality of the two zones delimited by Movius, despite some changes in their borders, is now more apparent than ever (Watanabe, 1985; Schick and Toth, 1993, pp. 276–277; Bar-Yosef, 1994, p. 256; Schick, 1994, Yingsan, 1994). Opponents of this view usually point to the presence of handaxes in some assemblages of the eastern zone [this was noted also by Movius himself (e.g., 1944, Figs. 39–41)], but this argument is problematical. First, the number of such objects is extremely small, as even Movius's critics admit (e.g., Seonbok, 1992, p. 195). Second, the objects are morphologically rather amorphous and not really comparable to the handaxes from the western zone. Third, their geological age is usually (if not always) unclear and association with Lower/Middle Paleolithic assemblages debatable. Finally, and most importantly, the eastern zone differs from the western one not only in the rarity of handaxes, but also in the general character of its stone industries which are relatively simple technologically and poor typologically.

Returning to Central Asia, which is the frontier between Movius's (1944, p. 103) zones, one finds that here, too, the geographic distribution of the pebble industries, on the one hand, and the handax assemblages, on the other (Fig. 12), suggests the existence of an east–west opposition (Vishnyatsky, 1989b). All the known handaxes are in the west (Yangadja, Esen 2, Shakhbagata) and the north (Jaman-Aibat, Vishnevka, Semizbugu), but they are absent in the southeast (except Kulbulak), while the core-and-flake industries are concentrated in the southeast (Kuldara, Sel-Ungur, Karatau, Lakhuti) and only along the Karatau range (Borykazgan, Tanirkazgan, Tokaly, etc.), possibly reaching the southern part of central Kazakhstan (Muzbel). It should also be noted that core-and-flake industries are associated almost exclusively with mountainous areas and handaxes with the plains.

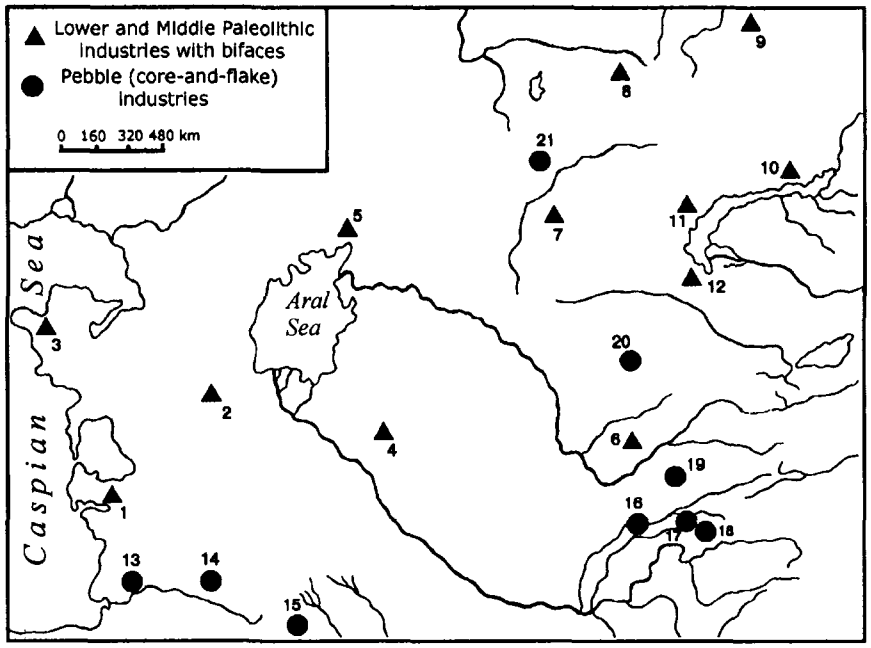

Fig. 12. Distribution of the Lower/Middle Paleolithic industries with handaxes (indicated by triangles) and core-and-flake industries (indicated by circles). 1—Yangadja; 2—Esen 2; 3—Shakhbagata; 4—Kyzylnura 1; 5—Aralsk; 6—Kulbulak; 7—Jaman-Aibat 4; 8—Vishnevka 3; 9—Kudaikol; 10—Semizbugu; 11—Bale; 12—Khantau; 13—sites of western Kopetdag; 14—sites of central Kopetdag; 15—Keshefrud; 16—Karatau 1; 17—Lakhuti 1; 18—Kuldara; 19—Sel-Ungur; 20—Borykazgan, Tanirkazgan, etc.; 21—Muzbel 1.

The Lower Paleolithic pebble industries of the Tadjik depression are assigned by Ranov (1993, p. 6) to the Karatau culture, which, in his opinion, developed during hundreds of thousands of years with practically no external influences. Although both the use of the term "culture" and the thesis concerning its continuous autochthonous development are vulnerable to criticism, the similarity of the South Tadjikistan industries associated with different paleosols (Lakhuti, Karatau, etc.) seems quite obvious and unified when contrasted to sites of neighboring regions. They are characterized by the near-total absence of prepared cores and blade flakes, the frequent presence of citrus segments and wedge-shaped flakes, the abundance of choppers, and the rarity of flake tools, which, in addition, are rather amorphous. All these traits are also characteristic of Sel-Ungur, which is especially close to Karatau and Lakhuti. The pebble industries of southern Kazakhstan (Borykazgan, Tanirkazgan, and so on), which are rich in chop-

pers and poor in flake tools, may represent a somewhat later(?) continuation of the same tradition, in which the amorphous pebble cores were replaced by discoidal forms. However, it should be noted that the use of pebbles as raw material is not sufficient reason to define an industry as a "pebble industry." Thus the assemblage of Kara-Bura, while dominated by pebble cores and tools, also includes typical sidescrapers and retouched points on flakes, which sharply differentiates it from the Karatau or Soanian occurrences. Here we are probably dealing either with a mixture of two industries or with a normal Mousterian manifesting itself in an unusual raw material, as was undoubtedly the case for Kuturbulak, as well as for some European Middle Paleolithic sites located in areas rich in pebbles (e.g., Darlas, 1995).

Variability of the Mousterian Industries and Their Place in the Asian Middle Paleolithic

By the beginning of the 1970s, Russian researchers influenced by Bordes had adopted the view that the Mousterian industries should and could be divided into several "cultural groups" (or "facies," "variants," etc.). These were distinguished in the Caucasus, the Russian Plain, and the Crimea. "As a result the Mousterian culture, which formerly seemed to be unified or almost unified, has fallen into several groups which differ from each other in a number of respects" (Ranov, 1968, p. 3). Having reconsidered the old material from this new standpoint, Ranov came to the conclusion that the Mousterian of Central Asia was not as homogeneous as had been previously thought and that at least four groups of assemblages ("variants") could be isolated: Levallois (Khodjakent, Dzhar-Kutan, Obi-Rakhmat), Levallois–Mousterian (Kairak-Kumy, Tossor, Khudji), typical (Mountain) Mousterian (Teshik-Tash, Ogzi-Kichik, Kuturbulak), and Moustero-Soanian (Kara-Bura, Ak-Dzhar) (Ranov, 1968, 1971, 1984; Ranov and Davis, 1979). A similar attempt was undertaken by Suleimanov (1972), and both he and Ranov claimed that their groupings were based on statistical methods. However, as I have shown in detail elsewhere (Vishnyatsky, 1989c), neither of these schemes has been substantiated.

Another attempt to reveal and briefly describe the variability inherent in the Central Asian Mousterian was undertaken recently by Kulakovskaya (1990, p. 213), who mentioned in passing that it seems less "mosaic" than the European Mousterian. I cannot but agree with this. Moreover, in my view the differences between the Mousterian assemblages of Central Asia appear (when considered against the background of common features) so insignificant and casual that there is no incentive to try to divide them into

"variants," "types," or "facies." It is highly questionable that we should strive for such a division only because it has been successfully(?) done for some other region(s). Of course, an archaeologist pursuing such a goal will reach it one way or another (our material is silent and endures anything we do), but often nothing is gained—as was the case with Ranov's four groups.

