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Oldowan or Pebble-Flake Industry? Levantine Mousterian or Levantine Middle Paleolithic?*

The emergence of Levallois technique and the origin of the Levantine Middle Paleolithic, addressed in my previous publication, are revisited. In the final Acheulean of the Levant, the Acheulo-Yabrudian industry emerged, and the blade technology was invented. On that base, the Levantine Middle Paleolithic originated. The terms "Oldowan industry" and "Levantine Mousterian" should be abandoned. The Oldowan industry was associated with Homo habilis, who had never migrated outside Africa. Because early Middle Paleolithic industries originated from the Acheulo-Yabrudian industry of the Levant, they should be referred to as Middle Paleolithic rather than Mousterian. The Mousterian was associated with H. neanderthalensis, whereas the industries of territories where Neanderthals had not migrated should be referred to as Middle Paleolithic. Neanderthal migrations resulted in the emergence of Mousteroid industries in Eastern Europe, Caucasus, Crimea, southern Siberia, etc. In Africa, a new taxon—Homo heidelbergensis (H. rhodesiensis)—originated ca 800 ka BP. Eventually, those humans migrated to the Near East, as evidenced by the Gesher Benot Ya'aqov site. Throughout the Middle Pleistocene, Near Eastern, primarily Levantine populations were involved in the sapienization process. By the early Upper Pleistocene, two sister taxa had apparently originated there: anatomically modern humans (Skhul, Qafzeh) and Palestinian Neanderthals (Tabun, Amud, Kebara). There was no radical change in Acheulean or Middle Paleolithic industries in the Levant that might suggest immigration from Africa or the adjacent territories of Eurasia. Anatomically modern humans associated with the Nubian Levallois industry migrated from Africa to Arabia ca 110 ka BP. They may have had short-term contacts with Levantine Middle Paleolithic populations, but archaeological evidence of acculturation is lacking.

Keywords: *Oldowan industry, pebble-flake industries, Mousterian, Middle Paleolithic, acculturation, genetic drift, H. heidelbergensis, H. neanderthalensis, H. sapiens.*

Introduction

The basic terminology used in Paleolithic studies became established around the second half of the 19th and the first half of the 20th century. Many terms were influenced by the French school of archaeology; and this seems natural, because it was in France that a large number of classic Paleolithic sites were first discovered; indeed, they are still being examined. Over the past decades, intense field research carried out in Africa and Eurasia has yielded thousands of Paleolithic sites and workshops, necessitating changes in the names of lithic industries and traditions. For instance, a lithic industry was named Acheulean after a site located in France. However, this industry originated in Africa ca 1.7 Ma BP,

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but not in Europe; and the first Acheulean bifaces emerged in France only ca 600 ka BP. The Levallois primary reduction strategy, a marker for the Middle Paleolithic, seems to have been developed in the Near East, in Israel, at the site of Gesher Benot Ya'aqov, rather than in France, where it occurred ca 300 ka BP. Such French definitions for the Lower Paleolithic assemblages as "Chellean" and "Abbevillian" have become a thing of the past, being replaced by the term "Oldowan" (for the lithic industry discovered at Olduvai Gorge in Tanganyika, in East Africa).

In any science, an accumulation of new facts and new knowledge results in the refinement of the conceptual apparatus. Archaeologists repeatedly emphasize the need to revise some terms that were previously introduced into Paleolithic studies, or to refuse them. Given that archaeological works were carried out more intensely in Southwestern Europe, finds discovered at local sites were treated as reference materials, when comparing evidence resulting from field studies in the regions across Africa and Eurasia (Buzy, 1929; Neuville, 1934; The Stone Age…, 1937; Rust, 1950; and others). This frame of reference, which we consider incorrect, is currently reflected in the works of some modern researchers.

O. Bar-Yosef and S. Kuhn note that the major stages of the Paleolithic Age (the Lower, Middle and Upper) roughly reflect the steps of evolution in human tool-making activities (1999). M.K. Kleindienst rightly expresses dissatisfaction with the use of such overly broad terms as "Early Stone Age" and "Middle Stone Age". He classified the Middle Stone Age of the Sahara in accordance with several historical-cultural complexes, and recommended to other archaeologists that they use a historical-cultural approach for identifying lithic industries (2006).

The Eurasian Lower Paleolithic— a pebble-flake industry

Researchers refer to an industry associated with hominins, who first left Africa and began to settle in Eurasia ca 1.8–1.7 Ma BP, as the Oldowan. From our point of view, it is necessary to refrain from employing this term and to use the general name for the Lower Paleolithic industry—a "pebble-flake industry", or "Mode 1". The main argument in favor of this proposal is that human dispersal out of Africa into Eurasia, according to the majority of anthropologists and archaeologists, had nothing to do with *Homo habilis*, which some anthropologists attribute to *Australopithecus,* at all (Wood, Collard, 1999). In Eurasia, the Lower Paleolithic industries are called Oldowan, although they were associated with *Homo habilis*. We consider that it is illogical to refer to the earliest industrial complexes in Eurasia as the Oldowan, because *Homo habilis* appears never to have left Africa. Moreover, the earliest localities containing stone tools on the African continent could have been left behind not only by representatives of the genus *Homo*, but also by *Australopithecus*. According to the majority of archaeologists and anthropologists, the initial colonization of Eurasia was associated with *H. ergaster/erectus*. The situation seems paradoxical: the industry that became widespread in Eurasia during the Lower Paleolithic is referred to as the Oldowan, although it belonged to a taxon that never left Africa, and a techno-typological complex from Olduvai Gorge is considered a reference, being frequently identified with materials derived from all the Early Pleistocene sites in Eurasia.

The Eurasian Lower Paleolithic industry can and should be compared with the Oldowan, but it should not be associated with the industry of *Homo habilis*. When comparing the African Oldowan industry and the Lower Pleistocene industry in Eurasia, researchers find some similarities both in the primary reduction and secondary treatment, and also in the types of stone tools. This is further convincing evidence that early *Homo*, and likewise *Australopithecus*, appear to have had limited options for lithic reduction. Stone tools produced by representatives of different taxa demonstrate similarity in form and processing techniques. Therefore, we propose to call a lithic industry that began to spread across Eurasia ca 1.8–1.7 Ma BP, a pebble-flake or Mode 1, with a name specific to the particular region of its origin (Derevianko, 2009, 2015b; and others).

The need to refrain from using such a general term as "Oldowan" for the Lower Paleolithic industries is also important, as the latter embrace lithic industries located at a large distance from each other, from the Pacific Ocean to the Atlantic Ocean. Populations associated with these industries lived in different environmental conditions. It is obvious that archaeology is a peculiar kind of iceberg: the known archaeological records represent a negligible part of the various cultural objects that actually existed on Earth in the past; some were destroyed as a result of technogenic and anthropogenic impacts, but most of them still stay hidden from the eyes of researchers, and the number of Lower Paleolithic localities that are already known to science is very small.

