THE MICROLITHS OF ÖKÜZİNİ CAVE

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INTRODUCTION

This study focuses primarily on the microliths obtained from excavations at Öküzini Cave from 1990 to 1997 under the direction of Professor Işın Yalçınkaya, but other lithic remains were also considered. The principal aims were to construct a type-list for the microliths, to describe their typological and technological features, and to examine their distribution in the stratigraphic sequence.

Epi-Paleolithic finds are becoming increasingly common in Turkey, particularly in the southern and northwestern parts. Southeastern Anatolia, as well, seems to be an important region for the Epi-Paleolithic period (Rosenberg 1992); recent ongoing research (begun in 1998) should yield further data for this period (Taşkıran and Kartal 1999).

Although there are Epi-Paleolithic microlithic finds from central and northern Anatolia, assemblages were not available for analysis and information was available only from old publications (Kansu 1944; Kansu and Ozansoy 1952).

GENERAL ISSUES AND DATA ON THE ÖKÜZINI LITHIC ASSEMBLAGE

The total count of lithic artifacts greater than 5 mm in size from the archaeological levels at Öküzini is 195,539 and all were examined during the course of this research (Kartal 1999:38).

The lithic assemblage includes both local and imported raw material, mostly consisting of radiolarite and flint, with very rare pieces of obsidian and rock crystal from the upper levels. Radiolarite, with local sources, is dominant.

In general, core reduction techniques were often unipolar in the upper layers, and mostly bipolar in the lower layers. However, it is possible to see both techniques throughout most of the stratigraphy.

Reduction products and debris include: cores, flakes, blades, bladelets, microburins, core tablets, plungings, crested pieces, small debris, etc. Tools were made on different kinds of blanks.

This study established 14 major tool classes were defined for the lithic tool type-list of Öküzini Cave. These are as follows:

A. End scrapers on flakes, blades and other by-products
B. Carinated end scrapers
C. Multiple tools
D. Burins
E. Retouched and backed blades
F. Truncated blades
G. Notched and denticulated tools
H. Macro points
I. Diverse (macroliths)
J. Non-geometric microliths
K. Geometric microliths
L. Microburin technique
M. Unidentifiable broken pieces
N. Middle Paleolithic tools

According to our type-list, 9,728 retouched tools in these 14 categories were identified. Excluding unidentifiable broken pieces and Middle Paleolithic tool types, the total number is 5,589. Macroliths account for 2,989 tools (53.5%) and microliths 2,258 (40.4%). There are 342 microburins (6.1%).

Detailed classification of the macroliths has been done by M. Beray Kösem (Kösem 2000; see also this volume). For this reason, only the microliths and microburins (classes J, K and L) will be discussed in this paper.

IDENTIFICATION OF ARCHAEOLOGICAL UNITS

Based on the classification and distribution of the microliths, four different archaeological units could be identified in the stratigraphy:

Unit I (Fig. 1): Unit I is found between archaeological horizon (AH) 33 and 27 and is dated to around 17-16,500 BP. Backed bladelets are dominant in this unit and microgravette points are also significant elements. In addition, there are retouched bladelets, elongated and short scalene triangles (representing the geometrics) and obliquely truncated bladelets (at the distal or proximal end). Lunates and trapezes are absent. The lithic assemblage is clearly Late Upper Paleolithic in character. Results from ongoing

excavations at nearby Karain B Cave are thus important to understand the earlier periods of this region.

Unit II (Fig. 2): Unit II is found between AH 26 and 18 and is dated between 15,500 BP and 14,200 BP. Various kinds of microliths are present. However, as in the first unit, backed bladelets are the most dominant elements. The other important microliths are retouched bladelets, various kinds of narrow micropoints, obliquely truncated bladelets, obliquely truncated backed bladelets, elongated and short scalene triangles, various curved backed bladelets and microgravettes. Lunates (from AH 23), trapezes (from AH 26) and isosceles triangles (mostly from AH 20) first appear in this unit.

Unit III (Fig. 3): Unit III is found between AH 17 and 9 and is dated between 13,200 BP and 12,000 BP. This unit marks the increasing dominance of geometrics in the sequence. Lunates are the most dominant elements among the microliths. Isosceles triangles and various trapezes are also significant. However, while narrow micropoints, backed bladelets, obliquely truncated bladelets, short scalene triangles and retouched bladelets are present, they are the most rare, in contrast to the first two archaeological units.

Unit IV (Fig. 4): Unit IV includes the uppermost layers of the cave (between AH 8 and 0), which contain a mixture of Epi-Paleolithic, Protohistoric and Classical periods. Radiocarbon dates obtained are between 10,000 BP and 7,900 BP. Intact Neolithic and/or Chalcolithic graves in this unit - pits dug into the underlying Epi-Paleolithic layers - account for the mixture of the periods represented. In addition to the skeletons in the burials and associated grave goods, artifacts include lithics, some ornaments, groundstone, ceramic pottery (whole or sherds) and polished axes. Among the Epi-Paleolithic artifacts in this mixed context, lunates are most dominant, followed by isosceles triangles and trapezes. Short scalene triangles and backed bladelets are also present.

ANALYSIS OF THE MICROLITHS

Non-geometric microliths (n=1521) are dominant in the entire lithic assemblage, with 737 geometric microliths (Table 1). The lower part of the sequence is represented mainly by non-geometrics, while the upper part is by geometrics. However, both groups are present throughout the stratigraphy.

Table 2 summarizes the total numbers and percentages of the tools and the microburins in the stratigraphy. The distribution of the microliths in the sequence and their relative frequencies are more clearly expressed in Figures 5 and 6, taking into consideration the archaeological and geological layers (AHs and GHs).

As seen in Figures 5 and 6, non-geometric microliths are dominant between the GH XII and VI, corresponding in general to between the AH 33 and 18. These layers are dated to between approximately 17,000 BP and 13-12,000 BP. The dominance of geometric microliths begins with GH V (or AH 17) and continues in the uppermost layers. These layers are dated between 13-12,000 BP and 7,000 BP.

The total number of non-identifiable broken microliths is 3,554 for the entire sequence. These broken pieces are smaller than half of a microlith and were not intensively studied as were the unbroken microliths.

SOME GENERAL FEATURES OF THE MICROLITHS

Blank selection

The vast majority of microliths were produced on bladelets (Table 3). Interestingly, all of the blade blanks were used to produce geometric microliths.

Butt type

We distinguished 12 different kinds of butts (or platforms) were identified (Table 4). Most were prepared by retouch and/or taken by the microburin technique or broken.

Retouch types

Five different categories of retouch type were identified (Table 5). Semi-abrupt retouch is clearly dominant.

Raw material color

Local radiolarite is the overwhelmingly dominant raw material exploited at Öküzini Cave. Its color varies, as reflected in the diversity of colors observed in the microliths (Table 6).

Whole and fragmentary artifacts

1038 pieces of broken or fragmentary microliths were identified. These microliths are not bigger than 1/3 of an entire tool. Apart from size measurements, all of these pieces were subject to the same technological and typological analyses as whole tools. There are 1220 whole microliths, which do not include any break except for some micro-fractures.

Cortex

Most of the microliths are non-cortical, with only 28 pieces with cortex.

Burning

75 microliths show traces of burning.

Microburin technique

It is significant that microburin technique scars were observed on 100 pieces, all of which were geometric microliths.

THE MICROLITH TYPE-LIST OF ÖKÜZİNİ CAVE

60 different types of microliths were defined based on the Öküzini assemblages. Of these,44 types are non-geometric, with 16 geometric. All are grouped in the "J" and "K" categories (see below).

MICROBURINS

As mentioned above, 342 pieces resulting from the microburin technique were identified. Excluding unidentifiable broken pieces and Middle Paleolithic tools, they account for 6.1% of the total toolkit (all layers combined). This technique is observed throughout most of the stratigraphy. Three different types can be defined which are related to this technique.

L. Microburin Technique (MT)
1. Microburin (M)
2. Microburin *krukowski* (MK)
3. Piquant Trièdre (PT).

As seen in Table 8 and Figure 10, use of the microburin technique is more common after GH VIII, which is dated to approximately 14,500 years BP. Microburin *krukowski* is the most dominant type. Microburins and microburin *krukowskies* were produced on the proximal or distal parts of blades and bladelets. Double microburins are absent.

Piquant trièdres are rare.

The existence of the microburin technique is quite rare in the lower layers. There are two possibilities for this: First, this technique was possibly only rarely used during earlier occupations. Second, the excavated area is comparatively limited to the upper layers in the cave (i.e., the upper layers have been excavated over a greater surface than the lower layers), resulting in greater representation of the microburin technique in the upper layers. In my opinion, the first possibility seems to be more valid than the second, at least for the moment.

METHODOLOGY

The methodology employed for lithic analysis is here briefly described. Data was recorded on two different forms. The first described the general features and information about the lithic assemblage. All statistical data was recorded on this form (called the "Lithic Assemblage Statistical Format" (LASF)). The second form was used specifically for the microliths (called "Microlith Analysis Format" (MAF)), one form per microlith.

According to the excavation system at Öküzini Cave, archaeological horizons (or layers) (hereafter "AH") were dug in artificial, horizontal, 10 cm spits. The AH of the artifacts was used for this study, but the GH was considered as well. The greatest difficulty was the huge hole in the middle of the cave, which was excavated by Professor Kökten in the 1950s (Kökten 1959), both during excavation and analysis of the assemblages. Data obtained during the recent excavations, at the sides and back of the cave, could not be correlated with the data obtained by Kökten in the center of the cave. It would be remiss to base our results only on geological layers. Thus, it was decided to discuss the results of this analysis in terms of both AH and GH.

SOME SIGNIFICANT MICROLITHS AND THEIR FEATURES

As mentioned above, 60 different microlith types were identified in the type-list. Here, due to space limitations, only the most important microlith types will be discussed in detail.

J. Non-geometric Microliths

Retouched Bladelet (number 2) (Fig. 11:1, 2): 46 whole pieces are present in the entire sequence. Broken but identified pieces have been grouped in the "Retouched Bladelet Fragment" category. They account for 3.024% of the non-geometric microliths, 2.037% of all microliths, and 0.823% of all lithic artifacts.

