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## THE IMPLICATIONS OF THE MIDDLE-UPPER PALEOLITHIC CHRONOLOGICAL BOUNDARY IN THE CAUCASUS TO EURASIAN PREHISTORY

*ABSTRACT: The systematic excavations at Ortvale Klde rockshelter and Dzudzuana Cave in Western Georgia uncovered an occupational sequence spanning the Late Mousterian and Early Upper Paleolithic. The cultural break between the two entities is dated to ca 36–34 Ka BP and reflects a relatively late survival of Neanderthals in this region; similar results were reported from Mezmaiskaya cave on the northern slopes of the Caucasus. The major difference between the Late Mousterian industries on the two sides of these mountains, namely Eastern Micoquian with foliates in the north and a Mousterian rich in scrapers in the south indicates that the topographic heights were a cultural boundary during the Middle Paleolithic. The similarity in the Early Upper Paleolithic assemblages across the Caucasus, rich in retouched and backed bladelets and bone and antler objects, demonstrates a rapid expansion of modern humans. No positive evidence was found for the presence of the classical Aurignacian culture that according to current models emerged in western Europe.*

*KEY WORDS: Caucasus – Middle Paleolithic – Upper Paleolithic – Aurignacian – Modern humans – Neanderthals*

### INTRODUCTION

One of the most intriguing issues at the forefront of prehistoric research over the last two decades is the demise of the Neanderthals and the worldwide expansion of modern *Homo sapiens*, generally referred to in Europe as Cro-Magnons. The debate on how to interpret the archaeological records relevant to these controversial questions, namely, the expansion of one population and the disappearance of the other has been greatly influenced by molecular and nuclear genetic data obtained from current populations as well as from several ancient DNA samples (Forster 2004). Accordingly, it seems that the issue is no longer whether Neanderthals evolved into modern humans, but what the interactions were between these two different species (or sub-species-come-populations), and who among the two was responsible for the formation of the archaeological entities identified across Eurasia dating to the period of 50–30 Ka BP. These variable entities or

industries are traditionally attributed to the Late Middle Paleolithic (LMP) and Early or Initial Upper Paleolithic (EUP or IUP). The only way to obtain a clear cultural and chronological understanding is by testing sites across the region between western Asia and western Europe, while disregarding the ambiguous results of old excavations. Among other considerations we should take into account the taphonomy and context of the finds together with a clear definition of the cultural entities that is based not only on core reduction strategies but also the particular morphotypes of artifacts identified according to archaeological classifications as "tools" (i.e. formal retouched pieces).

Here we briefly demonstrate how meticulous excavations provide sound evidence for the stratification of Middle and Upper Paleolithic industries in two cave and rockshelter sites on the southwestern slopes of the Caucasus Mountains. The interpretation of field and laboratory observations provides interesting insights concerning the expansion of one population (modern humans) and the disappearance

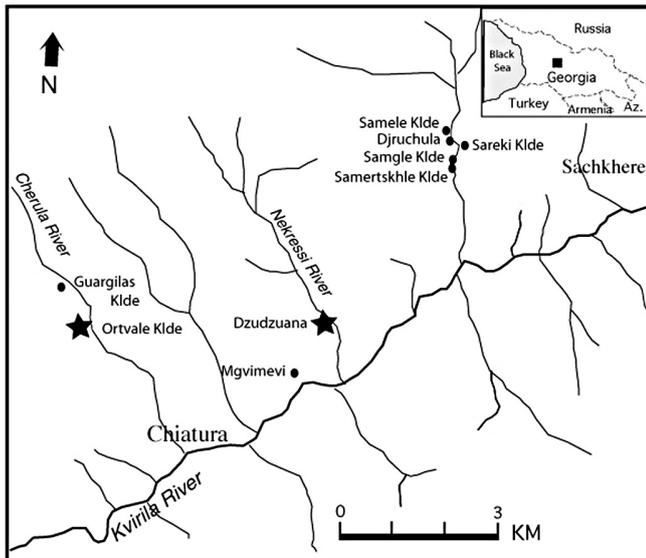


FIGURE 1. A map showing the location of the sites in the Republic of Georgia and the particular region where Ortvale Klde and Dzudzuana Cave are located.

of another (Neanderthals) that have major implications for current debates.

Western Georgia, also known as Imeretia, lies between the slopes of the Caucasus ranges, the Likhi hills, and the Black Sea (Figure 1). The local environments within which Neanderthals and modern humans subsisted during Oxygen Isotope Stage 3 (OIS 3) can be characterized as mountainous, warm, humid, and well forested (Volodicheva 2002). Like today, the numerous deep river valleys that drained the Caucasus in the Upper Pleistocene formed a patchwork of ecological niches populated by a diverse flora and fauna. High quality lithic raw materials were and are widely distributed throughout the area, placing few limitations on occupation duration or lithic economy. The onset of cooler and drier conditions during OIS 3 led to the increase of coniferous species at the expense of broad-leaved elements, but large-mammal diversity and frequency do not appear to have been impacted greatly (Adler, Tushabramishvili 2004). In this regard, the region appears to have served as a biogeographical refugium throughout the Middle Pleniglacial and even during the Late Pleniglacial (Tarasov *et al.* 2000). These favourable conditions were fostered by the ameliorating effects of the Black Sea, which continues to maintain subtropical conditions (warm and humid) with ample rainfall (Tarasov *et al.* 2000, Volodicheva 2002), and the Caucasus Mountains, which buffer the region from cold winds originating in the north (Sankovski, Pridnia 1995, Volodicheva 2002). These features spared the southern Caucasus from the severe effects of OIS 3 climatic oscillations and allowed both Neanderthals and modern humans to prosper throughout much of the region for many millennia. The lack of significant and sustained local environmental alterations at the boundary between the Middle and Upper Paleolithic at Ortvale Klde (*ca* 36–34 Ka BP) suggests that climate change played a minor role in

this transition as it occurred locally (and perhaps elsewhere, see d'Errico, Sánchez Goñi 2003, 2004).

A brief historical survey of research in the region clearly demonstrates the problematic nature of past excavations of caves and rockshelters. First, stratigraphic observations were not systematic and excavation units were artificially thick, often in excess of 10 cm, therefore, the admixture of discrete archaeological horizons caused the false impression that certain sites contain lithic industries transitional between the Middle and Upper Paleolithic. In addition, most of the cave sites argued to contain a stratigraphic continuum from the Middle to the Upper Paleolithic, were completely cleaned out in the course of excavation. Second, the faunal remains from these sites were studied as paleontological collections, producing species presence/absence lists without any zooarchaeological analyses. Unidentified or small bone fragments were not collected or analysed thus the available collections cannot serve as a basis for studying patterns of butchery or carcass transport, age or mortality, or the frequency of burning. Finally, available radiocarbon readings were scarce.

There is no doubt that caves and rockshelters in western Georgia contain important Middle and Upper Paleolithic remains. The majority of the known sites were excavated from the late 19th century onward (Liubin 1989) and the findings served to establish the local Paleolithic sequence. Questions regarding the regional development of the Middle Paleolithic have received considerable attention by many researchers, a detailed summary of which can be found in Adler and Tushabramishvili (2004).

Zamiatnin (1957) was the first to build a chronostratigraphic Upper Paleolithic sequence by examining the relationship between the various assemblages on the basis of lithic typological criteria. His tri-partite scheme of the Georgian Upper Paleolithic was generally accepted (Berdzenishvili 1972, Berdzenishvili, Nioradze 1991, Tushabramishvili 1981, 1984), with a few modifications introduced later by Liubin (1989).