The oecumene was not a territory completely populated by humans; and judging by the distribution-pattern of Paleolithic sites discovered to date, areas

occupied by some human groups were sometimes separated by significant distances. In Africa and Eurasia, for external reasons, human populations settled in environments which differed in climate, diversity of flora and fauna, and availability of water and mineral resources (raw material), so *a priori* they could not have had the same industries. However, cognitive and sensorimotor abilities would have limited the opportunities of man to create a new innovative product; therefore, lithic industries separated from each other by many, many kilometers, could have revealed similar techno-typological characteristics.

The lithic industries discovered in Dmanisi (Eastern Georgia), the Nihewan Basin (China), Longgupo (China), central and the southeastern parts of Dagestan, and in other regions of Eurasia, belong to the same pebble-flake type; but even so, they differ significantly both from each other and from the Oldowan industry, although they date back to the period between 1.8 to 1.5 Ma BP. In our view, it would be correct to refer to the pebble-flake industry of Dmanisi as the Dmanisi. Apparently, the Longgupo pebble-flake industry and the Nihewan microlithoid industry should be distinguished in the Chinese Lower Paleolithic. In the Lower Paleolithic of Dagestan, in the northeastern Caucasus, it is also necessary to distinguish the pebble-flake industry, which can be called the Aynikab; the microlithoid industry, which differs from the latter, we suggest referring to as the Darvagchai. This proposal will likely cause an objection from many researchers; but we believe that the facts now given are sufficient to initiate a discussion of the issue and to seek a consensus.

Researchers identify stone tools that show similarity in techno-typological characteristics, and likewise manufacturing techniques, among Paleolithic assemblages discovered at sites that are separated by several hundred or thousand kilometers from each other, in areas with different environmental conditions. Given the similarities between lithic products, specialists often use such definitions as "Quina side-scrapers" or "Quina retouch" when describing collections, although the remaining associated material does not have anything in common with the Quina Mousterian. The presence of Quina side-scrapers and Quina retouch implies that these products and techniques emerged as a result of migration-processes. It is clear that identification of industries cannot be based only on certain similarities between some artifacts: it requires an in-depth comparative analysis of all available lithic implements, considering chronology and other factors. If a researcher finds that it is necessary to emphasize the similarity (rather than the identity) of a specific tool-type in two different localities, while conducting a comparative analysis of lithic inventory, then in this case (we think), it would be correct to use such term as "Quina side-scrapers".

The determination of similarity or identity between stone tools from different localities is a very important and complex issue. For instance, carinated end-scrapers or core-scrapers can be found at the Lower Paleolithic sites in Africa and Eurasia (Derevianko, 2015b). The appearance of these items at a significant distance from each other within a time-span ranging from 1.7 to 0.8 Ma BP seems to have resulted not only from migration processes, but also from technological convergence. There are many examples of technological convergence that occurred at different stages of human history. It is impossible to explain the distribution of such tools as returning and non-returning boomerangs, across all continents from the late Paleolithic and up to the present day, only by migration processes.

The Levantine Middle Paleolithic rather than Levantine Mousterian

The question of whether it is relevant to identify the Middle Paleolithic industries with the Mousterian industry or a Mousterian culture (epoch) is one of the debatable issues. In modern literature, the term "Mousterian" is used in both a broad and a narrow sense. To date it is employed, in a broad sense, by many researchers to define the Middle Paleolithic in a time-span ranging from 270 ka BP to 35 ka BP; and, in a narrow sense, to designate a certain type of toolkit most typical of the Mousterian (side-scrapers with various modifications, points with triangular cross-sections, trimmed along the edges and from one side, etc.).

Eurasian localities, dating back to the late-Middle to early-Upper Pleistocene, have yielded few Neanderthal remains; but researchers often refer them to the Mousterian, judging by side-scrapers showing different modifications and points with triangular cross-sections available in tool-kits. We have repeatedly mentioned the incorrectness of such an approach. Over the last 20 years, in papers focused on the Middle Paleolithic in Altai, we have never used the term "Mousterian" with regard to lithic industries dating back to the final Middle to the first half of the Upper Pleistocene, but have made use of such a wording as the "Middle Paleolithic of Southern Siberia and Altai". In a number of recent publications, we have clearly outlined our position: the concept of the "Mousterian" is not equivalent to that of the "Middle Paleolithic", and the Mousterian industry can be traced only in areas occupied by Neanderthals

(Derevianko, 2011; Derevianko, Shunkov, Markin, 2014; and others).

The issue under discussion, from our point of view, is particularly important in connection with the study of the Levantine Middle Paleolithic, which is often improperly referred to as the Levantine Mousterian. D. Shea considered the issue regarding the Mousterian somewhat differently, and arrived at a very definite conclusion: "The use of the term 'Mousterian' for Levantine MP assemblages is particularly inappropriate, for these assemblages exhibit techno-typological characteristics that are very nearly the exact opposite from those of the original French Mousterian" (2014: 173).

The Middle Paleolithic (an intermediate stage between the Lower and the Upper Paleolithic) is known in Africa and in large parts of Eurasia. The Mousterian culture was recognized in the second half of the 19th century by G. de Mortillet, based on the evidence obtained in France. This was also the time when the remains of a hominin, who was named the Neanderthal man, were discovered in the Neander Valley in Germany. In the late 19th to early 20th century, a substantial amount of evidence associated with the Middle Paleolithic of Western and Central Europe was collected. Gradually, an idea had become firmly established in science that the Middle Paleolithic was represented by the Mousterian culture associated with Neanderthals, a taxon which was an immediate predecessor of modern humans.

Owing to the discovery and study of the Middle Paleolithic localities in the Levant during the 1920–1940s, scholars received extensive evidence that had to be integrated into the existing European classification-schemes. On the basis of data obtained during field-research at Tabun Cave, D. Garrod came to the conclusion that no parallels can be drawn between the Paleolithic localities in the Near East and the contemporaneous Middle Paleolithic sites in Europe. However, given the outcomes obtained through analysis of finds from Europe, and also the Mousterian-like techno-complexes, she defined the Middle Paleolithic industries from layers D, C, and B at Tabun Cave as the Levallois-Mousterian, dividing them into two stages: Lower and Upper (The Stone Age…, 1937). She attributed to the Lower Levallois-Mousterian the finds from layers D and C, including a variety of cores: classical Levallois, discoid, prismatic, pyramidal and triangular flakes; and also numerous stone tools of Upper Paleolithic type such as burins, end-scrapers, and backed knives. The Upper Levallois-Mousterian she associated with the artifacts from layer B and from deposits in the upper gallery; in comparison to the previous layers, these included a greater amount of Mousteroid tools: side-scrapers and points of various modifications.