Retouched Bladelet Fragment (number 11): There are 74 identifiable fragments of retouched bladelets. They account for 4.865% of the non-geometric microliths, 3.277% of all microliths, and 1.324% of all lithic artifacts (A-L categories).

Butt types, retouch types and size data are summarized in Table 9. Size was not measured for fragments although these pieces are inventoried for the stratigraphic distribution of retouched bladelets. The total number of the whole and

broken retouched bladelets is 120, constituting 5.314% of the entire lithic assemblage.

The distributions shown in Figures 12 and 13 are similar. Based on Figure 13, retouched bladelets are mostly found in Unit II (AH 26 to 18).

Backed Bladelet (number 13) (Fig. 11:3-10): 143 whole backed bladelets are present. Broken backed bladelets grouped in the backed bladelet fragment type. They account for 9.401% of the non-geometric microliths, 6.333% of all microliths, and 2.558% of all lithic artifacts (A-L categories).

Backed Bladelet Fragment (number 26): There are 500 backed bladelet fragments. They account for 32.873% of the non-geometric microliths, 22.143% of all microliths, and 8.946% of all lithic artifacts (A-L categories).

Butt types, retouch types and size data are summarized in Table 10. Most butts were prepared by retouch. Cross sections are generally triangular and trapeze shaped.

The total number of the whole and broken backed bladelets is 643, constituting 42.3% of the non-geometric microliths and 28.5% of all microliths. Thus, this type strongly affects the values of the bars in the microlith graphics (see Figures 5 and 6). Based on the distribution illustrated in Figure 15, it is clear that backed bladelets mostly occur in Units I and II (AH 33 to 18).

Microgravette Point (number 42): (Fig. 16:4-6): 36 microgravette points are present in the sequence, 13 of them broken. Their distribution in the sequence is shown in Figure 17. Most were made on bladelets. All butts were prepared by retouch. It is important to mention that there is a techno-typological similarity between Types 41 (micropoint with ventral retouch on tip) and 42 (microgravette point), and possibly 33 (narrow micropoint with lateral retouch on tip), of the type-list. While these three types can be summarized in one group, they are discussed separately here. Microgravette points account for 2.366% of the non-geometric microliths, 1.594% of all microliths, and 0.644% of all lithic artifacts (A-L categories).

The microgravette point is one of the typical microliths of Units I and II (AH 33 to 18) (see Figures 17-19). There is only one piece in Unit IV, which must have been mixed from the lower layers during the previous excavations made by Kökten.

Narrow Micropoint with Lateral Retouch on Tip (number 33) (Fig. 16:1,2): There are 45, of which 26 are broken. They account for 2.958% of the non-geometric microliths, 1.992% of all microliths, and 0.805% of all lithic artifacts (A-L categories).

As can be seen in Figure 18, this type occurs in Units I and II (AH 33 to 18). They were primarily produced on bladelet blanks. Bases are as wide as those of Type 41, although the tools are generally smaller in size than Types 41 and 42.

Micropoint with Ventral Retouch on Tip (number 41) (Fig. 16:3): There are 91 micropoints of this type, including 78 broken. They account for 5.982% of the non-geometric microliths, 4.030% of all microliths, and 1.628% of all lithic artifacts (A-L categories).

This type mostly occurs in Unit II (AH 26 to 18) (see Fig. 19).

Narrow Micropoint (number 32) (Fig. 20:1-8): There are 83 pieces, 23 found broken. They account for 5.456% of the non-geometric microliths, 3.675% of all microliths, and 1.485% of all lithic artifacts (A-L categories).

This type is particularly typical of Units II and III (AH 26 to 9). While it first appears in Unit I (AH 33 to 27), they become much more common in Units II and III, as geometric microliths become dominant (Fig. 21). Variants of this type are rare, such as narrow micropoints with basal truncation. There are only 6 broad micropoints with its variants.

Obliquely Truncated Bladelets (on distal and/or proximal ends) (numbers 28 and 30) (Fig. 16:10-12): Together, there are 78 tools of this type. The generalized distribution of truncated bladelets throughout most of the sequence may it impossible to detect possible shifts in their use with respect to the four archaeological units identified. Their total percentage is 3.453% among the microliths.

K. Geometric Microliths

Short Scalene Triangle (number 47) (Fig. 16:7,8): There are 60 in number, including 11 broken pieces. They account for 2.657% of the geometric microliths, 2.657% of all microliths, and 1.079% of all lithic artifacts (A-L categories).

The distribution of this type is fairly homogeneous throughout the sequence (Fig. 22).

Elongated Scalene Triangle (number 49) (Fig. 16:9): There are 44 tools of this type, including 14 broken pieces. They account for 5.970% of the geometric microliths, 1.948% of all microliths, and 0.787% of all lithic artifacts (A-L

categories).

It should be emphasized that, while geometrics are dominant in the upper layers and non-geometrics in the lower layers, this geometric type has a significant presence in the lower layers of Öküzini Cave (Fig. 23). Their frequencies are higher, particularly in Units I and II (AH 33 to 27), than in Units III and IV (AH 17-0).

Isosceles Triangle (number 50) (Fig. 24): There are 161 in number, including 33 broken ones. They account for 21.845% of the geometric microliths, 7.130% of all microliths, and 2.880% of all lithic artifacts (A-L categories).

Isosceles triangles start to increase in frequency at the end of Unit II (beginning with AH 20) (Fig. 25). It is the second most common microlith type in Units III and IV (AH 17 to 0), after the lunate. While there is a significant increase in AH 4, it should be remembered that Unit IV (AH 8 to 0) is mixed.

Trapezes (Fig. 26): Five different variants of trapezes were defined, as follows: atypical trapeze, asymmetrical trapeze, trapeze A, trapeze B, trapeze C (Fig. 26:9) and trapeze D (Fig. 26:10). There are only three total for types C and D and only 13 atypical trapezes. The dominant types are asymmetrical trapezes and types A and B. Bipolar retouched trapezes are absent.

Asymmetrical Trapeze (number 53) (Fig. 26:1,2): There are 30 of this type, including 5 broken pieces. They account for 4.070% of the geometric microliths, 1.328% of all microliths, and 0.536% of all lithic artifacts (A-L categories).

Asymmetrical trapezes resemble the trapeze A type technologically. They are found mainly in Units III and IV (AH 17 to 0) (Fig. 27).

Trapeze A (number 54) (Fig. 26:3-5): There are 50 trapezes of type A, including 8 broken pieces. Its shape generally shows good symmetry. They account for 6.784% of the geometric microliths, 2.214% of all microliths, and 0.894% of all lithic artifacts (A-L categories).

This type first appears in Unit II (AH 26 to 18), but is more common in Unit III (AH 17 to 9) (Fig. 28).

Trapeze B (number 55) (Fig. 26:6-8): 28 tools were identified as type B trapezes, including 6 broken. They account for 3.799% of the geometric microliths, 1.240% of all microliths, and 0.500% of all lithic artifacts (A-L categories).

This type of trapeze generally occurs in Unit III (AH 17 to 9). As seen in Figure 29, they appear at the end of Unit II. There are also a few rare type B trapezes in Unit IV. Based on analysis, there seems to be a techno-typological connection between this type of trapeze and obliquely double truncated bladelets, but the type B trapeze is much shorter. They may both belong to the same tool type; however, for now, they are described separately.

Lunate (number 59) (Fig. 30): This type is quite significant in the Öküzini sequence. There is a total of 282 pieces, including 62 broken pieces. They account for 38.263% of the geometric microliths, 23.488% of all microliths, and 5.045% of all lithic artifacts (A-L categories).

Lunates are the most typical microliths for Units III and IV (AH 17 to 0), but they first appear (rare) in Unit II (AH 26 to 18) (Fig. 31). The lunate may be considered a kind of a "fossil director" of Units III and IV at Öküzini cave.

CONCLUSION

Due to its long sequence of human occupation during the Epi-Paleolithic, Öküzini Cave is a very important prehistoric site in Anatolia. It has yielded significant data about the nature of the Epi-Paleolithic period in southwest Turkey. Research at Epi-Paleolithic sites in the Marmara Region, directed by Professor Mehmet Özdoğan provides data for northwest Turkey (Özdoğan 1985, 1986, 1988; Gatsov and Özdoğan 1994). Excavation of an Upper Paleolithic and Epi-Paleolithic sequence at Karain B Cave, not far from Öküzini Cave, is ongoing, under the direction of Professor Işın Yalçınkaya (Yalçınkaya *et al.* 1998; Yalçınkaya and Otte 1999). The increase in active Epi-Paleolithic fieldwork will make it possible to undertake comparative studies in Anatolia.

The first detailed type-list for Anatolian microliths was developed in this study. It is clear that parts of this type-list, being based on the data from Öküzini Cave, may be particular to this site, although the general structure should be applicable to other Epi-Paleolithic sites in Anatolia. Such a type-list was lacking in Anatolian research. It is thus preferable to present the microlith type-list here in both Turkish and English, which will also facilitate the use of terminology. A similar type-list has been developed for the macroliths by M. Beray Kösem (see Kösem, this volume).

Geometric and non-geometric microliths are found together throughout most of the sequence, but the lower part (Units I and II) is characterized by dominance of the non-geometrics while the upper part (Units III and IV) is characterized by well developed geometrics, such as lunates, isosceles triangles and various kinds of trapezes.

The existence of micropoints suggest that the hunter-gatherers occupying Öküzini Cave

probably used the bow and arrow.

A large number of the microliths were broken (n=3554) (Kartal 1999:76). Several hypotheses could be put forward to explain such a high frequency of broken tools: broken after abandonment as a result of pressure of overlying deposits, broken during tool production, broken during use, etc. All of these hypotheses may have played a role.

In the type-list, there is a type called a "transversal arrow head" (Type 43) (Fig. 20:13) which belongs to periods following the Epi-Paleolithic. Its origin and attribution are unknown. A few such pieces were found in the cave, but were out of context. They were produced on small flakes. This type is also observed in the Holocene levels of Karain B Cave. In the uppermost layers, Neolithic and/or Chalcolithic microliths were also found.

