The Settling of the Ancient Man by the Example of North-Western Altai

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Abstract Archaeological collections from the Pleistocene deposits of North-Western Altai are the best studied Quaternary materials from all of Northern and Central Asia. Stratified sites in that region have yielded the longest archaeological record, which includes Middle and Upper Pleistocene, covering all the stages of the Paleolithic, from the early to the late. Archaeological materials from these sites illustrate the gradual evolution of lithic industries and attest to the continuity of the technological traditions throughout the Paleolithic.

The Paleolithic complex in the Altai Mountains currently provides the most complete information about early human occupation in Northern and Central Asia. It is best represented in studies of multilayered Paleolithic sites in the Anui River valley of North-Western Altai. The general stratigraphic profile, which includes Middle and Upper Pleistocene deposits, has been defined based on data obtained from a number of sites in this region. Multidisciplinary research at the stratified Paleolithic sites in the Anui valley using archaeological, lithostratigraphic and paleontological methods has made it possible to trace the origins and evolution of Paleolithic cultural traditions and to reconstruct the conditions of early human habitation throughout a long phase of the Pleistocene.

The occupation of the Altai by early humans is most likely connected with a northern migration wave of *Homo erectus* who expanded beyond the boundaries of the African continent and reached Asia. According to the dates that have been recently generated from the loess and soil from the Kuldara, Khonako II and Obi-Mazar-6 sites in Tajikistan, *Homo erectus* arrived in Central Asia in the chronological range of 600–900 ka (Ranov, 2001). The most archaic pebble tools that probably correspond to roughly that same

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time have been reported from the northeastern piedmonts of Karatau in Kazakhstan (the Borykazgan, Tanirkazgan and Akkol sits) (Alpysbaev, 1979) and from the northern portion of the Valley of Lakes in Mongolia (Nariyn-Gol-17) (Derevianko et al., 2000c). These industries are characterized by irregular orthogonal cores, "citron" spalls, massive tools reminiscent of *racloirs* and large cutting tools resembling chopper/chopping tools.

The earliest stage of the human presence in the Altai Mountains is evidenced by archaic artifacts found in the red deposits at Karama site, dating from early Middle Pleistocene (Derevianko and Shunkov, 2005). Karama is located in the Anui valley 15 km downstream from the well-known archaeological site of Denisova Cave. The Karama site has yielded a cultural sequence of several human occupation horizons bearing distinct pebble tools attributable to the Lower Paleolithic in the time range of 600–800 ka BP.

The characteristic features of the lithic implements suggest their attribution to the Lower Paleolithic pebble industries. The assemblage of the products of primary reduction includes pebbles showing signs of core preparation with plain striking platforms and negative scars of parallel detachments and short non-faceted spalls. The collection of typologically distinct tools includes longitudinal and transverse *racloirs,* denticulate and notch-denticulate tools fashioned on short spalls and cutting tools of the chopper/chopping tool type with a convex flattened cutting edge and a trimmed massive back. Most pebble tools from Karama are characterized by archaic morphological features and comparatively advanced technology of secondary treatment.

The next stage in the development of the Altai Paleolithic is illustrated by the Early Mousterian industries from the basal sediments at Denisova Cave (strata 22 and 21) and from the alluvial sediments of stratum 19 at the lowermost portion of the Ust-Karakol site. Various dating methods suggest that the age of these lithological strata lies in the range of 133–282 ka, which corresponds to the second half of the Middle Pleistocene (Derevianko et al., 2003).

The most ancient industries of the Denisova Cave demonstrate the Levallois features in stone reduction and a preferable usage of flakes as blanks for tool manufacturing. Various types of *racloirs* and notch-denticulate tools prevail in the tool kit. Most spalls identified within the Ust-Karakol industry from stratum 19 show parallel edges on the dorsal face and a prepared platform. Such categories as *racloirs* with longitudinal and convergent edges, spur-like tools and notched tools with Clactonian and retouched *encoches* have been identified within the tool kit. A notable absence of tools made on complete pebbles and Acheulian bifaces, together with the features of parallel reduction and a set of typologically distinct implements made on standard blanks, all suggest a Middle Paleolithic attribution to the most ancient industries of the Denisova and Ust-Karakol.