The Mousterian sites of Central Asia all have rather similar inventories, whether they are caves (Obi-Rakhmat, Khodjakent, Ogzi-Kichik, Teshik-Tash, etc.) or open-air locations (Khudji, Kuturbulak, Zirabulak, etc.), occupation sites (of varied durations and purposes) or workshops. They are characterized by smaller discoidal (centripetal) and larger single-platform or bipolar cores, series of relatively large regular blanks (blades and elongated flakes), a combination of various sidescrapers (including, as a rule, double and convergent) and retouched points, which, in large collections, are invariably supplemented with limaces, and the total or near-total absence of handaxes, leaf-shaped points, and other bifacial tools. The resemblance between different assemblages would be even more marked if not for the variability of raw materials used in tool manufacture. It is most probably due to the latter that "pebble tools" are abundant in Kuturbulak and predominant in Kara-Bura, that some core and tool types are underrepresented in Teshik-Tash, and that the Mousterian complex of Koshkurgan 1 consists basically of small-sized objects. Sometimes assemblages of different raw materials from the same collection (for example, Zirabulak) are less similar than assemblages from different sites. Thus, the Mousterian of Central Asia lacks any unique or peculiar characteristics and displays a rather classical and coherent set of artifacts and techniques reconstructed from these artifacts. There is no real reason to divide it into smaller units (including chronological ones), and for the purposes of interregional comparisons it can be regarded as a single entity.

When compared with most Middle Paleolithic sites, the Kulbulak industry, with its bifacial tools and predominance of denticulated artifacts, is striking in its originality. While it is possible that the predominance of denticulates might (at least in part) reflect noncultural factors, such an explanation cannot account for the presence of bifacial tools. In contrast to most other Central Asian sites, the inhabitants of Kulbulak had a good supply of high-quality flint, which could have provided better opportunities for the realization of their technical skills, but it is doubtful whether this was the only cause of the site's peculiarity. Despite the long history of research, this site still remains enigmatic in almost all respects (chronological, functional, cultural) and its place in the Paleolithic of Central Asia is unclear.

Equally obscure is the character of the Middle Paleolithic industries of Central Kazakhstan. It was claimed that bifacial industries coexisted

with biface-free Mousterian assemblages in the northern part of this area (Voloshin, 1990, p. 105), while Mousterian of Acheulean Tradition complexes were identified in the southern part, in the Balkhash region (Medoev, 1982). However, the materials themselves remain undescribed and unpublished, making it impossible to assess these claims.

When comparing the Central Asian Mousterian with the Middle Paleolithic industries of surrounding regions, one observes the absence or extreme rarity of close analogies to the north and the south and the presence of such analogies to the west and the east. It is clear that the Micoquian of the southern part of Eastern Europe (as at Ilskaya and Sukhaya Mechetka) represents something very different, as does the Middle Stone Age of India and Pakistan, which apparently more resembles the contemporaneous industries of East Asia. Boriskovsky (1966, 1970), who had a good knowledge of South and East Asian materials, noted more than once that the term "Mousterian" is inapplicable to the Middle Stone Age industries of India, because they lack or are very poor in retouched points and limaces, usually have atypical sidescrapers (most of which should rather be called "retouched flakes" because the retouch does not modify the shape of the edge but follows its natural outline), often include more tools on slabs and natural pieces than on flakes, and so on. All these traits are equally characteristic of the inventory of the Sangao cave, Pakistan [though the author of the monograph devoted to this site calls it Mousterian (Salim, 1986)], the late Soanian of the Punjab, the materials from Radjasthan and Central India, and perhaps, the still poorly known Middle Paleolithic of Afghanistan (Davis, 1978, p. 41).

While different in most respects from the Middle Paleolithic of South Asia, the Mousterian of Central Asia does have much in common with the approximately coeval industries of the Middle East (the Zagros). This was noted for the first time by Okladnikov (1949a, p. 81) more than half a century ago, and the data gathered since then appear to confirm his observation. The similarities appear in the topography of the sites, in the composition of the faunal assemblages, and in the character of the stone industries. Most Mousterian sites in both regions are situated at heights of 1200–1400 m asl, and their faunas are usually dominated by either wild goat, wild sheep, or both (Table II). The stone industries are characterized by blade-oriented but still Middle Paleolithic technologies; the presence of truncated-faceted pieces; a substantial degree of core reduction and tool resharpening (with one or two exceptions); a total absence of handaxes and total or near-total absence of other bifacial tools; the ubiquitous presence of various sidescrapers, including double and convergent but, very rarely, transverse or Quina scrapers; frequent retouched points (including elongated ones); the presence of limaces; and the rarity or absence of Upper Paleolithic tool

Table II. Comparison of the Zagros and Trans-Caspian Mousterian Sites by Their Altitudes and Dominating Faunal Species (the Zagros Sites Are Shown in Italics)[a]

Site	Elevation (m above sea level)	Dominant species
Shanidar, cave	*745*	*Wild goat*
Hazar Merd, cave	*1200*	*?*
Ogzi-Kichik, cave	1200	Wild goat/sheep
Khudji, open-air site	1200	Wild goat/sheep
Obi-Rakhmat, cave	1250	Wild goat
Aman-Kutan, cave	1300	Wild sheep
Kobeh, cave	*1300*	*Wild goat/sheep*
Kunji, cave	*1300*	*Cervids and wild goat/sheep*
Warwasi, cave	*1300*	*Equids, followed by wild goat/sheep*
Bisitun, cave	*1400*	*Red deer*
Teshik-Tash, cave	1800	Wild goat
Houmian, cave	*2000*	*Wild goat(?)*

[a]Sources: Lindly (1997); Marean and Kim (1998); Vishnyatsky (1996).

types. There are also differences between the Mousterian industries of the two regions (for example, so-called "rods" are typical of the Zagros but are completely unknown in the Trans-Caspian), as well as differences between assemblages within each region. However, it would be difficult to identify differences that could not be accounted for by specific site functions or the peculiarities of available raw materials (type, quality, abundance, size of nodules, and so forth). In this respect, it is important to stress that while the Mousterian toolmakers of the Zagros used mainly rather good-quality flint, those of the Trans-Caspian usually had to rely on more coarse-grained and therefore less tractable rocks such as quartz, sandstone, and silicified limestone. In fact, the major difference between the assemblages of, for example, Khudji (quartz sandstone and alevrolite) and Obi-Rakhmat (silicified limestone), on the one hand, and Warwasi (flint) and Bisitun (flint), on the other hand, is that the former pair does not look as elegant as the latter, although all have essentially the same types of tools, blanks, and cores.

To the east, a Mousterian very similar to that of Central Asia is well known in the Altai mountains (Derevianko and Markin, 1992). Most of the Altai industries seem to continue the trend extending from the Zagros through the foothills of the Pamirs and Tien-Shan. The only exception is Ust-Karakol 1, where several bifacial tools of different types were found associated with Middle Paleolithic assemblages (*Arkheologia i paleoekologia . . .*, 1990, pp. 72–73).

If we consider (1) the probability of a relatively late age for the Central Asian Mousterian sites, (2) their association with Neandertals (at Shanidar and Teshik-Tash), (3) the total absence in Central Asia of any clear pre-

cedessor from which this industry could have evolved, and (4) the similarity of the Zagros-Taurus, Trans-Caspian, and Altai stone assemblages, then it is possible to formulate the following hypotheses. First, it is possible that both Zagros and Transcaspian Mousterian sites were occupied by Neandertals moving east out of western Asia (Ranov, 1990; Vishnyatsky and Liubin, 1995). Second, this movement could have been either an expansion resulting from successful adaptation (this would probably imply that all the available dates are too young, which is a possibility), or a forced retreat under the pressure of some other expanding population—presumably modern humans. It will not be possible to test these hypotheses until new and more reliable dates are obtained.