Groundstone (e.g., saddle querns) first appears during the Epi-Paleolithic. These hunter gatherers may have collected and ground wild cereals. One broken fragment of a sickle blade was recovered in Unit IV. It would be very difficult to conclude, with the limited data available, that there is a Pre-Pottery Neolithic (PPN) period in the upper layers of the cave.

The Holocene levels of this cave are primarily represented by burials, not by occupations (Kartal and Erek 1998). Human activity at the cave may have been extremely rare (perhaps seasonal or only used for burials) during the Holocene. The thickness of the Holocene deposit is 0.5 m while it is nearly 1.5 m thick at Karain B Cave (Yalçınkaya 1987:23).

The aim of this research was to analyze the technological and typological characteristics of the Öküzini microliths in order to develop a type-list which could be applied to other Epi-Paleolithic sites in Anatolia. Subsequent research will focus on the post-glacial period of Anatolia, at sites such as Beldibi and Belbaşı caves (southwest Anatolia), which were excavated by Professor Enver Yaşar Bostancı. At this point, techno-typological and stratigraphical features of the lithic assemblages of these caves are still unclear. Nevertheless, the results from Öküzini and Karain B Caves contribute to understanding of the chronological sequences from the Middle Paleolithic to the Epi-Paleolithic in southwestern Anatolia as well as the larger questions of comparison with the neighboring Levant and Balkan regions.

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BIBLIOGRAPHY

GATSOV, I. and ÖZDOĞAN, M., 1994, Some Epi-Paleolithic Sites From NW Turkey. Ağaçlı, Domalı And Gümüşdere. *Anatolica* XX, pp. 97-120.

KANSU, Ş.A., 1944, Anadolu Mezolitik Kültür Buluntuları. *A.Ü.D.T.C.F.D. (Ankara)* cilt II, sayı 5, T.T.K. Basımevi, pp. 673-684.

KANSU, Ş.A. and OZANSOY, F., 1952, Ankara Civarında Paleolitik Yeni Buluntular. Türk Tarih Kongresi 4, Kongreye Sunulan Tebliğler. *Türk Tarih Kurumu Yayınları (Ankara)* 9. Seri, 4. Sayı, Türk Tarih Kurumu Basımevi, pp. 381-390.

KARTAL, M., 1999, *Öküzini Mağarası (Katran Dağı) Mikrolitik Endüstrisi.* Unpublished Ph.D. thesis, Ankara University.

KARTAL, M. and EREK, C.M., 1998, The Burials in Öküzini Cave (SW Anatolia). In *Préhistoire d'Anatolie, Genèse de deux mondes, Anatolian Prehistory at the Crossroads of Two Worlds*, Volume 2, Actes du colloque international Liège, 28 avril – 3 mai 1997, edited by M. Otte. Liège, ERAUL 85, pp. 551-558.

KÖKTEN, İ.K., 1959, Tarsus-Antalya Arası Sahil Şeriti Üzerinde Ve Antalya Bölgesinde Yapılan Tarihöncesi Araştırmaları. *Türk Arkeoloji Dergisi (Ankara)* Sayı VIII-2, Maarif Basımevi, pp.10-16.

KÖSEM, M.B., 2000, *Öküzini Mağarası Mikrolitik Olmayan Yontmataş Alet Endüstrisi.* Unpublished Ph.D. thesis, Ankara University.

ÖZDOĞAN, M., 1985, 1983 Yılı Doğu Marmara ve Trakya Araştırmaları, II. Araştırma Sonuçları Toplantısı, (İzmir, 16-20 Nisan 1984), *Başbakanlık Basımevi (Ankara)*, pp. 221-232.

ÖZDOĞAN, M., 1986, 1984 Yılı Trakya ve Doğu Marmara Araştırmaları. III. Araştırma Sonuçları Toplantısı, (Ankara, 20-24 Mayıs 1985), *Başbakanlık Basımevi (Ankara)* pp. 409-420.

ÖZDOĞAN, M., 1988, Yarımburgaz Mağarası 1986 Yılı Kazı Çalışmaları. V. Araştırma Sonuçları Toplantısı II, (Ankara, 6-10 Nisan 1987), *Başbakanlık Basımevi (Ankara)* pp. 323-346.

ROSENBERG, M., 1992, The Batman River Archaeological Reconnaissance Survey, 1990. IX. Araştırma Sonuçları Toplantısı, Çanakkale-27-31 Mayıs 1991, *Ankara Üniversitesi Basımevi* pp. 447-460.

TAŞKIRAN, H. and KARTAL, M., 1999, Karkamış Baraj Gölü Alanında Yapılan Paleolitik Çağ Yüzey Araştırması: İlk Gözlemler, (Turkish-English). In *Ilısu ve Karkamış Baraj Gölleri Altında Kalacak Arkeolojik Kültür Varlıklarını Kurtarma Projesi 1998 Yılı Çalışmaları, ODTÜ Yayınları*, edited by T. Numan and J. Öztürk. Ankara, Ünal Ofset Ltd. Şti., pp.45-56; 57-62.

YALÇINKAYA, I., 1987, 1985 Yili Karain Kazıları. VIII. Kazı Sonuçları Toplantısı I, Ankara-26-30 Mayıs 1986, *Başbakanlık Basımevi (Ankara)* pp.21-37.

YALÇINKAYA, I., TAŞKIRAN, H., KARTAL, M., KÖSEM, M.B., CEYLAN, K., EREK, C.M., ATICI, A.L. and OTTE, M., 1998, 1995 ve 1996 Yılları Karain Kazıları. XIX. Kazı Sonuçları Toplantısı I, Ankara-26-30 Mayıs 1997, *Milli Kütüphane Basımevi* pp. 17-45.

YALÇINKAYA, I. and OTTE, M., 1999, 1997 Yılı Karain Kazısı. XX. Kazı Sonuçları Toplantısı I, Tarsus-25-29 Mayıs 1998, *Milli Kütüphane Basımevi* pp. 23-37.

Type	Number	Percent
Non-geometric microliths	1521	67%
Geometric microliths	737	33%
TOTAL	**2258**	**100%**

Table 1. Frequencies and percentages of microliths.

Type	Number	Percent
Macroliths	2989	53.5%
Non-geometric microliths	1521	27.2%
Geometric microliths	737	13.2%
Microburins	342	6.1%
TOTAL	**5589**	**100%**

Table 2. Frequencies and percentages of tools and microburins.

BLANK	NUMBER
Bladelet	2041
Blade	214
Flake	2
Diverse	1
TOTAL	**2258**

Table 3. The numbers of the microlith blanks.

BUTT TYPE	NUMBER
(1) Broken	564
(2) Reduced and/or taken (by retouch and/or microburin technique)	1207
(3) Truncated	61
(4) Broken when knapping the blank	137
(5) Pointed butt	90
(6) Linear butt	85
(7) Flat butt	98
(8) Cortical butt	7
(9) Burned	2
(10) Still visible but very small because of reducing	1
(11) Dihedral butt	3
(12) Facetted butt	3
TOTAL	**2258**

Table 4. Butt types of the microliths.

RETOUCH	NUMBER
(1) Fine	192
(2) Semi-abrupt	1384
(3) Abrupt	513
(4) Bipolar	167
(5) Covering	2
TOTAL	**2258**

Table 5. Retouch types of the microliths.

COLOR	NUMBER
Brown	1064
Gray	613
Green	227
Cream	124
White	70
Beige	68
Yellow	48
Pink	20
Purple	13
Black	9
Red	2
TOTAL	**2258**

Table 6. Colors of the microliths.

