

OBSIDIAN IN THE NEOLITHIC IN CENTRAL ANATOLIA FROM RAW MATERIAL TO WORKSHOPS AND SETTLEMENTS A CASE STUDY

Nur Balkan-Atlı and Marie Claire Cauvin

Resumé: L'analyse technologique et géologique du matériel lithique du site Néolithique d'Aşıklı Höyük a permis de retrouver les ateliers, de mettre en évidence l'existence de différentes chaînes opératoires et les modalités de la circulation de l'obsidienne.

Abstract: Technological and geological analyses of the lithics from the Neolithic settlement of Aşıklı Höyük have permitted the discovery of workshops, the acknowledgement of different chaînes opératoires and the distribution of the obsidian.

Keywords: Obsidian, Neolithic, central Anatolia, Cappadocia, Aşıklı Höyük, obsidian workshops, chaîne opératoire.

Obsidian has been distributed in the Near East since 12,000 BC and is present at prehistoric sites in different forms such as cores, blades, projectiles, beads or bowls. Yet the principal sources of this material are located only in certain regions, Anatolia and Caucasia. This indicates that obsidian had circulated; this fact forms the basis of several lines of research. Since the early 1960's, there has been great interest in obsidian concerning the sources, and the chemical analyses of these sources in order to know the exact provenance of this circulated material. The synthesis of these studies has already been the subject of several papers (Cauvin 1996; Cauvin and Chataigner 1996).

In this paper, our aim is to present some of the preliminary results of obsidian research in a limited region, south of western Cappadocia (Fig. 1), where multidisciplinary research has been going on since 1993. This work concerns the geology and geomorphology of the region, the obsidian sources and the obsidian workshops near the sources, the obsidian found at prehistoric settlements, and the geophysical and geochemical analyses of the sources and of the material from the sites. The results of these various studies are in press (Cauvin *et al.*). Here we will limit ourselves to the techno-archaeological aspect of the research, insisting more on the obsidian workshops. Our research in the region took its roots from a prehistoric site, Aşıklı Höyük, and its obsidian industry.