The general classification of the Middle Paleolithic industry in southwestern France, developed by F. Bordes (Bordes, 1955, 1961a, b; 1968; Bordes, Sonneville-Bordes, 1970; and others), considerably influenced the tendency to identify Middle Paleolithic implements with the Mousterian industry. Bordes divided the Mousterian industries into several groups: Charentian, including two types (Quina and Ferrassie); Typical Mousterian, notable for a great proportion of side-scrapers, points, and an insignificant share of notched-denticulate tools; Mousterian of Acheulean Tradition, divided into two subtypes (A and B); and Denticulate Mousterian, with a large number of denticulate products.

Later, the Asinipodian and Vasconian Mousterian, with flake cleavers, were recognized in Southern France and Spain. There was the Pontinian Mousterian in Italy. In Central and Eastern Europe, G. Bosinski identified more than a dozen Middle Paleolithic industries of the Mousterian type (1967). A variety of Mousterian industries were distinguished in the Crimea, the Caucasus, and other regions. The majority of Mousterian sites in Western and Central Europe are thought to be of local origin, and basically assigned to MIS 6–4. In the 1950–1980s, Bordes's classification was partly or completely accepted by many researchers studying the Middle Paleolithic. Probably for this reason, since the 1950s, the Levantine Middle Paleolithic has been most often called the Levantine Mousterian.

But now new data, resulting from the study of Paleolithic sites in Africa, East, Southeast and Northern Asia, make it possible to revisit the notion of the Mousterian industry. This is important, given that one more taxon other than Neanderthals, *H. sapiens altaiensis* (Denisovan), has been recognized in the Middle Paleolithic. Accordingly, two fundamental issues may be raised as follows: 1) The Mousterian industry did not spread in Africa, the Near East, East, Southeast and a large part of Northern Asia; 2) Should the Mousterian industry be associated only with Neanderthals? Let us focus on the discussion of these issues in more detail.

In Africa, during the Middle and the first half of the Upper Pleistocene, the development took place of lithic industries that had nothing to do with the origin of European industries. E.A.A. Garcea quite rightly points out that the use of European terminology in respect of the African assemblages leads to confusion, and distortion of ideas about the distinctness of African cultural manifestations (2004: 31). It is not coincidental that as early as 1927, M. Wilman and N. Jones suggested introducing the term "Middle Stone Age of Africa"

instead of the European term "Mousterian" (Ibid.). To date, all researchers studying this period associate the lithic industries of South and East Africa with the Middle Stone Age (MSA). The Middle Paleolithic industries of South Africa, dating as far back as 250–40 ka BP, can be divided into several stages: MSA I and II, Howiesons Poort, MSA III and IV (Singer, Wymer, 1982).

In South Africa, during the Middle Stone Age, the primary reduction technique involved the use of several core-types (such as discoid, Levallois, pyramidal), and a small number of narrow-faced cores. The proportion of blade-blanks varied throughout all the MSA stages within the area in question. The laminar reduction system appears to have been the most advanced during the MSA I, Howiesons Poort, and MSA IV stages. A characteristic feature of the Middle Paleolithic in South and East Africa is the availability of geometric tools in lithic assemblages. In the south of the continent, these tools appeared in the Fauresmith industry, which is thought to be transitional between the Lower and Middle Paleolithic; in its central part, in the very beginning of the Middle Stone Age, they occurred in the Lupemban industry. Most abundant they were in the Howiesons Poort industry. In general, the Stone Age of South and East Africa has nothing in common with the Mousterian in Europe.

Excavations carried out in the Klasies River basin at Howiesons Poort sites have yielded teeth, jaw-fragments, skulls, and postcranial skeletons of a few individuals (Deacon, 1992, 1995; Rightmire et al., 2006). All these paleoanthropological finds were attributed to early *H. sapiens*.

Another trend in the development of the Middle Paleolithic can be traced in North Africa. Here, two dominant industries, Aterian and Nubian, dating to a period younger than 130–120 ka BP, were recognized. The Aterian industry is characterized by the use of the Levallois primary reduction technology (McBurney, 1967). The industry was intended for manufacturing points, flakes, and blades. Its diagnostic elements are stemmed pieces, primarily points with a retouched tip and stem. The pieces reveal single- and double-row retouch. Stems are observed on side-scrapers, end-scrapers, borers, and burins, which indicates that the Aterian population widely utilized multifunctional composite tools and reliable hafting-techniques. Lithic assemblages associated with the Aterian sites are dominated by side-scrapers of various modifications, and also include notched-denticulate pieces. At a later stage in the development of this industry, a variety of points became popular, including those with a rounded and slightly pointed stem, a triangular and asymmetrical base, and bifacial foliate points. In the last century, the Aterian culture was dated to the period ca 40–20 ka BP. Now, newly obtained age-determinations show that it is significantly older. OSL analysis yielded a date of 110 ka BP for the site of Dar-es-Soltan located near Rabat (Barton et al., 2009). The time when sites with similar industry existed in the Temara region is close to this value. The sample derived from the lower Aterian layers at the cave of Mugharet el' Alyia is dated to the range between 81 ± 9 ka BP and 62 ± 5 ka BP (Wrinn, Rink, 2003). It is likely that the Aterian industry evolved within a time span ca 112–110 ka BP and existed for a long time.

Establishing a time-frame for the Aterian enables insight to be gained into its origins. Sites containing Aterian assemblages located in northwestern Africa date back to over 100 ka BP, i.e. they are older than similar techno-complexes in other areas. Therefore, the origins of this culture should be sought in the local Middle Paleolithic, which is improperly attributed by many researchers to the Mousterian (Bordes, 1976/1977; Debenath, Dibble, 1994; Debenath et al., 1986; Straus, 2001; and others). One of the first researchers of the Aterian, G. Caton-Thompson (1946), considered this industry a flexible technological system tracing its roots to Sub-Saharan Africa. Some scholars link the origin of the Aterian to the Lupemban industry in East and Central Africa. Given that Aterian assemblages include Nazlet Khater points, and also Nubian Levallois cores, Ph. Van Peer concluded that the Aterian culture belonged to lithic industries from the Nile Valley, and integrated it into the Nubian complex (1998: 123). In this case, it is not so important whether this tradition originated from the industries of East, Central, or Northeast Africa. The important thing is that it is a purely African phenomenon, and has no European Mousterian roots; therefore, from our point of view, there is no reason to attribute the Aterian to the Mousterian.

On the basis of the presence of numerous Levallois primary reduction side-scrapers, some researchers compare the Aterian industry to the Mousterian Levallois facies (Hublin, Tillier, Tixier, 1987) or the Mousterian version of Ferrassie (Wengler, 2006). Technologically, the Aterian industry appears to have been more advanced than the Mousterian industry in Europe. The Aterians utilized sophisticated composite tools, which phenomenon was not observed among Neanderthals. The stem was attached to a wooden base, and not only the points of projectile weapons were stemmed, but also tools designed for various household tasks. In the process of primary reduction, the Aterians produced blade-blanks, and utilized bone for manufacturing tools; and around 80 ka BP, symbolic

objects came into use among them, which is consistent with modern human behavior.

