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RECENT PROGRESS IN LOWER AND MIDDLE PALAEOLITHIC RESEARCH AT DEDERIYEH CAVE, NORTHWEST SYRIA

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Introduction

The Dederiyeh cave in northwest Syria is one of the rare Palaeolithic sites presently being excavated in the northern Levant. It is known for its Neanderthal fossils found in the 1990s, the discovery having been documented in a series of publications (Akazawa & Muhesen 2002; Akazawa *et al.* 2004; Kondo *et al.* 2006 and references therein). On the other hand, the archaeological aspects of this cave, mainly the Palaeolithic lithic industries, have not been published in detail. The initial excavations between 1989 and 2001 were mostly conducted in one area (the chimney area), while in 2003, a new research programme was introduced, aiming at conducting extensive excavations in the other areas of this large cave site so that the complete prehistoric sequence of the Dederiyeh cave would be clarified (Nishiaki *et al.* 2005, 2006, 2008). The excavations since 2003 consequently have revealed that the Dederiyeh cave was occupied not only during the Neanderthal period, or the late Middle Palaeolithic (late Levantine Mousterian), but also during the late Epi-Palaeolithic (Natufian), the earlier Middle Palaeolithic (earlier Levantine Mousterian), and even the terminal Lower Palaeolithic (Yabrudian). At the same time, the systematic analyses of the lithic assemblages discovered with the Neanderthal fossils from the previous seasons have also made progress in these years. Here, we will provide an overview of the archaeological evidence currently available for the Lower and Middle Palaeolithic sequence of the Dederiyeh cave.

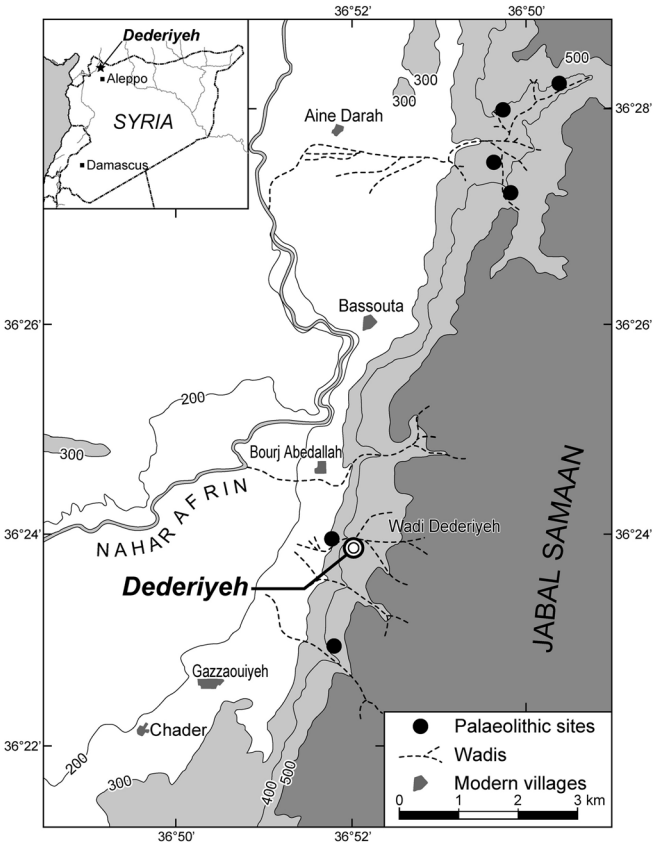

Figure 1 - Location of the Dederiyeh cave and related Palaeolithic sites in Jabal Samaan.

The site and excavations

The Dederiyeh cave is situated in the western plateau of Jabal Samaan, approximately 60 km northwest of Aleppo, Syria (fig. 1). It is located on the left bank of Wadi Dederiyeh, one of the tributaries of the Afrin River running west. The altitude is approximately 450 m. This cave has two openings: the main entrance faces Wadi Dederiyeh, while the other one is a natural chimney, approximately 5 m × 10 m in plan, located deep within the cave and open to the sky on the plateau side. It is a very large cave, one of the largest known in the Levant, measuring approximately 60 m long, 10 to 25 m wide, and approximately 10 m high. The cave in fact consists of three internally connected major chambers (fig. 2), designated as the entrance, central and chimney areas, for the sake of convenience. The cave floor inclines from the chimney toward the entrance areas by 15 to 20° (fig. 3), with relatively flat surfaces in some parts (Oguchi & Fujimoto 2002).

The excavations of the first (1989–1990 and 1993–2001) and the subsequent (2003–2008) campaigns conducted by a Japan-Syria joint mission demonstrated that Palaeolithic remains were distributed over almost the entire areas of the cave. Especially rich were the areas close to the main entrance and the chimney. The area between them, the central area, revealed rather sparse occupations. The excavations also indicated that the different