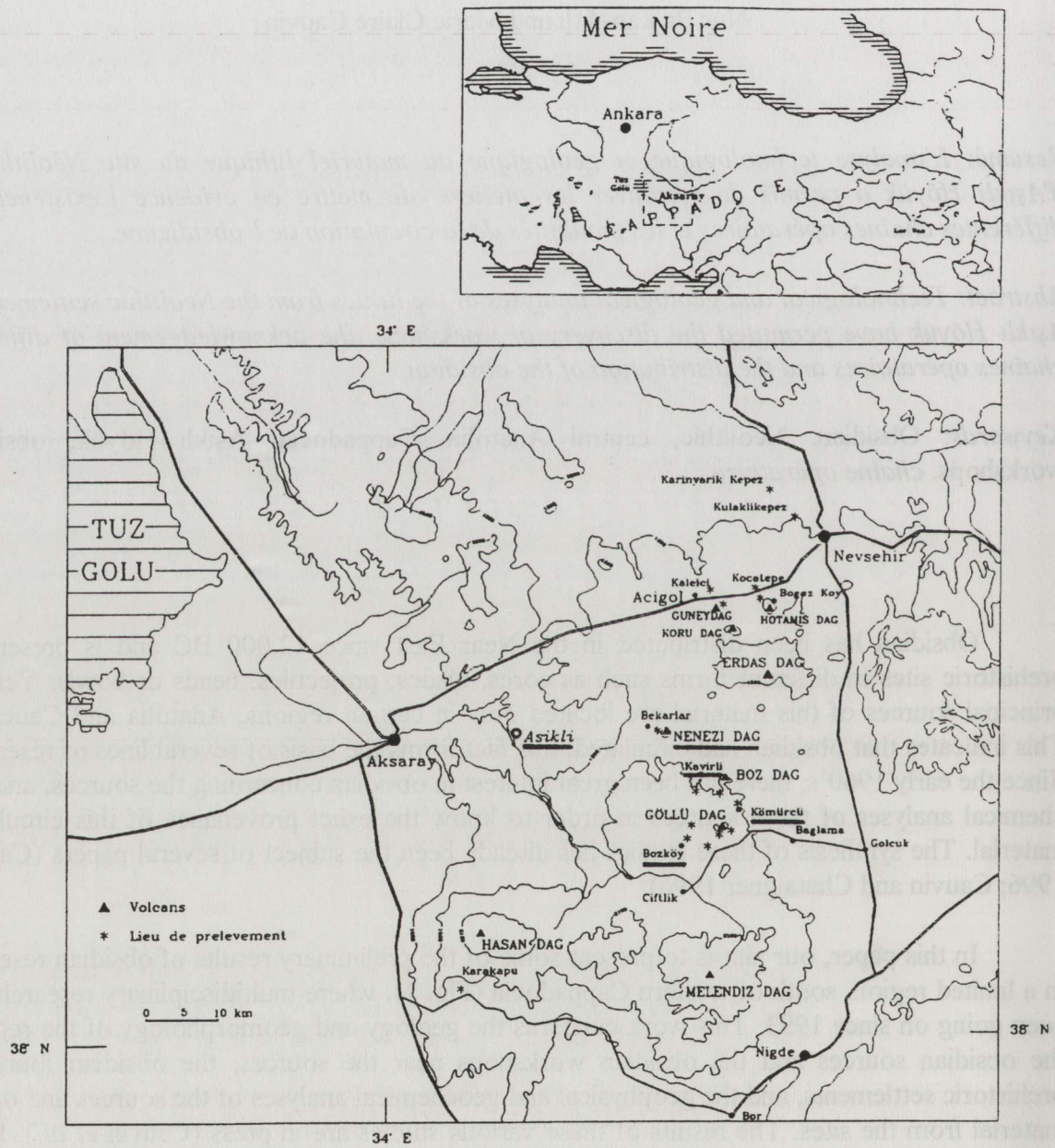


Fig. 1. Map of the surveyed region.

AŞIKLI HÖYÜK

General Aspects

Aşıklı Höyük is situated about 25 km south-east of the province of Aksaray in central Anatolia, near the Melendiz river in a volcanic region surrounded by basaltic, andesite and tuff rocks. The Aşıklı Höyük settlement occupies about 35/40,000 m². The excavations started in 1989 are still underway. The site is dated to 10,000 BP and it is the earliest settlement of the Holocene in Central Anatolia discovered yet (Esin 1994).

Aşıklı Höyük displays a mud-brick architecture; stone is only observed in the surrounding walls of the settlement. Houses are rectangular in plan, closely knitted together, forming "sectors" separated by narrow passages. A large open space, used primarily as a garbage area, takes an important place in the settlement. The settlement is surrounded by curved stone walls on the east as if limiting the site.

Burials are found in the houses, under the floors. They are simple pit burials where the dead were placed in hocker position, tightly enveloped in mattes. Burial gifts consist of string beads of shells, agate, copper, bone or stone.

Hunting has an important role in the subsistence. There are no domesticated animals. Sheep and goat are the most hunted animals. Besides *Bos*, wild pig, deer, and horse, small game animals like hare were also hunted. There is also evidence of bird hunting and fishing (Buitenhuis, in press).

The flora consists of domesticated crop plants, such as einkorn wheat, emmer wheat, durum wheat and barley, though in small numbers; pulse crops such as bitter vetch, lentil and pea. Fruits and nuts are represented by huge amounts of hackberry (*Celtis*) stones and small amounts of *Pistacia* and wild almonds (van Zeist and de Roller 1995).

A groundstone industry is mainly represented by grinding slabs and grinding stones, mortars, pestles, polishing stones and stone balls (bolas). Polished axes do occur but rarely.