Garcea notes that Aterian and Neanderthal Mousterians did not share any behavioral features other than a common Levallois technology. Aterian populations demonstrated skills typical of modern humans, including the capacity to adapt to various environmental and climatic conditions, exploit a great variety of natural resources, utilize different raw materials, move rapidly across the region, build dwelling and hearth structures, and also to practice fishing and fowling (Garcea, 2004: 38–39).

The lithic industry from the unique site of Jebel Irhoud in Morocco, which yielded paleoanthropological remains compatible with an early form of modern humans, also cannot be attributed to the Mousterian. It should be associated with the Middle Paleolithic of North Africa. Some similarities between individual categories of lithic products and the Mousterian tools can be explained by the convergent appearance of artifacts in North Africa, or by short-term contacts with Neanderthals in Southern Europe—although there is no convincing evidence to support this last assumption. In terms of the key techno-typological characteristics, the Middle Paleolithic and the Aterian of North Africa differ not only from the European Mousterian, but also from the Middle Stone Age of South Africa (Derevianko, Shunkov, Markin, 2014).

In Northeast Africa, in the late Middle/early Upper Paleolithic, there was the Early Nubian industry, with tools manufactured using Levallois primary reduction strategy. Its range covers areas including the Middle and Lower Nile Valley, Egypt, North Sudan, the eastern oases of the Sahara, and the northern regions of Ethiopia and Somalia (Van Peer, 1998; Usik et al., 2013; Rose, Marks, 2014; Rose, 2004; and others). The Early Nubian industry was widespread in Arabia and possibly in parts of the Levant. This Afro-Arabian Nubian techno-complex is thought to have consisted of a few lithic industries showing features typical of the Nubian version of the Levallois core reduction strategy (Usik et al., 2013: 244). The creators of the Early Nubian industry were anatomically modern humans (Vermeersch et al., 1998; Van Peer, 1998; Rose, 2010; Rose, Marks, 2014; Usik et al., 2013; and others).

In Northeast Africa, two industries have been recognized in the Nile Valley: the Early Nubian, falling within MIS 5e (~130–115 ka BP), and the Late Nubian, dating to MIS 5a (~ 85–74 ka BP) (Mercier et al., 1999; Van Peer, Vermeersch, Paulissen, 2010). The first is characterized by Lupemban-type bifaces. They are mostly lanceolate and elongated-triangular in shape. Denticulate and notched-denticulate pieces made of blades and flakes are found to be typical of the tool-kit. The lithic assemblage is dominated by side-scrapers of various modifications. A key feature distinguishing the Early Nubian industry from the Late Nubian (except for bifaces) is a special shaping of the Levallois cores. Both industries show no similarities with the Mousterian assemblages of Europe, in terms of their key techno-typological characteristics (Derevianko, 2011, 2015a).

An important argument, which does not allow identification of the Aterian, Early and Late Nubian cultures distributed in Northwest and Northeast Africa with the Mousterian in Europe, is the affiliation of people who represented the first three traditions with anatomically modern humans, and that of Mousterian populations with Neanderthals. In addition, the Neanderthals never settled in Africa.

They also never settled in East and Southeast Asia. In the eastern part of Eurasia, from the time of the first arrival of *H. erectus* about 1.8–1.5 Ma BP, and up to 35–30 ka BP, lithic industries appear to have evolved according to a different scenario than in the rest of Eurasia. In Northern China, excavations in the Nihewan Basin resulted in the discovery of a microlithoid industry, with its localities dating back to 1.7–0.9 Ma BP. During the same period, sites with a pebble-flake industry were common in much of China (Derevianko, 2015b).

In East and Southeast Asia, the Acheulean industry was not distributed, although bifacially worked pieces occurred there as a result of the technological convergence ca 1 Ma BP (Derevianko, 2008, 2014; and others). The Levallois primary reduction strategy is not represented in these Asian regions, with the exception of Xinjiang province (Derevianko et al., 2012), where it appeared under the influence of lithic industries from Mongolia and southern Siberia. It should be noted that in China, the laminar technology—judging by evidence dating back to ca 35–30 ka BP (Derevianko, 2008; 2009; 2011; and others)—had also been inspired by the industries from Mongolia and Altai.

As long ago as the last century, scientists noticed that the Paleolithic record in China differed from that in the other regions of Eurasia, and that it was improperly classified into three stages: the Lower, Middle and Upper Paleolithic (Schick, Dong, 1993; Schick, 1994; Gao Xing, Olsen, 1997; Gao Xing, 1999; Ranov, 1999; and others). Data resulting from the study of sites in China, dating back to 400–30 ka BP, indicate no significant differences between their industries in all major techno-typological characteristics. In East and Southeast Asia, the Paleolithic industries reveal no reliable markers that could make it possible to distinguish an individual stage

between the Lower and Upper Paleolithic. Therefore, the three-stage classification of the Paleolithic in the Sino-Malayan zone should be abandoned by analogy with the rest of Eurasia and Africa; and the Middle Paleolithic should be excluded from the regional periodization of the Stone Age. Distinguishing the Chinese Paleolithic into the Lower and Upper, or the Early and Late, emphasizes the specificity in the development of Paleolithic industries across the Sino-Malayan zone, but in no way their underdevelopment and archaism (Derevianko, 2009, 2015b).

An indigenous population of Eastern Eurasia developed its own effective adaptation strategies that differed from those of inhabitants of the western areas. It was in China that evolution of anatomically modern humans (*H. sapiens orientalensis*) occurred, in the final Middle Pleistocene and the first half of Upper Pleistocene (Derevianko, 2011; Derevianko, Shunkov, Markin, 2014).

The Mousterian culture, as follows from the above discussion, was not distributed in Africa, nor Southeast and East Asia, and Neanderthals did not disperse into these regions. Therefore there is no reason to identify the so-called Mousterian industry with the Middle Paleolithic industries.

The development of the lithic industry dating back to the late Middle Paleolithic and the first half of the Upper Paleolithic in the Levant provides convincing evidence in favor of this conclusion. In the final Acheulean, a set of Middle Paleolithic artifacts emerged in this area that fundamentally differed from the industry found in the European Mousterian. The European Mousterian industry developed by Neanderthals is characterized by dominance of the discoid and Levallois techniques of primary reduction, particularly in southern Europe; and also diverse modifications of side-scrapers (the so-called Mousterian points on flakes and on special blanks, bifacially worked and notched-denticulate products). All these types of tools are found in many Middle Paleolithic industries of Africa and Eurasia in different percentages, providing a ground for attributing these industries to the Mousterian. This identification can be discerned from research analysis of evidence obtained in Africa and the Near East. The presence of side-scrapers in the Middle Paleolithic assemblages, in our opinion, was due to relevant environmental conditions and economic activities.