The Upper Paleolithic

In contrast to the Mousterian, the few known Upper Paleolithic industries are very diverse. It appears that no two sites can be classified to the same group on the basis of typology (except, perhaps, Samarkandskaya, Khodjamazgil, and Siabcha, which are close together). Nonetheless, there is one noteworthy peculiarity common to Karasu, Shugnou, the sites of the Samarkand region, and the Upper Paleolithic layers of Kulbulak: the retention of marked Middle Paleolithic elements in their typology and technology, while the Upper Paleolithic elements remain somewhat underdeveloped. The persistence of the Middle Paleolithic elements in these industries might indicate their local roots, but there is not sufficient evidence to assess this possibility. Despite the diversity of the industries, none of them seems to have analogies in the adjacent regions. Neither Baradost, with its Aurignacoid features (Olszewski and Dibble, 1994), nor Layer 3 of Kara-Kamar (northern Afghanistan), characterized by a blade-oriented technology and dominated by carinated endscrapers and retouched blades (Davis, 1978, p. 53), nor the Ak-Kupruk culture (Afghanistan) has yielded assemblages similar to those of Central Asian. Only western and southern Siberia hold any promise in the search for analogies to the industries of the eastern part of Kazakhstan, but even this will not be possible until the latter have been fully studied and published.

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REFERENCES

Abramova, T. A. (1985). Palinologicheskie issledonaniya donnyh osadkov Kaspijskogo morya (Palynological study of the bottom sediments of the Caspian Sea). *Vestnik Moskovskogo Universiteta, seria geograficeskaya* **5**: 77–84.

Abramova, Z. A. (1984). Rannij paleolit aziatskoi chasti SSSR (The Early Paleolithic of the Asian part of the USSR). In Boriskovsky, P. I. (ed.), *Paleolit SSSR,* Nauka, Moscow, pp. 135–160.

Abramova, Z. A. (1988). Grot Teshik-Tash—pamyatnik mirovogo znacheniya (Teshik-Task Cave—the monument of world importance. In *Problemy vzaimosvyazi prirody i obshchestva v kamennom veke Srednei Azii,* Fan, Tashkent, pp. 3–4.

Abramova, Z. A., and Mandelshtam, A. M. (1977). Begarslandag—novyi pamyatnik kamennogo veka v doline Uzboya (Begarslandag—A new stone age site in the Uzboi region). *Bulleten Komissii po izucheniyu chetvertichnogo perioda* **47**: 111–115.

Alpysbaev, H. A. (1979). *Pamyatniki nizhnego paleolita Yuzhnogo Kazakhstana* (The Lower Paleolithic sites of South Kazakhstan), Nauka, Alma-Ata.

Anisutkin, N. K., Islamov, U. I., Krahmal, K. A., Saifullaev, B., and Khushvakov, N. O. (1995). *Novye issledovaniya paleolita v Akhangarone, Uzbekistan* (New Investigatons of the Paleolithic in Akhangaron, Uzbekisatan), Institute for the History of Matetrial Culture, St. Petersburg.

Ariai, A. A., and Thibault, C. (1975–1977). Nouvelles précisions à propos de l'outillage ancien sur galets du Khorossan (Iran). *Paléorient* **3**: 101–106.

Arkheologia i paleoekologia paleolita Gornogo Altaya (Archaeology and Paleoecology of the Paleolithic in the Altai Mountains) (1990). Nauka, Novosibirsk.

Artyukhova, O. A. (1986). Paleoliticheskie stoyanki-masterskie severo-vostochnogo Priaralia (Paleolithic workshops of the north-eastern part of the Aral region). In Adamenko, O. M. (ed.), *Korrelyatsia otlozhenij, sobytij i protsessov antropogena,* Komissia po izucheniyu chetvertichnogo perioda, Kishinev, p. 197.

Artyukhova, O. A. (1990). Mustie Kazakhstana (The Mousterian of Kazakhstan). In *Chronosratigraphia paleolita Severnoi, Tsentralnoi i Vostochnoi Azii i Ameriki,* Nauka, Novosibirsk, pp. 35–39.

Artyukhova, O. A. (1992). Mustierskie pamyatniki Semirechia (Mousterian sites in Semirechie). In Samashev, Z. S. (ed.), *Margulanovskie Chtenia,* Nauka, Moscow, pp. 44–48.

Artyukhova, O. A. (1994). Koshkurgan—mustierskij pamyatnik (The Mousterian site of Koshkurgan). *Rossijskaya arkheologia* **4**: 98–111.

Aubekerov, B. Zh. (1990). Geologicheskij vozrast paleolita Kazakhstana (The geological age of the Paleolithic of Kazakhstan). In *Chronosratigraphia paleolita Severnoi, Tsentralnoi i Vostochnoi Azii i Ameriki,* Nauka, Novosibirsk, pp. 44–47.

Babaev, A. G., and Gorelov, A. S. (1985). Razvitie drevnei rechnoi seti Badghyz-Karabilskoi vozvyshennosti (The development of the ancient river system in the badghyz-Karabil region). *Problemy osvoeniya pustyn* **5**: 3–11.

Bar-Yosef, O. (1994). The Lower Paleolithic of the Near East. *Journal of World Prehistory* **8**: 211–265.

Bazhanov, V. S., and Kostenko, N. N. (1962). *Atlas rukovodyaschih form mlekopitayuschih*

antropogena Kazakhstana (Atlas of the Principal Mammal Forms of the Anthropogene of Kazakhstan), Nauka, Alma-Ata.

Beregovaya, N. A. (1960). *Paleoliticheskie mestonahozhdenia SSSR* (Paleolithic Sites of the USSR), Nauka, Moscow–Leningrad.

Beregovaya, N. A. (1984). *Paleoliticheskie mestonahozhdenia SSSR* (Paleolithic Sites of the USSR), Nauka, Leningrad.

Bibikova, V. I. (1958). Nekotorye zamechania po faune iz mustierskoi peshchery Aman-Kutan (Some notes about the fauna of the Mousterian cave site Aman-Kutan). *Sovetskaya arkheologia* **3**: 229–233.

Bizhanov, E. (1979). Nahodki pamyatnikov paleolita na yugo-vostochnom Usturte (Paleolithic sites in south-eastern Usturt). *Vestnik Karakalpakskogo filiala AN Uzbekskoi SSR* **3**: 68–72.

Bizhanov, E. (1983). Paleolicheskie mestonahozhdenia vpadiny Shakhpakhty na Usturte (The Paleolithic sites of the Shakhpakhty depression, Usturt). *Vestnik Karakalpakskogo filiala AN Uzbekskoi SSR* **2**: 86–89.

Bizhanov, E. (1988). Paleolit Usturta (The Paleolithic of Usturt). *Vestnik Karakalpakskogo filiala AN Uzbekskoi SSR* **1**: 68–71.

Bordes, F. (1955). Review of: Movius, H. L., 1953. *L'Anthropologie* **59**: 118–123.

Boriskovsky, P. I. (1947). Paleoliticheskie mestonahozhdenia v Turkmenii (Paleolithic sites in Turkmenia). *Kratkie soobshchenia Instituta istorii materialnoi kultury* **18**: 3–8.

Boriskovsky, P. I. (1966). *Pervobytnoe proshloe V'etnama* (The Primordial Past of Vietnam), Nauka, Moscow–Leningrad.

Boriskovsky, P. I. (1971). *Drevnij kamennyi vek Yuzhnoi i Yugo-Vostochnoi Azii* (The Old Stone Age of South and South-East Asia), Nauka, Leningrad.

Bronger, A., Winer, R., Derevjanko O., and Aldag, S. (1995). Loess-Paleosol sequences in Tadjikistan as a paleoclimatic record of the Quaternary of Central Asia. *Quaternary Proceedings* **4**: 69–81.

Cherdyntsev, V. V. (1969). *Uran-243* (Uranium-243), Nauka, Moscow.

Chernikov, S. S. (1951). Nakhodka paleoliticheskih stoyanok v Vostochnom Kazakhstane (The discovery of Paleolithic sites in Eastern Kazakhstan). *Vestnik AN Kazakhskoi SSR* **12**: 63–70.

Chernikov, S. S. (1956). O rabotah Vostochno-Kazakhstanskoi ekspeditsii (On the work of the East Kazakhstan expedition). *Kratkie soobscheniya Instituta istorii materialnoi kultury* **64**: 43–60.

Chupina, L. N. (1963). Palinologicheskij kompleks mustierskoi stoyanki Karasu 1 sr. Arystandy, Zapadnyi Tien-Shan (Palynological complex of the Karasu Mousterian site from the Arystandy River, West Tien-Shan). *Materialy po istorii fauny i flory Kazakhstana* **4**: 243–246.