It is interesting to note the presence of copper beads produced by pyrotechnology (Esin 1995) and small tokens lightly fired. Figurines are extremely rare but there are some abstract objects of baked clay. Different kinds of material such as shells and stone beads also indicate an exchange system with its neighbors or different regions.

Obsidian Industry

Aşıklı Höyük yielded large amounts of obsidian artifacts. The retouch modified pieces (Fig. 2) are represented by microliths and geometrics obtained by microburin technology, which are quite abundant in the lower building layers, and by backed blades, backed pointed blades, truncated blades and large quantities of scrapers. Projectiles s.s. are poorly represented, especially by one shouldered points (Aşıklı point). Two shouldered points are present in small numbers in the upper layers. Pressure flaked arrowheads were found but not in context, only

on the surface, and so may belong to the uppermost layers which are completely eroded. Burins and piercing tools are few (Balkan-Atlı 1994).

The analysis of *chaînes opératoires* of Aşıklı Höyük clearly indicates that they were oriented to the production of blades as blanks (Abbes *et al.* in press). However, the presence of some polyhedral cores reveals a production of flakes as well. The raw material was brought to the site in the form of blocks, unmodified or slightly reduced, and knapping took place on the site. The debitage is realized from blocks with two lateral sides which are more or less parallel and a narrow flaking surface used from two opposed striking platforms which form steep angles with the flaking surface (Fig. 3).

The presence of obsidian in large quantities and the naviform technology, unknown up to now in Central Anatolia guided us towards research of sources and workshops in the region. The samples of obsidian from Aşıklı were analyzed by neutron activation and the results indicated two sources: Kayırlı and, to a lesser degree, Nenezi Dag (Gratuze *et al.* 1993). These sources are located on the north of the Göllü Dag and they are part of the sources known as the Çiftlik obsidians. Most of the sources were already known but the workshops were not well documented.

OBSIDIAN SOURCES AND WORKSHOPS

In this stage of our research, we aimed to visit all the sources known, besides those connected with Aşıklı, to look for new ones and especially to locate workshops in relation with the sources to find technologies comparable or not with Aşıklı. The results that we obtained from the survey of the workshops showed different kinds of *chaînes opératoires* which were performed in the region in prehistoric times. Near each source with good quality obsidian, there are several workshops but most of them are eroded and difficult for study. Here, besides just mentioning Nenezi Dag, we will present two of them, Kayırlı and Kaletpe, which yielded more homogeneous and complete collections and where the *chaîne opératoire* of naviform cores was established.

Nenezi Dag

Nenezi Dag is a rhyolitic dome east of Bekarlar village on the north of the road from Aksaray to Derinkuyu. It has an isolated situation compared to other domes. Obsidian is black, and is present in form of blocks, homogeneous but sometimes with perlites. On the lower plateau of the mountain, a workshop is observed which yields large numbers of knapping products. Eroded obsidian artifacts were also found on slopes, and on the surrounding fields.

Obsidian artifacts consist of cores, bifacial preforms and bifacially retouched oval points (Fig. 4, n° 2), comparable to those of Çatal Höyük, besides large numbers of cortical flakes. The cores are in most cases uni-directional and pyramidal with flat or cortical backs. Bi-

directional cores are fewer including short naviform cores with crested backs. These are similar to those of Aşıklı (Fig. 4, n° 1), and their presence indicates that while looking for raw material Aşıklı people did some knapping in the source area. The same phenomenon is also observed at the other source, Kayırlı, which was used by the Aşıklı inhabitants.

Kayırlı

Kayırlı, a rhyolitic dome, is located east/south-east of the village of Kayırlı and is a part of Massif of Kabaktepe. The source is of an easy approach by a ravine, the obsidian is shiny black and of good quality for knapping. Two workshops were discovered: Bitlikeler on the east and Ekinlik on the west of the ravine. At Ekinlik uni- and bi-directional cores were found as well as naviform cores similar to Aşıklı ones (Fig. 5, n° 2). At the Bitlikeler workshop Aşıklı type naviform cores were present but less common (Fig. 5, n° 1). Besides this Aşıklı type of *chaîne opératoire*, there was another type of *chaîne opératoire* for obtaining long regular blades represented by long and narrow Kaletepe naviform cores (named after the cores found first at the Kaletepe workshop at Kömürcü at quite a close distance). Kaletepe type naviform cores (Fig. 6) are quite abundant (~ 23% of the cores). They are long and narrow with triangular sections and with a crested back (Balkan-Atlı and Deraprahamian, in press). They are less standardized in comparison to those of Kaletepe (*supra.*).