The main typological considerations were (a) the presence or absence of Mousterian tool types, reflecting the notion that the greater the percentage of Mousterian tool types the older the assemblage within the Upper Paleolithic sequence; and (b) the presence of microlithic tools, especially those of geometric form, was recognized to represent Late Upper Paleolithic and Mesolithic industries. The sites of Togon Klde and Khergulis Klde were considered the earliest Upper Paleolithic occurrences. Those were followed by a group of assemblages derived from the sites of Sakajia, Devis-Khvreli and Mgvimevi. The representative of the latest phase was the Guargilas Klde assemblage, rich in geometric microliths (see Figure 1). Later excavations at sites such as Apianchi and Dzudzuana Caves added new assemblages assigned to the Upper Paleolithic (see Lubin 1989), still most researchers agreed that the majority of the assemblages, except for the earliest and latest ones, were difficult to assign a precise chronological position.

The first to cast doubts on the validity of the tri-partite scheme was J. Kozłowski (1970) who did not accept the presumed chronological sequence and suggested that the Georgian sequence would benefit from comparison with assemblages further afield, especially those of the Near East. Thus he proposed to date the earliest assemblage of Sagvardjila, Layer V to 34,000–30,000 BP by comparing it with the Baradostian lithic assemblages from Shanidar Cave (Solecki 1963, 1964, Kozłowski 1972). Radiocarbon dates available at the time indicated that the earliest Upper Paleolithic of the southern Caucasus was more or less as old as that of the Levant (Howell 1959) or western Europe (Waterbolk 1972).

T. Meshveliani (1989) made another major revision to the scheme when he re-studied the collections from those sites considered to represent the bulk of the Upper Paleolithic sequence. Meshveliani tried to incorporate data obtained through geological, palynological and paleontological investigations within the lithic chronostratigraphic contexts but the outcome of his studies revealed that none of the sites (except Sagvardjila which was not available for re-study) could correspond to the definitions of either the European or Near Eastern "Early Upper Paleolithic." His detailed examination demonstrated the admixture between Middle and Upper Paleolithic layers. Thereupon Meshveliani rejected the accepted notion that the western Georgian Upper Paleolithic evolved from the local late Mousterian, an interpretation based on supposed typological continuity but without solid stratigraphic evidence. Finally, Meshveliani concluded that most of the Upper Paleolithic occurrences of western Georgia belong to the final stages of the Pleistocene and lasted well into the Holocene. He also claimed that there was incongruence between the established techno-typological seriation of the Upper Paleolithic sequence and the then available <sup>14</sup>C dates obtained from bone samples of unspecified stratigraphic provenance.

With these issues in mind a new research project was initiated in 1996 that focused on the excavation of two sites in western Georgia, namely Dzudzuana Cave and the Ortvale Klde rockshelter. This research continues to be conducted by a joint team of Georgian, American, and Israeli researchers from various research institutes (see Adler 2002, Adler, Tushabramishvili 2004, Adler *et al.* 2006, Bar-Oz *et al.* 2002, Bar-Oz, Adler 2005, Meshveliani *et al.*, 1999, 2004, Tushabramishvili *et al.* 1999). The following is a brief summary of our efforts at these two sites and the bearing of our results on questions pertaining to the regional shift from the Middle to the Upper Paleolithic.

### **ORTVALE KLDE ROCKSHELTER**

The new excavations at Ortvale Klde, conducted in 1997–2001, focused on 6 m<sup>2</sup> and led to the recovery of over 12,000 Upper Paleolithic and 22,000 Middle Paleolithic stone artifacts from Layers 2–4 and Layers 5–7, respectively.

Likewise, more than 3,200 Upper Paleolithic and 12,500 Middle Paleolithic faunal specimens were recovered (Adler *et al.* 2006, Bar-Oz, Adler 2005). The lithic assemblage from the earliest Upper Paleolithic, Layers 4d and 4c, contains uni-directional blade cores, end scrapers on blades, rounded flake scrapers, burins on truncation, numerous retouched bladelets (some 2–3 mm wide), and backed bladelets (N=160). Noteworthy are three bevel-based bone/antler points, two polished bone/antler abraders, and a polished bone implement with parallel linear incisions of unknown use (Adler *et al.* 2006). Similar lithic and bone materials were never encountered in the underlying LMP layers, which are dominated by Levallois technology and a typical array of Middle Paleolithic scraper types (Adler 2002, Adler *et al.* 2006). Rare Mousterian artifacts were encountered at the bottom of Layer 4, at the contact with Layer 5, but these could be distinguished by their patination and typology (Adler 2002).

Another important difference relates to raw material use. High quality Cenomanian-Turonian flint deposits were scattered throughout the region during the Paleolithic and, in combination with other local raw materials, were exploited heavily during the LMP (99.6% total assemblage) and EUP (95.1% total assemblage). These materials could be procured easily within deposits on the plateaus above Ortvale Klde, or in alluvial deposits in river valleys such as the Cherula where Ortvale Klde is located. Non-local raw materials, specifically high-quality obsidian, the nearest source of which is located in the Javakheti region approximately 100 km to the southeast (Blackman *et al.* 1998), are also present at Ortvale Klde. Within the LMP occupations (0.4% of the combined LMP assemblage), obsidian artifacts appear as small debitage (<10 mm) and heavily reduced tools whose use lives have been greatly extended through extensive resharpening, recycling, and curation. This pattern of non-local raw material use differs from that observed in the EUP (Layer 4a–d) where obsidian is represented by full reduction sequences, including cores and debitage, and comprises roughly 5% of the total assemblage; within Layer 4c the frequency reaches almost 7%. The same pattern can be observed through the ratio of obsidian specimen per volume of excavated sediment. The frequency of obsidian is considerably higher in the EUP (Layers 4a–d: N=441, 153.1 pieces/m<sup>3</sup>, ca 7,000 years) compared with the LMP (Layers 5–7: N=93, 14.9 pieces/m<sup>3</sup>, ca 7,000 years) (see Adler *et al.* 2006 for discussion).

The uppermost Upper Paleolithic layers are very poor in lithics (Layer 3: 39 tools; Layer 2: 41 tools; with similarly low debitage frequencies in each). With respect to techno-typological categories and radiocarbon dates the Upper Paleolithic lithic material from Ortvale Klde compares well with the lower component, Unit D, at Dzudzuana Cave. The dates from the lowermost occupations at Ortvale Klde were obtained from Layer 4d and the lower part of Layer 4c (for details see Adler *et al.* 2006). The earliest manifestations of the Upper Paleolithic in Layer 4d are:

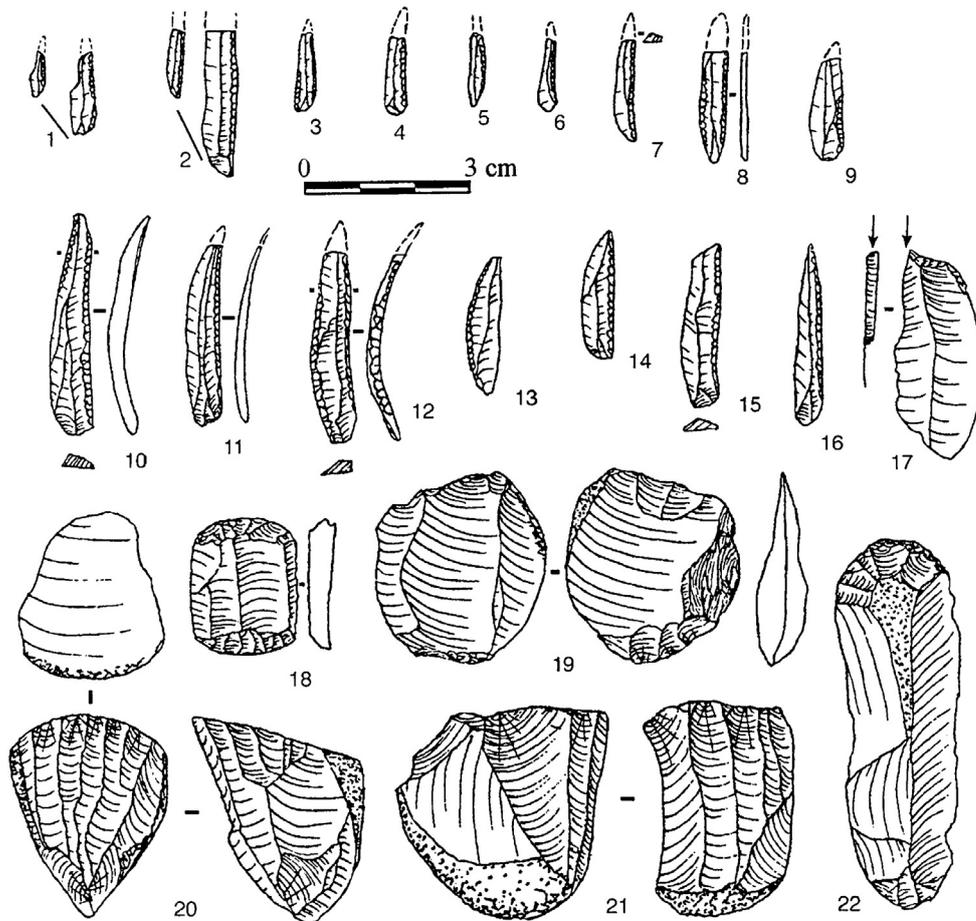


FIGURE 2. Dzedzuana – selected artifacts from Unit D: 1–16 – various retouched bladelets (note the small size of nos. 1 and 2). 17 – burin on truncation. 18, 22 – scrapers; 19 – piece esquillée; 20–21 – uni-directional bladelet cores.

32,620±520 (RTT-4726), and in the lower part of Layer 4c: 32,300±550 (RTT-4211); 32,510±530 (AA-45865); 34,100±800 (RTT-4214); 34,600±600 (RTT-4213); 33,700±620 (AA-45864); 34,300±650 (RTT-4212) BP. All dates reported in this paper are uncalibrated BP.

## DZUDZUANA CAVE

As mentioned above, the lower layers at Dzedzuana Cave were considered to represent early Upper Paleolithic occurrences. The lowermost depositional ensemble, recovered during the earlier excavations and encountered also during the last seasons of the current excavations is called Unit D, subdivided into Da and Db. The difference between the two series of excavations in the frequencies of bladelets, both plain and retouched, is due to the introduction of water sieving during the recent project. The industry is characterized by the production of short blades and small bladelets from unidirectional blade/bladelet cores, although numerous cores are exhausted and their final morphology eludes formal typological classification. The most distinctive tool-types in Unit D (N=269) are

microliths, mostly minute, finely retouched bladelets often less than 4 mm wide. Among the macroliths there are typical end scrapers on flakes and blades, including an oval type that occurs also in Ortvale Klde. Interestingly, the same types of simple end scrapers on blade or flake, thumb-nail scrapers and double end scrapers appear consistently through the entire sequence of Dzedzuana, including the uppermost Units C and B. Besides the end scrapers there are also numerous burins (Figure 2). The radiocarbon measurements from Unit D, arranged in stratigraphic order and spread over a thickness of 0.6 meter, provide the age of this industry at the site: 32,140±500 (RTT-4701); 26,320±260 (RTT-4336); 30,350±400 (RTA-3438); 27,400±300 (RTA-3437); 27,150±300 (RTA-3436); 26,925±255 (RTT-4340); 27,450±275 (RTT-4338) BP.

The second industry in the sequence of Dzedzuana Cave was retrieved from several stratigraphic sub-units incorporated in Unit C, which is dated to 23–20 Ka BP (Meshveliani *et al.* 2004). Deposited *ca* 4,000 radiocarbon years after Unit D, Unit C contains an industry dominated by the production of small blades and bladelets detached predominantly from carinated narrow cores (Figure 3). Among the retouched pieces (N=2249) many are bladelets

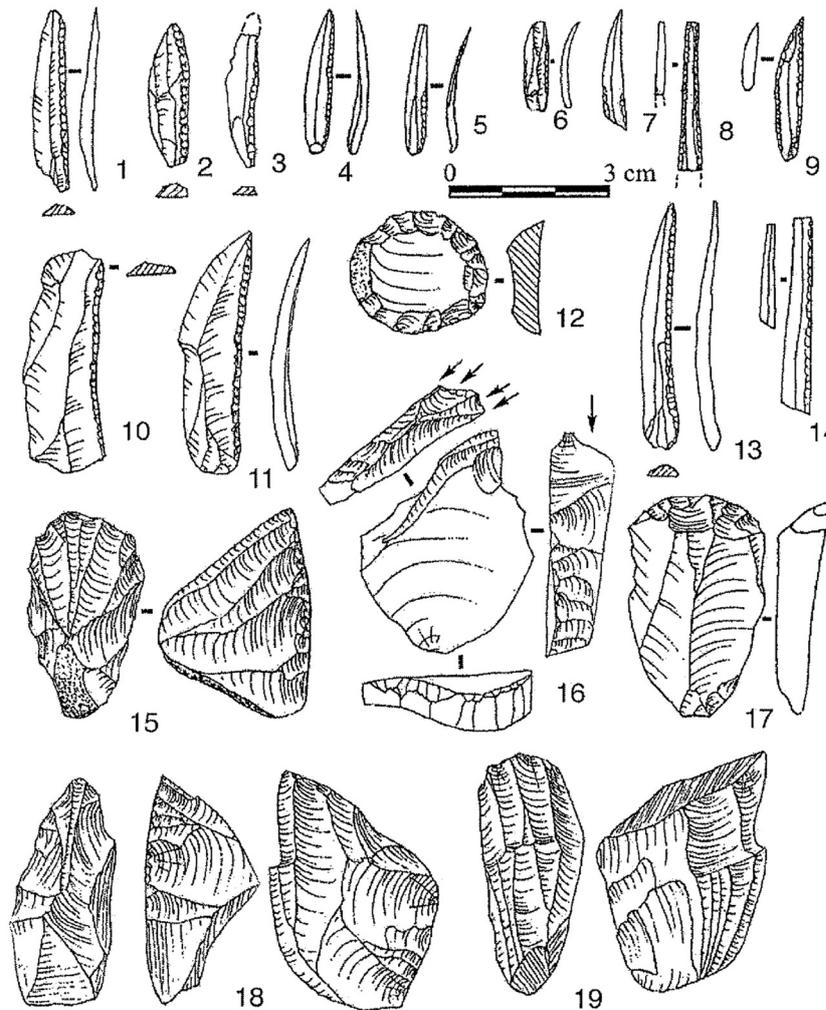


FIGURE 3. Dzudzuana – selected artifacts from Unit C: 1–9, 13–14 – fully or partially retouched bladelets (note the small size of nos. 7–9); 10–11 – semi-steep retouched blades; 12 – round scraper; 15, 18–19 – exhausted carinated cores; 16 – burin or bladelet core on thick core tablet; 17 – simple end scraper.

removed from carinated cores and typically shaped by fine to semi-abrupt retouch. Besides the microliths, the lithic tool types of this industry include simple end scrapers on flakes and blades, burins, and rare borers (Figure 3). This industry provided the following series of AMS dates: 23,125 ± 175 (RTT-4341); 23,240 ± 200 (RTA-3823); 22,490 ± 180 (RTT-4339); 21,220 ± 200 (RTA-3433); 21,930 ± 190 (RTA-3435); 20,980 ± 150 (RTA-3434) BP.