Darlas, A. (1995). L'industrie du Paléolithique moyen de Mavri Myti (Lakkopetra, Grèce). *Bulletin de la Socíté Préhistorique Française* **92**: 390–398.

Davis, R. S. (1978). The Palaeolithic. In Allchin, F. R., and Hammond, N. (eds.), *The Archaeology of Afghanistan,* Academic Press, London, pp. 37–70.

Davis, R. S., Ranov, V. A., and Dodonov, A. E. (1980). Early man in Soviet Central Asia. *Scientific American* **243**: 130–137.

Debénath, A., and Dibble, H. L. (1994). *Handbook of Paleolithic Typology. Volume One: Lower and Middle Paleolithic of Europe,* University of Pennsylvania Museum, Philadelphia.

Dennell, R. W., Rendell, H. M., Hurcombe, L., and Hailwood, E. A. (1994). Archaeological evidence for hominids in Northern Pakistan before one million years ago. In Franzen, J. L. (ed.), *100 Years of Pithecanthropus. The Homo erectus Problem,* Forschungsinstitut Senckenberg, Frankfurt, pp. 151–155.

Derevianko, A. P., and Markin, S. V. (1992). *Mustie gornogo Altaya* (The Mousterian of Altai Mountains), Nauka, Novosibirsk.

Derevianko, A. P., Aubekerov, B. Zh., Petrin, V. T., Taimagambetov, Zh. K., Artyukhova, O. A., Zenin, V. N., and Petrov, V. G. (1993). *Paleolit severnogo Pribalkhashia: Semizbugu*

punkt 2, rannij-pozdnij paleolit (The Paleolithic of the Northern Shore of Lake Balkhash, Semizbugu 2, Early-Late Paleolithic), Nauka, Novosibirsk.

Derevianko, A. P., Petrin, V. T., and Taimagambetov, Zh. K. (1997). *Early Paleolithic Assemblages in Travertine, Southern Kazakhstan,* Institute of Archaeology and Ethnography Press, Novosibirsk.

Derevianko, A. P., Petrin, V. T., Rybin, E. P., and Chevalkov, L. M. (1998). *Paleoliticheskie kompleksy stratifitsirovannoi chasti stoyanki Kara-Bom* (Paleolithic assemblages from the stratified part of the Kara-Bom site), Institute of Archaeology and Ethnography Press, Novosibirsk.

Djurakulov, M. D. (1987). *Samarkandskaya stoyanka* (The Samarkandskaya Site), Fan, Tashkent.

Dodonov, A. E. (1986). *Antropogen Yuzhnogo Tadjikistana* (The Anthropogene of Southern Tadjikistan), Nauka, Moscow.

Dodonov, A. E., and Ranov, V. A. (1976). Novye paleoliticheskie nakhodki v lessah basseina r.Kyzylsu (New Paleolithic finds from the loess of the Kyzylsu basin). *Bulleten Komissii po izucheniyu chetvertichnogo perioda* **46**: 99–106.

Dodonov, A. E., and Ranov, V. A. (1984). Antropogen Srednei azii: Stratigrafia, korrelyatsia, paleolit (The Anthropogene of Central Asia: stratigraphy, correlations, Paleolithic). In *Chetvertichnaya geologia i geomorfologia, Vol. 3,* Nauka, Moscow, pp. 67–81.

Dodonov, A. E., Lomov, S. P., Ranov, V. A., and Sosin, P. M. (1976). Voprosy paleogeografii i paleoekologii paleoliticheskoi stoyanki Lakhuti v Yuzhnom Tadjikistane (Paleogeography and paleoecology of the Paleolithic site Lakhuti in Southern Tadjikistan). In Nikiforova, K. V. (ed.), *Stratigrafia i paleogeografia antropogena,* Nauka, Moscow, pp. 114–124.

Dodonov, A. E., Ranov, V. A., and Penkov, A. V. (1978). Nakhodki paleolita v drevnih pochvah Yuzhnogo Tacjikistana i ih geologicheskaya pozitsia (Paleolithic finds from the loess deposits of Southern Tadjikistan and their geological position). *Bulleten Komissii po izucheniyu chetvertichnogo perioda* **48**: 88–96.

Dodonov, A. E., Ranov, V. A., and Schafer, J. (1995). Das Lösspaläolithium am Obi-Mazar (Tadjikistan). *Jahrbuch des Römisch-Germanisches Zentralmuseums Mainz* **39**: 209–243.

Dolukhanov, P. M. (1977). Raboty v Zapadnoi Turkmenii (Works in Western Turkmenia). In *Arkheologicheskie otkrytia 1976 goda,* Nauka, Moscow, pp. 551–552.

Fedorov, P. V. (1957). Stratigrafia chetvertichnyh otlozhenij i istoria razvitiya Kaspiiskogo morya (The stratigraphy of the Quaternary deposits and the history of the Caspian Sea). *Trudy geologicheskogo instituta AN SSSR* **10**: 1–308.

Forster, T., and Heller, F. (1994). Loess deposits from the Tadjik depresion (Central Asia): Magnetic properties and paleoclimate. *Earth and Planetary Science Letters* **128**: 501–512.

Gabori, M. (1988). Nouvelles découvertes dans le Paléolithique d'Asie centrale soviétique. In Dibble, H. L., and Montet-White, A. (eds.), *Upper Pleistocene Prehistory of Western Eurasia,* University of Pennsylvania Museum, Philadelphia, pp. 287–295.

Gohman, I, I. (1957). Paleoliticheskaya stoyanka "Peschera" na Buhtarme (The Paleolithic site "Peschera" upon Buhtarma). *Kratkie soobschenia Instituta istorii materialnoi kultury* **67**: 54–58.

Grechkina, T. Yu. (1990). Nekotorye itogi issledovaniya Zirabulakskoi paleoliticheskoi stoyanki (Some results of the study of the Zirabulak Paleolithic site). In *Arkheologicheskie raboty na novostroikah Uzbekistana,* Fan, Tashkent, pp. 13–25.

Grechkina, T. Yu., and Tashkenbaev, N. H. (1990). K voprosu o kvartsevyh izdeliyah Kuturbulaka, 3 sloi (On the quartz artifacts of Kuturbulat, layer 3). *Istoria materialnoi kultury Uzbekistana* **23**: 130–139.

Gromova, V. I. (1949). Pleistotsenovaya fauna mlekopitayuschih iz grota Teshik-Tash, Yuzhnyi Uzbekistan (The Pleistocene mammals from Teshik-Tash Cave, Southern Uzbekistan). In Gremyatsky, M. A. (ed.), *Teshik-Tash. Paleoliticheskii chelovek,* Moscow University Press, Moscow, pp. 87–99.

Huang, W., and Wang, D. (1995). La recherche récente sur le Paléolithique ancien en Chine. *L'Anthropologie* **99**: 637–651.

Ivanov, G. V. (1979). Arkheologicheskie pamyatniki Badghyza (Archaeological sites of Badghyz). *Pamyatniki Turkmenistana* **1**: 13.

Ivanova, N. G., and Nesmeyanov, S. A. (1980). Rezultaty palinologicheskogo izuchenia Samarkandskoi verhnepaleoliticheskoi stoyanki (The results of the palynological study of the Samarkandskaya Upper Paleolithic site). In Larichev, V. E. (ed.), *Paleolit Srednei i Vostochnoi Azi,* Nauka, Novosibirsk, pp. 47–50.

Islamov, U. I. (1990). Sel'ungur, nouveau site du Pal&eacute:olithique inférieur d'Asie centrale. *L'Anthropologie* **94**: 675–688.

Islamov, U. I., and Krahmal, K. A. (1992). Kompleksnye issledovania drevnepaleoliticheskoi peschernoi stoyanki Sel'ungur (The complex study of the Early Paleolithic cave site Sel'ungur). In Derevyanko A. P., and Petrin V. T (eds.), *Rannepaleoliticheskie kompleksy Evrazii,* Nauka, Novosibirsk, pp. 49–59.

Islamov, U. I., Zubov, A. A., and Kharitonov, V. M. (1988). Paleoliticheskaya stoyanka Sel-Ungur v Ferganskoi doline (The Paleolithic site of Sel-Ungur in the Fergana valley). *Voprosy antropologii* **80**: 38–49.