At the two workshops, a considerable number of bifacial preforms were found. Unipolar cores are of various types: pyramidal with a natural or flat backs; and very regular ones with a central crested backs and a flat and oblique striking platforms (Cauvin and Balkan-Atlı 1996).

Kömürcü/Kaletepe

The Kömürcü obsidian source is probably the most spectacular one in the region with its outcrops continuing for at least 3 km. This obsidian is the result of one eruption of the volcanic system of the East Göllü Dag (Poidevin, in press). Along the obsidian reaches several workshops which are generally eroded are observed (Cauvin and Balkan-Atlı 1996). The materials that they yield are varied and may be attached to different periods: unipolar cores, scrapers, oval bifacial projectiles, Levallois flakes and even a biface. It is likely that this source was exploited since Paleolithic until at least the Neolithic period.

The workshop that especially interests us yielded a more homogeneous and less eroded material. This workshop, Kaletepe, is located on the north of the Kömürcü village at an altitude of 1560 m on a supervising position. It is a more or less flat plateau of a rhyolitic dome covered by ignimbrites. Obsidian is present in forms of elongated blocks visible in the ravines that cut the plateau. The workshop is situated above the source as is often the case at the workshops we visited.

The Kaletepe workshop yielded a variety of material of exceptional quantity: cores of different types, preforms, primary flakes, ... About 22 % of the cores collected are unipolar cores. Apart from some atypical examples, they are mostly pyramidal cores which are exploited on one surface with a natural back. Some cores exploited all around exist also. Besides these unipolar cores with a regular, central crested back, a very oblique striking platform and regular blade removals as at Kayırlı/Bitlikeler are present also. Aşıklı type of naviform cores were not observed anywhere at Kömürcü.

The majority of the cores (64.7 %) of this workshop display high standardization. These are bipolar/naviform cores of triangular sections, long and narrow measuring in average at their discarded state 160 mm in length, 26.2 mm in width and 27 mm in thickness. They have two oblique and flat striking platforms opposed to each other and a crested back (Fig. 7). The debitage surface is parallel to the crested back and often carries the negative of an axial blade as we mentioned above the same type but less regular is also found at Kayırlı/Bitlikeler workshop¹. The use of these cores were oriented to the production of regular long blades for exportation. Not even a single sample was found on the workshop. The analyses of the cores and other pieces and experimentation by Gerard Deraprahamian enabled us to reconstruct the *chaîne opératoire* of these cores (Balkan-Atlı and Deraprahamian, in press).

CHAÎNE OPÉRATOIRE OF KALETEPE CORES

G. Deraprahamian states that three major conditions for this type of cores were assembled at the two sources, Kayırlı and Kömürcü: raw material accessible in the form of big blocks, good quality, and large quantity. The form of the blocks often present one or several natural surfaces from which the knapper may begin to reduce the block. First of all, he prepares a bifacial piece more or less rectangular with the lateral sides parallel to each other. The striking platforms are opened by the removal of the crests opposed. The flaking surface is opened by the removal of crested blades, first from one striking platform and second from the other (Fig. 8). Afterwards the extraction of central blades is accompanied by the extraction of lateral blades. The purpose of this *chaîne opératoire* is the obtainment of long, regular, pointed blades, probably to be used as blanks for projectiles. The rectitude of the flaking surface is important and a must in order to obtain these blades. After the extraction of each blade, a concavity is formed on the flaking surface. This concavity is removed by the extraction of an axial opposed blade called the upsilon blade. One of the striking platforms will be preferred, and the other will be used for the rectitude of the flaking surface. The debitage will continue till the exhaustion of the core (for more details see *ibid.*).