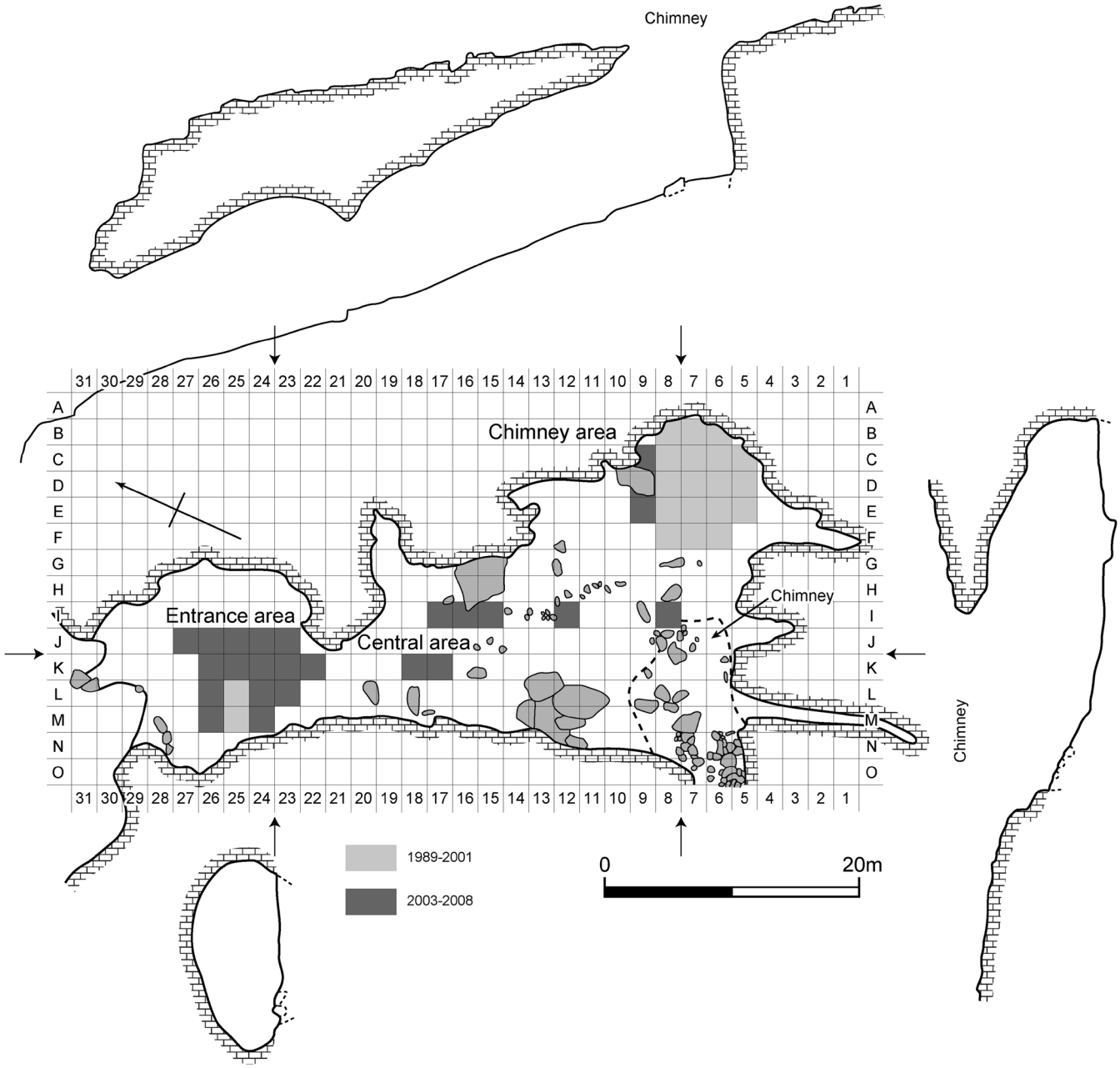

Figure 2 - Ground plan and excavated areas of the Dederiyeh cave.

areas of the cave were occupied in different periods. While the occupations of the chimney and the central areas were principally confined to the late Middle Palaeolithic, the entrance area was evidently occupied for a longer period, starting from the end of the Lower Palaeolithic (see below).

Middle Palaeolithic

The chimney area

The cave floor below the chimney is covered with cone-shaped deposits including plenty of limestone boulders and rubble. The excavations were conducted along a relatively flat-roofed eastern formation. A total of eighteen 2 m × 2 m squares were excavated between 1989 and 2001, resulting in the exposure of bedrock in Squares E/F6–8 approximately 4 m below the surface (fig. 2). Aside from modern disturbances and historical pits on the top, the remaining deposits of this area were exclusively dated from the Middle Palaeolithic, consisting of fifteen stratified geological layers. At least five layers, distributed well in this sequence from Layers 11 to 3, yielded Neanderthal fossils, including those from two burials (Akazawa & Muhesen 2002). This strongly suggested that all the cultural remains recovered from this area belonged to the Neanderthals.

In the current campaign, being conducted since 2003, an additional four squares have been excavated in this area (fig. 2). The excavations of Squares E9–C9 testified that the well-preserved Middle Palaeolithic occupation floors containing a number of hearths were distributed further north. On the other hand, Square I8 yielded either disturbed or nearly sterile Middle Palaeolithic deposits only, delineating the western limit of the distribution of the primary Middle Palaeolithic deposits in this area.

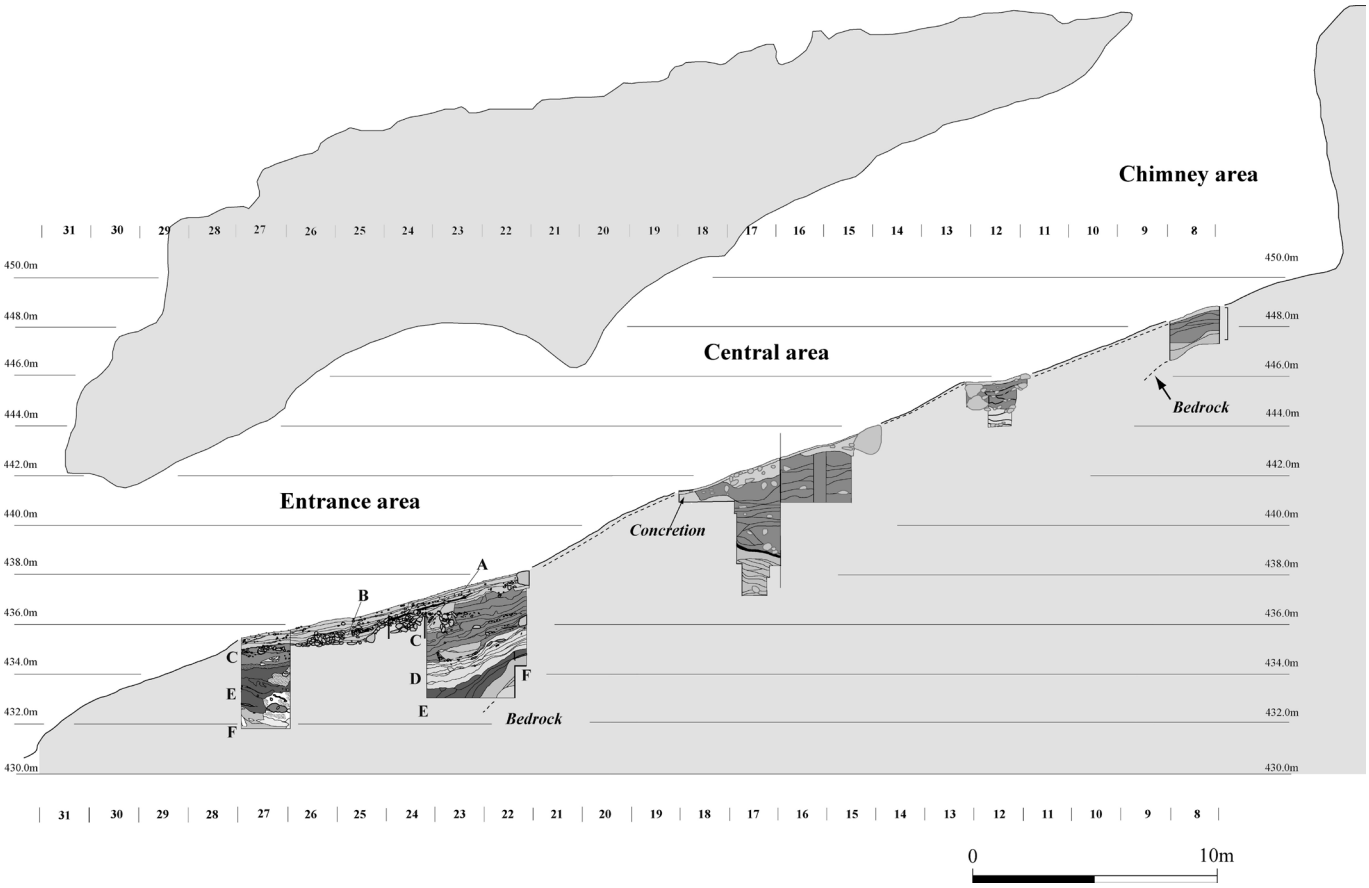

Figure 3 - Longitudinal section of the Dederiyeh cave.