The Acheulo-Yabrudian industry of the Near East took its roots in the earlier Acheulean industry; evidence of such complexes has been found neither in the East and Northeast Africa nor in Europe. This does not imply a lack of occasional short-term contacts between populations of the Levant and people from the adjacent regions (including the African groups migrating through the Levantine corridor), nor of genetic drift between them. The origin of the laminar Amudian industry was related to the Acheulo-Yabrudian (Derevianko, 2016). Thus, judging by the finds from horizon XI of Tabun Cave, the primary reduction strategy in the Amudian industry co-existed with the methods that allowed production of flakes and tools typical of the Acheulo-Yabrudian complex from the underlying horizon (Monigal, 2001).

It was in the Levantine Middle Pleistocene that lithic industries evolved, subsequently serving as a basis for the Middle Paleolithic assemblages, which are improperly considered by many scholars to be within the Levantine Mousterian. The Levantine blade-based industries, dating back to the final Middle Pleistocene and the first half of the Upper Pleistocene, differ significantly from the African Stone Age industries and the European Mousterian industry. On the basis of archaeological records obtained from his excavations at Tabun Cave, A. Jelinek came to the following conclusions: the whole industry of layer E, including the Amudian, belongs to the Mugharan industry; different facies appear to reflect adaptation to different living-conditions, and the Levantine Levallois-Mousterian originates from the Mugharan tradition (Jelinek, 1981, 1982). By contrast, Bordes associated the origin of Quina Mousterian with the Micoquian (Bordes, Sonnevill-Bordes, 1970).

A. Ronen, when studying the locality of Tabun-Mapolet, which is chronologically related to the Acheulo-Yabrudian industry (Tabun Ed and Ec), drew attention to the abundance and typological diversity of side-scrapers (ordinary, composite, double, déjeté, Quina (they make up 25 % of the tool-kit)). According to his calculations, the Charentian index (based on ordinary convex and transversal scrapers) is equal to 13.9 (Ronen, Gisis, Safadi, 2003). The whole tool-kit refers to the Acheulo-Yabrudian industry, which is much older than the Charentian Quina or the Charentian Mousterian. Side-scrapers typical of the European Mousterian could have appeared in it under the influence of the Levantine Acheulo-Yabrudian industry, and not the other way around; or, what seems more likely, resulted from the technological convergence.

Researchers studying the Levant have repeatedly noted that the Acheulo-Yabrudian industry served as a basis for development of the Middle Paleolithic industries in this area; but somehow, it was attributed to one or another facies of the Mousterian. According to A. Rust, evidence recovered from excavations at Yabrud 1 demonstrates the evolution of the Acheulo-Yabrudian industry into the Yabrudian-Mousterian (layers 2, 8, 10)

industry, and the Acheulean, which, in its turn, developed into techno-complexes of the Levallois-Mousterian (layers 3, 4, 6) (1950). Thus, he believed that the occurrence of two Mousterian variants in Syria resulted from the evolutionary development of earlier techno-typological complexes in the region. It should be noted that the so-called Mousterian elements in the occupation layers of Yabrud 1 start to appear from layer 25. Hence, layer 25 in the Yabrudian complex yielded déjeté scrapers that have proven to be a marker of the European Mousterian industry. The lithic industry from layers 25 and 22 at Yabrud 1, according to Rust, develops into the Mousterian. The finds from layer 15, from his point of view, represent the already-established Mousterian industry of the Upper Paleolithic type. The deposits of layer 5 revealed the Micro-Mousterian. In the Levant, the evolution of the Acheulo-Yabrudian industry resulted in the development of the Middle Paleolithic industry, rather than Mousterian.

Bordes suggested a new classification of the lithic industry associated with the site of Yabrud 1. For example, he assigned the finds from layers 10, 8, 6, 4, 3, 2 to the Ferrassie type of the Charentian Mousterian in its Levallois facies (1955). Bordes's interpretation of the Yabrudian industry, in accordance with the classification developed by him for materials from southeastern France, is an example of a biased approach to the analysis of Paleolithic records from Near Eastern sites. The lithic industry from layers 10 to 2 at Yabrud 1 has no analogs in the assemblages of either southwestern France (no sites with lithic materials containing more than 25 % of the Levallois points and blades have been found), or its northern part (no Ferrassie type materials) (Grigoriev, 1968).

Carinated points of the Mousterian type were found at the Acheulean site of Latamna in Syria (Paleolit…, 1978). According to some researchers, the so-called Mousterian tools from Syria and Israel, which are related to the Levantine Acheulo-Yabrudian industry in terms of their origins, appeared in the Levant much earlier than in Europe. From our point of view, the Levantine Middle Paleolithic industry cannot be regarded as part of the Mousterian industry or Mousterian culture, insofar as the Acheulean-Yabrudian industry was not represented in Europe, and the pre-Aurignacian, Amudian and Hummalian industries provided a basis for the development of the Levantine Middle Paleolithic*.

One of the key issues in the Levantine Paleolithic is to determine the phylogenetic status and evolutionary development of the hominins who inhabited this area during the Pleistocene. The earliest paleoanthropological material (a few skull fragments, a molar tooth, a lower right lateral incisor) were found at the site of Ubeidiya in Israel. It is likely that they belonged to *H. ergaster/H. erectus* (Belmaker et al., 2002). More recent anthropological remains were discovered in the caves of Zuttiyeh and Qesem (Israel). Analysis of the accompanying lithic implements associated with the Acheulo-Yabrudian industry enabled their dating to 400–200 ka BP. There are several definitions of these finds. B. Vandermeersch attributed the finds from Zuttiyeh Cave to archaic sapiens (1989), I. Gisis and O. Bar-Yosef assigned them to anatomically modern humans (1974). According to D.D. Rightmire, a frontal bone from this cave could have belonged to both early Neanderthals and the ancestors of people from Skhul and Qafzeh (2009). Since the layer contained lithics associated with the Acheulo-Yabrudian industry (350–300 ka BP), he considered it possible to attribute the anthropological materials from Zuttiyeh Cave to an archaic population that inhabited Africa and has been known from the finds from Bodo, Elandsfontein, Broken Hill, Eyasi, and Ndutu. S.E. Freidline and co-authors suggested four evolutionary scenarios, based on the views of researchers about the morphology of the Zuttiyeh fossils (Freidline et al., 2012: 237–238). According to the fourth scenario, Zuttiyeh and West Asian hominins (Skhul, Qafzeh, and Neanderthals) represented either a regional *H. sapiens* lineage, or made a deeply rooted *H. sapiens* lineage together with the African Middle and Late Pleistocene humans.