The chronological attribution of the Altai early Mousterian industries to the Middle Pleistocene seems reasonable when comparing it to archaeological evidence from other Eurasian Paleolithic sites. Archaeological materials from Western and Central Europe have shown that pre- and early Mousterian

industries with flake tools but without Acheulian bifaces appeared along with typical Acheulian technocomplexes as early as the initial Riss period (Bosinski, 1982; Tuffreau, 1982). It is known that *racloirs*, notches and denticulate tools were the most characteristic flake tools for certain early Mousterian industries (Laville, 1982). Recent geo-chronological estimations of the age of true Mousterian industries of the Tabun Cave in the Near East have suggested a period 250,000–270,000 years ago (Bar-Yosef, 1995; Mercier et al., 1995).

The Altai Middle Paleolithic industries continued their development in the Upper Pleistocene. Available Paleolithic evidence from the Altai testifies to the fact that the majority of Mousterian sites exhibit common features that evolved within a single Middle Paleolithic culture. However, various Altai technocomplexes reveal different proportions of the major technical–typological indices within this single cultural tradition. On the basis of these variations, two major types of industries have been established in the Altai Mousterian sites: industries with predominantly Mousterian technology and those with distinct Levallois tools.

The Mousterian group of industries includes collections recovered from the Denisova and Okladnikov cave sites as well as from the open-air Tiumechin-1 site. The primary reduction strategy is predominantly parallel and radial. Levallois reduction is apparent on only a few artifacts. In general, the impact of the Levallois technique on the technological process seems insignificant. The majority of tools were produced on medium-sized, short spalls. The collection of typologically distinct tools is dominated by Mousterian and notch-denticulate tools. Levallois implements are morphologically distinct but scarce. Various *racloirs* are most numerous. On the basis of the common technical–typological features noted within these materials, we propose categorizing these collections into a "Denisova variant of the Altai Mousterian" (Derevianko and Shunkov, 2002).

The Altai Middle Paleolithic industries included in the Levallois group possess the most distinct technical–typological features. This group includes the sites of Kara-Bom, Ust-Karakol, Anui-3, Ust-Kan Cave. These industries are characterized by the predominance of Levallois reduction, a developed technique of blade detachment, comparatively large numbers of tools fashioned on blades and Levallois spalls, a rather small variety of tool types where blades and Levallois points are most numerous. According to these specific characteristics of the Altai Levallois-Mousterian industries, they are designated as the "Kara-Bom variant of the Altai Middle Paleolithic" (Derevianko et al., 2000b).

The Middle Paleolithic industries from the multilayered sites of Anui-3 and Ust-Karakol demonstrate a well-developed Levallois technology of tool production and bifacial working. Within the Kara-Bom technical variant, materials included in these Levallois-Mousterian collections form a specific industrial type with distinct foliate bifaces (Derevianko and Shunkov, 2002).

The evidence available has not yet provided reliable grounds for associating the technological variants of the Altai Middle Paleolithic with distinct prehistoric human populations bearing independent cultural traditions. There is also

currently insufficient evidence for considering the noted industrial variability of the Altai Middle Paleolithic as a purely chronological phenomenon. The Altai Paleolithic chronostratigraphy testifies to the long-term parallel development of two major industrial variants throughout the so-called Mousterian Würm chron. The initial stage of development of true Mousterian industries (e.g., Denisova Cave, stratum 22) is estimated as falling within the Middle Pleistocene, while its final stages (e.g., Okladnikov Cave) are associated with an absolute date of 33–44 ka. The age estimates for Ust-Karakol (stratum 18) and Kara-Bom (Mousterian horizon 1) suggest that Levallois-Mousterian industries occurred within the chronometric range of 100 to 44 ka. The current state of our knowledge allows us to hypothesize that differentiation of lithic industries took place within a single Middle Paleolithic culture as the result of various adaptation strategies to different environmental, seasonal, economic, productive and raw material factors, among others.