More than 100,000 Middle Palaeolithic artifacts have been recovered from this area, mainly from the upper layers. The artifact density markedly decreased from Layer 12 downwards, and the lowest layer, approximately 1-m thick sediments of Layer 15, was almost sterile. This pattern is considered to reflect the changes in the occupational intensity in relation to the formation processes of the chimney. A sedimentological analysis of the cave deposits indicated that the soil flow from the chimney to this area was moderate in the lowest layers, but it dramatically increased in Layers 11 to 7, probably due to the occurrence of an abrupt enlargement of the chimney in this period (Oguchi & Fujimoto 2002:53-54). The chimney enlargement would no doubt have brought the Neanderthals easier access and more sunlight to their habitation zone.

The techno-typological aspects of the lithic assemblages from the chimney area have been only briefly mentioned in the previous publications. Akazawa *et al.* (2002:30) have stated that all the assemblages belonged to the Levallois-based Levantine Mousterian and that there could have been a chronological change over the layers, marked by the abundance of Upper Palaeolithic-type tools such as burins and end-scrapers in the upper layers. Muhesen (2004:40) has reported that the assemblages of all the layers exhibited similar techno-typological traits, i.e., rich in short broad Levallois points, assignable to the Tabun B-type Late Levantine Mousterian.

In order to describe the nature of the assemblages in further detail, a systematic lithic analysis was recently started; a collection of 45,391 flint artifacts has been examined thus far (Nishiaki *et al.* 2007). The major results, which largely confirmed the above preliminary statements, were as follows. The assemblages clearly indicated a Levantine Mousterian entity, characterized by the frequent use of the Levallois method (fig. 4:1-9). Their Levallois indices ranged between 20 and 25 for the different layers. It was estimated that each Levallois core produced approximately 20 or even more desired products, though significantly varying in number among the different layers, thus indicating the consistent employment of the recurrent Levallois method (Boëda 1995). The products were generally small in size. The average length of unretouched Levallois flakes was at most approximately 4 cm throughout the layers. The majority of the blank shapes were flakes, with a certain number of short Levallois points and blades. Elongated Levallois points were sparsely present throughout the sequence. The blade indices (Bordesian ILam) ranged approximately from 10 to 15. The common type of dorsal scar patterns for Levallois pieces was the convergent flaking type (ca. 40 to 50%), which was followed by multiple and parallel flaking. In short, the assemblages here were comparable with those of the Tabun B-type industry, or the late Levantine Mousterian (Copeland 1975; Bar-Yosef 1998, 2000), characterized by the widespread production of short Levallois points and flakes using the convergent, recurrent Levallois flaking method.

In addition, a continuous but clearly observable diachronic change in the Levallois technology was also noted. Convergent flaking, reportedly typical of the Tabun B-type industry, be-

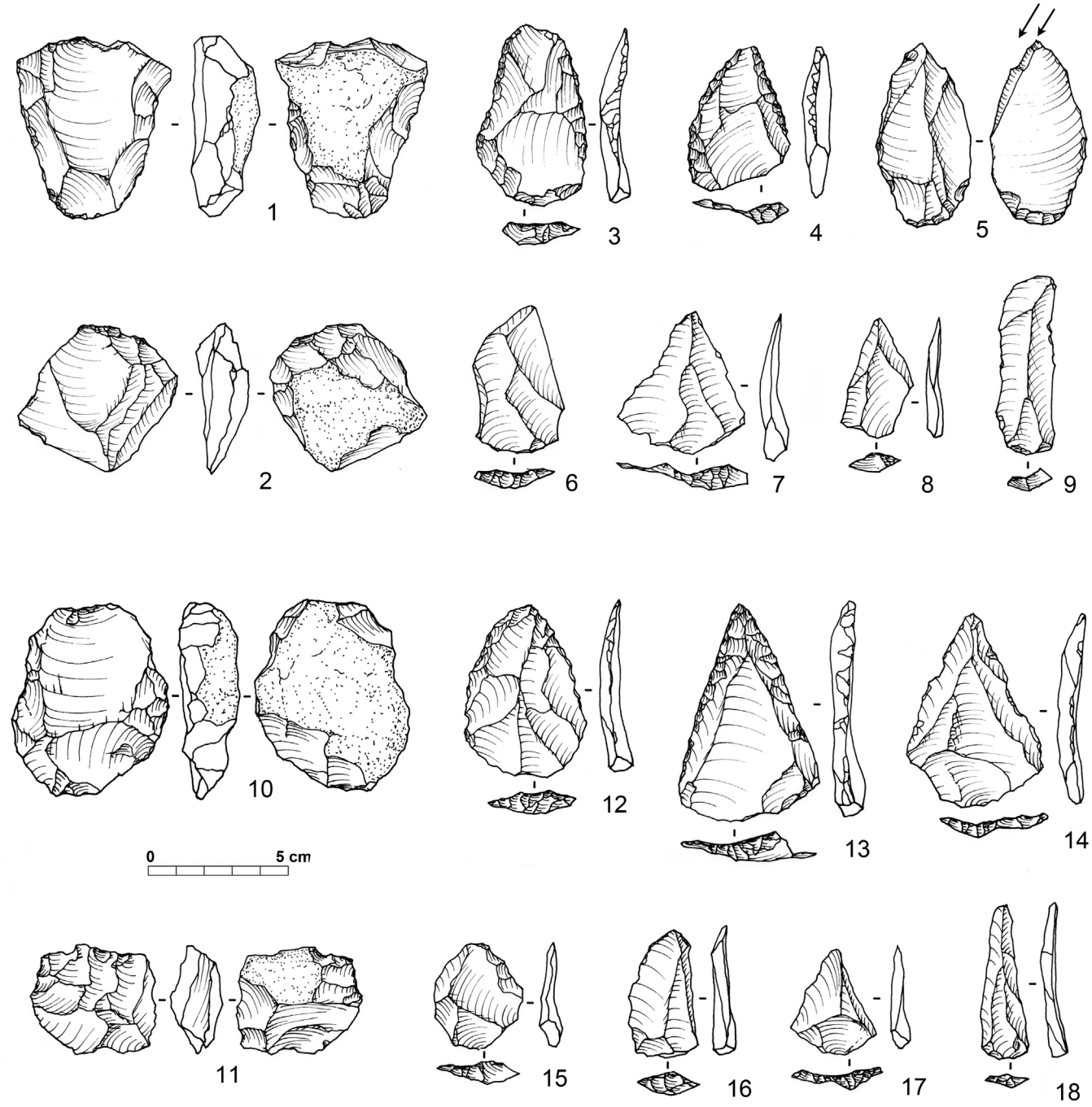

Figure 4 - Levantine Mousterian artifacts from the Dederiyeh cave. 1-9: the chimney area; 10-18: the central area.