Qesem Cave has yielded more informative paleoanthropological remains (Hershkovitz et al., 2011). Excavations carried out at the site revealed a large number of lithic products associated with the Amudian industry, which are thought to be of local origin and without any features indicating cultural influence from African and European populations (Barkai, Gopher, Shimelmitz, 2005; Gopher et al., 2005; Barkai et al., 2009). Evidence recovered from the cave includes both maxillary and mandibular teeth. I. Hershkovitz and co-authors proposed three interpretations of the morphology of these teeth. From our point of view, the most convincing is the first: the cave dwellers belonged to a local archaic population of *Homo*, who lived in Southwest Asia ca 400–200 ka BP; and the teeth, despite some plesiomorphic traits, indicate their greater affinity with the Skhul and Qafzeh population, rather than with Neanderthals (Hershkovitz et al., 2011). This hypothesis

*The issues of continuity between lithic industries of the final Acheulean and the Middle Paleolithic, as well as related anthropological aspects, will be discussed more thoroughly in the upcoming article to be published in Issue No. 3 of this journal in 2016.

is also confirmed by archaeological evidence, such as Levallois complexes with a large number of blade-blanks recovered from Qesem Cave.

Excavations conducted at the caves of Skhul, Qafzeh, Tabun, Amud, and Kebara have resulted in the recovery of unique anthropological material. The majority of researchers agree that the anthropological remains from Skhul and Qafzeh can be assigned to modern humans, and those found at Tabun, Amud, and Kebara are associated with Neanderthals. Migration of anatomically modern humans out of Africa to the Near East is thought to have begun 130 (110) ka BP.

According to many scholars, Neanderthals migrated from Europe to the Levant, owing to the cool climatic conditions, between 70 ka BP and 50 ka BP. Some investigators assume that local populations of modern humans failed to compete with the immigrants and were exterminated; others suppose that hybridization and cross-cultural exchange took place between these two taxa.

We offer a different hypothesis about population movement between Africa and the Near East, and about the evolution of anatomically modern humans in the Levant during the period from the Middle to the first half of the Upper Pleistocene.

According to many anthropologists, a speciation process took place in Africa about 0.9–0.8 Ma BP: *H. erectus* gave birth to a new species that has been given various names such as *H. heidelbergensis*, *H. rhodesiensis*, and *H. sapiens* (Rightmire, 1996, 1998; Braüer, 2012; Hublin, 2001, 2009; and others). According to this view, approximately 0.8 Ma BP the new species entered Eurasia, and the site of Gesher Benot Ya'akov is likely associated with it. Let us refer to this new species as *Homo heidelbergensis* in the Levant, and as *Homo rhodesiensis* in Africa. The lithic industry of this period is characterized by the presence of bifaces and cleavers on flakes. Bifaces and cleavers began to spread with *Homo heidelbergensis* in Europe, and then in Southern Asia, about 600 ka BP.

Populations of *Homo heidelbergensis*, a new species, who emerged in Africa and moved to the Levant, met the indigenous people in the region. Subsequently, as a result of acculturation between them, a newly arrived population assimilated many techno-typological features of a lithic industry developed by the local inhabitants of the area. This accounts for the appearance of numerous characteristic features in the Gesher Benot Ya'akov industry, which distinguish it from the Acheulean industry in Africa (Derevianko, 2016).

We suppose that the development of the Levantine Middle Paleolithic assemblages occurred on the basis of the Acheulo-Yabrudian industry, and the continuity is reflected in the Tabun D, C, B assemblages, i.e. within the time range of 265–40 ka BP. As already noted, it does not exclude short-term contacts between the indigenous population and populations from the adjacent areas, including Africa, and genetic drift between them. However, the Levantine Middle Paleolithic industry reveals no features suggesting that a massive flow of migrants, including anatomically modern humans with different industry, entered the region 130 (120) ka BP. The Middle Paleolithic industry of the Tabun C-type demonstrates a homogeneous nature; it was left behind by modern humans, who evolved in this region during earlier periods. The movement of modern humans from Africa into Arabia ca 115–110 ka BP is evidenced by the lithic industry with Nubian Levallois primary reduction system, which stands out against the background of the Middle Paleolithic industries in the region. Contacts between the immigrants from Africa and the Levantine indigenous population, as well as genetic drift between them, probably did take place; however, in general, the new African industry did not appear in the Levantine Middle Paleolithic in any way.

Lithic analysis revealed no changes in the industry associated with the final Levantine Middle Paleolithic of the Tabun B-type in the time range of 70–50 ka BP, when (according to some researchers) the Neanderthals from Europe came into this region*. The continuity is well recognized in the development of the industry throughout the Levantine Middle Paleolithic, showing no features indicating the arrival of new populations with a different industry that could have changed the local one, as the Nubian in Arabia. It follows that in the Levant, and perhaps in the adjacent regions of the Eastern Mediterranean, the development of both the industry and a physical type of man himself took place in the Middle and the first half of the Upper Pleistocene. In our opinion, archaeological and anthropological evidence from the Levant, dating back to 800–40 ka BP, indicates the evolution of two sister taxa on the basis of *H. heidelbergensis*: anatomically modern humans (Skhul and Qafzeh) and the Palestinian Neanderthals (Tabun, Amud, and Kebara) with a similar material culture. It is very important that, in many morphological characteristics, the Palestinian, or atypical, Neanderthals in the Levant differed from those in Europe.

The suggested hypothesis about parallel evolution of two sister taxa in the Levant can be verified by

*These questions will be discussed more thoroughly in the following issue of the journal.

sequencing the DNA of modern humans from Skhul and Qafzeh, and also the Palestinian Neanderthals from Tabun, Amud, and Kebara.

Eurasian Mousterian industry was left behind by Neanderthals

The issue regarding the linkage between the Mousterian industry and Neanderthals is no less difficult. There are many researchers who associate Mousterian assemblages with Neanderthals (Oakley, 1964; Aigner, 1980; Ranov, 1990; and others). From our point of view, the Mousterian industry was created by European Neanderthals. The use of the term "Mousterian" with reference to the Middle Paleolithic industries of North Africa is due to the fact that Paleolithic studies in this area were carried out during colonial times, primarily by European scholars, who mainly employed terminology based on evidence obtained in France. As rightly noted by Garcea, extension of European terminology to include the African industry resulted in improper assumptions and erroneous conclusions. One of the most striking examples is the hypothesis that the Mousterian industry of Jebel Irhoud and Haua Fteah was created by Neanderthals. Although Neanderthals never settled on the African continent, however, some techno-complexes dating to the Middle Stone Age of Africa are still considered Mousterian (Garcea, 2012: 128).