This standardization may well indicate specialization and the blades obtained were probably exported over long distances such as the Levant. The study of such obsidian blades found at the settlements may give information about the period of the workshop and the diffusion pattern.

¹ As these were observed at Kaletepe for the first time, we named them the Kaletepe type.

CONCLUSION

The results of our work showed the necessity of the use of different methodologies:

- 1) from the geological aspect, the characterization of the raw material at the settlements and at the sources;
- 2) from the technological aspect, the characterization of the artifacts at the settlements and at the workshops;
- 3) finally, intersection of these two processes.

Thus we will obtain a clearer view about the relation settlement-workshop-source which will enable us to have a more precise understanding of regional and inter-regional relations concerning the obsidian from the techno-cultural point of view.

Bibliography

- ABBÈS F., BALKAN-ATLI N., BINDER D., CAUVIN M.C., in press,
Gestion de la matière première et économie du débitage. Rapport préliminaire sur l'industrie d'Aşıklı, *Anatolica*.
- BALKAN-ATLI N., 1994,
The Typological Characteristics of the Aşıklı Höyük Chipped Stone Industry. In Gebel H.G. and Kozłowski S (eds.), *Neolithic Chipped Stone Industries of the Fertile Crescent. Proceedings in Early Near Eastern Production, Subsistence and Environment 1*, Berlin *ex oriente*, pp. 209-221.
- BALKAN-ATLI N. AND DERAPRAHAMIAN G., in press,
Les nucleus de Kaletpe et deux ateliers de taille en Cappadoce. In Cauvin M.C., Gourgaud A., Gratuze B., Poupeau G., Poidevin J.L. (eds.), *L'Obsidienne au Proche et Moyen Orient: du Volcan à l'Outil*, Tempus Reparatum, Oxford-BAR.
- BUITENHUIS H., in press,
Aşıklı Höyük: a 'predomestication' site, VII. International Conference of Archaeozoology, Konstanz, 1994.
- CAUVIN M.C., 1996,
L'obsidienne dans le Proche Orient préhistorique: état des recherches en 1996, *Anatolica* XXII, pp. 1-31.
- CAUVIN M.C. and BALKAN-ATLI N., 1996,
Rapport sur les recherches sur l'obsidienne en Cappadoce, 1993-1995, *Anatolia Antiqua* IV, pp. 249-271.

- CAUVIN M.C. AND CHATAIGNER C., 1996,
Possible Relationships between Geochemical Groups of Obsidian from the Near East,
Archaeometry, pp. 529-541.
- CAUVIN M.C., GOURGAUD A., GRATUZE B., POUPEAU G., POIDEVIN J.L. (eds.),
in press,
L'Obsidienne au Proche et Moyen Orient: du Volcan à l'Outil, Tempus Reparatum,
Oxford-BAR.
- ESIN U., 1994,
Akeramik Neolitik Evrede Aşıklı Höyük, XI. *T.T.Kong*, Ankara, 21-38.
- ESIN U., 1995,
Early copper metallurgy at the pre pottery site of Aşıklı Höyük, *Readings in Prehistory, Studies presented to Halet Çambel*, Istanbul, Graphis, pp. 61-77.
- GRATUZE B., BARRANDON J.N., AL ISA K., CAUVIN M.C., 1993,
Non-destructive analysis of obsidian artifacts using nuclear techniques: Investigation of provenance of Near Eastern Artifacts, *Archaeometry*, 35/1, pp. 85-110.
- VAN ZEIST W. and DE ROLLER G.J., 1995,
Plant remains from Aşıklı Höyük, a pre-pottery Neolithic site in central Anatolia.,
Vegetation History and Archaeobotany 4, 179-185.