J. Non-Geometric Microliths (Turkish – English)	
1. Kısmi düzeltili dilgicik	Partially retouched bladelet (Fig. 7:1)
2. Düzeltili dilgicik	Retouched bladelet (Fig. 7:2)
3. İki kenarı düzeltili dilgicik	Retouched bladelet on both edges (Fig. 7:3)
4. İki kenarı düzeltili uçlu dilgicik	Pointed retouched bladelet on both edges (Fig. 7:4)
5. İç yüzde düzeltili dilgicik	Inverse retouched bladelet (Fig. 7:5)
6. Dışbükey budanmış düzeltili dilgicik	Convex truncated retouched bladelet (Fig. 7:6)
7. Tek kenarı düzeltili sırtlı dilgicik	Retouched (on one edge) and backed bladelet (Fig. 7:7)
8. Almaşık düzeltili sırtlı dilgicik	Alternately retouched backed bladelet (Fig. 7:8)
9. Almaşık düzeltili çeşitli sırtlı dilgicik	Alternately retouched various backed bladelet(s) (Fig. 7:9)
10. Eğik budanmış almaşık düzeltili sırtlı dilgicik	Obliquely truncated, alternately retouched backed bladelet (Fig. 7:10)
11. Düzeltili dilgicik parçası	Retouched bladelet fragment (Fig. 7:11)
12. Kısmi sırtlı dilgicik	Partially backed bladelet (Fig. 7:12)
13. Sırtlı dilgicik	Backed bladelet (Fig. 7:13)
14. Çeşitli sırtlı dilgicik	Various backed bladelet(s) (Fig. 7:14)
15. İki ucu sivri kavisli sırtlı dilgicik	Double pointed curved backed bladelet (Fig. 7:15)
16. Kısmi kavisli sırtlı dilgicik	Partially curved backed bladelet (Fig. 7:16)
17. Kavisli sırtlı dilgicik	Curved backed bladelet (Fig. 7:17)
18. Kavisli sırtlı uçlu dilgicik	Curved backed pointed bladelet (Fig. 7:18)
19. Düz sırtlı uçlu dilgicik	Straight backed pointed bladelet (Fig. 7:19)
20. Dibi düzeltili düz sırtlı uçlu dilgicik	Straight backed pointed bladelet with basal retouch (Fig. 7:20)
21. Dibi incelt ilmiş düz sırtlı uçlu dilgicik	Straight backed pointed bladelet with ventrally thinned base (Fig. 7:21)
22. İki sırtlı dilgicik	Double backed bladelet (Fig. 7:22)
23. İki sırtlı uçlu dilgicik	Double backed pointed bladelet (Fig. 7:23)
24. Eğik budanmış sırtlı dilgicik	Obliquely truncated backed bladelet (Fig. 7:24)
25. Dibi eğik budanmış sırtlı dilgicik	Backed bladelet with obliquely basal truncation (Fig. 7:25)
26. Sırtlı dilgicik parçası	Backed bladelet fragment (Fig. 7:26)
27. Düz budanmış dilgicik	Straight truncated bladelet (Fig. 7:27)
28. Eğik budanmış dilgicik	Obliquely truncated bladelet (Fig. 7:28)
29. İçbükey budanmış dilgicik	Concave truncated bladelet (Fig. 7:29)
30. Dibi eğik budanmış dilgicik	Bladelet with obliquely basal truncation (Fig. 8:30)
31. İki ucu eğik budanmış dilgicik	Obliquely double truncated bladelet (Fig. 8:31)
32. Dar mikro uç	Narrow micropoint (Fig. 8:32)
33. Ucu düzeltili dar mikro uç	Narrow micropoint with lateral retouch on tip (Fig. 8:33)
34. Dibi düzeltili dar mikro uç	Narrow micropoint with basal retouch (Fig. 8:34)
35. Dibi düz budanmış dar mikro uç	Narrow micropoint with straight basal truncation (Fig. 8:35)
36. Dibi eğik budanmış dar mikro uç	Narrow micropoint with obliquely basal truncation (Fig. 8:36)
37. Geniş mikro uç	Broad micropoint (Fig. 8:37)
38. Dibi düzeltili geniş mikro uç	Broad micropoint with basal retouch (Fig. 8:38)
39. Dibi içbükey budanmış geniş mikro uç	Broad micropoint with concave basal truncation (Fig. 8:39)
40. Saplı mikro uç	Tanged micropoint (with one and/or double shouldered) (Fig. 8:40)
41. Ucu iç yüzde (almaşık) düzeltili mikro uç	Micropoint with ventral retouch on tip (Fig. 8:41)
42. Mikrogravet uç	Microgravette point (Fig. 8:42)
43. Keski ağızlı ok ucu	Transversal arrowhead (Fig. 8:43)
44. Diğer mikrolitler	Diverse microliths (Fig. 8:44)
45. Dikdörtgen	Rectangle (Fig. 8:45)
46. Atipik üçgen	Atypical triangle (Fig. 8:46)
47. Kısa çeşitkenar üçgen	Short scalene triangle (Fig. 8:47)
48. Çıkmalı kısa çeşitkenar üçgen	Projected short scalene triangle (Fig. 8:48)
49. Uzun çeşitkenar üçgen	Elongated scalene triangle (Fig. 8:49)
50. İkizkenar üçgen	Isosceles triangle (Fig. 8:50)
51. Çıkmalı ikizkenar üçgen	Projected isosceles triangle (Fig. 8:51)
52. Atipik trapez	Atypical trapeze (Fig. 9:52)
53. Asimetrik trapez	Asymmetric trapeze (Fig. 9:53)
54. Trapez A	Trapeze A (Fig. 9:54)
55. Trapez B	Trapeze B (Fig. 9:55)
56. Trapez C	Trapeze C (Fig. 9:56)
57. Trapez D	Trapeze D (Fig. 9:57)
58. Atipik yarımay	Atypical lunate and/or crescent (Fig. 9:58)
59. Yarımay	Lunate and/or crescent (Fig. 9:59)
60. Çıkmalı yarımay	Projected lunate and/or crescent (Fig. 9:60)

Table 7. Microlith type-list of Öküzini Cave. J: Non-geometric microliths.

Geological Horizon (GH)	M Microburin	MK Microburin krukowski	PT Piquant trièdre
0	18	13	0
I	20	7	2
II	13	16	0
III	0	3	0
IV	19	73	2
V	3	9	0
VI	20	42	4
VII	12	13	2
VIII	10	21	4
IX	0	7	0
X	1	0	1
XI	4	1	0
XII	2	0	0
TOTAL	122	205	15

Table 8. Distribution of the microburin technique by geological horizon.

RETOUCHED BLADELETS Types 2 and 11			
		Whole	Fragment
BUTT TYPES		NUMBER	NUMBER
Broken			54
Reduced and/or taken (by retouch and/or microburin technique)		8	5
Broken when knapping the blank		21	5
Pointed		6	4
Linear		8	2
Flat		3	3
Cortical			1
TOTAL		46	74
RETOUCH TYPES		NUMBER	NUMBER
Fine		35	56
Semi abrupt		11	18
TOTAL		46	74
SIZE (Whole artifacts only)			
(n=46)	Length (mm)	Width (mm)	Thickness (mm)
Minimum	13.0	2.0	1.0
Mean	17.7	4.8	1.7
Maximum	31.2	10.5	3.5

Table 9. Butt types, retouch types, size for whole and broken retouched bladelets.

BACKED BLADELETS Types 13 and 26			
		Whole	Fragment
BUTT TYPES		NUMBER	NUMBER
Broken			351
Reduced and/or taken (by retouch and/or microburin technique)		64	75
Broken when knapping the blank		34	18
Pointed		14	20
Linear		8	20
Flat		19	15
Dihedral			1
Cortical		2	
Burned		2	
TOTAL		143	500
RETOUCH TYPES		NUMBER	NUMBER
Semi abrupt		87	312
Abrupt		43	138
Bipolar		13	50
TOTAL		143	500
SIZE (Whole artifacts only)			
(n=143)	Length (mm)	Width (mm)	Thickness (mm)
Minimum	10.8	2.9	1.2
Mean	20.4	5.1	2.5
Maximum	33.5	8.8	5.5

Table 10. Butt types, retouch types, size for whole and broken backed bladelets.

MICROGRAVETTE POINTS Type 42			
RETOUCH TYPES			NUMBER
Semi abrupt			9
Abrupt			17
Bipolar			10
TOTAL			36
SIZE (Whole artifacts only)			
(n=23)	Length (mm)	Width (mm)	Thickness (mm)
Minimum	20.3	3.9	1.7
Mean	30.8	5.5	2.7
Maximum	43.0	7.0	4.0

Table 11. Butt types, retouch types, size for microgravette points.

NARROW MICROPOINTS WITH LATERAL RETOUCH ON TIP Type 33			
BUTT TYPES			**NUMBER**
Broken			17
Reduced and/or taken (by retouch and/or microburin technique)			23
Broken when knapping the blank			1
Pointed			1
Linear			2
Flat			1
TOTAL			**45**
RETOUCH TYPES			**NUMBER**
Semi abrupt			30
Abrupt			11
Bipolar			4
TOTAL			**45**
SIZE (Whole artifacts only)			
(n=19)	**Length (mm)**	**Width (mm)**	**Thickness (mm)**
Minimum	19.7	3.5	1.6
Mean	23.8	5.5	2.8
Maximum	28.5	6.8	3.8

Table 12. Butt types, retouch types, size for narrow micropoints with lateral retouch on tip.

MICROPOINT WITH VENTRAL RETOUCH ON TIP Type 41			
BUTT TYPES			**NUMBER**
Broken			39
Reduced and/or taken (by retouch and/or microburin technique)			48
Broken when knapping the blank			2
Pointed			1
Flat			1
TOTAL			**91**
RETOUCH TYPES			**NUMBER**
Semi abrupt			41
Abrupt			29
Bipolar			21
TOTAL			**91**
SIZE (Whole artifacts only)			
(n=13)	**Length (mm)**	**Width (mm)**	**Thickness (mm)**
Minimum	17.3	3.6	1.7
Mean	22.4	5.1	2.4
Maximum	39.0	6.6	3.3

Table 13. Butt types, retouch types, size for micropoints with ventral retouch on tip.

NARROW MICROPOINT Type 32			
BUTT TYPES			**NUMBER**
Broken			11
Reduced and/or taken (by retouch and/or microburin technique)			38
Broken when knapping the blank			9
Pointed			4
Linear			5
Flat			15
Facetted			1
TOTAL			**83**
RETOUCH TYPES			**NUMBER**
Semi abrupt			74
Abrupt			6
Bipolar			3
TOTAL			**83**
SIZE (Whole artifacts only)			
(n= 60)	**Length (mm)**	**Width (mm)**	**Thickness (mm)**
Minimum	11.6	3.7	1.5
Mean	21.1	6.5	2.5
Maximum	27.5	8.9	3.9

Table 14. Butt types, retouch types, size for narrow micropoints.

SHORT SCALENE TRIANGLE Type 47			
RETOUCH TYPES			**NUMBER**
Fine			4
Semi abrupt			32
Abrupt			20
Bipolar			4
TOTAL			**60**
SIZE (Whole artifacts only)			
(n= 49)	**Length (mm)**	**Width (mm)**	**Thickness (mm)**
Minimum	12.0	3.7	1.0
Mean	16.8	5.5	2.1
Maximum	19.9	8.3	3.5

Table 15. Butt types, retouch types, size for short scalene triangles.

ELONGATED SCALENE TRIANGLE Type 49			
RETOUCH TYPES			**NUMBER**
Semi abrupt			19
Abrupt			21
Bipolar			4
TOTAL			**44**
SIZE (Whole artifacts only)			
(n= 30)	**Length (mm)**	**Width (mm)**	**Thickness (mm)**
Minimum	20.0	4.5	1.3
Mean	24.1	5.7	2.5
Maximum	33.0	8.0	4.5

Table 16. Butt types, retouch types, size for elongated scalene triangles.

ISOSCELES TRIANGLE Type 50			
RETOUCH TYPES			**NUMBER**
Fine			6
Semi abrupt			99
Abrupt			42
Bipolar			14
TOTAL			**161**
SIZE (Whole artifacts only)			
(n= 128)	**Length (mm)**	**Width (mm)**	**Thickness (mm)**
Minimum	10.0	3.0	1.1
Mean	16.8	6.2	2.2
Maximum	29.0	10.4	3.6

Table 17. Butt types, retouch types, size for isosceles triangles.

ASYMMETRICAL TRAPEZE Type 53			
RETOUCH TYPES			NUMBER
Fine			3
Semi abrupt			17
Abrupt			10
TOTAL			30
SIZE (Whole artifacts only)			
(n= 25)	Length (mm)	Width (mm)	Thickness (mm)
Minimum	12.5	4.5	1.0
Mean	16.0	6.1	2.1
Maximum	21.0	9.6	3.1

Table 18. Butt types, retouch types, size for asymmetrical trapezes.