Scientists often refer the Middle Paleolithic industries discovered in the areas that Neanderthals did not occupy to the Mousterian, relying only on the presence of isolated elements (side-scrapers of various modifications, Levallois reduction technology, points, specific stepped retouch, etc.) and technological similarities with such elements; while in all other techno-typological characteristics, these industries differ from the Mousterian. In many of these industries, the so-called Mousterian tools appeared much earlier than in assemblages from the Mousterian sites in Europe. Thus, the Levantine Acheulo-Yabrudian industry increased the proportion of side-scrapers of Quina type, déjeté, and others for many years earlier, compared to the European Mousterian industries. The appearance of lithic implements, typologically similar to the Mousterian tools, in other Middle Paleolithic complexes, chronologically close to the Mousterian assemblages, could have resulted from technological convergence. It is likely that a diversity of side-scrapers in one industry or another is associated with the appearance of forest vegetation and intense use of tools for working wood or bone. It cannot be excluded that the handoff of stone-working innovations may have taken place during short-term contacts. From our point of view, the root of the problem is well explained by the following original pronouncement: "…whereas all Neanderthals made Mousterian tools, not all Mousterian toolmakers were Neanderthals" (Trinkaus, Howells, 1979: 118).

Neanderthals settled in Europe, partly in the Near and Middle East, in the Caucasus, and in some regions of Central Asia and Southern Siberia. Their habitats in Eurasia coincide with the distribution areas of Mousterian industry. The appearance of Neanderthals in areas where the indigenous peoples were absent or insignificant in number is determined by the dominance of the Mousterian industry. The arrival of Neanderthals in the regions with a large local population is identified by the Mousteroid industry of migrants, with clearly distinguishable features against the background of the autochthonous one. This process is best illustrated with evidence discovered in Altai.

About 300 ka BP, people associated with the Amudian (Mugharan) industry migrated from the Near East to the Altai region*. Over the last 30 years, during annual field research at deeply stratified sites (9 cave sites and 10 open-air sites), more than 70 occupation layers, dating back to the Middle and Upper Paleolithic, have been studied, including 60 occupation layers spanning from 100 ka BP to 70 ka BP, which showed different degrees of saturation with archaeological and paleontological materials (Derevianko et al., 2003; Derevianko, 2011; and others).

The study of deeply and clearly stratified cave and open-air sites located at a relatively short distance from each other, involving a wide range of scientists such as geologists, geomorphologists, paleontologists, paleobotanists, geochronologists, anthropologists, paleogeneticists, etc., has made it possible to obtain a large amount of data, to fill in the existing gaps in our knowledge on sedimentation, on evolutionary development of the industry, and to trace completely the dynamics of techno-typological changes in lithic implements over the last 100 thousand years.

Extensive data obtained from field and laboratory research indicate that the development of human culture in the Altai region was based on the evolution of the Middle Paleolithic industry, and occurred without any noticeable influences from infiltration of populations with a different industry. All the Middle Paleolithic layers recognized at all Altai sites reveal continuity in evolution of the lithic industry. Evidence documented

*DNA sequencing of modern humans from Skhul and Qafzeh should demonstrate the degree of their kinship with *Homo sapiens altaiensis* (Denisovans).

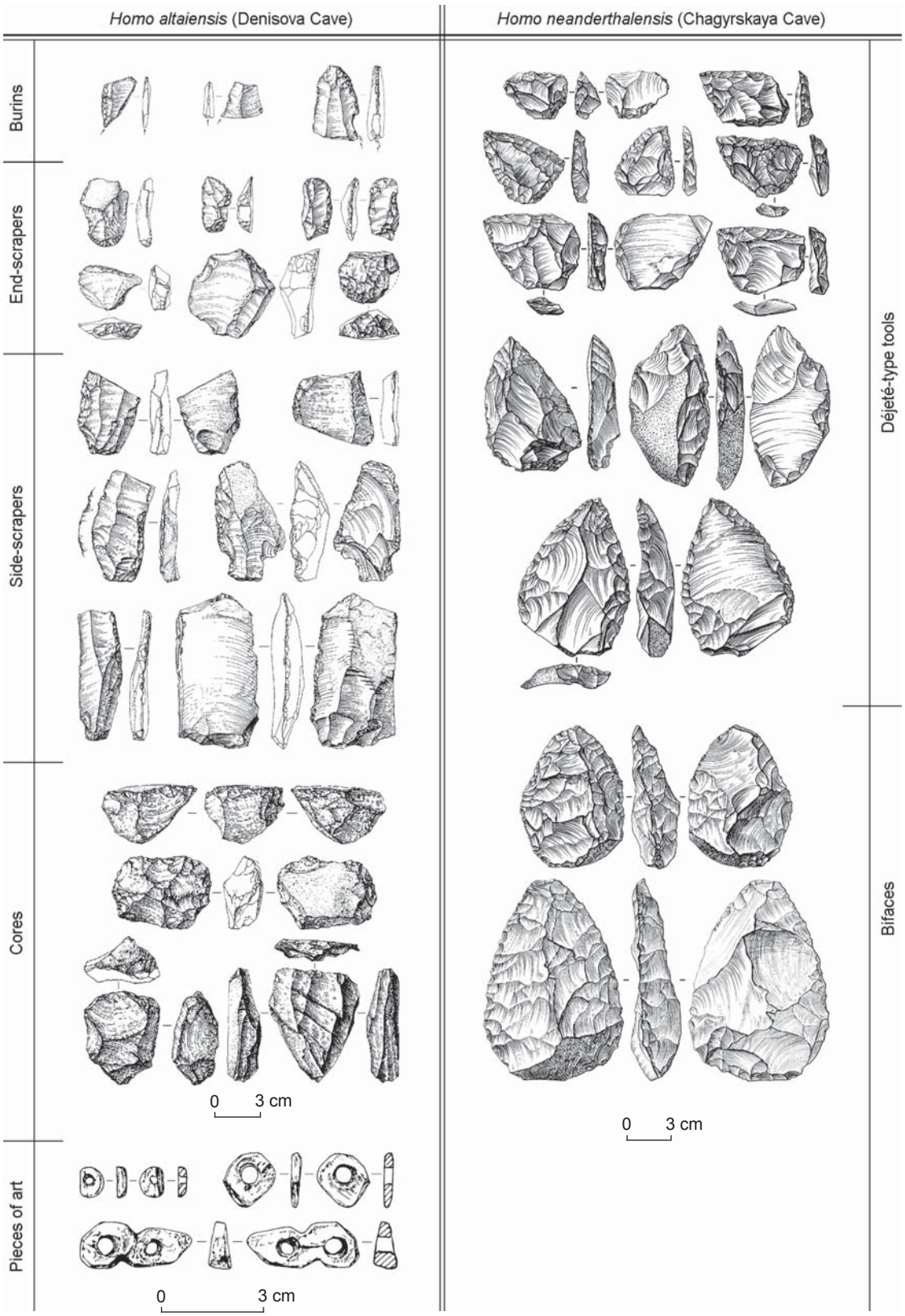
in Denisova Cave, from occupation layers 19–12, dating back to 140–60 ka BP, can be considered a particularly striking embodiment of this process. The industrial complex associated with these layers includes Middle Paleolithic items showing similar technical and typological characteristics. Differences between the assemblages of artifacts from cultural horizons, in terms of percentage ratios of primary and secondary reduction techniques, and also typological forms, are found to be insignificant. This attests to the integrity of the lithic industry. Primary reduction is characterized by the availability of radial and Levallois technologies in the lower layers, and by the gradually increasing (from bottom to top) proportion of cores, which suggests the wider use, compared to the upper layers, of the system of parallel detachment of blades and blade-blanks, and also manufacture of tools on blades. Upper Paleolithic tool-types appeared at Denisova Cave ca 100–90 ka BP. Subsequently, they tended to increase in number, showing improvement in primary and secondary reduction techniques. The Middle to Upper Paleolithic transition seems to have taken place 60–55 ka BP, and the final stage of development of the Upper Paleolithic industry in Altai spanned the period of 55–45 ka BP (Derevianko, 2011).