The specificity of the productive and economic activities of ancient populations at long-term and seasonal occupation sites may be regarded as one of the reasons for the variability noted in these archaeological assemblages. The pattern of lithic artifact distribution by stratum at the sites of Ust-Karakol and Anui-3 suggests regular, though relatively short-term, occupation by human ancestors. On the other hand, the diverse composition of the tool kit does not allow us to regard these sites as merely short-term encampments. Practically all occupation horizons at these sites yielded lithic collections illustrating the entire technological sequence of raw material utilization. Thus, these collections include instruments for primary stone working, principal products of stone reduction and a typologically diverse tool kit. The noted specificity of the tool kits, correlated with the structure of enclosing sediments, suggests the classification of these multilayered sites as sequences of episodic, seasonal occupation sites. This hypothesis is well supported by the topography of Ust-Karakol and Anui-3. Both sites are located in areas of the river valley, which are most beneficial for establishing seasonal hunting camps. The available evidence suggests that these Middle Paleolithic industries were primarily aimed at producing hunting equipment, such as Levallois points and foliate bifaces. Refitting analyses of the lithic artifacts from Ust-Karakol and petrographic analysis of knapped stone from Anui-3 indicate that the tools were produced there, rather than having been brought in from elsewhere.

The Mousterian collections associated with long-term occupation cave sites also include bifacially worked tools and classic Levallois implements. Generally, bifacial and Levallois traditions in stone reduction are less pronounced in the collections from presumed long-term occupation sites. This may be explained by the fact that solitary, typologically distinct products are not as apparent in the non-homogeneous concentration of waste accumulated at long-term sites. Most likely, distinct technical and typological characteristics dissolved in the homogeneous industrial context of long-term occupation sites.

Early Paleolithic pebble-tool technocomplexes, which have been recently discovered in the Altai, may hardly be considered as a basis for the development

of Middle Paleolithic industries. Sources for the development of such industries are likely to be discovered in contiguous regions of North and Central Asia. Acheulian industries, which are characterized by tools produced on strategically planned, shaped spalls detached from well-prepared nuclei, i.e., technocomplexes exhibiting parallel (proto-prismatic) reduction strategies and Levallois flaking, may be considered as candidates for the Early Paleolithic genesis of their development. These cultural traditions may have originated in Acheulian industries of Western Asia: the Caucasus, the Levant and southern Arabia (Amirhanov, 1991; Bar-Yosef, 1994; Hours, 1975; Liubin, 1998).

Kazakhstan, adjacent to the Altai, has produced the most distinctive Acheulian-like technocomplexes from sites located in the northwestern piedmont of the Mugodjari Mountains (Derevianko et al., 2001). The Early Paleolithic sites of Mugodjari-3 to 6 represent concentrations of heavily to moderately abraded artifacts occurring on the surfaces of diluvial benches and on the crests of hills in the vicinity of quartz sandstone outcrops exploited as sources of raw material for tool production. These assemblages contain distinct foliate, ovoid and cordiform bifaces of the Acheulian type as well as nuclei exhibiting morphological features of Levallois reduction and various *racloirs* and notch-denticulate tools.

In Mongolia, Acheulian-like bifaces were first reported within the surface collections at such open-air sites as Bottom-of-the-Gobi and in the vicinity of Mount Yarkh (Okladnikov, 1986). Recent investigations in the southeastern Gobi Altai have provided new information supporting a model of the dissemination of Acheulian elements over Mongolia in the Paleolithic. Bifacially worked tools associated with Levallois products have been identified within the series of artifacts exhibiting heavy surficial aeolian abrasion at Tsakhiurtyn Hondii or "Flint Valley" (Derevianko et al., 1996), as well as from collections associated with the lower stratigraphic levels in Tsagaan Agui Cave (Derevianko et al., 2000a). Age estimates for the Tsagaan Agui sediments suggest a Lower Pleistocene origin for the local Levallois-Acheulian traditions.

The majority of the Mongolian Lower Paleolithic industries bears features characteristic of pebble tool traditions (Derevianko et al., 1990, 2000c). Numerous sites located have yielded rich collections of aeolian abraded artifacts including large polyhedral cores, Levallois and parallel nuclei with one flaking surface, "citron" spalls, various types of *racloirs*, notch-deniculate tools and choppers. Nearly all the early industries of Mongolia exhibit Levallois technical methods in stone reduction.