came sparse in the upper layers, where parallel flaking increased (ca. 20 to 25%). In accordance with this trend, the proportion of Levallois blades slightly increased at the expense of the Levallois points in the upper layers. In the tool assemblages, the originally noted trend that the tools of the Upper Palaeolithic types (fig. 4:5) increased in number in the later levels (Akazawa *et al.* 2002) was confirmed. This suggested that the sequence of the chimney area in this cave could be used to monitor the diachronic industrial changes within the Late Levantine Mousterian in the northern Levant.

Reliable radiometric dates for this Mousterian sequence have not been made fully available. Preliminary TL dates are as yet too varied (Muhesen 2004:43), and the samples used for OSL dating are still under processing. The only available dates at this point are those obtained through AMS radiocarbon dating. They indicate a minimum date of approximately 50,000 years BP for Layers 2 and 3 (Akazawa *et al.* 2002:20). The analysis of the faunal remains, which indicated a climatic change from dry to humid conditions that started in the period corresponding to Layer 11 and accelerated upwards from Layer 6, may help estimate the dates (Griggo 2002). Importantly, a similar environmental change was suggested from the sedimentological analysis as well (Oguchi & Fujimoto 2002), which related the abrupt chimney enlargement in Layers 11 to 7 to the humid conditions and the decrease in soil inflow and erosion in the upper layers to an increase in the amount of vegetation due to climatic wetting. Considering the strong affinities of the lithic assemblages

with the late Levantine Mousterian, this climatic change might be related to Oxygen Isotope Stages 4 to 3, a period to which most of the Neanderthal sites in the Levant such as Kebara and Amud belong (Bar-Yosef 2000; Shea 2003).

The central area

A series of soundings was carried out in 2003 on the slope between the chimney and the entrance areas to explore the distribution of Palaeolithic cultural deposits (fig. 2; Nishiaki *et al.* 2005). The one conducted at the maximum depth was located in Square K17, approximately 5 m below the cave floor, but none of those conducted in the six squares reached the bedrock (fig. 3). All the squares revealed a thin layer corresponding to the Iron Age–Byzantine period at the top, and Middle Palaeolithic deposits at the bottom. The upper portion of the latter was distinguished by coarse-grained reddish brown soil containing plenty of limestone rubble. According to the stratigraphic mapping of the layer at the maximum depth in Square K17, however, the amount of limestone rubble sharply decreased downwards, and below approximately 3.5 m, dark brown silt-like sediments often mixed with orange brown ones, and white and black patches appeared. Lithic artifacts and animal bones were found in abundance only in the upper portion, while the lower portion yielded merely a few artifacts and micro-fauna.

The lithic artifacts indicated the use of a Levallois-based technology, comprising assemblages dominated by short Levallois points and small flakes and blades, often manufactured by the convergent Levallois core reduction method (fig. 4:10-18). The general techno-typological features were principally indistinguishable from those of the Late Levantine Mousterian assemblages recovered from the chimney area. It was also noted that the artifacts often exhibited irregular edge damages and even traces of water abrasion, which indicated their secondary depositional contexts. At least some of the Middle Palaeolithic artifacts in this area were therefore considered to have been transported from other areas of the cave, most probably from the chimney region, by natural causes. The absence of any anthropogenic features such as hearths also suggested that this portion of the cave was not a primary habitation zone in the Middle Palaeolithic.

The entrance area

The area designated as the entrance area constituted a distinct chamber, approximately 15 m × 15 m in plan, with a vaulted dome approximately 10 m high (fig. 2). It is connected nowadays to the central area region via a round tunnel-like passageway with a diameter of 5 to 7 m. Two test squares (L24 and M24) in the 1989-1990 seasons revealed Epi-Palaeolithic Natufian layers (Akazawa *et al.* 2002:31), but further excavations of this area had been suspended. Large-scale excavations of this area started in 2003, opening seventeen 2 m × 2 m squares. It was soon found that massive Natufian stone constructions extensively covered this area. While these constructions have continued to be the main focus of careful investigations to date (Nishiaki *et al.* in press), two deep sounding areas were also set up beside them to examine the lower levels. Squares K22/23 were then excavated down to approximately 4.5 m deep in 2003–2008, and Square J27, down to approximately 3.5 m from the surface in 2005 (fig. 3). These soundings established six major stratigraphic units in this area. Unit A consists of occupation layers of the Iron Age to the Islamic period, and Unit B corresponds to the Natufian constructions. Units C to E belong to the Middle Palaeolithic, below which are situated the terminal Lower Palaeolithic layers of Unit F.

A complete sequence was obtained in Squares K22/23. The youngest Middle Palaeolithic unit, Unit C, up to 2.2 m thick, basically revealed reddish brown soil layers with plenty of limestone rubble. At the base of this unit was situated a large limestone rock 1.8 m long, presumably due to the collapse of the roof or the inner wall of this chamber. Unit D, on the other hand, was characterized by dark brown to grayish brown soil layers containing little limestone rubbles or gravel. It was approximately 1 m thick. Patches of reddish and bluish-grey ash were occasionally noted. The oldest unit, Unit E, consisted of layers of relatively soft, homogeneous dark grey sediments. It was approximately 40 cm thick at the chimney side of K22, with increasing thickness toward the entrance side. On the other hand, the stratigraphy of Square J27, 6 m away from K22/23, was somewhat different. The Middle Palaeolithic deposits of J27 consisted of Unit C, approximately 70 cm thick, and Unit E, more than 2 m thick. Unit D was apparently missing there, indicating the occurrence of erosion below Unit C, which was obvious from the stratigraphic discontinuity. The resemblance of the sedimentological characteristics of Unit C with those of the chimney and the central areas indicated that erosion might have occurred along the opening of the chimney and/or the inner wall of the entrance chamber, which must have caused significant soil and water inflow. It was also noted that all the layers of K22/23 and those of Unit C of J27 were inclined toward the entrance side, while the Unit E layers of J27 were tilted backwards (fig. 3). This suggested the formation of a sinkhole underneath the central portion of this area.