The industry from Unit C is of great relevance because it provides the key to unlock the confusing jumble of Upper Paleolithic terminology common in the current literature. The main "culprit" is the carinated core type (the dominant core type of Unit C). In brief, during the process of preparing the nodule for the detachment of blanks, the knapper first shaped it into a quasi-biface and then removed one of the thinner (or narrow) sides of the item to form a striking platform. From the narrow end of this platform, which is "nose-shaped", another ridge blade is removed (Figure 4). In order to keep a standard length (and thus avoid maximizing the curvature of the bladelet), the edge opposite the platform (or the "keel" of the core),

was continuously shaped into a "notched-form", either by retouch or the bifacial removal of small flakes. The chosen bladelets were modified into tools by fine retouch reminiscent of the Ouchtata bladelets (Tixier 1963).

It should be stressed that this type of core (and its modification) was described by one of us (Bar-Yosef 1970, 1991) under the term "narrow cores" in a report on the Kebaran industry from the site of Ein Gev I (Figure 5) in the Levant (dating to ca 18–14.5 Ka BP, uncalibrated) and was discussed in detail by Goring-Morris *et al.* (1998). Later they were more appropriately called "carinated cores" (Belfer-Cohen and Grosman *in press*).

These carinated cores were recognized almost a century ago by Boursillon and Bouyssonie (1912) in the French Aurignacian and had been defined as "rabot", intuitively correlated, due to their overall shape, to a push-plane. The Aurignacian of western Europe was and still is considered by many scholars as the first cultural manifestation of the Cro-Magnons. Thus it has become normative to use "Aurignacian" for every local first appearance of blade/bladelet industries made by modern humans, or alternately,

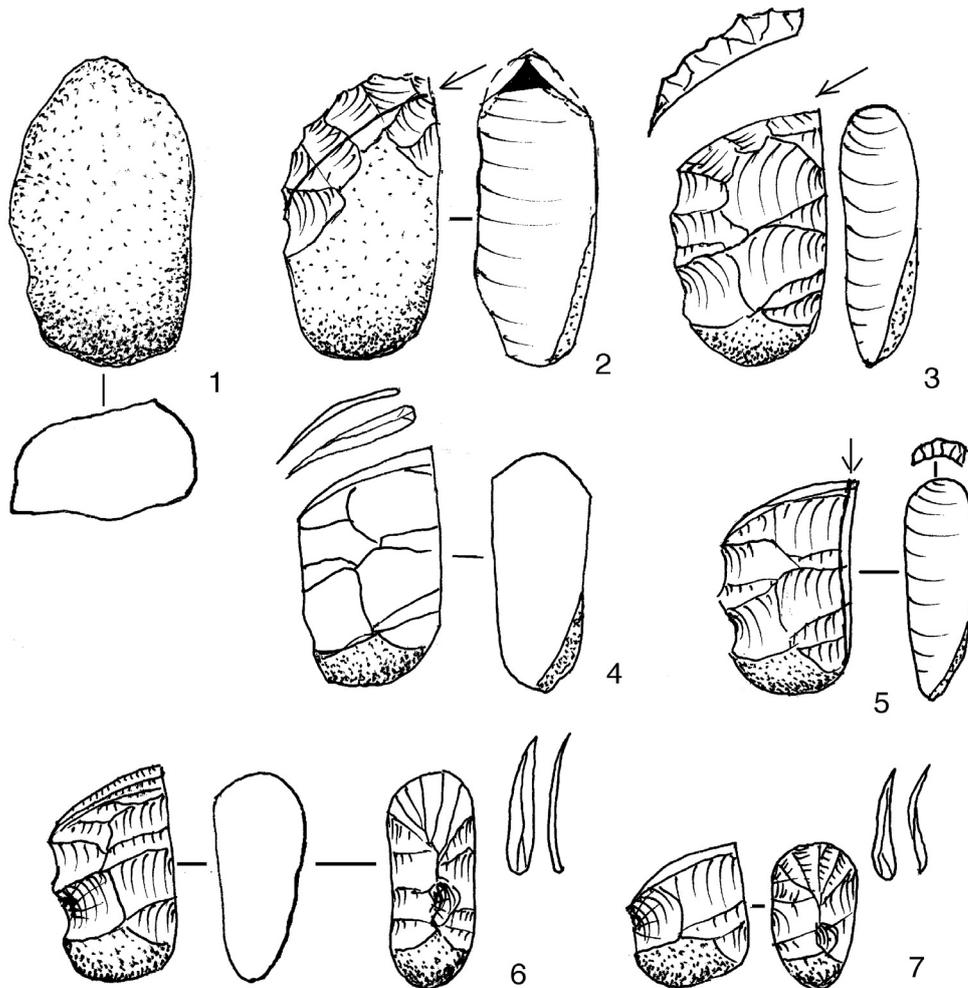


FIGURE 4. The technique of detaching bladelets from carinated cores: 1 – the nodule; 2 – removing the cortex by bifacial knapping and preparing the striking platform; 3 – removing the ridge blade; 4 – detaching the first bladelets; 5 – renewal of the striking platform by detaching a "core tablet"; 6 – detaching bladelets from a rounded front; 7 – continuous removal of bladelets. Note: The "notched crest" stops the bladelets from removing an additional "ridge blade". The "crest" of the core was formed by bifacial knapping which creates one or two "notches". Steps 6 and 7 resemble "carinated" scrapers or *rabot* as shown in Figures 3 and 5.

for every non-Mousterian assemblage overlying Middle Paleolithic layers (see discussion below). Attributing the term "Aurignacian" to industries that had nothing to do with this particular western European Early Upper Paleolithic culture is nicely demonstrated in Unit C at Dzudzuana Cave.

Based on the rest of the assemblage of Unit C, it is clear that there are no Aurignacian elements in this lithic industry aside from the "carinated cores". Also the dates prove that this industry is much younger than the western European Aurignacian and even from the Aurignacian in the Levant (Belfer-Cohen, Bar-Yosef 1999)

Unit C is overlain, following a chronological gap (from 19–13 Ka BP) by the topmost Upper Paleolithic Unit B, dated to 13,830±100 (RTA-3278) and 11,500±75 (RTA-3282) BP. The lithic assemblage of Unit B is rich in blades and bladelets flaked from bi-polar cores, which differ considerably in the various steps of core reduction from the carinated types encountered in Unit C. The dominant

microlithic types are the microgravettes and elongated straight-backed bladelets. The former are generally shaped by bipolar retouch of blades/bladelets 11–16 mm wide. Other common tool types are end scrapers, including many of the thumbnail variety.

Bone tools were also recovered from each unit in varying frequencies (N=195). These include simple points, awls, and some decorated items. The differences in frequencies most probably reflect the differences in the depth and thickness of the layers. As with the lithic, no Aurignacian bone "fossil guides" (e.g. the split-base point) were recovered in any of the stratigraphic units.

## DISCUSSION

The lessons learned from the new excavations at Ortvale Klde and Dzudzuana Cave may serve as a guide in other regions where old excavations are the only available