Kasymov, M. R. (1972a). *Kremnedobyvayuschie masterskie i shahty kamennogo veka Srednei Azii* (Flint-quarry Stone Age sites of Central Asia), Fan, Tashkent

Kasymov, M. R. (1972b). Mnogosloinaya paleoliticheskaya stoyanka Kulbulak v Uzbekistane (The multi-layered Paleolithic site of Kulbulak in Uzbekistan). *Materialy i issledovania po arkheologii* **185**: 111–119.

Kasymov, M. R., and Grechkina, T. Yu. (1994). Kul'bulak (Uzbekistan) and its significance for the Paleolithic of Central Asia. In Masson, V. M. (ed.), *New Archaeological Discoveries in Asiatic Russia and Central Asia,* Institute for the History of Material Culture, St. Petersburg, pp. 5–13.

Keates, S. G. (1994). Archaeological evidence of hominid behaviour in Pleistocene China and Southeast Asia. In Franzen, J. L. (ed.) *100 Years of Pithecanthropus. The Homo erectus Problem,* Forschungsinstitut Senckenberg, Frankfurt, pp. 141–150.

Klapchuk, M. N. (1964). Pervye paleoliticheskie nakhodki v Tsenralnom Kazahstane (The first Paleolithic finds in Central Kazakhstan). *Sovetskaya arkheologia* **3**: 268–271.

Klapchuk, M. N. (1969). K voprosu ob arkheologicheskih kulturah Tsenralnogo Kazakhstana v verhnem pleistotsene (On the Upper Pleistocene archaeological cultures of Central Kazakhstan). In Akishev, K. A. (ed.), *Kultura drevnih skotovodov i zemledeltsev Kazakhstana,* Nauka, Alma-Ata, pp. 121–135.

Klapchuk, M. N. (1970). Galechnye orudia mestonahozhdenia Muzbel 1-2 v Tsentralnom Kazakhstane (Pebble tools from the Muzbel 1-2 site in Central Kazakhstan). In Kadyrbaev, M. K. (ed.), *Po sledam drevnih kultur Kazakhstana,* Nauka, Alma-Ata, pp. 217–227.

Klapchuk, M. N. (1976). Pozdneashelskoe mestonahozhdenie Jaman-Aibat 4 in Central Kazakhstan (Late Acheulean site Jaman-Aibat 4 in Central Kazakhstan). *Sovetskaya arkheologia* **3**: 176–190.

Kostenko, N. P. (1958). Geomorfologicheskij analiz rechnyh dolin gornyh stran (The geomorphological analysis of mountain river valleys). *Bulleten Komissii po izucheniyu chetvertichnogo perioda* **22**: 73–90.

Kostenko, N. P., Nesneyanov, S. A., and Ranov, V. A. (1961). O nakhodke paleolitichesih orudij na vozvyshennosti Ak-Djar (On the discovery of Paleolithic tools on the Ak-Djar height). *Doklady AN Tadjikskoi SSR* **4**: 29–34.

Krylkov, Yu. V., and Ranov, V. A. (1959). Arkheologicheskie nakhodki mustierskogo vremeni na vozvyshennosti Kara-Bura i ih interpretatsia (Archaeological finds of the Mousterian Period from the Kara-Bura heights and their interpretation). *Doklady AN Tadjikskoi SSR* **2**: 3–8.

Krylova, A. A. (1959). Novye paleoliticheskie mestinahozhdenia v Vostochnom Kazakhstane (New Paleolithic sites in Eastern Kazakhstan). *Kratkie soobschenia Instrituta arkheologii* **76**: 28–32.

Kulakovskaya, L. V. (1990). Mustie Azii: vzglyad iz Evropy (The Mousterian of Asia: a glance from Europe). In *Chronosratigraphia paleolita Severnoi, Tsentralnoi i Vostochnoi Azii i Ameriki,* Nauka, Novosibirsk, pp. 210–214.

Larichev, V. E. (1977). Otkrytie rubil na territorii Vostochnoi Azii i problema lokalnyh kultur nizhnego paleolita (The discovery of handaxes on the territory of East Asia and the

problem of local cultures in the Lower Paleolithic). In Chlenova, N. L. (ed.), *Problemy arkheologii Evrazii i Severnoi Ameriki,* Nauka, Moscow, pp. 22–34.

Lazarenko, A. A., and Ranov, V. A. (1977). Karatau 1—drevneishij paleoliticheskij pamyatnik v lesseh Srednej Azii (Karatau 1—the oldest Paleolithic site in the loess of Central Asia). *Bulleten Komissii po izucheniyu chetvertichnogo perioda* **47**: 45–57.

Leontiev, O. K., Maev, N. G., and Rychagov, G. I. (1977). *Geomorfologia beregov i dna Kaspiiskogo morya* (Geomorphology of the Caspian Sea Coasts and Bottom), Nauka, Moscow.

Lev, D. N. (1949). *Drevnij paleolit v Aman-Kutane: predvaritelnoe soobschenie* (The Early Paleolithic in Aman-Kutan: A Preliminary Report), Uzbek State University, Samarkand.

Lev, D. N. (1965). Samarkandskaya paleoliticheskaya stoyanka (The Samarkandskaya Paleolithic site). *Istoria materialnoi kultury Uzbekistana* **6**: 22–29.

Lindly, J. M. (1997). *The Zagros Mousterian: A Regional Perspective,* Unpublished Ph.D. dissertation, Arizona State University, Tempe.

Litvinsky, B. A., Okladnikov, A. P., and Ranov, V. A. (1962). *Drevnosti Kairak-Kumov* (The antiquities of Kairak-Kumy), Institute of History, Dushanbe.

Liubin, V. P. (1970). Nizhnij paleolit (The Lower Paleolithic). *Materialy i issledovaniya po arkheologii* **166**: 19–42.

Liubin, V. P. (1984). Paleolit Turkmenii (The Paleolithic of Turkmenia). *Sovetskaya arkheologia* **1**: 26–45.

Liubin, V. P., and Vishnyatsky, L. B. (1990). Otkrytie paleolita v Vostochnoi Turkmenii (The discovery of the Paleolithic in Eastern Turkmenia). *Sovetskaya arkheologia* **4**: 5–15.

Lomov, S. P., and Panov, V. A. (1984). Pogrebennye pochvy Tadjikistana i raspredelenie v nih paleoliticheskih orudij (The buried soils of Tadjikistan and the distribution of Paleolithic tools in them). *Pochvovedenie* **4**: 21–30.

Luzgin, B. K., and Ranov, V. A. (1966). O pervyh nahodkah paleolita v Tsentralnom Kopetdage (On the first Paleolithic finds from Central Kopetdag). *Bulleten Komissii po izucheniyu chetvertichnogo perioda* **32**: 87–95.

Malgina, E. A. (1961). Rezultaty sporo-pyltsevogo analiza chetvertichnyh i verhnepliotsenovyh otlozhenij iz Pribalkhanskogo raiona Zapadnoi Turkmenii (The results of the palynological analysis of Quaternary and Upper Pliocene deposits from the Balkhan region of West Turkmenia). In Shantser, E. V. (ed.), *Materialy Vsesoyuznogo soveschania po izucheniyu chetvertichnogo perioda,* AN SSSR, Moscow, t.1; pp. 296–303.

Marean, C. W., and Kim, S. Y. (1998). Mousterian large-mammal remains from Kobeh Cave. Behavioral implications for Neanderthals and early modern humans. *Current Anthropology* **39** (Suppl.): 79–113.

Medoev, A. G. (1982). *Geochronologia paleolita Kazakhstana* (The Geochronology of the Paleolithic of Kazakhstan), Nauka, Alma-Ata.

Medvedev, G. I., and Nesmeyanov, S. A. (1988). Tipizatsia "kulturnyh otlozhenij i mestonahozhdenij kamennogo veka (Typology of Stone Age "cultural deposits" and sites). In Vasilievsky, R. S., and Kholyushkin, Y. P. (eds.), *Metodicheskie problemy arkheologii Sibiri,* Nauka, Novosibirsk, pp. 113–142.