The lithic artifacts recovered from this area were relatively few. Unit C thus far has produced 101 specimens, whereas Units D and E have yielded 176 and 364 specimens, respectively, including chips and tiny thermal fragments collected through dry-sieving. The scarcity of the Unit C material was striking for its relatively rich volume of deposits. Moreover, most of the lithic artifacts of Unit C were recovered from its upper portion, and the lower part was nearly sterile. The techno-typological features of Unit C assemblages were wholly comparable to those of the chimney Mousterian. The frequent use of the convergent recurrent Levallois flaking method (35.7%; n=28) and the widespread production of short points/triangular flakes were diagnostic (25.0%), and hence this assemblage was also assigned to the Tabun B-type Levantine Mousterian. However, the earlier two assemblages, although both obviously based on the Levallois technology, displayed markedly different features (fig. 5). First, the Levallois products from Units D and E were significantly larger, approximately 5 cm long on average, in contrast to the small size of the products recovered from Unit C and the chimney (cf. fig. 4). The differences in the core size were also remarkable. Second, dissimilarities existed in the use of Levallois technology. The Levallois pieces (n= 41) recovered from Unit D assemblage (fig. 5:3-6) were characterized by a multiple

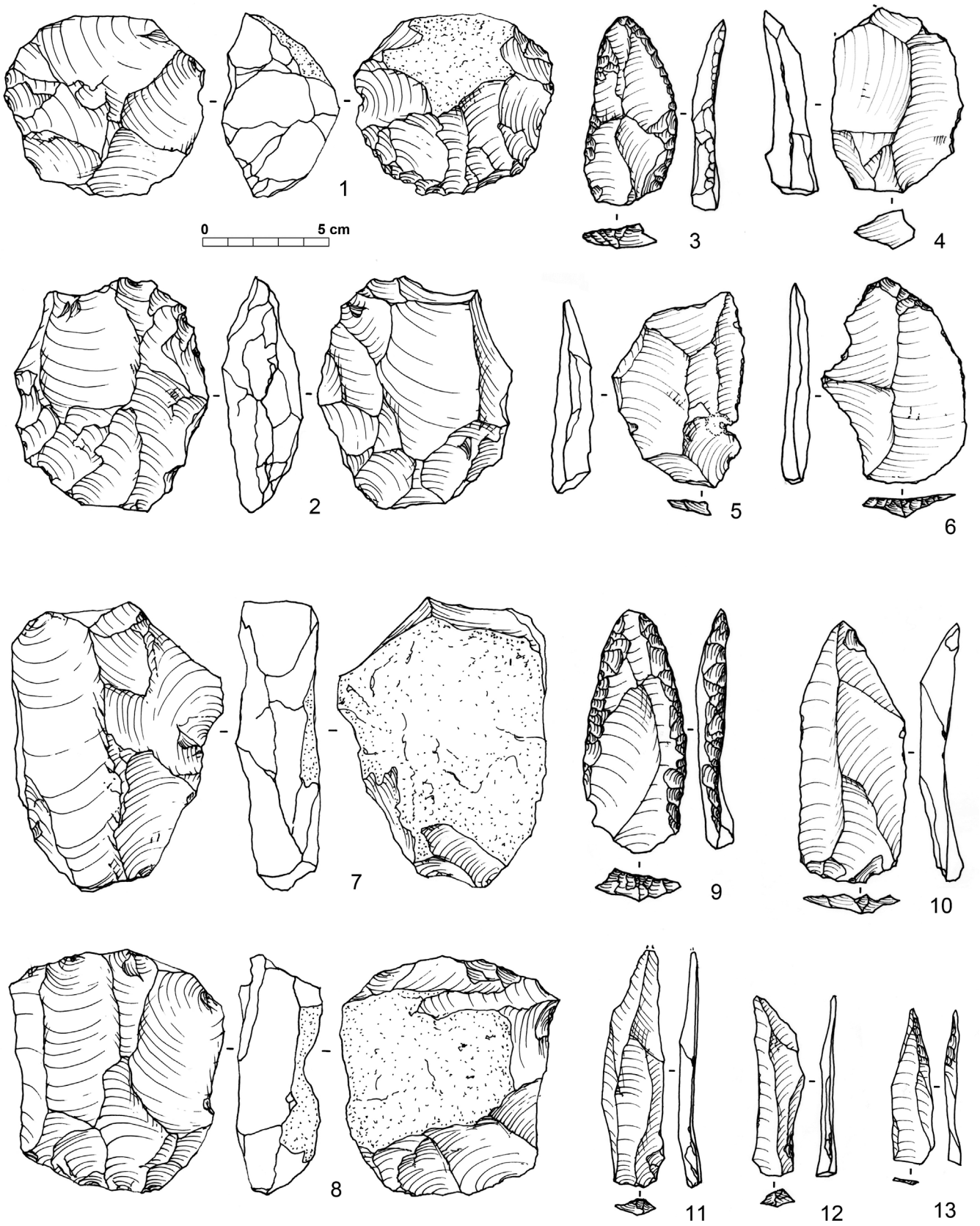

Figure 5 - Levantine Mousterian artifacts from the Dederiyeh cave. 1-6: Unit D of the entrance area; 7-13: Unit E of the entrance area.

dorsal scar pattern (66.7%), and convergent flaking was rarely observed (7.7%). Likewise, flake blanks were predominantly observed (85.4%), whereas short points typical of the Tabun B-type industry were rare (2.4%). The blade index itself was low (7.3). Conversely, the Unit E Levallois assemblage (n=91) contained a large number of Levallois blanks with parallel and convergent flaking (61.9%; fig. 5:9-13). Moreover, the blade index for the entire assemblage of this unit was higher (23.9) than

that for Units C (14.4) and D (7.3). The prevalence of elongated blanks was particularly notable among the Levallois products (46.2%).