The Torgalyk A Early Paleolithic site located in Tuva has yielded Acheulian artifacts (Astahov, 1998). Its geo-morphological setting and the heavily aeolized state of the artifact surfaces allow age estimates of the Middle Pleistocene. Among other artifacts, cores exhibiting elements of Levalloisian reduction, longitudinal *racloirs*, massive points and *grattoirs*, notched and denticulate tools have also been identified. The collection also includes archaic bifaces in a variety of forms including *limandes* and proto-*limandes* as well as amygdaloidal and ovoid bifaces.

Bifacial stone reduction strategy has also been recorded at the Early Paleolithic sites of the southern Angara region (Medvedev, 1983). Judging by the relative stratigraphic position of these artifacts and the state of aeolian abrasion apparent on their surfaces, they cannot be younger than the OIS 6. All southern Angara lithic collections may be subdivided into one of two traditions: Tarakhaiski and Olonski. The Tarakhaiski group comprises industries with well-developed pebble tool technology. Primary reduction is based on the "citron" flaking strategy and chopper tools constitute a considerable proportion of the tool kit. The Olonski assemblages are more similar to Acheulian-type industries. This variant is characterized by bifacially, radially flaked core-like implements and specific quartzite micro-bifaces.

Eastwards, bifaces reminiscent of western Acheulian specimens have been reported from the territory limited within North China. Solitary Middle Pleistocene bifacially worked tools classified as handaxes (e.g., the Gongwangling locality at Lantian, Shanxi, and Kehe, Shanxi) and a cleaver (Zhoukoudian, Locality 13) were recovered from the loess plateau and Huanghe Basin (Jia and Huang, 1991). However, reliable evidence illustrating Levallois technology in Paleolithic industries has not yet been reported from China (Gao, 2000). The notable absence of developed, standard Levallois technologies in East Asian industries serves as a major argument supporting the hypothetical western origin of the technical and typological basis of the Lower Paleolithic in Central Asia.

In summary, this brief review of known Lower Paleolithic technocomplexes reported from those regions geographically contiguous with the Altai has shown that the majority of industries producing Acheulian-like bifaces are characterized by developed methods of parallel and Levallois reduction and by the production of tools on intentional blanks of standard size. The features noted support our hypothesis regarding the original development of the Altai Middle Paleolithic on the basis of local Lower Paleolithic cultural traditions bearing the Levallois reduction strategy.

The original development of the majority of the Altai Middle Paleolithic industries does not exclude close relationships with contiguous territories. In particular, such a supposition is supported by similarities noted in the characteristics of the Mousterian industries of the Altai and Central Asia. Most Central Asian Mousterian technocomplexes as well as the Altai Middle Paleolithic industries can be subdivided into two major technical variants: the true Mousterian (Montane Mousterian) and the Levallois-Mousterian (Ranov and Nesmeianov, 1973).

The major technical features of the Central Asian Levallois-Mousterian industries, such as those from Obi-Rakhmat, Khodjakent and Khudji, include the parallel reduction strategy for cores with prepared platforms and large numbers of laminar blanks and tools fashioned on large blades. Similar features are also characteristic of the Kara-Bom variant of the Altai Middle Paleolithic. Predominantly radial and parallel cores, a small number of blades and a typologically diverse series of *racloirs* typify the industries associated with

long-term occupation cave sites like Teshik-Tash and Ogzi-Kichik. Such technical features are also noted within those industries included in the Denisova variant of the Altai Mousterian.

Previously identified variants of the Altai Middle Paleolithic also show features analogous with Paleolithic industries recorded in the Eastern Mediterranean. For instance, Levallois-Mousterian archaeological materials of the Kara-Bom type resemble the Tabun D Early Mousterian assemblages from the Levant (Bar-Yosef and Meignen, 1992; Marks, 1992). The high level of development of Levallois technology focused on parallel flaking in order to produce elongated spalls, including large blades and Levallois points, is the major characteristic feature shared by these industries. The resemblance of the Mousterian materials recovered from Okladnikov Cave in the Altai to the Yabrudian complexes recovered from Tabun Cave, Yabrud I rockshelter and other Paleolithic sites in the Levant is also noteworthy (Jelinek, 1982; Rust, 1950). These industries include many similar tool types, especially the numerous *déjeté* scrapers.