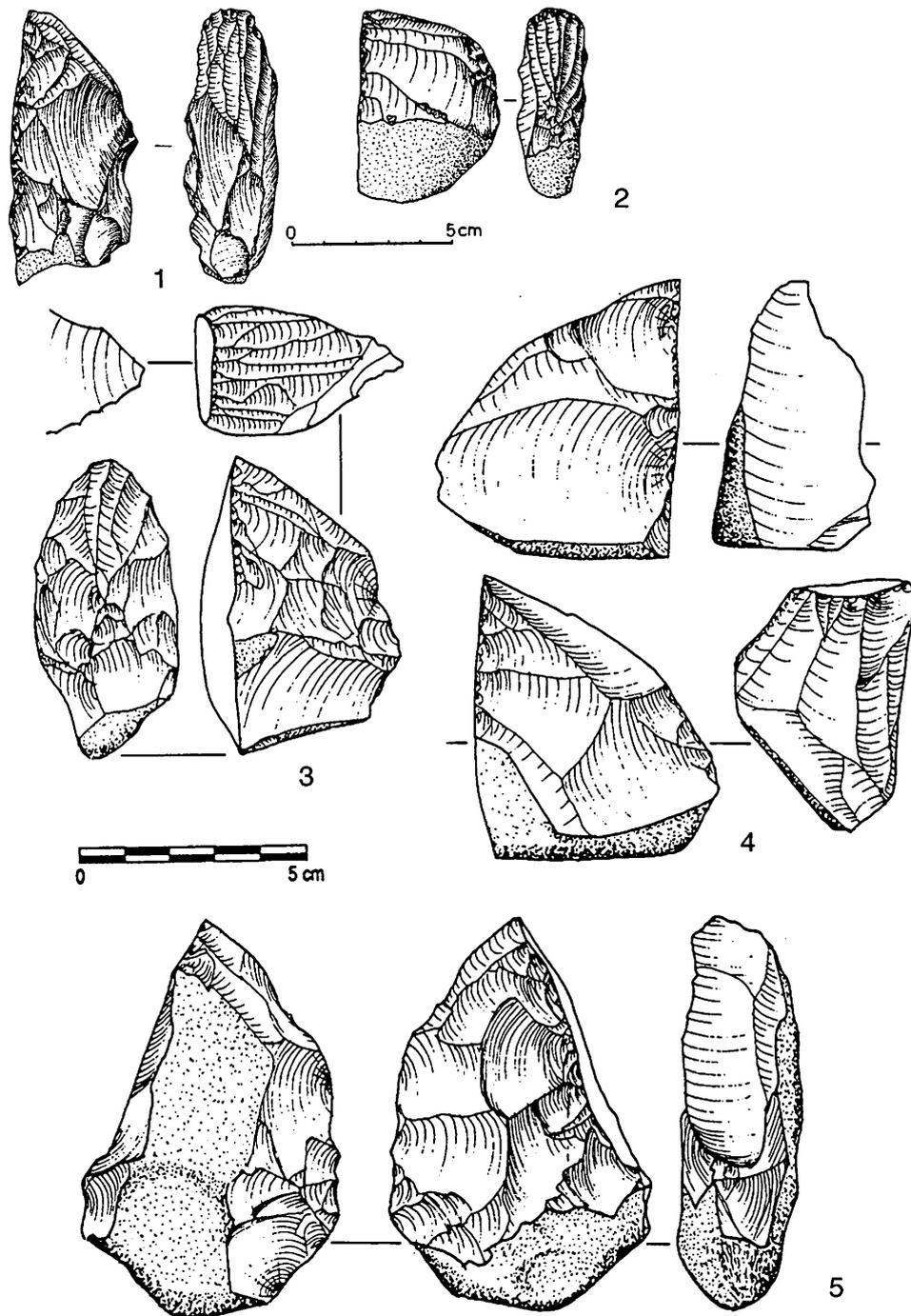


FIGURE 5. A sample of Kebaran carinated cores from Ein-Gev I dated to *ca* 16,000 BP (uncalibrated; after Bar-Yosef 1991).

sources of data. At Ortvale Klde, previous excavations conducted by D. Tushabramishvili and later by N. Tushabramishvili, revealed a thick sequence of Middle Paleolithic layers on top of which they identified a "transitional" industry presenting both Middle and Upper Paleolithic characteristics. This, as often was the case, was assumed to evolve into a typical Upper Paleolithic industry in the succeeding horizons. Using modern methods of excavation and retrieval, the renewed excavations at the site did not identify any evidence for an *in situ* cultural

transition between the terminal Middle Paleolithic and the earliest Upper Paleolithic. Instead, it became obvious that the thick LMP sequence was overlain by a thinner, full-fledged, EUP occupation. Based on the nature of the sediments and the archaeological materials in each layer, it was clear that a distinct archaeological, stratigraphic, occupational and temporal break exists between the LMP and EUP (Adler 2002, Adler, Tushabramishvili 2004, Adler *et al.* 2006). Thus there is no clear evidence at the site for interaction between Neanderthals and modern humans.

The renewed excavations at Dzudzuana Cave, employing systematic water-sieving of the clayey deposits, increased considerably the percentages of the microlithic component when compared with percentages of the original excavations (Meshveliani *et al.* 1999, 2004). Also, it became obvious that the lowermost Upper Paleolithic unit in Dzudzuana contains an industry similar to that of the Upper Paleolithic layers at Ortvale Klde, and that at both sites the Upper Paleolithic sequence begins at *ca* 34–32 Ka BP. The new data made it clear that most of the Upper Paleolithic sequence in Dzudzuana occupies the later part of this period when compared with Levantine and European Upper Paleolithic sequences. This observation, though originally based on techno-typological criteria, is now supported by the AMS radiocarbon dates presented above.

Industries similar to the Upper Paleolithic assemblages from these two sites were recovered from both the northern and southern slopes of the Caucasus, for example Mezmaiskaya Cave (Golovanova *et al.* 1999), dated by radiocarbon and ESR to the same period (35–34 Ka BP) as Ortvale Klde (Adler *et al.* 2006, Skinner *et al.* 2005). This suggests that the same Early Upper Palaeolithic populations expanded across the mountains. The situation during the Late Middle Paleolithic was entirely different. The Mousterian industries from the southwestern slopes of the Caucasus resemble those of the Zagros-Taurus types (Baumler, Speth 1993, Yalçinkaya *et al.* 1993), while the Mousterian of the northwestern slopes of the Caucasus resembles the Eastern Micoquian variety, characterized by the dominance of foliates (Golovanova 1998, Golovanova, Doronitchev 2003, Adler 2002, Adler *et al.* 2006). Apparently, the Caucasus Mountains represented a significant biogeographical and social barrier to the Neanderthals while modern humans appear to have crossed this topographic barrier with relative ease. The success of modern humans could be a result of better communication systems (both verbal and non-verbal), improved weaponry (i.e. reduced physical risk to hunters and increased kill rates), or improved reproductive conditions (i.e. decreased infant mortality or shortened inter-birth intervals). We do not claim that modern humans, as they crossed the Caucasus Mountains and later continued into Crimea and/or Siberia, exterminated local Neanderthals or any other endemic population. It is possible that under pressure of expanding foreign populations local Middle Paleolithic groups retreated of their own accord or died out as a result of pandemics. However, the possibility of physical conflict cannot be ruled out. It is well known from ethnographic records that invading populations of foragers had three possible relationships with local groups to choose from: a) mutual avoidance; b) peaceful interaction and interbreeding; or c) interpersonal conflict. The same options faced the modern humans who based on the genetic evidence (Forster 2004), expanded into Eurasia. The Middle to Upper Paleolithic shift, the so-called "Early/Initial Upper Paleolithic cultural expressions" was initiated somewhere in east or northeast Africa and is well represented over most of Eurasia. The pace of this process

could have been similar to that proposed for the spread of agriculture from the Near East to Europe and the Indus Valley (e.g. Bar-Yosef 1998). However, hunter-gatherers could move faster as they generally do not invest as much energy in the exploited territory as do farmers. Therefore, it is likely that the expansion of modern humans occurred much faster than that of the first farmers.