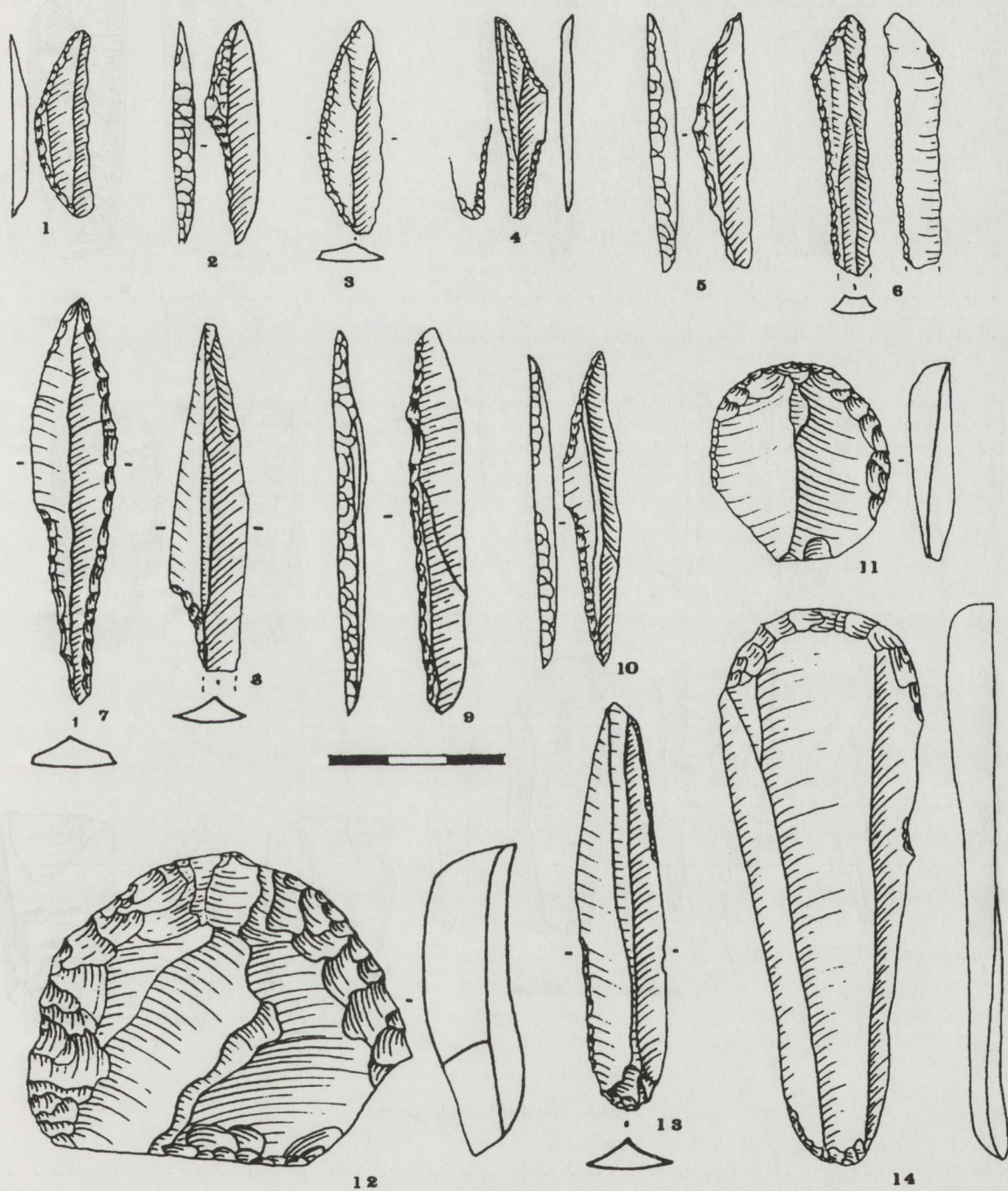


Fig. 2. Aşıklı Höyük: retouch modified pieces.