Given the stratigraphic contexts, the Unit D and E assemblages recovered from the entrance area predate the Late Levantine Mousterian represented by the Unit C assemblage (Tabun B-type), and they postdate the Yabrudian of Unit F (see below). The Mousterian industries of this time period have been divided into Tabun C-type and D-type in the central Levant, which are considered to have occurred successively with reference to the stratigraphic evidence of the Tabun cave (Copeland 1975; Jelinek 1982; Shea 2003). However, the applicability of this Tabun model to the other parts of the Levant is yet to be established (cf. Muhesen 2004; Mustafa & Clark 2007). The Unit D and E assemblages of the Dederiyeh cave have therefore provided an important opportunity to explore this issue in the northern Levant. Although the sample size is small at present, it is interesting to note that the general patterns of the Levallois technology employed in Units D and E resembled those in Tabun C- and D-type industries, respectively. Yet, it was also noted that there exist some typological anomalies that do not fit with the original definitions at the Tabun cave. For instance, the Unit E assemblage included few elongated retouched points and Upper Palaeolithic-type tools, which were said to be typical of the Tabun D-type industry in the central Levant (Copeland 1975). A further lithic analysis with larger samples from the latest season is currently in progress to compare the Unit D and E assemblages to Tabun C- and D-types in more detail. Radiometric dating is also required to determine their chronological placement. If indeed confirmed, the cultural sequence of the entrance area would suggest that the Tabun D-C-B diachronic change of the Levantine Mousterian industries could have occurred not only in the central Levant but also at the northern end of the Levant. Whatever the case, its careful analysis should contribute to clarifying previously undefined phases of the Levantine Mousterian in the northern Levant.

Lower Palaeolithic

The oldest cultural assemblages at the Dederiyeh cave were obtained from Unit F, the lowest layers of Squares K22/23 and J27. This stratigraphic unit comprised distinct and rather homogeneous layers that were yellowish-grey in color, sharply tilted toward the centre of this area. Unit F lay on the bedrock of Square K22, at a depth of approximately 4.5 m; the bedrock was not reached in the case of the other squares. The anthropogenic materials from this unit were mostly limited to flint artifacts. Animal bones, which were found in abundance in Units C and D and in a lesser degree in Unit E, were extremely rare in this unit. The paucity of animal bones in Unit F was true for all the squares, suggesting that this trend reflects differing sedimentary environments rather than a layer-wise indication of changes in human activity.

The on-going excavations have yielded several hundred flint artifacts, among which 255 specimens from the upper layers have been studied (fig. 6). Despite the stratigraphic proximity, the material radically differed from that obtained from the lowest Levantine Mousterian assemblage of Unit E. It indicated a non-Levallois thick flake industry, comparable to the Yabrudian of the Acheulo-Yabrudian complex of the terminal Lower Palaeolithic. The cores were observed to be either unprepared or prepared minimally; most of them had a globular or an irregular shape, retaining traces of a small number of flake removals from either the cortical surface or plain platforms (fig. 6:1-3). Apparently, each core yielded a small number of flakes only; that is, the number of flakes per core was less than 10, as is observed in the case of certain other Yabrudian assemblages (Shifroni & Ronen 2000). Blanks were predominantly cortical flakes, and blades were rare except for a few elongated flakes, probably produced unintentionally. The proportion of retouched tools was high, occupying about one-third of the small assemblage. More than two-thirds of the tools found were side scrapers; these included dejetés and transverse scrapers shaped with Quina-type retouch (fig. 6:4-6) and bifacially retouched pieces (fig. 6:8-10). Only a few bifaces were found. Tools representing the Upper Palaeolithic type, such as atypical burins and end scrapers, were also found, albeit very occasionally, in the collection examined thus far.

The Acheulo-Yabrudian complex is known to consist of at least three facies or industries: Acheulo-Yabrudian, Yabrudian, and Pre-Aurignacian/Amudian, each of which is defined by specific techno-typological features (Jelinek 1982; Barkai *et al.* 2009). The features of the Unit F assemblages at Dederiyeh, notably the dominance of side scrapers on non-Levallois flakes often made with Quina retouch, as well as the practical absence of bifaces and blade elements, fit well with those of the Yabrudian. The Yabrudian assemblages discovered at Dederiyeh, which is situated at the northern end of the Levant, are a significant addition to the inventory of Yabrudian materials, which hitherto have only been found in the central and southern parts of the Levant (see Ronen & Weinstein-Evron 2000). The well-defined stratigraphic context at this site enables a detailed examination of the industry, which will contribute to the interpretation of the considerable lithic variability observed in the Acheulo-Yabrudian complex (Barkai *et al.* 2009). Additionally, this observed geographic expansion of the Yabrudian to the northern part of the Levant may contribute to the understanding of the relationship between this industry and the contemporaneous industry located further north. Although the Yabrudian has been generally considered as an entity local to the Levant (Bar-Yosef 1994; Le Tensorer 2006), it has been suggested as having certain similarities with the "Proto-Charentien" in Anatolia; however, the details for this claim have not been fully clarified (Otte *et al.* 1998). Another interesting issue concerns the fact that the replacement of the Mousterian at Dederiyeh occurred in the absence of any early blade-rich industries such as the Pre-Aurignacian, Amudian, or Hummalian, which have often been discovered in stratigraphic proximity to the Yabruadian in the Levant. Whether this reflects real cultural processes or geological processes at Dederiyeh is, however, a subject of future investigation.

Conclusions

We have presented an outline of the Middle and Lower Palaeolithic evidence recently recovered from the Dederiyeh cave. The different sequences from different parts of the cave have al-