TRAPEZE TYPE A Type 54			
RETOUCH TYPES			NUMBER
Fine			1
Semi abrupt			34
Abrupt			15
TOTAL			50
SIZE (Whole artifacts only)			
(n= 42)	Length (mm)	Width (mm)	Thickness (mm)
Minimum	10.3	3.4	1.5
Mean	17.4	6.1	2.2
Maximum	29.1	8.5	3.3

Table 19. Butt types, retouch types, size for type A trapezes.

TRAPEZE TYPE B Type 55			
RETOUCH TYPES			NUMBER
Fine			4
Semi abrupt			21
Abrupt			3
TOTAL			28
SIZE (Whole artifacts only)			
(n= 22)	Length (mm)	Width (mm)	Thickness (mm)
Minimum	12.0	4.3	1.4
Mean	17.9	6.5	2.1
Maximum	26.7	8.8	3.5

Table 20. Butt types, retouch types, size for type B trapezes.

LUNATE Type 59			
RETOUCH TYPES			NUMBER
Fine			34
Semi abrupt			161
Abrupt			69
Bipolar			18
TOTAL			282
SIZE (Whole artifacts only)			
(n= 220)	Length (mm)	Width (mm)	Thickness (mm)
Minimum	11.0	3.0	1.0
Mean	17.3	5.6	2.1
Maximum	25.0	8.8	3.7

Table 21. Butt types, retouch types, size for lunates.

TYPE	AH 33	AH 32	AH 31	AH 30	AH 29	AH 28	AH 27
1			1		1		1
2	1		1	1	1	2	1
5		1				1	
8			1				1
11	1			2	1	1	1
12		2		1	3	1	6
13	1	1		3	6	5	6
14			1	1	1	1	1
15		3			1	2	
16					1		
18		1				1	1
19				1			
21		1		1			
23							1
24				5	1		
25					1		
26	1	1	7	17	8	7	16
28		1		1	1	2	5
30				1	1	1	
32				2		1	3
33					3	1	1
40							1
41				2	1	1	5
42			1	4	2	5	6
44				1	2		1
46				1		1	
47			1	2	4	1	2
49		1	1	3	4	1	3
50					2		1
51					1		

Figure 1. The microlith types and their values in the archaeological layers of unit I.

TYPE	AH 26	AH 25	AH 24	AH 23	AH 22	AH 21	AH 20	AH 19	AH 18
1		1			4	7	1		2
2	4	5	1		10	4	2	1	2
3		2			1		1		
4	3		1						1
5				1	1		1		1
6		1							
7		2				6	4	1	
8	1	3		1	1		1		
9		1							
10	1								
11	19	13	3		11	5	1	4	2
12	6	2	2		1	6	5	2	
13	17	10	3	4	17	21	7	12	4
14	3	2	3		10	4	4	2	
15	2	1				7	4	2	3
16								1	
17	1	4				2	7	2	
18	1				2		2	1	1
19		1	3	2	1	2	1		
20	1				1				
21	1								
22	1			1		2	2		1
23	4								
24	1	3			1	1	6	5	5
25					1	1	2	1	1
26	100	51	14	21	84	70	29	28	18
28	4	2	3		1	1	1	1	
30	2				1	1	1		7
31						1			
32	2	1	1	2		4	3	7	5
33	6	2	1		2	6	9	8	3
34						1	1	1	3
37	1								
40	1		1		1			1	1
41	35	11	3	3	9	4	10	3	
42	4	1	1		3	2	5		1
44	4	1	2			1	3	5	1
45			2		1				
46	4	1	3			2		1	1
47	4	3	4	1			1	1	3
49	9	6	1	1			2	1	
50	1		1	1			3	6	7
51							1		
52	1		1			1			1
53		3				1		1	1
54				1			1	3	1
55							2	1	2
58							1	1	2
59				1		1	2	12	14
60									2

Figure 2. The microlith types and their values in the archaeological layers of unit II.

TYPE	AH 17	AH 16	AH 15	AH 14	AH 13	AH 12	AH 11	AH 10	AH 9
1		1	2	1	3		1	3	1
2	1	1	1		2	3			
3					1				
4	1		1			1		3	
5			1		1	1	1		
8					1				
11	1	1					3	1	
12		1	1	1	1			1	
13	5	5	3		3	1	2		
14	2		1	1	2	2	2	2	
15		1	1	1					
16		1							
17	1	1				1			
18	1	1	1	1	2			1	
19	1						1		
20					1			1	
22	1	1							
23	1				2				
24	1			1			1		
25					1				
26	7	2	1	2	2	4	2	1	2
28	4	2	1	1	3	3	1		
29	1	1					1		
30	2	5	4		2	1	1	1	1
31		1							
32	4	9	6	2	6	8	9	2	2
33	2			1					
34		9	1	1	4				
35				1	2		1	1	
36		1					3		
38								1	
39							1		
40	1								
41	1	1			1	1			
44	4	4	2	1	2	1			
45	1				1				
46	2	3	2	1					
47	1	1	4	5	1	1	4	2	2
49	2		1		1	1	1	1	
50	9	11	9	5	4	5	9	10	10
51			1		1	1			
52	1	3	1	1					2
53	1	3	2	4	2	1			1
54	4	7	4	4	2	3	1	5	2
55	5	6	2	2	3				1
56				1					
57			1						
58	3	3	1	3		1		1	
59	28	28	24	22	36	20	9	7	12
60					1				

Figure-3. The microlith types and their values in the archaeological layers of unit III.

TYPE	AH 8	AH 7	AH 6	AH 5	AH 4	AH 3	AH 2	AH 1	AH 0
1	1				1	2		1	
2					2				
3		2							
5						1			
11	2	1					1		
12					1	1			
13	1			2	1	1	1	1	
14					1	1			
15						2			
17							1		
18					1		1		
20				1					
24			1						
26		1			2	1	1		
27								1	
28			1		2				
30				1	3	1			
32				1	1	2			
34		1		1		1			
35							1		
36					1				
37			1	1					
38						1			
42						1			
43								1	
44					1	1	1	1	
46	1					3			
47		3	1		4	2	2		
48						1			
49		1			2	1			
50	2	3	2	8	27	16	7	2	
51			1		1	2	1		
52					1				
53		2	1	3		1	1	2	
54	2	1		4	2	3			
55					3	1			
56					1				
58						1	3		
59	2	3	1	7	21	15	14	2	1
60							1		

Figure-4. The microlith types and their values in the archaeological layers of unit IV.

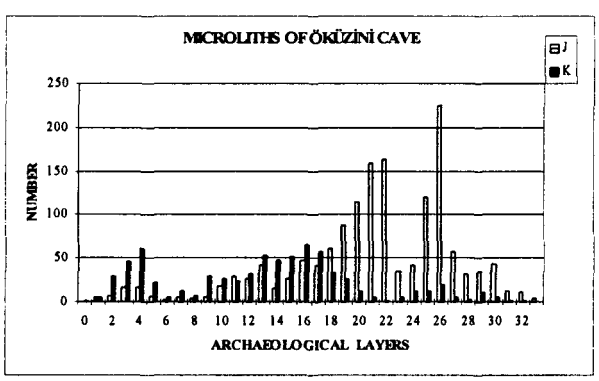

Figure 5. J: Non-geometric microliths; K: Geometric microliths.

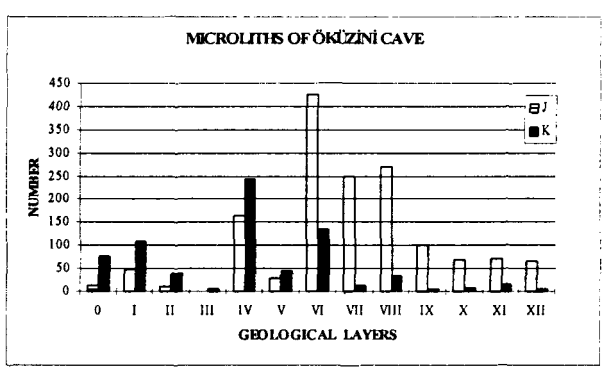

Figure 6. J: Non-geometric microliths; K: Geometric microliths.