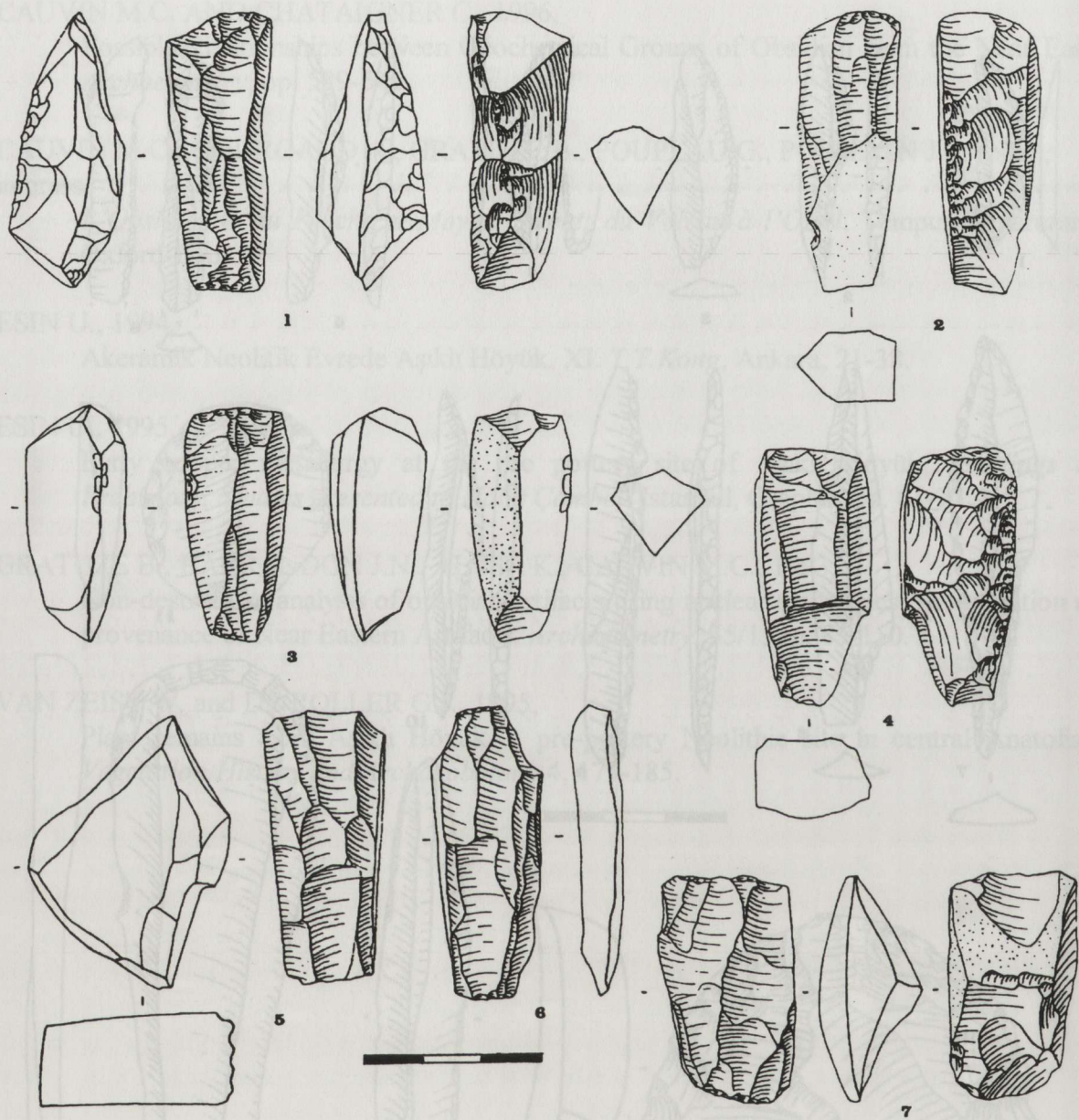


Fig. 3. Aşıklı Höyük: cores.