Mishra, S., Venkatesan, T. R., Rajaguru, S. N., and Somayajulu, B. L. K. (1995). Earliest Acheulian industry from Peninsular India. *Current Anthropology* **36**: 847–854.

Movius, H. L. (1944). Early man and Pleistocene stratigraphy in southern and eastern Asia. *Papers of the Peabody Museum of American Archaeology and Ethnology* **19**: 1–125.

Movius, H. L. (1948). The Lower Palaeolithic cultures of southern and eastern Asia. *Transactions of the American Philosophical Society* **38**: 329–420.

Movius, H. L. (1953). The Mousterian cave of Teshik-Tash, Southeastern Uzbekistan, Central Asia. *Bulletin of the American School of Prehistoric Research* **17**: 11–71.

Nasretdinov, Kh. K. (1962). Khodjakentskaya peschera N.2—mustierskij pamyatnik bliz Tashkenta (Khodjakent Cave 2—a Mousterian site near Tashkent). *Obschestvennye nauki v Uzbekistane* **4**: 63–67.

Nesmeyanov, S. A. (1977). Paleogeografia paleoliticheskih stoyanok v gornyh oblastyah Srednei Azii (Paleogeography of Paleolithic sites in the mountain areas of Central Asia).

In Ivanova, I. K., and Praslov, N. D. (eds.), *Paleoekologia drevnego cheloveka,* Nauka, Moscow, pp. 216–222.

Nesmeyanov, S. A. (1980). Geologicheskoe stroenie Samarkandskoi verhnepaleoliticheskoi stoyanki (Geological structure of the Samarkandskaya Upper Paleolithic site). In Larichev, V. E. (ed.), *Paleolit Srednei i Vostochnoi Azii,* Nauka, Novosibirsk, pp. 30–46.

Nikonov, A. A., and Ranov, V. A. (1978). Stoibische pervobytnyh lyudei v Gissarskoi doline (A camp-site of primordial people in the Hissar valley). *Priroda* **4**: 145–146.

Nikonov, A. A., Pakhomov, M. M., Romanova, E. A., Sulerzhitsky L. D., and Shumova, G. M. (1989). Novye dannye po paleogeografii pozdnego pleistotsena Pamiro-Alaya (New data on the paleogeography of the Pamir-Alai). In Velichko, A. A. (ed.), *Paleoklimaty i oledeneniya v pleistotsene,* Nauka, Moscow, pp. 117–125.

Okladnikov, A. P. (1940). Amir-Temir, novyi pamyatnik kamennogo veka v gorah Baisun-Tau (Amir-Temir, a new Stone Age site in the Baisun-Tau mauntains). *Kratkie sobscheniya Instituta istorii materialnoi kultury* **6**: 67–69.

Okladnikov, A. P. (1949a). Issledovanie mustierskoi stoyanki i pogrebenia neandertaltsa v grote Teshik-Tash, Yuzhnyi Uzbekistan, Srednyaya Azia (The study of the Mousterian site and Neandertal burial in the Teshik-Tash shelter, South Uzbekistan, Central Asia). In Gremyatsky, M. A. (ed.), *Teshik-Tash. Paleoliticheskij chelovek,* Izdatelstvo Moskovskogo Universiteta, Moscow, pp. 7–85.

Okladnikov, A. P. (1949b). Izuchenie drevneishih arkheologicheskih pamyatnikov Turkmenii (The study of the oldest archaeological sites in Turkmenia). *Kratkie sobscheniya Instituta istorii materialnoi kultury* **28**: 67–71.

Okladnikov, A. P. (1956). Drevneishee proshloe Turkmenistana (The oldest past of Turkmenistan). *Trudy Instituta istorii, arkheologii, etnografii AN Turkmenskoi SSR* **1**: 181–221.

Okladnikov, A. P. (1958). Issledonaniya pamyatnikov kamennogo veka Tadjikistana (Investigations of Stone Age sites in Tadjikistan). *Materialy i issledovaniya po arkheologii* **66**: 12–71.

Okladnikov, A. P. (1961). Khodjakentskaya peschera—novyi mustierskij pamyatnik Uzbekistana (The Khodjakent cave—a new Mousterian site in Uzbekistan). *Kratkie soobschenia Instituta arkheologii* **82**: 68–76.

Okladnikov, A. P. (1966). Paleolit (The Paleolithic). In Masson, V. M. (ed.), *Srednyaya azia v epokhu kamnya i bronzy,* Nauka, Moscow–Leningrad, pp. 11–75.

Okladnikov, A. P., Kasymov, M. R., and Konoplya, P. T. (1964). Kapchigaiskaya paleoliticheskaya masterskaya (The Kapchigai Paleolithic workshop). *Istoria materialnoi kultury Uzbekistana* **5**: 5–27.

Olszewski, D. I., and Dibble, H. L. (1994). The Zagros Aurignacian. *Current Anthropology* **35**: 68–75.

Omanzhulov, T. (1982). Novaya peschernaya stoyanka mustierskogo vremeni v Uzbekistane (New Mousterian cave site in Uzbekistan). *Istoria materialnoi kultury Uzbekistana* **17**: 11–15.

Pakhomov, M. M. (1973). Izmenenie struktury rastitelnogo pokrova gor vostoka Srednei Azii kak biosratigraficheskaya osnova raschleneniya pleistotsena (The change in the structure of mountain vegetation in the east of Central Asia as a basis for divisions of the Pleistocene). In Grichuk, V. P. (ed.), *Palinologia pleistotsena i pliotsena,* Nauka, Moscow, pp. 153–160.

Pakhomov, M. M. (1991). Korelyatsia sobytij pleistotsena v Srednei Azi i dinamika poyasnosti gor (The correlation of the Pleistocene events in Central Asia and the dynamics of mountain zonality). *Izvestiya Akademii Nauk SSSR, seria geograficeskaya* **6**: 94–103.

Pakhomov, M. M., Penkova A. M., and Ershova, L. N. (1980). Tsiklichnost klimaticheskogo protsessa i ego otrazhenie v palinologicheskih dannyh po kainozoyu Pamiro-Alaya (Cyclicity of climatic changes in the Cenozoic of the Pamir-Alai mountains as reflected by palynological data). In Nikiforova, K. V., and Dodonov, A. E. (eds.), *Granitsa neogena i chetvertichnoi sistemy,* Nauka, Moscow, pp. 171–183.

Pope, G. (1995). The influence of climate and geography on the biocultural evolution of the Far Eastern hominids. In Vrba, E. S. (ed.), *Paleoclimate and Evolution with Emphasis on Human Origins,* Yale University Press, New Haven, CT, pp. 493–506.

Ranov, V. A. (1965). *Kamennyi vek Tadjikistana* (The Stone Age of Tadjikistan), Tadjik Academy of Science Press, Dushanbe.

Ranov, V. A. (1968). O vozmozhnosti vydeleniya lokalnyh kiltur v paleolite Srednei Azii (On the possibility of distinguishing local cultures in the Paleolithic of Central Asia). *Izvestia AN Tadjikskoi SSR, otdelenie obshcestvennyh nauk* **3**: 3–11.

Ranov, V. A. (1971). K izucheniyu mustierskoi kultury v Srednei Azii (On the study of the Mousterian culture in Central Asia). *Materialy i issledovania po arkheologii* **173**: 209–232.

Ranov, V. A. (1972). Semiganch—novoe mustierskoe mestonahozhdenie v Yuzhnom Tadjikistane (Semiganch—a new Mousterian site in Southern Tadjikistan). *Materialy i issledovania po arkheologii* **185**: 100–110.

Ranov, V. A. (1973). Shugnou—mnogosloinaya paleoliticheskaya stoyanka v verkhoviyah r.Yakhsu, raskopki 1969-1970gg. (Shugnou—multi-layered Paleolithic site in the upper reaches of the Yakhsu river, 1969-1970 excavations). *Arkheologicheskie raboty v Tadjikistane* **10**: 42–61.

Ranov, V. A. (1975). Raboty otryada po izucheniyu kamennogo veka v 1971g.: raskopki na ploschadke pered pescheroi Ogzi-Kichik (Report on the field investigations of the Stone Age in 1971: The excavations of the area in front of the Ogzi-Kichik cave). *Arkheologicheskie raboty v Tadjikistane* **11**: 5–26.