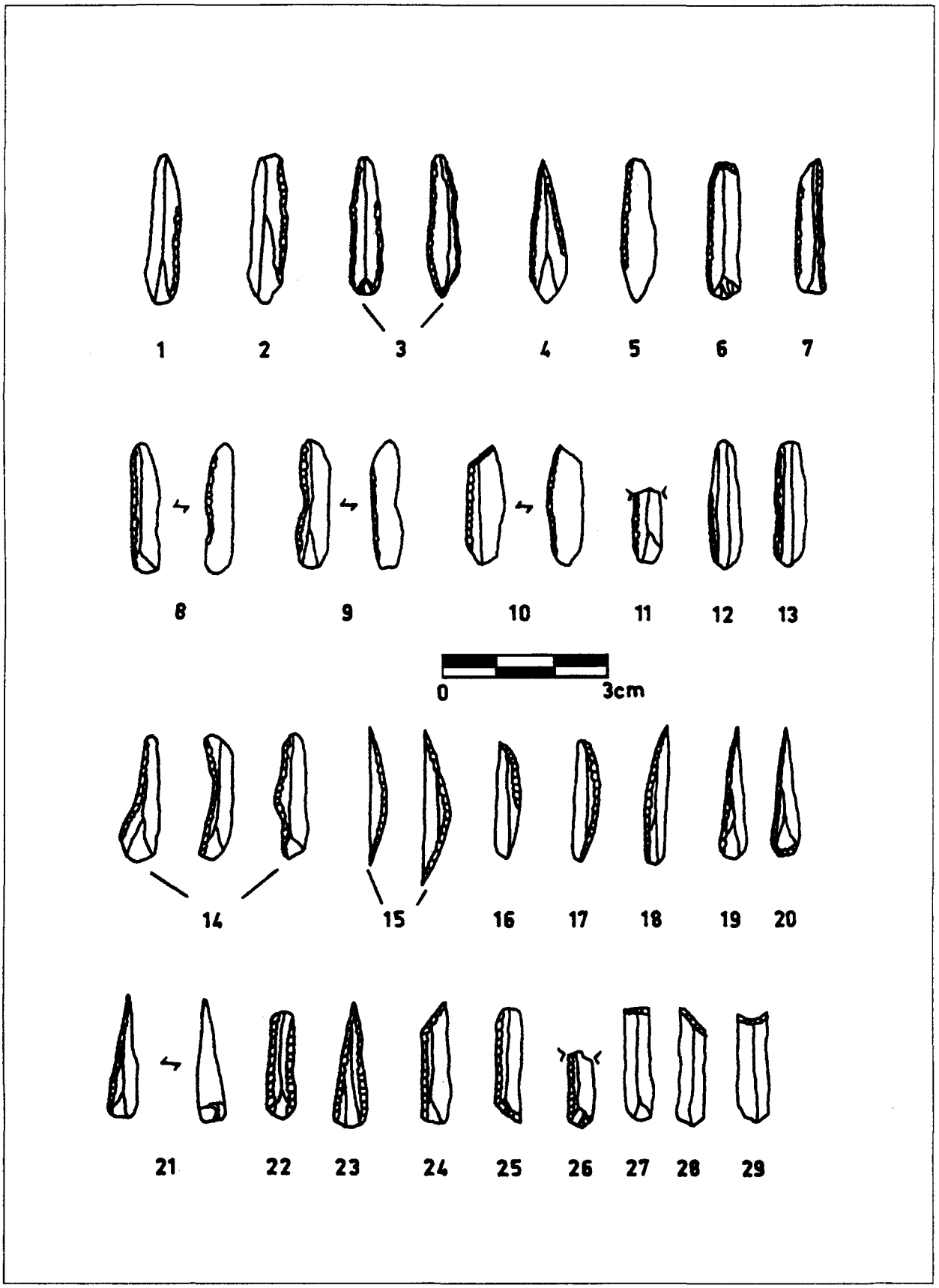

Figure 7. Microlith types 1 to 29 from Öküzini cave.

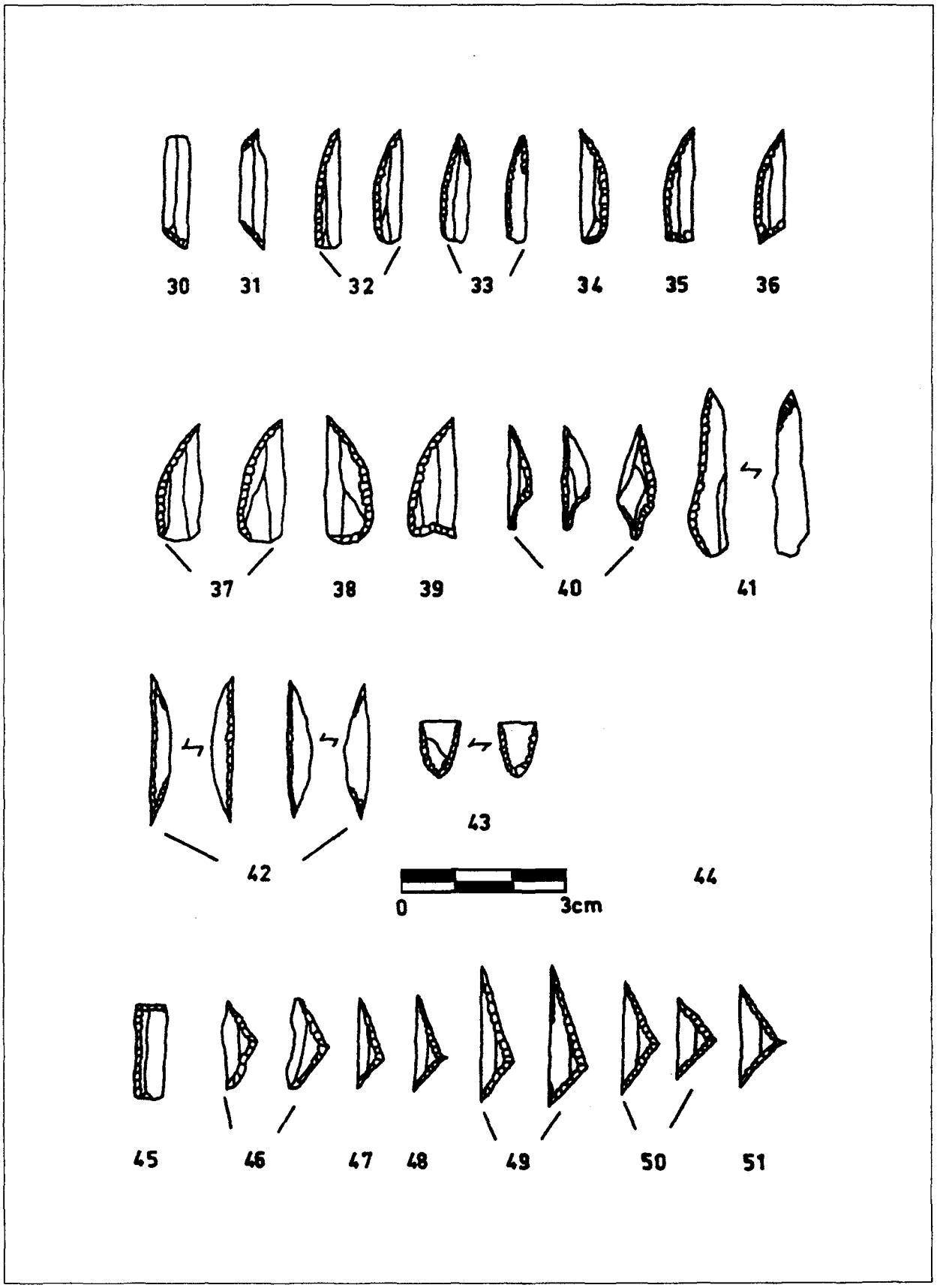

Figure 8. Microlith types 30 to 51 from Öküzini cave.

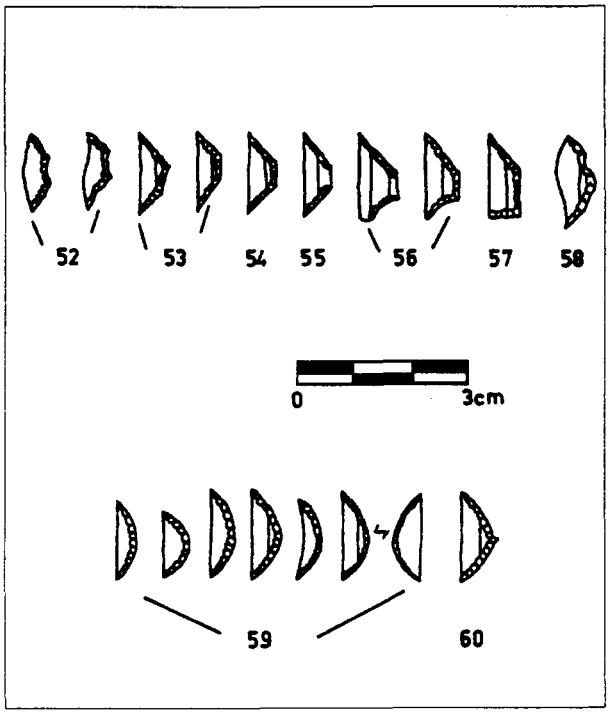

Figure 9. Microlith types 52 to 60 from Öküzini cave.

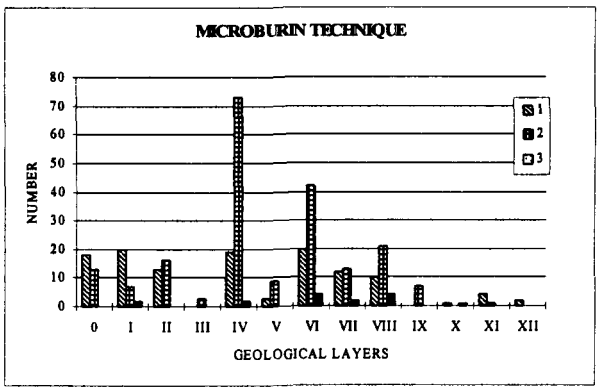

Figure 10. 1 microburin;
2 microburin *Krukowski*;
3 *piquant trièdre.*

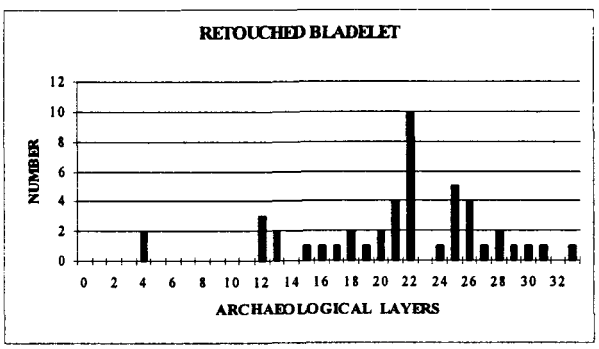

Figure 12.
Distribution of whole retouched bladelets by AH.

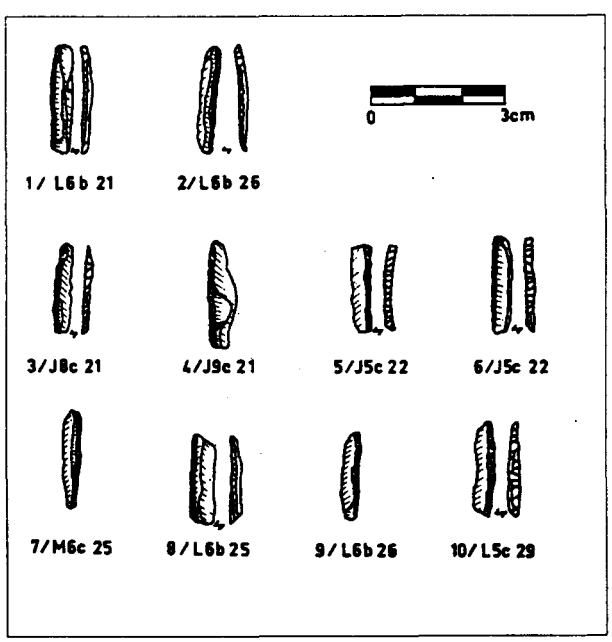

Figure 11.
1,2 . Retouched bladelets;
3-10. Backed bladelets.