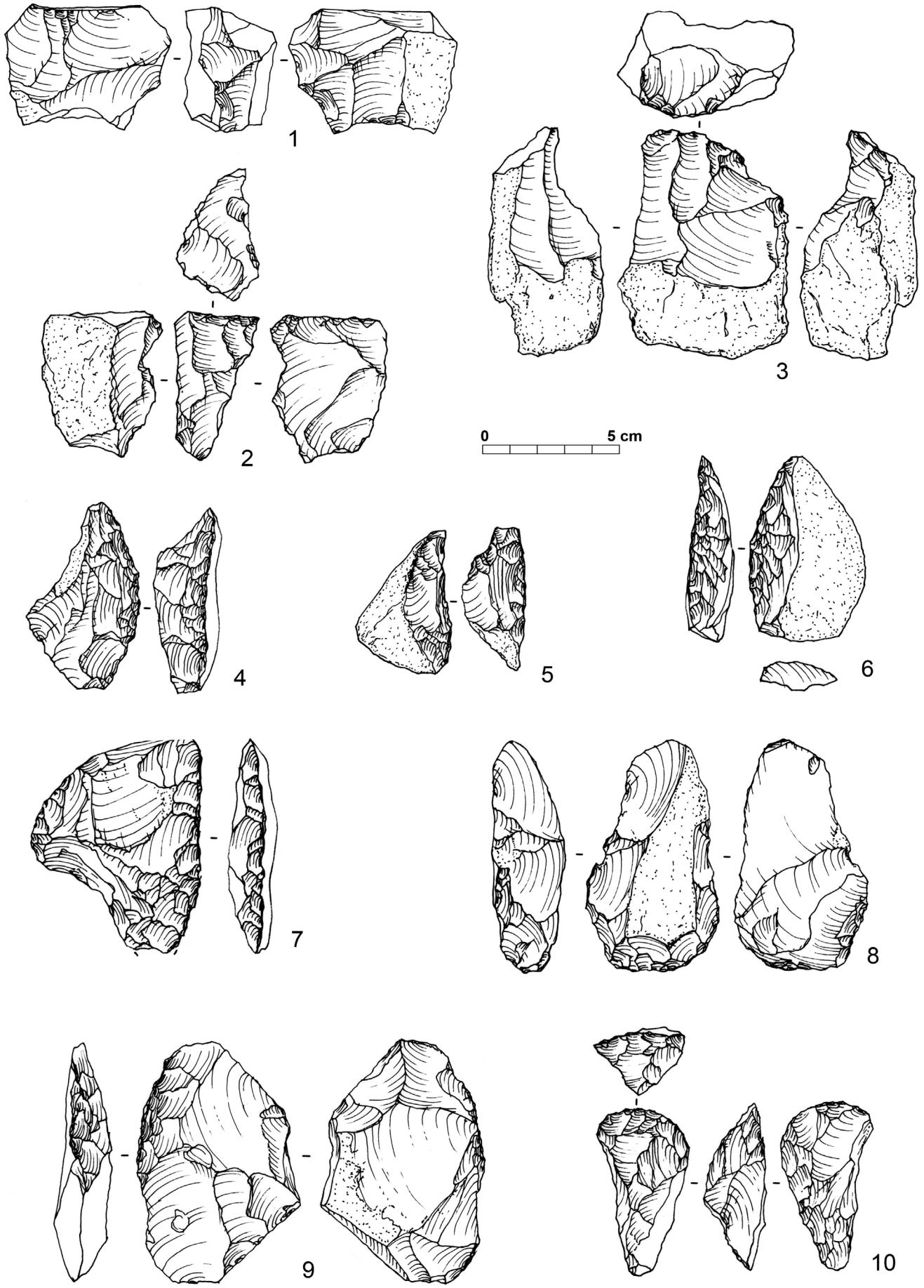

Figure 6 - Yabrudian artifacts from the Dederiyeh cave.

lowed us to reconstruct the occupational history of the Dederiyeh cave as follows. The Yabrudian occupations occurred on bedrock in the entrance area, followed by an earlier Middle Palaeolithic occupation. Until this stage, the vast inner portion of the cave was not occupied. Probably at the outset of the chimney enlargement and possibly the opening of the inner wall of the first chamber as well, which must have resulted in much more favourable conditions inside the cave, the entire area came to be occupied in the late Middle Palaeolithic, the period during which the Neanderthals made extensive use of the cave. The evidence of the Upper Palaeolithic occupations is presently missing, and the Epi-palaeolithic Natufian settlement marks the end of the Palaeolithic at the Dederiyeh cave.

This long Palaeolithic sequence makes the Dederiyeh cave undoubtedly a key site in the northern Levant as a valuable source for assessing the current prehistoric and anthropological models provided from other regions, notably the southern and the central Levant (Bar-Yosef 1998, 2000; Le Tensorer 2004), or for exploring the regional diversity of the Lower and Middle Palaeolithic industries in the Levant. The Yabrudian at the Dederiyeh cave enlarged its known distribution to the northern Levant. Its detailed examination should shed a new light upon the lithic variability of this period from perspectives beyond the southern Levant. With regard to the Middle Palaeolithic, the discovery of the earlier Levantine Mousterian assemblages will help to test the applicability of the Tabun D-C-B chronological changes in the Levantine Mousterian industries to regions outside the central Levant, enabling a discussion of the geographical and/or chronological distribution of the Neanderthals and early modern humans from the view-point of their lithic technology. In addition, the Late Levantine Mousterian evidence of the Dederiyeh cave has confirmed the association of the Tabun B-type industry with the Neanderthals. At the same time, the Late Levantine Mousterian of Dederiyeh displays a diachronic change within the Tabun B-type layers, which should be useful to refine the lithic chronology of this period, as well as to investigate the technological stability or innovations of the Neanderthals (Hovers 1998; Meignen 1991).

In order to exploit fully the significance of these wealthy Palaeolithic records at the Dederiyeh cave, it would be indispensable to acquire accurate radiometric dates; we are eagerly awaiting the results of the TL and OSL dating experiments presently in progress at laboratories.

References

Akazawa T. & Muhesen S. (2002) - *The Neanderthal Burials: Excavations of the Dederiyeh Cave, Afrin, Syria. Kyoto*. Auckland, International Research Center for Japanese Studies/ KW Publications Ltd.

Akazawa T., Muhesen S., Dodo Y., Ishida H., Kondo O., Yoneda M., Griggo C. (2002) - A summary of the stratigraphic sequence. In: T. Akazawa & S. Muhesen (eds.), *The Neanderthal Burials: Excavations of the Dederiyeh Cave, Afrin, Syria*. Kyoto - Auckland, International Research Center for Japanese Studies/ KW Publications Ltd., p. 15-32.

Akazawa T., Muhesen S., Dodo Y., Kondo O., Yoneda M., Griggo C., Ishida H. (2004) - Neanderthal burials: excavations of the Dederiyeh cave, Syria. In: O. Aurenche, M. Le Mière, P. Sanlaville (eds.), *From the River to the Sea: the Palaeolithic and Neolithic on the Euphrates and in the Northern Levant*. Oxford, Archeopress, p. 241-270.

Bar-Yosef O. (1994) The Lower Paleolithic of the Near East. *Journal of World Prehistory* 8(3):211-265.

Bar-Yosef O. (1998) - The chronology of the Middle Palaeolithic of the Levant. In: T. Akazawa, K. Aoki, O. Bar-Yosef (eds.), *Neandertals and Modern Humans in Western Asia*. New York, Plenum Press, p. 39-56.

Bar-Yosef O. (2000) - The Middle and Early Upper Palaeolithic in Southwest Asia and neighboring regions. In: O. Bar-Yosef & D. Pilbeam (eds.), *The Geography of Neandertals and Modern Humans in Europe and the Greater Mediterranean*. Cambridge MA, Peabody Museum Bulletin 8:107-156.

Barkai R., Gopher A., Lauritzen S.E. Frumkin A. (2003) - Uranium series dates from Qesem Cave, Israel, and the end of the Lower Palaeolithic. *Nature* 423:977-979.