Ranov, V. A. (1980). Raskopki v Ogzi-Kichike v 1975g (Excavations of Ogzi-Kichik in 1975). *Arkheologicheskie raboty v Tadjikistane* **15**: 13–38.

Ranov, V. A. (1984). Zentralazien. *Forschungen zur Allgemeinen und Vergleichenden Archäologie* **4**: 299–343.

Ranov, V. A. (1986). Raskopki nizhnepaleoliticheskoi stoyanki Lakhuti 1 v 1979 (Excavations of the Lower Paleolithic site Lakhuti 1 in 1979). *Arkheologicheskie raboty v Tadjikistane* **19**: 11–36.

Ranov, V. A. (1987a). Desyat let issledovanij kamennogo veka Yuzhnogo Tadjikistana i Pamira (Ten years of Stone Age research in Southern Tadjikistan and Pamir). *Arkheologicheskie raboty v Tadjikistane* **20**: 50–85.

Ranov, V. A. (1987b). Raboty otryada po izucheniyu kamennogo veka v 1980g. (Report on the field investigations of the Stone Age in 1980). *Arkheologicheskie raboty v Tadjikistane* **20**: 86–95.

Ranov, V. A. (1990). O vostochnoi granitse mustierskoi kultury (About the eastern border of the Mousterian culture). In *Chronosratigraphia paleolita Severnoi, Tsentralnoi i Vostochnoi Azii i Ameriki,* Nauka, Novosibirsk, pp. 262–268.

Ranov, V. A. (1993). Tout commence au Paléolithique. *Les Dossiers de l'Archéologie* **185**: 4–13.

Ranov, V. A. (1995). The Paleolithic of the Middle Pleistocene in Central Asia. In *Evolucion Humana en Europa y los yacimientos de la Sierra de Atapuerca,* Junta de Castilla y Leon, Valladolid, pp. 367–386.

Ranov, V. A., and Amosova, A. G. (1984). Raskopki mustierskoi stoyanki Khudji v 1978g (Excavations of the Mousterian site Khudji in 1978). *Arkheologicheskie raboty v Tadjikistane* **18**: 11–47.

Ranov, V. A., and Amosova, A. G. (1990). Raboty otryada po izucheniyu kamennogo veka v 1982g (Report on the field investigations of the Stone Age in 1982). *Arkheologicheskie raboty v Tadjikistane* **22**: 161–194.

Ranov, V. A., and Davis, R. S. (1979). Toward a new outline of the Soviet Central Asian Paleolithic. *Current Anthropology* **20**: 249–262.

Ranov, V. A., and Laukhin, S. A. (1998). Problema geohronologii lessovogo paleolita Yuzhnogo Tadjikistana (On the geochronology of the Paleolithic loess sites in Southern Tadjikistan) In Derevyanko, A. P. (ed.), *Paleoecologia pleistotsena i kultury kamennogo veka Severnoi azii i sopredelnyh territorij,* Novosibirsk, t.2, pp. 352–358.

Ranov, V. A., and Nesmeyanov, S. A. (1973). *Paleolit i stratigrafia antropogena Srednei Azii* (The Paleolithic and the Anthropogene Stratigraphy in Central Asia), Donish, Dushanbe.

Ranov, V. A., and Yunusaliev, M. (1975). Predvaritelnye rezultaty issledovaniya mustierskoi stoyanki Tossor (Preliminary results of the study of the Tossor Mousterian site). In Kozhemyako, P. N., and Vinnik, D. F. (eds.), *Arkheologicheskie pamyatniki Priissykkulia,* Ilim, Frunze, pp. 42–51.

Ranov, V. A., Sharapov, Sh., and Nikonov, A. A. (1973). Fauna mlekopitayuschih, arkheologia i geologia stoyanki Ogzi-Kichik, Yuzhnyi Tadjikistan (Mammal fauna, archaeology and geology of the Ogzi-Kichik site, Southern Tadjikistan). *Doklady AN Tadjikskoi SSR* **16**: 60–63.

Ranov, V. A., Nikonov, A. A., and Pakhomov, M., (1976). Liudi kamennogo veka na podstupah k Pamiru: Paleolitichesaya stoyanka Shugnou i ee mesto sredi okruzhayuschih pamyatnikov (Stone Age humans on the aproaches to Pamir: The Paleolithic campsite Shugnou and its place among surrounding sites). *Acta Archaeologica Carpathica* **16**: 5–20.

Ranov, V. A., Dodonov, A. E., Lomov, S. P., Pakhomov, M. M., and Penkov, A. V. (1987). Kuldara—novyi nizhnepaleoliticheskij pamyatnik Yuzhnogo Tadjikistana (Kuldara—a new Lower Paleolithic site in Southern Tadjikistan). *Bulleten Komissii po izucheniyu chetvertichnogo perioda* **56**: 65–74.

Ranov, V. A., Carbonell, E., and Rodriguez, X. P. (1995). Kuldara: Earliest human occupation in Central Asia in its Afro-Asian context. *Current Anthropology* **36**: 337–346.

Rendell, H., and Dennell, R. W. (1985). Dated Lower Palaeolithic artefacts from Northern Pakistan. *Current Anthropology* **26**: 393.

Salim, M. (1986). *The Middle Stone Age Cultures of Northern Pakistan,* Quaid-i-Azam University, Islamabad.

Schick, K. D. (1994). The Movius line reconsidered: Perspectives on the earlier Paleolithic of eastern Asia. In Ciochon, R., and Corruccini, R. S. (eds.), *Integrative Paths to the Past: Paleoanthropological Advances in Honor of Clark Howell,* Prentice Hall, Englewood Cliffs, NJ, pp. 569–596.

Schick, K. D., and Toth, N. (1993). *Making Silent Stones Speak: Hominid Evolution and the Dawn of Technology,* Touchstone, New York.

Seonbok, Yi. (1992). Towards an explanation of Northeast Asian Palaeolithic. In *Chronostratigrafia paleolita Severnoi, Tsentralnoi, Vostochnoi Azii i Ameriki,* Nauka, Novosibirsk, pp. 193–201.

Serebryanyi, L. R., Pshenin, G. M., and Punning Ya.-M. K. (1980). Oledenenie Tyan-Shanya i kolebania urovnya Arala (A stage-by-stage analysis of the events in the Late Quaternary history of Central Asia). *Izvestia AN SSSR, seria geograficeskaya* **2**: 52–70.

Shackleton, N. J., An, Z., Dodonov, A. E., Gavin, J., Kukla, G. J., Ranov, V. A., and Zhou, L. P. (1995). Accumulation rate of loess in Tadjikistan and China: Relatonship with global ice volume cycles. *Quaternary Proceedings* **4**: 1–6.

Shimchak, K., and Grechkina T. Yu. (1996). Polsko-Uzbekistanskaya arkheologicheskaya ekspeditsia. Pervyi sezon polevyh rabot (The Polish-Uzbek archaeological expedition. The first season of fieldwork). In Masson, V. M. (ed.), *Novye arkheologicheskie otkrytia i izuchenie kulturnoi transformatsii,* Institute for the History of Material Culture, St. Petersburg, pp. 67–68.

Skvortsov, Yu. A. (1949). *Elementy noveishih tektonicheskih dvizhenij Uzbekistana* (The latest tectonics of Uzbekistan), Tashkent University, Tashkent.

Storm, P. (1995). *The Evolutionary Significance of the Wajak Skulls* (Scripta Geologica 10), Rijksmuseum van Geologie en Minerologie, Leiden.

Suleimanov, R. Kh. (1972). *Statisticheskoe izuchenie kultury grota Obi-Rakhmat* (A Statistical Study of the Culture of the Obi-Rakhmat Shelter), Fan, Tashkent.

Swisher, C. C., Curtis, G. H., Jacob, T., Getty, A. S., Suprijo, A., and Widiasmoro, B. L. (1994). Age of the earliest known hominids in Java, Indonesia. *Science* **263**: 1118–1121.