The analogous technical–typological features noted in the Middle Paleolithic technocomplexes of the Altai, Central Asia and Near East suggest their attribution to a single cultural domain. In this respect, western Central Asian sites seem to provide links between Middle Eastern and Central Asian industries.

Mousterian traditions dispersed over Asia to include the territory of Mongolia. The available materials provide evidence for similar tendencies in the formation and development of Middle Paleolithic industries. Thus, the Mousterian industry identified in the important cave site of Tsagaan Agui (Derevianko et al., 2000a) is characterized by parallel reduction of Levallois, proto-prismatic and narrow-face nuclei. Massive *racloirs*, notch-denticulate and spurred tools represent major tool categories within tool kit. In Gorny Altai, the industries of the Denisova variant of the Middle Paleolithic represent the closest analog with these Mongolian materials.

The alternative variant of the Mongolian Middle Paleolithic is represented by Levallois industries. The Barlagiin-Gol-1 site located in the southeastern Mongolian Altai (Derevianko and Petrin, 1987) and the Orkhon-1 stratified site located in the southern Khangai Mountains yielded archaeological collections which demonstrated high indices of Levallois technique utilization in tool production. Levalloisian tools, including cores, points, blades and flakes, represent the most numerous categories in these tool kits. The Orkhon-1 archaeological materials indicate the contemporaneous existence of Levalloisian and Mousterian industries in the Mongolian Paleolithic. The Levallois technocomplexes of Mongolia particularly resemble the Kara-Bom variant of the Altai Middle Paleolithic. It has been noted that both technical traditions evolved within the Mongolian Paleolithic. Both developmental trends are illustrated in the available archaeological materials attributable to the transitional period from the Middle to the Upper Paleolithic. The true Mousterian variant is illustrated by the archaeological collection associated with deposits from the third sedimentation cycle in Tsagaan Agui Cave, while the Levallois-Mousterian

variant has been identified in materials recovered from the Orok-Nuur-1 and 2 sites (Derevianko et al., 2000c).

The cultural continuity apparent in the development of the Mongolian Paleolithic suggests the formation of Mousterian traits on the basis of a local Lower Paleolithic tradition with Levalloisian technology. The analogous features of the major Mousterian variants allow us to include Mongolia, primarily the Mongolian and Gobi Altai regions, and Altai Mountains in a single geographical unit representing the development of a distinctive Middle Paleolithic culture.

In this respect, the anthropological identification of the Middle Paleolithic population of the Altai presents particular interest. Formerly, it was believed that odontological remains of hominid fossils recovered from the Mousterian layers at Denisova and Okladnikov Caves represent clear European Neanderthal features (Turner, 1990). However, Alekseev argued that scanty anthropological materials did not allow unambiguous Neanderthal identification of the fossils. The noted morphological features are interpreted as belonging to physically modern humans (Alekseev, 1998). Additional analyses of the fossil collection from the Altai caves have shown that despite certain archaic features, these remains most likely belong to representatives of physically modern humans—early *Homo sapiens sapiens* (Shpakova, 2001).

Around 50,000–40,000 years ago, Initial Upper Paleolithic industries were formed as a result of the continuous transformation of Middle Paleolithic industries in the Altai. The Altai Initial Upper Paleolithic technocomplexes exhibit certain features in common. However, each assemblage possesses its own specific characteristics, on the basis of which the whole body of Altai Initial Upper Paleolithic industries may be subdivided into two major groups reflecting a particular developmental trend: the Ust-Karakol and Kara-Bom trajectories.