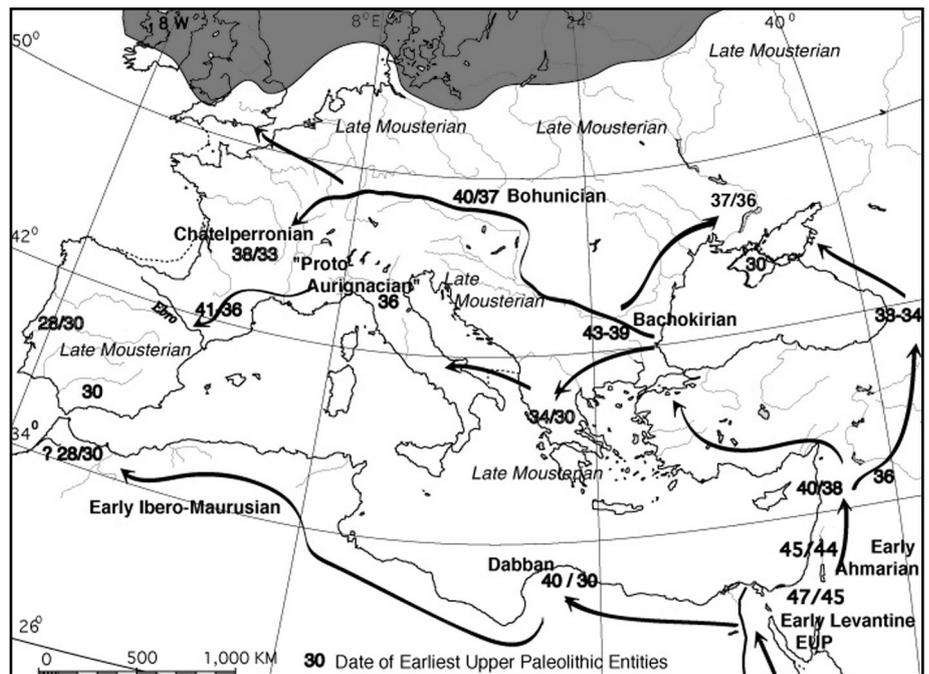
The process through which modern humans took over Europe is recorded in the variable industries reported from several regions. The lack of human fossils from Early Upper Paleolithic contexts in Europe means archaeologists must make do with cultural (i.e. techno-typological) features, and it is under these constraints that we must identify prehistoric populations. However, it is beyond the scope of this paper to enter into a discussion of what we can learn from technological analyses according to the *chaîne opératoire* paradigm, or how knowledge of knapping techniques is passed from one generation to the next. Suffice it to say that all human societies tend to maintain their traditions. There is little doubt that humans were engaging in verbal forms of communication and learning at least since 200,000 years ago, thus the transmission of knowledge pertaining to reduction sequences was more efficient. Following this line of reasoning we believe that one can, with a fair degree of certainty, associate specific toolkits with late Neanderthals and others with expanding modern human groups.

During the late European Mousterian (i.e. the cultures of the Neanderthals), the Eastern Micoquian tradition spread across northern Europe all the way to the northern slopes of the Caucasus, but it never penetrated southwards. Thus it is not surprising that the production of foliates or leaf shaped points, a common tool type of the Eastern Micoquian, continued later among the "retreating" Neanderthal populations. It implies, for example, that, as suggested previously by Valoch (1966), there is a high probability that the Jermanowician and the Szeletian, as suggested previously by Valoch (1966), both of which are rich in bifacially shaped foliates, were made by Neanderthals.

On the other hand, it is possible that the early blade industries found across Europe, such as the Bachokirian, the arched backed industry from Krakow-Zwierzyniec I (Kozłowski 2000a, b, Rigaud 2001), the Bohunician (Svoboda, Bar-Yosef 2003), the so-called "proto-Aurignacian" in Italy and south France, the Castelperronian in France and possibly in northern Spain (Mellars 2004), as well as the Uluzzian in Italy and possibly in Greece (Kozłowski 2000a), were produced by modern humans and not by Neanderthals (Bar-Yosef 2006). The case of the Castelperronian blade industries requires additional consideration. Although a detailed discussion is beyond the scope of this paper, we do believe that there are alternative explanations for the Neanderthal-Castelperronian association (Bar-Yosef 2006).

We would like to conclude by pointing out several observations concerning paradigmatic misconceptions, which seem to have blurred the general picture of the Early Upper Paleolithic until now:

FIGURE 6. The dispersal routes of modern humans into Europe and Western Asia. Only IUP entities are marked on the map with their radiocarbon dates. Note that the movements into certain areas took longer than the main routes westward. Areas identified as "Late Mousterian" represent territories occupied by the latest Neanderthals.



1. The "Aurignacian" was considered as the first Upper Paleolithic culture in Europe and therefore became a general term encompassing all sorts of blade industries that hardly resemble the classical Aurignacian of western Europe. Given the current available dates for the Aurignacian contexts in the Russian plains such as at Kostenki 14 (Sinitsyn 2003) and the Aurignacian occupations in central and western Europe, it seems that the classical Aurignacian emerged from within western or central Europe, and only later expanded eastward. If we accept the rule that the complete set of cultural attributes is evidenced first in the homeland of the cultural entity in question, we prefer western Europe as the birthplace of the Aurignacian (e.g. Conard, Bolus 2003). This is the region where the richest assemblages of stone, bone, and antler tools as well as art objects were found within Aurignacian lithic contexts. Hence the "chronological battle" over the earliest dates of the Aurignacian (Zilhao, d'Errico 1999) is of lesser importance and we can accept that they should be of the order of *ca* 36.5 Ka BP.
2. The industries that preceded the "Aurignacian" proper are truly the earliest Upper Paleolithic manifestations to be found across Europe. They emerged in the east and their bearers expanded westward following two tracks, one through the Danube valley and the other across the southern Mediterranean (Figure 6). These industries have different names and include the Emiran, early Ahmarian, Bachokirian, Bohunician, and Proto-Aurignacian. They generally date to an earlier time span than the Aurignacian *sensu stricto*, around 45–36 Ka BP. It is well known that this is not an easy period to date by radiocarbon and the ambiguities concerning the calibration of the measured dates are widely acknowledged (Hughen *et al.* 2004). However, among these industries, the Emiran and Bohunician in particular, demonstrate the "transitional" character of the reduction sequence, in which blade cores are employed to produce what we often classify as "Levallois points".
3. The French Castelperronian was considered to represent cultural continuity between the local Mousterian of Acheulian Tradition (MTA) and the Upper Paleolithic, evidence for the mental capacities of late Neanderthals for an intra-society change and their ability to invent and adapt to "new ways and times". There is no doubt that Neanderthals could have produced blades from prismatic cores as demonstrated at sites dated to the Last Interglacial period in northwestern Europe (e.g. Conard 1990). However, blade production ceased during the Last Glacial period and was renewed only when the Castelperronian and the other Initial Upper Paleolithic industries mentioned above appeared. The false sense of cultural continuity was created when typical Mousterian pieces were counted as integral elements of Castelperronian assemblages. Rigaud (1996, 2001) argues that we should question this proposed continuity from the late Mousterian into the Castelperronian because the lithic assemblages pertaining to the latter are rich in Mousterian elements only when a Castelperronian layer is superimposed above a Mousterian deposit. An example of a similar phenomenon has been reported recently by J.-G. Bordes (2003) at Roc de Combe. There, the supposed interstratification of Castelperronian and Aurignacian occurrences was shown by systematic refitting to be due to natural admixture. This case exemplifies the need for careful taphonomic studies and highlights the dubious nature of those studies that do not take into consideration this important factor.

4. The expansion of modern humans from the Levant and into the southern Caucasus led to the replacement of the Neanderthals by 35–34 Ka BP as shown by the data from Ortvale Klde and Mezmaiskaya Cave. This does not preclude the possibility that another, perhaps earlier route, had facilitated the expansion of modern humans into northern Asia beyond the Caspian Sea (Figure 6).

In sum, the techno-typological variability among EUP/IUP assemblages across Europe reflects the individuality of modern human groups or entities. This feature, also expressed in some cases by the production of particular bone tools or the differential use of items of personal adornment, separates them from the Neanderthals. In our view the expressions of group individuality within modern human populations is an important behavioural attribute. When small migrating groups of people move into territories already occupied, even if only sparsely, a certain degree of interaction is expected. This is not a new contention, as earlier scholars, for example F. Bordes (1972), recognized that as modern humans dispersed through Europe and western Asia, they encountered Neanderthals. The frequency and form of interactions between these newcomers and indigenous populations is the subject of continued research, yet the final outcome of these interactions is not in question.