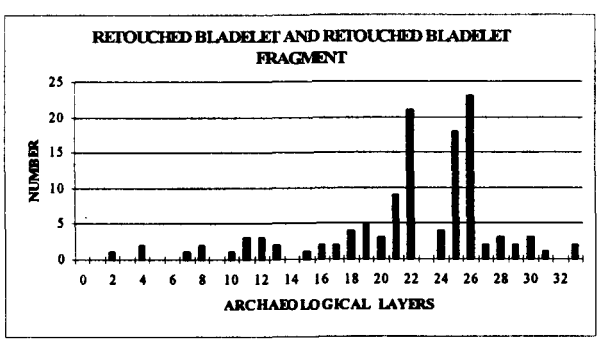

Figure 13. Distributions of whole retouched bladelets and retouched bladelet fragments by AH.

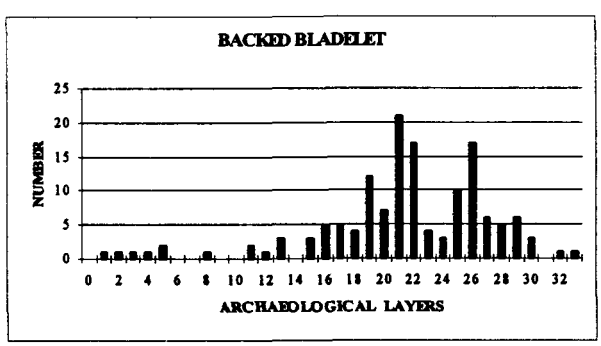

Figure 14. Distribution of backed bladelets by AH.

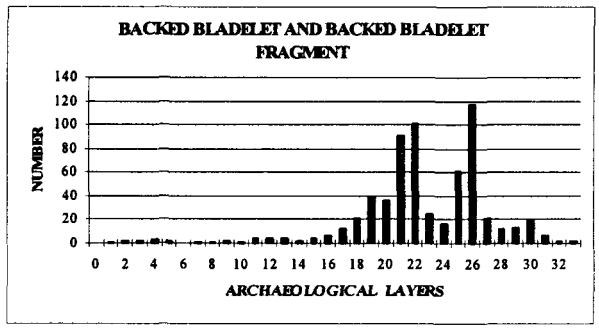

Figure 15. Distribution of whole backed bladelets and backed bladelet fragments by AH.

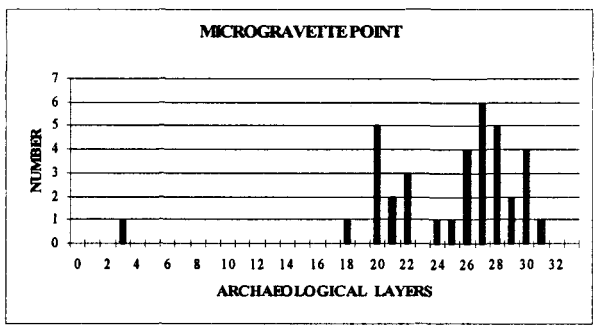

Figure 17.
Distribution of microgravette points.

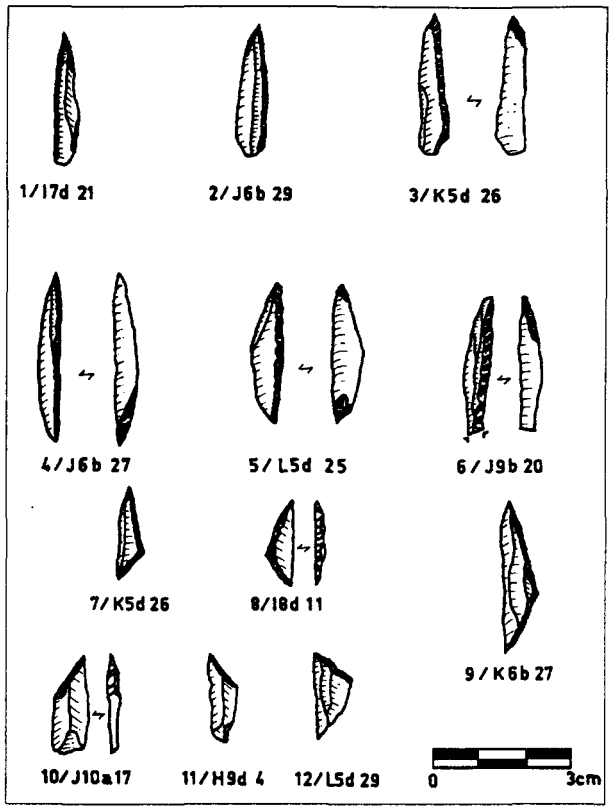

Figure 16. 1,2. narrow micropoints with lateral retouch on tip; 3. micropoint with ventral retouch on tip; 4-6. microgravette points; 7, 8. short scalene triangles; 9. elongated scalene triangle; 10-12. obliquely truncated bladelets.

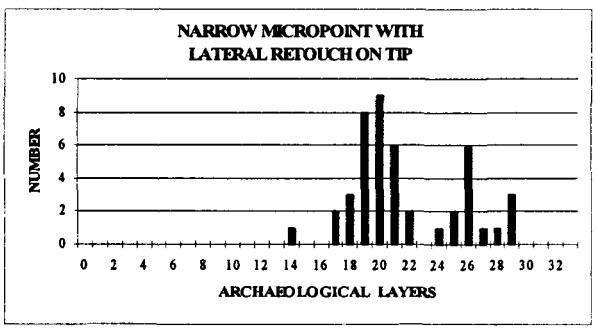

Figure 18.
Distribution of narrow micropoints with lateral retouch on tip by AH.

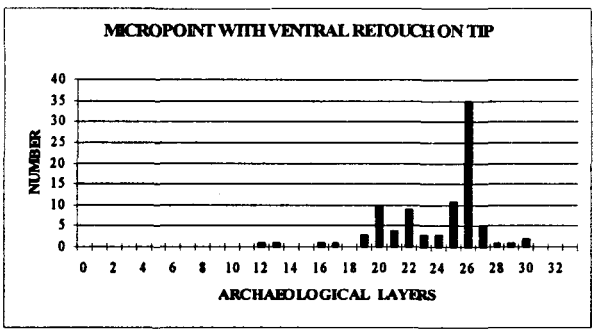

Figure 19.
Distribution of micropoints with ventral retouch on tip by AH.

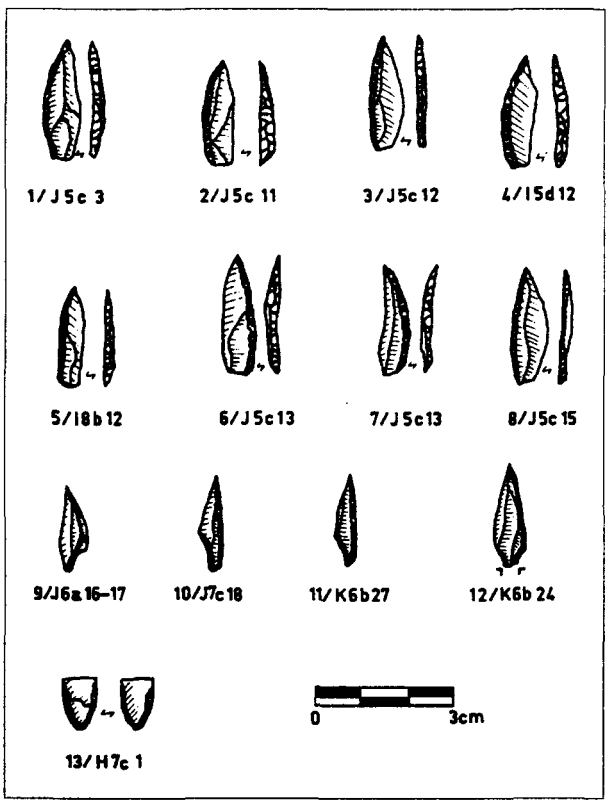

Figure 20. 1-8. narrow micropoints; 9-12. tanged micropoints; 13. transversal arrowhead.

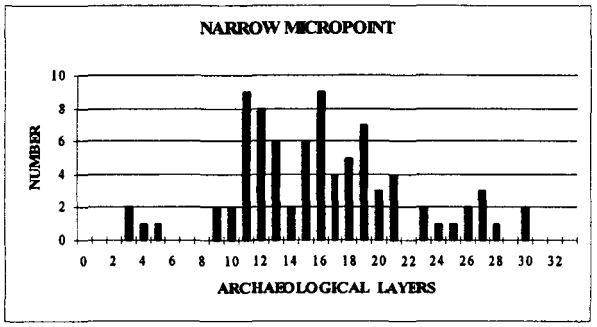

Figure 21.
Distribution of narrow micropoints by AH.

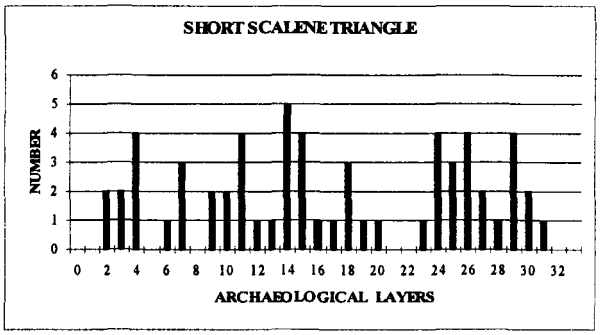

Figure 22.
Distribution of short scalene triangles by AH.

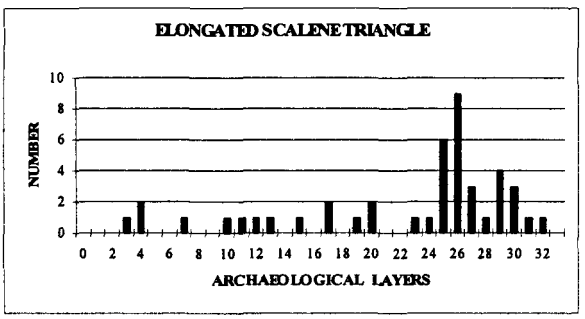

Figure 23.
Distribution of elongated scalene triangles by AH.