Barkai R., Lemorini C., Shimelmitz R., Lev Z., Stiner M. C. Gopher A. (2009) - A blade for all seasons? Making and using Amudian blades at Qesem Cave, Israel. *Human Evolution* 24(1):57-75.

Boëda E. (1995) - Levallois: A volumetric construction, methods, a technique. In: H. Dibble & O. Bar-Yosef (eds.), *The Definition and Interpretation of Levallois Technology*. Madison, Prehistory Press, p. 41-68.

Copeland L. (1975) - The Middle and Upper Palaeolithic of Lebanon and Syria in the light of recent research. In: F. Wendorf & A. Marks (eds.), *Problems in Prehistory, North Africa and the Levant*. Dallas, South Methodist University Press, p. 317-350.

Copeland L. (2000) - Yabrudian and related industries: the state of research in 1996. In: A. Ronen, & M. Weinstein-Evron (eds.), *Toward Modern Humans: Yabrudian and Micoquian 400-50 kyears Ago*. BAR International Series 850:97-117.

Griggo C. (2002) - Faunal remains from the Dederiyeh cave, 1993 through 1996 excavations. In: T. Akazawa & S. Muhesen (eds.), *The Neanderthal Burials: Excavations of the Dederiyeh Cave, Afrin, Syria*. Kyoto - Auckland, International Research Center for Japanese Studies/KW Publications Ltd., p. 63-74.

Hovers E. (1998) - The Lithic Assemblages of Amud Cave: Implications for the end of the Mousterian in the Levant. In: T. Akazawa, K. Aoki, O. Bar-Yosef (eds.), *Neandertals and Modern Humans in Southwest Asia*. New York, Plenum Press, p. 143-163.

Jelinek A. (1982) - The Middle Palaeolithic in the Southern Levant, with comments on the appearance of modern Homo sapiens. In: A. Ronen. (ed.), *The Transition from Lower to Middle Palaeolithic and the Origin of Modern Man*. BAR International Series 151:57-104.

Kondo O., Ishida H., Yoneda M., Nishiaki Y., Nakata H., Aoki M., Akazawa T. (2006) - Excavation of Dederiyeh cave in Syria: its contribution to paleoanthropology in West Asia. In: D. Yang & S. Yang (eds.), *Collected Works for the 40th Anniversary of Yuanmou Man Discovery and the International Conference on Paleoanthropological Studies*. Kunming, Yunnan Science and Technology Press, p. 261-268.

Le Tensorer J.-M. (2004) - Nouvelles fouilles à Hummal (El Kowm, Syrie Centrale): Premiers résultats (1997-2001). In: O. Aurenche, M. Le Mière, P. Sanlaville (eds.), *From the River to the Sea: the Palaeolithic and Neolithic on the Euphrates and in the Northern Levant*. Oxford, Archeopress, p. 223-239.

Le Tensorer J.-M. (2006) - Le Yabroudien et la transition du Paléolithique ancien au Paléolithique moyen en Syrie: l'exemple d'el Kowm. *Munibe (Anthropologia-Arkeologia)* 57(2):71-82.

Meignen L. & Bar-Yosef O. (1991) - Les outillages lithiques moustériens de Kebara (fouilles 1982). In: O. Bar-Yosef & B. Vandermeersch (eds.), *Le Squelette Moustérien de Kebara 2*. Paris, CNRS, pp. 49-85.

Mustafa M. & Clark G. A. (2007) - Quantifying diachronic variability: the 'Ain Difla rockshelter (Jordan) and the evolution of Levantine Mousterian technology. *Eurasian Prehistory* 5(1):47-84.

Muhesen S. (2004) - An introduction to the Palaeolithic of Syria. In: K. von Folsach, H. Thrane, I. Tuesen (eds.), *Handaxe to Khan*. Arhus, Arrhus University Press, p. 28-48.

Nishiaki Y., Nakata H., Aoki H., Kondo O., Yoneda M. Akazawa, T. (2005) - Excavations of the Dederiyeh Cave and its cultural stratigraphy (2003-2004 seasons). *Bulletin of Kochi University of Technology* 2(1):31-62. (in Japanese).

Nishiaki Y., Nakata H., Aoki H., Sudo H., Kondo O., Yoneda M., Akazawa T. (2006) - The 2005 season's excavations at Dederiyeh Cave, Syria. *Bulletin of Kochi University of Technology* 3(1):135-153. (in Japanese).

Nishiaki Y., Nakata H., Yoneda M., Kondo O., Muhesen S., Akazawa T. (2007) - Chronological changes of the Late Levantine Mousterian industries at the Dederiyeh Cave, Syria. *Anthropological Science* 115(3):245.

Nishiaki Y., Nakata H., Yoneda M., Kondo O., Tanno K., Kanjo Y., Muhesen S., Akazawa, T. (2008) - The 2006-2007 season's investigations at Dederiyeh Cave, Afrin, Syria. *Bulletin of Kochi University of Technology*, 5(1):9-23. (in Japanese).

Nishiaki Y., Muhesen S., Akazawa T. (in press) - Newly discovered Late Epipalaeolithic lithic assemblages from Dederiyeh Cave, the northern Levant. In: E. Healey, S. Campbell, O. Maeda (eds.), *Proceedings of the 6th Workshops on PPN Chipped Lithic Industries*. Manchester, University of Manchester.

Oguchi T. & Fujimoto K. (2002) - The sediment and paleoenvironment of the Dederiyeh Cave. In: T. Akazawa & S. Muhesen (eds.), *The Neanderthal Burials: Excavations of the Dederiyeh Cave, Afrin*. Syria. Kyoto/Auckland, International Research Center for Japanese Studies/ KW Publications Ltd., p. 33-61.

Otte M., Yalçinkaya I., Kozlowski J., Bar-Yosef O., López Bayón I., Taskiran, H. (1998) - Long-term technical evolution and human remains in the Anatolian Palaeolithic. *Journal of Human Evolution* 34:413-431.

Rink W.J., Schwarcz H.P., Ronen A., Tsatskin A. (2004) - Confirmation of a near 400 ka age for the Yabrudian industry at Tabun Cave, Israel. *Journal of Archaeological Science* 31(1):15-20.

Ronen A. & Weinstein-Evron M. (2000) - *Toward Modern Humans: Yabrudian and Micoquian 400-50 kyears Ago*. BAR International Series 850.

Shea J. (2003) - The Middle Palaeolithic of the East Mediterranean Levant. *Journal of World Prehistory* 17(4):313-394.

Shifroni A. & Ronen A. (2000) - Observations on the Yabrudian of Tabun Cave. In: A. Ronen & M. Weinstein-Evron (eds.) *Toward Modern Humans: Yabrudian and Micoquian 400-50 kyears Ago*. BAR International Series 850:119-132.