## REFERENCES

- ADLER D. S., 2002: *Late Middle Palaeolithic Patterns of Lithic Reduction, Mobility, and Land Use in the Southern Caucasus*. Unpublished PhD. thesis, Harvard University, Cambridge. 488 pp.
- ADLER D. S., BAR-OZ G., BELFER-COHEN A., BAR-YOSEF O., 2006: Ahead of the game: Middle and Upper Palaeolithic hunting behaviors in the southern Caucasus. *Curr. Anthropol.* 47,1: 89–118.
- ADLER D. S., BELFER-COHEN A., BAR-YOSEF O. 2006: Between A Rock And A Hard Place: Neanderthal-Modern Human Interactions In The Southern Caucasus. In: N. J. Conard (Ed.): *Neanderthals and Modern Humans Meet*. Pp. 165–188. Tübingen Publications in Prehistory, Kerns Verlag Tübingen.
- ADLER D. S., TUSHABRAMISHVILI N., 2004: Middle Palaeolithic Patterns of Settlement and Subsistence in the Southern Caucasus. In: N. Conard (Ed.): *Middle Settlement Dynamics*. Pp. 91–132. Publications in Prehistory, Kerns Verlag, Tübingen.
- BAUMLER M. F., SPETH J. D., 1993: A Middle Paleolithic assemblage from Kunji Cave, Iran. In: D. I. Olszewski, H. L. Dibble (Eds.): *The Paleolithic Prehistory of the Zagros-Taurus*. Pp. 1–74. The University Museum, University of Pennsylvania, Philadelphia.
- BAR-OZ G., ADLER D. S., MESHVELIANI T., TUSHABRAMISHVILI N., BELFER-COHEN A., BAR-YOSEF O., 2002: Middle and Upper Paleolithic foragers of southwest Caucasus: New faunal evidence from western Georgia. *Archaeology, Ethnology and Anthropology of Eurasia* 4, 12: 45–52.
- BAR-OZ G., ADLER D. S., 2005: Taphonomic history of the Middle and Upper Palaeolithic faunal assemblages from Ortvale Klde, Georgian Republic. *J. of Taphonomy*: in press.
- BAR-YOSEF O., 1970: *The Epi-Paleolithic Cultures of Palestine*. Unpublished PhD. thesis, The Hebrew University, Jerusalem. 199 pp.
- BAR-YOSEF O., 1991: The search for lithic variability among Levantine Epi-Paleolithic industries. In: L. Meignen (Ed.): *25 Ans d'etudes technologiques en préhistoire, XIe rencontre internationale d'archéologie et histoire d'Antibes*. Pp. 319–336. Editions APDCA, Juan-les-Pins.
- BAR-YOSEF O., 1998: On the nature of transitions: the Middle to Upper Palaeolithic and the Neolithic revolution. *Cambridge Archaeological Journal* 8, 2: 141–163.
- BAR-YOSEF O., 2006: Neanderthals and Modern humans: A different interpretation. In: N. J. Conard (Ed.): *Neanderthals and Modern Humans Meet*. Tübingen Publications in Prehistory, Kerns Verlag Tübingen.
- BELFER-COHEN A., BAR-YOSEF O., 1999: The Levantine Aurignacian: 60 years of research. In: W. Davies, R. Charles (Eds.): *Dorothy Garrod and the Progress of the Palaeolithic: Studies in the Prehistoric Archaeology of the Near East and Europe*. Pp. 118–134. Oxbow Books, Oxford.
- BELFER-COHEN A., GROSMAN L., in press: Tools or cores? Carinated artifacts in Levantine Late Upper Paleolithic assemblages and why does it matter. In: S. P. McPherron, J. Lindly (Eds.): *Tools or Cores? The Identification and Study of Alternative Core Technology in Lithic Assemblages*. University of Pennsylvania Museum Press, Philadelphia.
- BERDZENISHVILI N. Z., 1972: On the question of the initial stage of the Upper Palaeolithic of Georgia (in Russian). In: V. M. Masson (Ed.): *Kamenniy vek Sredney Asii i Kazakhstana (The Palaeolithic of Central Asia and Kazakhstan)*. Pp. 23–25. Izdatelstvo Kazakhskoy akademii nauk (The Kazakhstan Academy of Science), Tashkent.
- BERDZENISHVILI N. Z., NIORADZE M. G., 1991: The Paleolithic stage (in Russian). *Sakartvelos arkeologia* I: 161–300.
- BLACKMAN J., BADALIAN R., KIKODZE Z., KOHL P., 1998: Chemical characterization of Caucasus obsidian: Geological sources. In: M.-C. Cauvin, A. Gourgaud, B. Gratuze, N. Arnaud, G. Poupeau, J.-L. Poidevin, C. Chataigner (Eds.): *L'obsidienne au Proche et Moyen Orient*. Pp. 205–234. BAR International Series 738. Oxford.
- BORDES F., 1972: Du Paléolithique moyen au Paléolithique supérieur: Continuité ou discontinuité. In: F. Bordes (Ed.): *The Origin of Homo sapiens*. Pp. 211–218. UNESCO, Paris.
- BORDES J.-G., 2003: Lithic taphonomy of the Chatelperronian/Aurignacian interstratifications in Roc de Combe and Le Piage (Lot, France). In: J. Zilhao, E. d'Errico (Eds.): *The Chronology of the Aurignacian and of the Transitional Technocomplexes. Dating, Stratigraphies, Cultural Implications*. Pp. 223–246. Instituto Portugues de Arqueologia, Lisbon.
- BOURLON J., BOUYSSONIE A., 1912: Grattoirs carénés: rabots et grattoirs nucléiformes: essai de classification des grattoirs. *Revue anthropologique*, Vingt-deuxième année: 475–486.
- CONARD N., 1990: Laminar lithic assemblages from the last interglacial complex in northwestern Europe. *J. of Anthropological Research* 46: 243–262.
- CONARD N. J., BOLUS M., 2003: Radiocarbon dating of the appearance of modern humans and timing of cultural innovations in Europe: new results and new challenges. *J. of Hum. Evol.* 44, 27: 331–371.
- D'ERRICO F., SÁNCHEZ GOÑI M. F., 2003: Neanderthal extinction and the millennial scale climatic variability of OIS 3. *Quaternary Science Reviews* 22: 769–788.