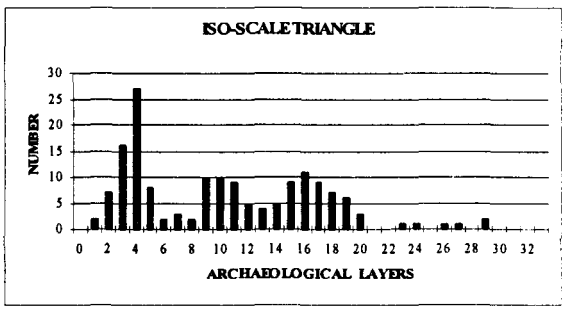

Figure 25.
Distribution of isosceles triangles by AH.

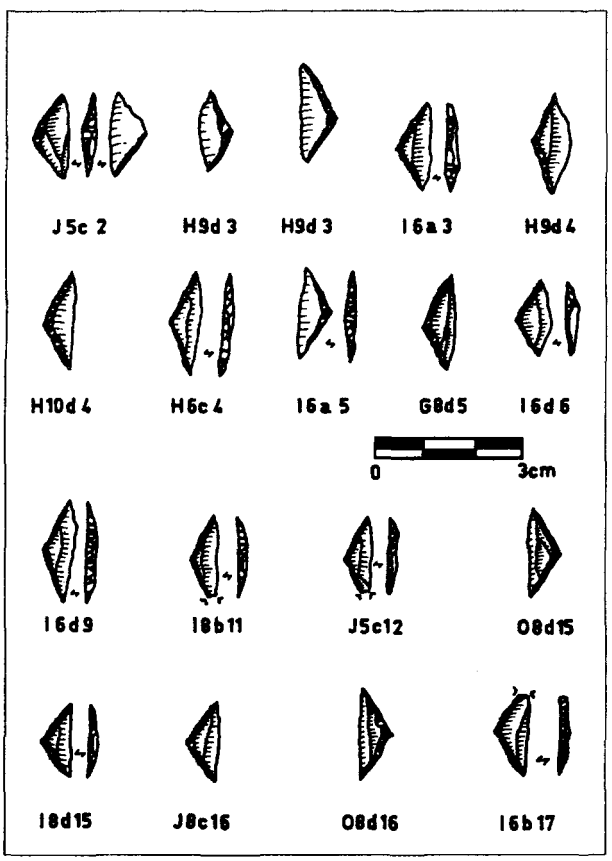

Figure 24. Iso-scale triangles.

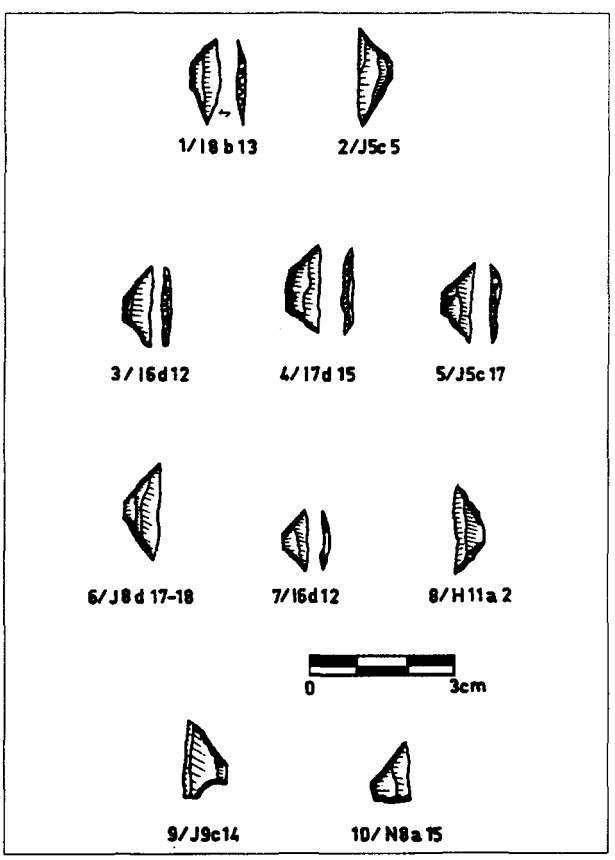

Figure 26. 1,2. asymmetrical trapezes;
3-5. type A trapezes;
6-8. type B trapezes; 9. type C trapeze;
10. type D trapeze.

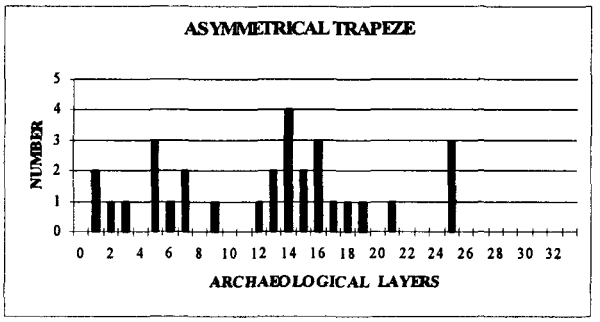

Figure 27.
Distribution of asymmetrical trapezes by AH.

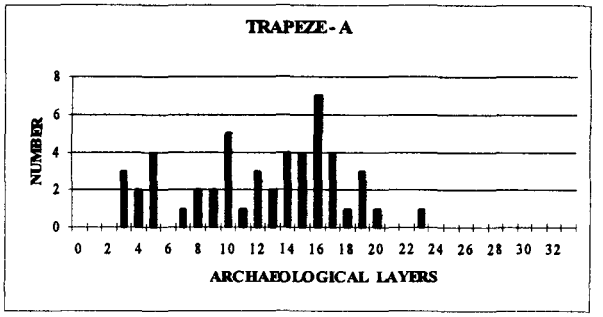

Figure 28.
Distribution of type A trapezes by AH.

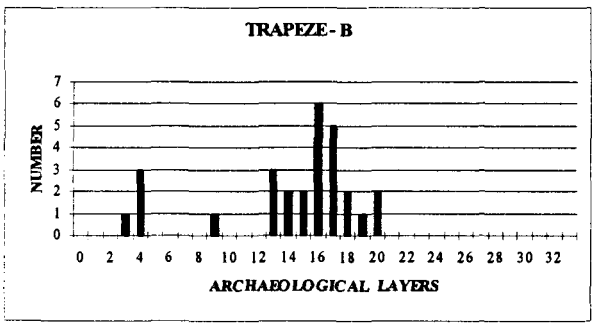

Figure 29.
Distribution of type B trapezes by AH.

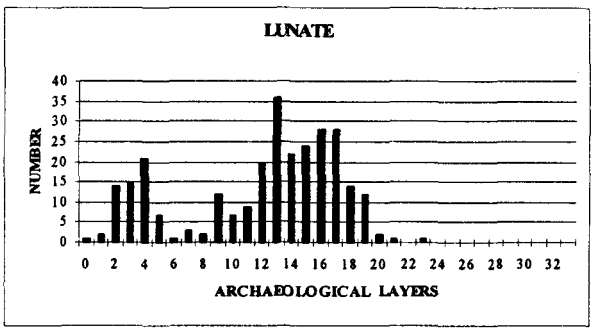

Figure 31.
Distribution of lunates by AH.

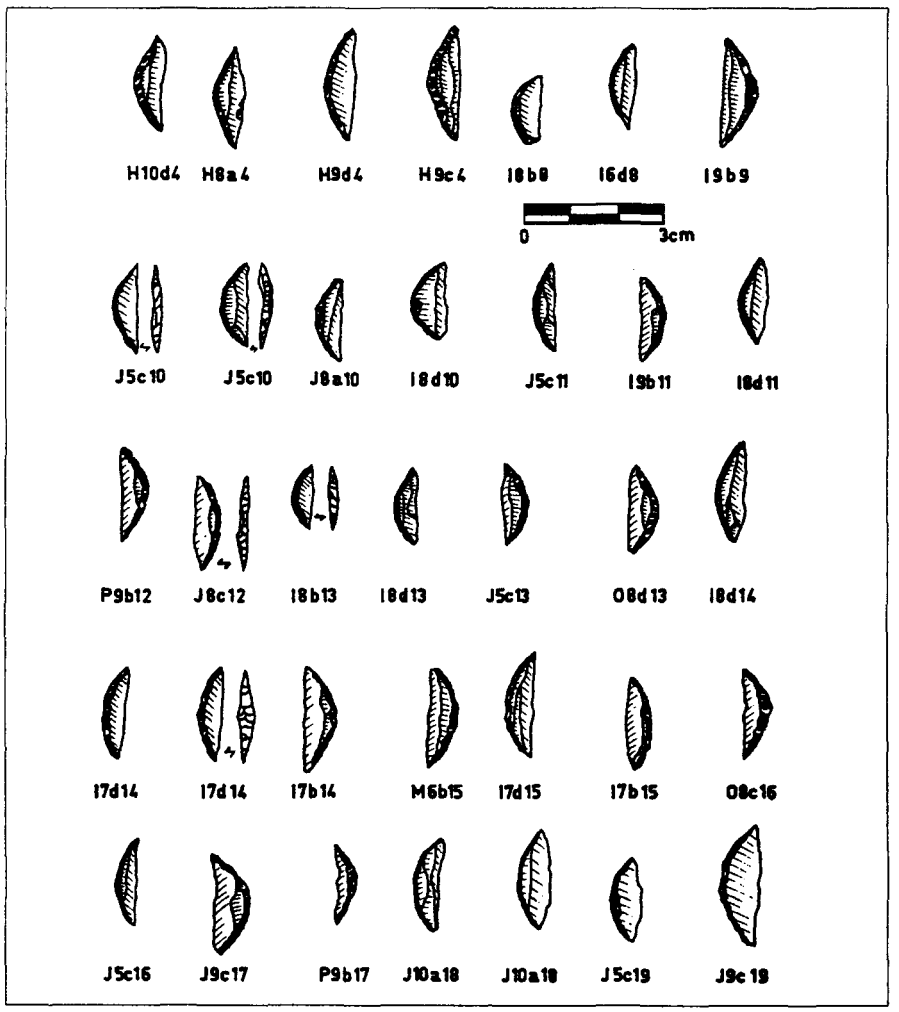

Figure 30.
Lunates.