Such Altai technocomplexes as Ust-Karakol, Denisova Cave, Anui-3, Tiumechin-4 are included in the Ust-Karakol variant. This variant is characterized by the parallel reduction of Levallois and single platform cores as well as by the addition of new methods aimed at repetitive detachment of elongated blanks from prismatic, conical and narrow-face cores, including wedge-shaped varieties. As a result of the application of this progressive technology, the technique of microblade flaking developed, aimed at the production of microblades themselves and at fashioning specific Upper Paleolithic tool forms. The tool kits identified within these industries still include numerous *racloirs* and notch-denticulate tools. The Upper Paleolithic tools constitute several new types that have not been noted in earlier collections. Most interesting are the so-called Aurignacian forms including end-scrapers on blades, carinated scrapers fashioned with micro-laminar removals, dihedral burins, large blades retouched throughout their whole perimeters and backed microblades. Bifacially worked tools, especially classical foliate bifaces, constitute an important characteristic feature of these assemblages. Another important feature is the occurrence of various bone implements recovered in Denisova Cave stratum 11.

The bone tool collection includes eyed needles, piercers, cylindrical beads with annular incisions, bead blanks, a ring fragment made of mammoth tusk and pendants made of various animal teeth (Color Plate 8, see p. 400). This bone implement collection from Denisova Cave is the earliest thus far recorded in the Paleolithic of North and Central Asia.

The lithic industries from Kara-Bom, Kara-Tenesh and possibly Maloyalomansky Cave represent the Kara-Bom variant of the Initial Upper Paleolithic. The laminar technique is most pronounced in the technological processes of these industries. Most cores exhibit parallel flaking patterns suggesting the production of elongated spalls. The Levallois technique is still apparent; however, certain new technical methods began to be employed, in particular microlaminar flaking of cores including narrow-face varieties. Large blades were the principal intended product, as more than one half of the collection of tools is fashioned on such blanks. Notch-denticulate tools are still numerous in the collection, although Upper Paleolithic tools fashioned mostly on large blade blanks dominate the tool kit. The following Upper Paleolithic categories have been identified: end-scrapers, dihedral burins, knives with retouched backs, long points with flattened ventral faces and blades showing retouch along their longitudinal margins. Certain so-called Aurignacian elements were also noted within these collections, as well as scarce bifaces and objects of adornment made from animal teeth. However, such artifacts are scarce and do not form a discernible stable technical–typological series. Repetitive production of large blades and blade-based tools represents the principal technological feature of the Kara-Bom tradition.

Two technological trends in the development of the Altai Upper Paleolithic have been identified on the basis of excavated technocomplexes attributable to the Initial Upper Paleolithic. These trends may be extrapolated over a broader area of North and East Asia because of the crucial geographical and chronological position of the Altai. The Kara-Bom tradition was responsible for the dissemination of blade-based industries over this territory. The Ust-Karakol technical variant stimulated the development of industries based on a narrow-face reduction strategy, micro-flaking technology and the production of foliate bifaces.

The middle stage of the Altai Upper Paleolithic is best illustrated by the artifacts recovered in association with the lowermost culture-bearing horizons of the Anui-2 site. A series of radiocarbon dates in the range 27–23 ka has been generated for this site. Most cores show the parallel reduction strategy including the prismatic reduction and detachment of flakes from the narrow face of the cores. Microblade cores of the narrow-face, wedge-shaped and prismatic varieties are especially noteworthy. A considerable share of elongated blanks including microblades attests to a well-developed laminar technique. The relevant tool kit is predominated by the Upper Paleolithic tools including *grattoirs*, burins, chisel-like tools and piercers. The major typological feature specific for the industry is the series of microtools comprising Gravettian points, miniature *grattoirs*, piercers and microblades showing abrupt retouch on the margins.

The final stage of the Altai Upper Paleolithic is represented in the archaeological materials of cave sites. The Upper Paleolithic industries of Denisova and Kaminnaya caves demonstrate the further development of the laminar technique. Comparing to the assemblages associated with previous stages, these final Upper Paleolithic industries comprise a greater amount of elongated spalls, in which the share of microblades also increases. Blades were used as blanks for manufacturing longitudinal varieties of *racloirs*, end-scrapers, burins, chisel-like tools, denticulate and notched tools. Backed microblades and foliate bifaces represent the most typologically perfect tool types. A set of bone tools and adornments includes eyed needles, piercers, pendants made of deer teeth cylindrical beads and ring-shaped beads made of ostrich egg shell.