- D'ERRICO F., SANCHEZ GOÑI M. F., 2004: A Garden of Eden for the Gibraltar Neandertals? A reply to Finlayson *et al.* *Quaternary Science Reviews* 23: 1210–1216.
- FORSTER P. I., 2004: Ice ages and the mitochondrial DNA chronology of human dispersals: a review. *Philosophical Transactions of the Royal Society, London B* 359: 255–264.
- GOLOVANOV L. V., 1998: New Mousterian sites in caves of the Northern Caucasus. In: C. Giunchi, C. Perretto (Eds.): *XIII International Congress of Prehistoric and Protohistoric Sciences (1996)*. Pp. 609–614. A.B.A.C.O. Edizioni, Forli Italia.
- GOLOVANOV L. V., DORONICHEV V. B., 2003: The Middle Paleolithic of the Caucasus. *J. of World Prehistory* 17, 1: 71–140.
- GOLOVANOV L. V., HOFFECKER J. F., KHARITONOV V. M., ROMANOVA G. P., 1999: Mezmaiskaya Cave: A Neanderthal occupation in the northern Caucasus. *Curr. Anthropol.* 40, 1: 77–86.
- GORING-MORRIS A. N., MARDER O., DAVIDZON A., IBRAHIM F., 1998: Putting Humpty together again: Preliminary observations on refitting studies in the Eastern Mediterranean. In: S. Milliken (Ed.): *The Organization of Lithic Technology in Late Glacial and Early Postglacial Europe*. Pp. 149–182. BAR International Series 700, Oxford.
- HOWELL F. C., 1959: Upper Pleistocene stratigraphy and early man in the Levant. *Proceedings of the American Philosophical Society* 103: 1–65.
- HUGHEN K., LEHMAN S., SOUTHON J., OVERPECK J., MARCHAL O., HERRING C., TURNBULL J., 2004: <sup>14</sup>C activity and global carbon cycle changes over the past 50,000 years. *Science* 303: 202–207.
- KOZŁOWSKI J. K., 1970: The Upper Palaeolithic of Transcaucasus and the Near East. Part I. *Prace Komisji archeologicznej PAN* 9: 14–124.
- KOZŁOWSKI J. K., 1972: Gorny Paleolit w krajach Zakaukaskich i na Bliskim Wschodzie. Cz. II. Periodyzacja Gornego Paleolitu zachodnich krajow Zakaukaskich. *Swiatowit XXXIII*: 7–46.
- KOZŁOWSKI J. K., 2000a: The problem of cultural continuity between the Middle and the Upper Paleolithic in central and eastern Europe. In: O. Bar Yosef, D. Pilbeam (Eds.): *The Geography of Neandertals and Modern Humans in Europe and the Greater Mediterranean*. Pp. 77–105. Peabody Museum, Harvard University, Cambridge, MA.
- KOZŁOWSKI J. K., 2000b: Southern Poland between 50 and 30 Kyr B.P., environment and archaeology. In: J. Orschiedt, G.-C. Weniger (Eds.): *Neandertals and Modern Humans – Discussing the Transition: Central and Eastern Europe from 50,000–30,000 B.P.* Pp. 76–91. Mettman, Neanderthal Museum.
- LIUBIN V. P., 1989: The Palaeolithic of the Caucasus. In: P. I. Boriskovski (Ed.): *The Palaeolithic of the Caucasus and Northern Asia*. Pp. 9–142. Institute of Archaeology, Moscow.
- MELLARS P., 2004: Neandertals and the modern human colonization of Europe. *Nature* 432: 461–465.
- MESHVELIANI T., 1989: About the early stages of the Upper Paleolithic cultures in western Georgia (in Georgian). *Newsletters of the State Museum of Georgia* 40-B: 13–31.
- MESHVELIANI T., BAR-YOSEF O., BELFER-COHEN A., DJAKELIN., KRAUSA., LORDKIPANIDZE D., TVALCHRELIDZE M., VEKUA A., 1999: Excavations at Dzudzuana cave, Western Georgia (1996–1998): Preliminary results. *Préhistoire européenne* 15: 79–86.
- MESHVELIANI T., BAR-YOSEF O., BELFER-COHEN A., 2004: The Upper Paleolithic of Western Georgia. In: P. J. Brantingham, S. L. Kuhn, K. W. Kerry (Eds.): *The Early Upper Paleolithic Beyond Western Europe*. Pp. 129–143. University of California Press, Berkeley.
- RIGAUD J.-P., 1996: L'émergence du Paléolithique Supérieur en Europe Occidentale. Le rôle du Castelperronien. *The Lower and Middle Paleolithic*. A.B.A.C.O. Edizioni, Forli, Italia. 219–223 pp.
- RIGAUD J.-P., 2001: A propos de la contemporanéité du Castelperronien et de l'Aurignacien ancien dans le Nord-Est de l'Aquitaine: Une révision des données et ses implications. In: Actes du colloque de la commission VIII de l'UISPP: *Les premiers hommes modernes de la Péninsule ibérique*, Villa Nova de Foz Côa, 22–24 Octobre 1998.
- SANKOVSKI A., PRIDNIA M., 1995: A comparison of the Southern Appalachian (U.S.A.) and Southwestern Caucasus (Russia) forests: Influences of historical events and present environment. *J. of Biogeography* 22:1073–1081.
- SINITSYN A. A., 2003: The most ancient sites of Kostenki in the context of the Initial Upper Paleolithic of Northern Eurasia. In: J. Zilhao, F. d'Errico (Eds.): *The Chronology of the Aurignacian and the Transitional Complexes: Dating, Stratigraphies, Cultural Implications*. Pp. 89–108. Instituto Portuges de Arqueologia, Lisbon.
- SKINNER A. R., BLACKWELL B. A. B., MARTIN S., ORTEGA A., BLICKSTEIN J. I. B., GOLOVANOV L. V., DORONICHEV V. B., 2005: ESR dating at Mezmaiskaya Cave, Russia. *Applied Radiation and Isotopes* 62: 219–224.
- SOLECKI R. S., 1963: Prehistory in Shanidar Valley, Northern Iraq. *Science* 139: 179–193.
- SOLECKI R. S., 1964: Shanidar Cave, a Late Pleistocene site in Northern Iraq. *Report of the Vth International Congress on the Quaternary, Warsaw, 1961*: 413–423.
- SVOBODA J., BAR-YOSEF O., 2003: *Stránská skála: Origins of the Upper Paleolithic in the Brno Area, Moravia, Czech Republic*. Peabody Museum of Archaeology and Ethnology, Cambridge, MA. 232 pp.
- TARASOV P. E., VOLKOVA V. S., WEBB III T., GUIOT J., ANDREEV A. A., BEZUSKO L. G., BEZUSKO T. V., BYKOVA G. V., DOROFYUK N. I., KVAVADZE E. V., OSIPOVA I. M., PANOVA N. K., SEVASTYANOV D. V., 2000: Last glacial maximum biomes reconstructed from pollen and plant macrofossil data from northern Eurasia. *J. of Biogeography* 27: 609–620.
- TIXIER J., 1963: *Typologie de l'Épipaléolithique du Maghreb*. C.R.A.P.E., 2, Paris. 209 pp.
- TUSHABRAMISHVILI D. M., 1981: The Paleolithic of Georgia. *Pescheri Gruzii* 9: 3–12.
- TUSHABRAMISHVILI D. M., 1984: The Georgian Palaeolithic. *Bulletin of the Georgian State Museum* 37, 2: 5–27.
- TUSHABRAMISHVILI N., LORDKIPANIDZE D., VEKUA A., TVALCHERLIDZE M., MUSKHELISHVILI A., ADLER D. S., 1999: The Paleolithic rockshelter of Ortvale Klde, Imereti region, the Georgian Republic. *Préhistoire Européenne* 15: 65–77.
- VALOCH K., 1966: Die altertumlichen Blattspitzenindustrien von Jezerany (Sudmahren). *Časopis Moravského musea, Scientiae sociales*, Brno 58: 5–60.
- VOLODICHEVA, N., 2002: The Caucasus. In: M. Shahgedanova (Ed.): *The Physical Geography of Northern Eurasia*. Pp. 350–376. Oxford University Press, Oxford.
- WATERBOLK H. T., 1972: Radiocarbon dates from Paleolithic sites in western Europe, compared with the climatic curve of the Netherlands. In: F. Bordes (Ed.): *The Origin of Homo sapiens, Ecology and Conservation*. Pp. 245–252. UNESCO, Paris.

- YALÇINKAYA I., OTTE M., BAR-YOSEF O., KOZŁOWSKI J., LÉOTARD J. M., TASKIRAN H., 1993: The excavations at Karain Cave, south-western Turkey: An interim report. In: D. I. Olszewski, H. L. Dibble (Eds.): *The Paleolithic Prehistory of the Zagros-Taurus*. Pp. 100–106. The University Museum, University of Pennsylvania, Philadelphia.
- ZAMIATNIN S. N., 1957: The Palaeolithic of Western Trans-Caucasus (in Russian). *Collection of Papers in Anthropology and Ethnography* 7: 432–439.
- ZILHÃO J., D'ERRICO F., 1999: The chronology and taphonomy of the earliest Aurignacian and its implications for the understanding of Neanderthal extinction. *J. of World Prehistory* 13, 1: 1–68.

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