Taimagambetov, Zh. K. (1987). Pamyatniki kamennogo veka (The Stone Age sites). In Akishev, K. A. (ed.). *Arkheologicheskie pamyatniki v zone zatopleniya Shulbinskoi GES,* Nauka, Alma-Ata, pp. 9–23.

Taimagambetov, Zh. K. (1990). *Paleoliticheskaya stoyanka im. Ch. Ch. Valikhanova* (Ch. Ch. Valikhanov Paleolithic site), Nauka, Alma-Ata.

Taimagambetov, Zh. K., and Aubekerov, B. Zh. (1996). Verkhnij paleolit Kazakhstana (The Upper Paleolithic of Kazakhstan). In *Voprosy arkheologii Zapadnogo Kazakhstana,* Samara University, Samara, pp. 23–29.

Tashkenbaev, N. Kh. (1973). Novaya mustierskaya stoyanka Kuturbulak (Kuturbulak, a new Mousterian site). *Istoria materialnoi kultury Uzbekistana* **10**: 24–26.

Tashkenbaev, N. Kh. (1975). Ob issledovanii paleoliticheskoi stoyanki Kuturbulak (On the investigation of the Paleolithic site of Kuturbulak). *Istoria materialnoi kultury Uzbekistana* **12**: 5–15.

Tashkenbaev, N. Kh. (1987). Nekotorye dannye po paleolitu Zeravshanskoi doliny (Some data on the Paleolithic of the Zeravshan valey). *Istoria materialnoi kultury Uzbekistana* **21**: 9–16.

Tashkenbaev, N. Kh., and Suleimanov, R. Kh. (1980). *Kultura drevnekamennogo veka doliny Zeravshana* (The Old Stone Age Culture of the Zeravshan Valley), Fan, Tashkent.

Tetyukhin, G. F., Tashkenbaev, N. Kh., and Suleimanov, R. Kh. (1978). Geomorfologicheskoe polozhenie mustierskogo mestonahozhdenia Kuturbulak (Geomorphological position of the Kuturbulak Mousterian site). *Istoria materialnoi kultury Uzbekistana* **14**: 13–18.

Valueva, N. M. (1973). Razvitie pozdnekainozoiskih flor Mangyshlaka, Usturta i Priuralia (The development of the Late Cenozoic vegetation in Mangyshlak, Usturt and Southern Ural). In Grichuk, V. P. (ed.), *Palinologia pliotsena i pleistotsena,* Nauka, Moscow, pp. 181–184.

Vasilkovsky, N. P. (1957). K stratigrafii chetvertichnyh otlozhenij vostochnogo Uzbekistana (On the stratigraphy of Quaternary deposits in eastern Uzbekistan). *Trudy Komissii po izucheniyu chetvertichnogo perioda* **13**: 93–99.

Velichko, A. A., Arslanov, H. A., Gerasimova, S. A., Islamov, U. I., Kremenetsky, K. V., Markova, A. K., Udartsev, V. P., and Chikolini, N. I. (1990). Stratigrafia i paleoekologia rannepaleoliticheskoi peschernoi stoyanki Sel-Ungur, Sovetskaya Sredniaya Azia (Stratigraphy and paleoecology of the Early Paleolithic cave site Sel-Ungur, Soviet Central Asia). In *Chronosratigraphia paleolita Severnoi, Tsentralnoi i Vostochnoi Azii i Ameriki,* Nauka, Novosibirsk, pp. 76–79.

Verma, B. C. (1989). Time stratigraphic position of the early Palaeolithic culture in the Siwaliks of northwest India based on fission-track age of the associated sediments. *Current Science* **58**: 242–244.

Vinigradov, A. V. (1981). *Drevnie okhotniki i rybolovy sredneaziatskogo mezhdurechia* (Ancient Hunters and Fishermen of the Central Asian Interfluvial), Nauka, Moskow.

Vinogradov, A. V., and Mamedov, E. D. (1966). Kyzylnura 1—pervyi mustierskij pamiatnik v Kyzylkumah (Kyzylnura 1—the first Mousterian site in Kyzylkumy). *Sovetskaya arkheologia* **1**: 84–97.

Vishnyatsky, L. B. (1989a). The discovery of Palaeolithic handaxes in Western Turkmenia: A preliminary report. *Paléorient* **15**: 95–98.

Vishnyatsky, L. B. (1989b). The Movius's theory and the Palaeolithic of Soviet Central Asia (with special reference to some recent finds in Turkmenia). *Journal of Central Asia* **12**: 21–50.

Vishnyatsky, L. B. (1989c). Izuchenie paleolita Srednei Azii (The study of the Paleolithic of Central Asia). *Sovetskaya Arkheologia* **1**: 5–18.

Vishnyatsky, L. B. (1989d). Paleolit Krasnovodskogo poluostrova (The Paleolithic of the Krasnovodsk peninsula). *Izvestia AN Turkmenskoi SSR, Seria obschestvennyh nauk* **3**: 9–18.

Vishnyatsky, L. B. (1990). O vozraste paleolita severo-zapadnoi Turkmenii (On the age of the Paleolithic in north-western Turkmenia). In *Chronosratigraphia paleolita Severnoi, Tsentralnoi i Vostochnoi Azii i Ameriki,* Nauka, Novosibirsk, pp. 88–93.

Vishnyatsky, L. B. (1996). *Paleolit Srednei Azii i Kazakhstana* (The Paleolithic of Central Asia and Kazakhstan), Evropeiskiy Dom, St. Petersburg.

Vishnyatsky, L. B., and Liubin, V. P. (1995). Paleolit Turkmenii: drevneishie industrii i problema pervonachalnogo zaselenia (The Paleolithic of Turkmenia: The oldest industries and the problem of the initial colonization). *Arkheologicheskij almanach* **4**: 41–46.

Voloshin, V. S. (1981). Raboty v tselinogradskoi oblasti (Work in the Tselinograd region). In Rybakov, B. A. (ed.), *Arkheologicheskie otkrytia 1980 goda,* Nauka, Moscow, pp. 432–433.

Voloshin, V. S. (1987). Raboty Tselinogradskoi ekspeditsii (Work of the Tselinograd expedition). In Shilov, V. P. (ed.), *Arkheologicheskie otkrytia 1985 goda,* Nauka, Moscow, pp. 565–566.

Voloshin, V. S. (1988). Ashelskie bifasy iz mestonahozhdenia Vishnevka 3 (Acheulean bifaces from the Vishnevka 3 site). *Sovetskaya arkheologia* **4**: 199–203.

Voloshin, V. S. (1989). Mustierskaya industria iz Koshkurgana (The Mousterian industry of Koshkurgan). In Evdokimov, V. V. (ed.), *Voprosy arkheologii Tsentralnogo i Severnogo Kazakhstana,* Karaganda University, Karaganda, pp. 3–12.

Voloshin, V. S. (1990). Startigrafia i periodizatsia paleolita Tsentralnogo Kazakhstana (The stratigraphy and periodization of the Paleolithic of Central Kazakhstan). In *Chronosratigraphia paleolita Severnoi, Tsentralnoi i Vostochnoi Azii i Ameriki,* Nauka, Novosibirsk, pp. 99–106.

Voloshin, V. S. (1992). Ob istokah paleolita v Tsentralnom Kazakhstane (On the sources of the Central Kazakhstan Paleolithic). In Samashev, Z. S. (ed.), *Margulanovskie chtenia,* Nauka, Moscow, pp. 48–53.

Watanabe, H. (1985). The chopper-chopping tool complex of Eastern Asia: an ethnoarchaeological reexamination. *Journal of Anthropological Archaeology* **4**: 1–18.

Yingsan, F. (1994). The pebble tool or chopper/chopping tool industry in China. *Human Evolution* **9**: 263–272.

Yunusaliev, M. B. (1978). Raboty na paleoliticheskom komplekse Salamat-Bulak (Work on the Salamat-Bulak Paleolithic site). In Rybakov, B. A. (ed.), *Arkheologicheskie otkrytia 1977 goda,* Nauka, Moscow, pp. 572–573.

Yunusaliev, M. B. (1981). Domustierskij kompleks Salamat-Bulak (Pre-Mousterian asemblage of Salamat-Bulak). *Izvetia AN Kirgizskoi SSR* **3**: 92–95.