In general, lithic industries of the final stage Upper Paleolithic demonstrate a continuous development. This continuity is reflected in a combination of certain archaic (radial and Lavallois cores, Mousterian *racloirs* and notch-denticulate tools) and clear Upper Paleolithic (prismatic and narrow-face nuclei, end-scrapers, dihedral burins, backed microblades, composite tools) elements both in primary reduction strategy and in typology of lithic and bone implements. Additionally, these archaeological materials demonstrate a continuous development of Paleolithic traditions apparent in a wider application of laminar reduction technique, in microblade production in particular.

References

Alekseev, V. (1998) The physical specificities of Paleolithic hominids in Siberia. In: The Paleolithic of Siberia. Univ. of Illinois Press, Urbana, IL, pp. 329–335.

Alpysbaev, H.A. (1979) Pamiatniki nizhnego paleolita Yuzhnogo Kazahstana. Nauka Kaz. SSR, Alma-Ata.

Amirhanov, H.A. (1991) Paleolit Yuga Aravii. Nauka, Moscow.

Astahov, S.N. (1998) Paleolit Tuvy. In: Drevnie kultury Tsentralnoi Azii i Sankt-Peterburg. Kult-inform-press, St Petersburg, pp. 109–114.

Bar-Yosef, O. (1994) The Lower Palaeolithic of the Near East. J. World Prehist. 8(3), 211–265.

Bar-Yosef, O. (1995) The Lower and Middle Paleolithic in the Mediterranean Levant: chronology and cultural entities. In: Man and Environment in the Paleolithic. Univ. de Liege, Liege, pp. 247–263. (ERAUL, 62).

Bar-Yosef, O. and Meignen, L. (1992) Insights into Levantine Middle Paleolithic cultural variability. In: The Middle Paleolithic: Adaptation, Behavior, and Variability. Univ. Museum, Univ. of Pennsylvania, Philadelphia, PA, pp. 163–182. (Univ. Museum Monograph; 72. Univ. Mus. Symp. Ser.; 4).

Bosinski, G. (1982) The transition Lower/Middle Paleolithic in North-Western Germany. In: The Transition from Lower to Middle Paleolithic and the Origin of Modern Man. British Archaeological Reports, Oxford, pp. 165–177. (BAR. International Ser.; 151).

Derevianko, A.P. and Petrin V.T. (1987) Kompleks kamennoi industrii s yuzhnogo fasa Mongolskogo Altaia. In: Arkheologia, etnografia i antropologia Mongolii. Nauka, Novosibirsk, pp. 5–27.

Derevianko, A.P. and Shunkov, M.V. (2002) Middle Paleolithic industries with foliate bifaces in Gorny Altai. Archaeol. Ethnol. Anthropol. Eurasia 1, 16–42.