Layer 11 of Denisova Cave, which contained four sub-horizons with the dates older than 50 ka BP and up to 40 ka BP, yielded (along with the Upper Paleolithic implements) numerous tools made of bone (points, needles, borers), and ornaments including stone and bone beads, tubular beads, and a fragment of bracelet with signs of sawing, drilling, and polishing. Stone and bone tools, abundant non-utilitarian items, subsistence methods and patterns, and also objects which were received by the cave-dwellers through exchange from places located many hundreds of kilometers away, characterize populations settled in Altai as anatomically modern humans. The sequencing of mitochondrial and nuclear DNA isolated from the distal phalanx of a girl (Denisova 3), found in layer 11 of Denisova Cave, resulted in data suggesting that this hominin differed from *H. sapiens* and *H. neanderthalensis* (Reich et al., 2010). It was referred to as *H. sapiens altaiensis* or Denisovan (Derevianko, 2011). Later, excavations conducted at Denisova Cave yielded two molars: the first from layer 11 (Denisova 4), and the second from layer 12 (Denisova 8). On the basis of the nuclear DNA sequence data, it was found out that these individuals also belonged to *H. sapiens altaiensis*. The Denisova 4 molar was discovered in a layer that yielded two dates: one is older than 50 ka BP (OxA-V-2359-17 and OxA-V-2359-18) and another is 48.6 ± 2.3 ka BP (KIA 25285). Given the rate of mutation, Denisova 8 was about 60 thousand years older than the Denisova 3 and Denisova 4 specimens (Sawyer et al., 2015). This suggests a long-term Denisovan occupation of the cave and the evolution traced in lithic implements from the Middle to Upper Paleolithic resulting from their activities.

About 55 ka BP, another population of humans with a completely different Mousterian-type industry migrated to Altai (Derevianko, Markin, 1992; Derevianko, 2007; Derevianko, Markin, Shunkov, 2013; and others). Only two caves, Okladnikov and Chagyrskaya, have yielded evidence for the Mousterian industry. Materials from these sites, showing similar techno-typological characteristics, are not typical of the Denisovan industry (see *Figure*). This industry represents a Mousteroid version of the Middle Paleolithic in Altai, the Sibiryachikha facies. It can be characterized by the prevalence of the radial primary reduction, which became a basis for the mass-production of flakes and angular blanks. Data recovered from both sites demonstrate the identity of the secondary reduction strategy that was used to form cutting edges of tools, additional sections, and various kinds of thinning. Lithic assemblages comprising the complete typological kits of side-scrapers, points, and notched-denticulate pieces, and also retouched flakes and bifaces, are also of the same type. A key feature of this industry is the presence of representative stone tool-kits including backed scraper-knives and diverse angular tools such as déjeté, of double and triple combinations. It is impossible to attribute the Mousteroid Sibiryachikha industry to any variety recognized by Bordes, or to variants described by researchers of Central Asia (Ranov, 1965; Suleimanov, 1972) and other regions which used to be inhabited by Neanderthals.

The mtDNA sequencing showed that the creators of Sibiryachikha tradition, whose osteological remains were found in Okladnikov Cave, were Neanderthals (Krause et al., 2007). Hence, 50–40 ka BP, representatives of two taxa with completely different lithic industries lived in the Altai Mountains: *H. sapiens altaiensis* (Denisovans) with the Upper Paleolithic industry and *H. sapiens neanderthalensis* with the Mousteroid industry.

These two industries differed significantly from each other. In terms of some techno-typological characteristics, the Sibiryachikha industry reveals the greatest similarity with the Mousterian artifacts from the Crimea. But Altai and the Crimea are separated by several thousand kilometers, and so far no sites with like industry have been discovered in the area between them. According to M.B. Mednikova, some morphological features of the postcranial skeleton indicate that a Neanderthal individual from Altai demonstrates the



Comparative table of lithic inventory attributed to the Altai Denisovans and Neanderthals.

greatest resemblance with the Palestinian Neanderthals: "…South Siberian and West Asian species from Okladnikov and Tabun Caves show specific similarity owing to their alleged origin from a common population of early Neanderthals" (2011: 86).

Neanderthals who migrated from the southwest to Altai were few in numbers, and they were probably assimilated by Denisovans (Derevianko, Shunkov, 2012). It was found that Neanderthal DNA represents up to 17 % of the Denisovan genome. No signs indicating further development of the Sibiryachikha techno-complex were recorded in the Upper Paleolithic industries of Altai (Derevianko, 2012). The expansion of Neanderthals with a strongly distinguished Mousterian industry into Altai is another convincing piece of evidence that the Mousterian industry spread across Eurasia with Neanderthals.

Conclusions

1. Hypotheses proposed for discussion to colleagues are not indisputable, but it appears that there is sufficient evidence to refuse the designation of the Eurasian Lower Paleolithic industries as Oldowan. Owing to the divergence of *Homo erectus*, who occupied a vast area from the Pacific Ocean to the Atlantic Ocean, and owing to differences in environmental conditions, the Eurasian Lower Paleolithic assemblages varied significantly at a local level. It is necessary that lithic industries from areas densely populated by *H. erectus* have their own names.

2. The Levantine Middle Paleolithic significantly differed from the European Mousterian and African Stone Age, as Palestinian Neanderthals significantly differed from European Neanderthals in many morphological characteristics. The Levantine Middle Paleolithic evolved on the basis of the Acheulo-Yabrudian industry dating to the late Acheulean period, and there is no good reason to refer it to the Mousterian industry.

3. Bearers of the Mousterian industry were European Neanderthals, and in areas where they settled, the Middle Paleolithic industries were of a distinct Mousteroid type.

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