Derevianko, A.P. and Shunkov, M.V. (2005) The Karama Lower Paleolithic site in the Altai: initial results. Archaeol. Ethnol. Anthropol. Eurasia 3, 52–69.
Derevianko, A.P., Dorj, D., Vasilevskii, R.S., Larichev, V.E., Petrin, V.T., Deviatkin, E.V. and Malaeva, E.M. (1990) Kamennyi vek Mongolii: Paleolit i neolit Mongolskogo Altaia. Nauka, Novosibirsk.
Derevianko, A.P., Olsen, J.W., Tseveendorj, D., Petrin, V.T., Zenin, A.N., Krivoshapkin, A.I., Reeves, R.W., Deviatkin, E.V. and Mylnikov, V.P. (1996) Archaeological Studies Carried Out by the Joint Russian–Mongolian–American Expedition in Mongolia in 1995. IAET SO RAN, Novosibirsk.
Derevianko, A.P., Olsen, J.W., Tseveendorj, D., Krivoshapkin, A.I., Petrin. V.T. and Brantingham P.J. (2000a) The Stratified Cave site of Tsagaan Agui in the Gobi Aita i (Mongolia). Archaeol. Ethnol. Anthropol. Eurasia 1, 23–36.
Derevianko, A.P., Petrin, V.T. and Rybin, E.P. (2000b) The Kara-Bom Site and characteristics of the Middle-Upper Paleolithic Transition in the Altai. Archaeol. Ethnol. Anthropol. Eurasia 2, 33–51.
Derevianko, A.P., Petrin, V.T., Tseveendorj, D., Deviatkin, E.V., Larichev, V.E., Vasilevskii, R.S., Zenin, A.N. and Gladyshev, S.A. (2000c) Kamennyi vek Mongolii: Paleolit i neolit severnogo poberezhia Doliny Ozer. IAET SO RAN, Novosibirsk.
Derevianko, A.P., Petrin, V.T., Gladyshev, S.A., Zenin, A.N. and Taimagambetov, Z.K. (2001) Acheulian complexes from the Mugodjari Mountains (North-Western Asia). Archaeol. Ethnol. Anthropol. Eurasia 2, 20–36.
Derevianko, A.P., Shunkov, M.V., Agadjanian, A.K., Baryshnikov, G.F., Malaeva, E.M., Ulianov, V.A., Kulik, N.A., Postnov, A.V. and Anoikin, A.A. (2003) Prirodnaya sreda I chelovek v paleolite Gornogo Altaya. IAET SO RAN, Novosibirsk.
Gao, X. (2000) Core reduction at Zhoukoudian locality 15. Archaeol. Ethnol. Anthropol. Eurasia 3, 2–12.
Hours, F. (1975) The Lower Paleolithic of Lebanon and Syria. In: Problems in Prehistory: North Africa and the Levant. Southern Methodist Univ. Press, Dallas, pp. 249–271.
Jelinek, A.J. (1982) The Tabun Cave and Palaeolithic man in the Levant. Science 216, 1369–1375.
Jia, L. and Huang, W. (1991) The Paleolithic cultures of China. Quatern. Sci. Rev. 10, 519–521.
Laville, H. (1982) On the transition from "Lower" to "Middle" Paleolithic in South-West France. In: The transition from Lower to Middle Paleolithic and the origin of Modern Man. British Archaeological Reports, Oxford, pp. 131–137. (BAR. International Ser.; 151).
Liubin, V.P. (1998) Ashelskaia epoha na Kavkaze. Peterburgskoe Vostokovedenie, St Petersburg.
Marks, A. (1992) Typological variability in the Levantine Middle Paleolithic. In: The Middle Paleolithic: Adaptation, Behavior, and Variability. Univ. Museum Univ. of Pennsylvania, Philadelphia, PA, pp. 127–142.
Medvedev, G.I. (1983) Paleoliticheskie obitateli iuga Sibirskogo ploskogoria i drevnie kultury Severnoi Ameriki. In: Pozdnepleistotsenovye i rannegolotsenovye kulturnye sviazi Azii i Ameriki. Nauka, Novosibirsk, pp. 36–41.
Mercier, N., Valladas, H. and Valladas, G. (1995) Flint thermoluminescence dates from the CFR Laboratory at GIF: contributions to the study of the chronology of the Middle Palaeolithic. Quatern. Sci. Rev. 14, 351–364.
Okladnikov, A.P. (1986) Paleolit Mongolii. Nauka, Novosibirsk.
Ranov, V.A. (2001) Loess-paleosoil formation of Southern Tajikistan and the loess Palaeolithic. Praehistoria 2, 7–27.
Ranov, V.A. and Nesmeianov, S.A. (1973) Paleolit i stratigrafia antropogena Srednei Azii. Donish, Dushanbe.
Rust, A. (1950) Die Hohlenfunde von Jabrud (Syrien). Karl Wachholtz, Neumunster.
Shpakova, E.G. (2001) Paleolithic human dental remains from Siberia. Archaeol. Ethnol. Anthropol. Eurasia 4, 64–76.

Tuffreau, A. (1982) The transition Lower/Middle Paleolithic in Northern France. In: The transition from Lower to Middle Paleolithic and the origin of Modern Man. British Archaeological Reports, Oxford, pp. 137–151. (BAR. International Ser.; 151).
Turner, C.G. (1990) Paleolithic Siberian dentition from Denisova and Okladnikov Caves, Altaiskiy Kray, USSR. Curr. Res. Pleistocene 7, 65–66.