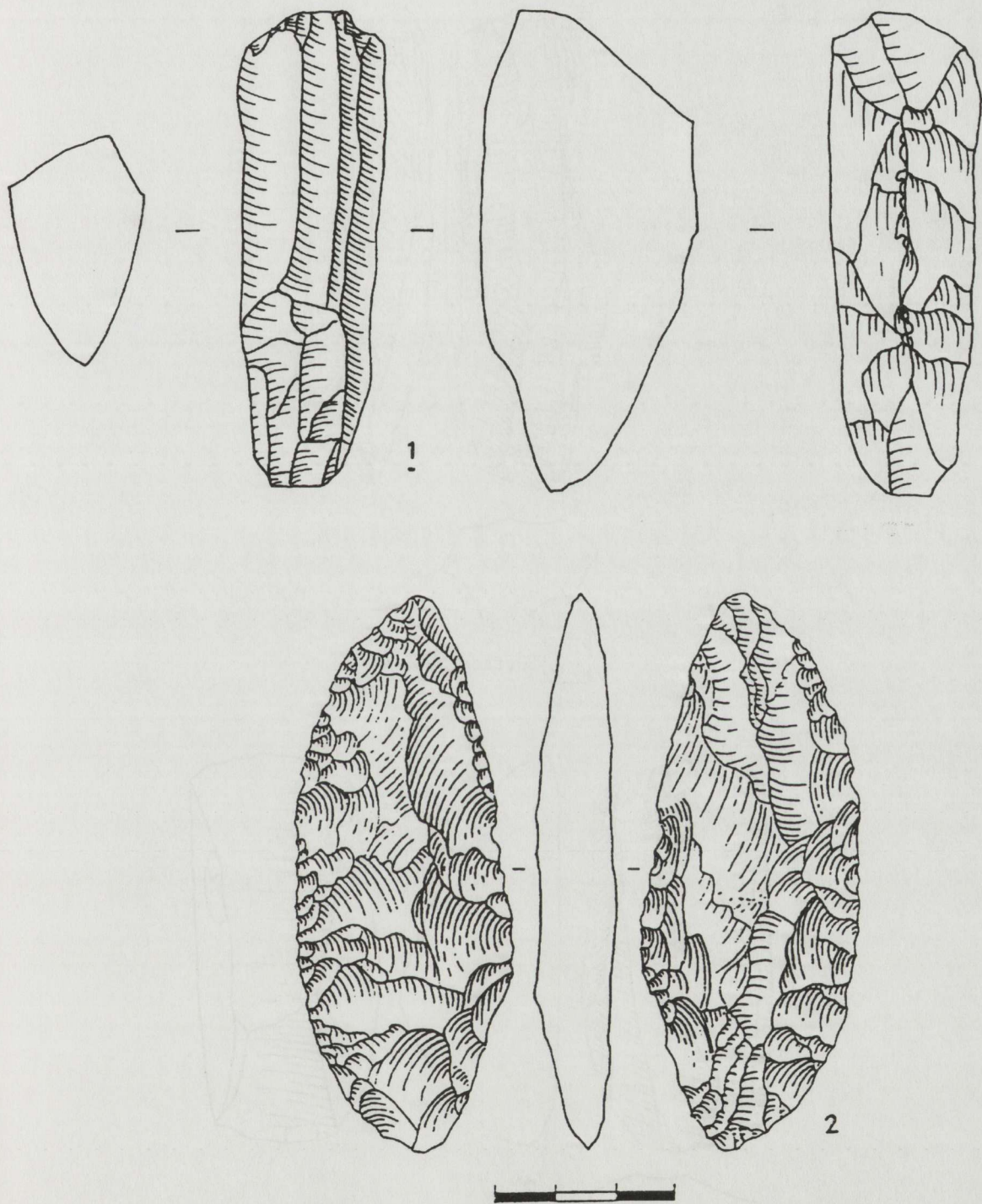


Fig. 4. Artifacts from the workshop of Nenezi Dag.

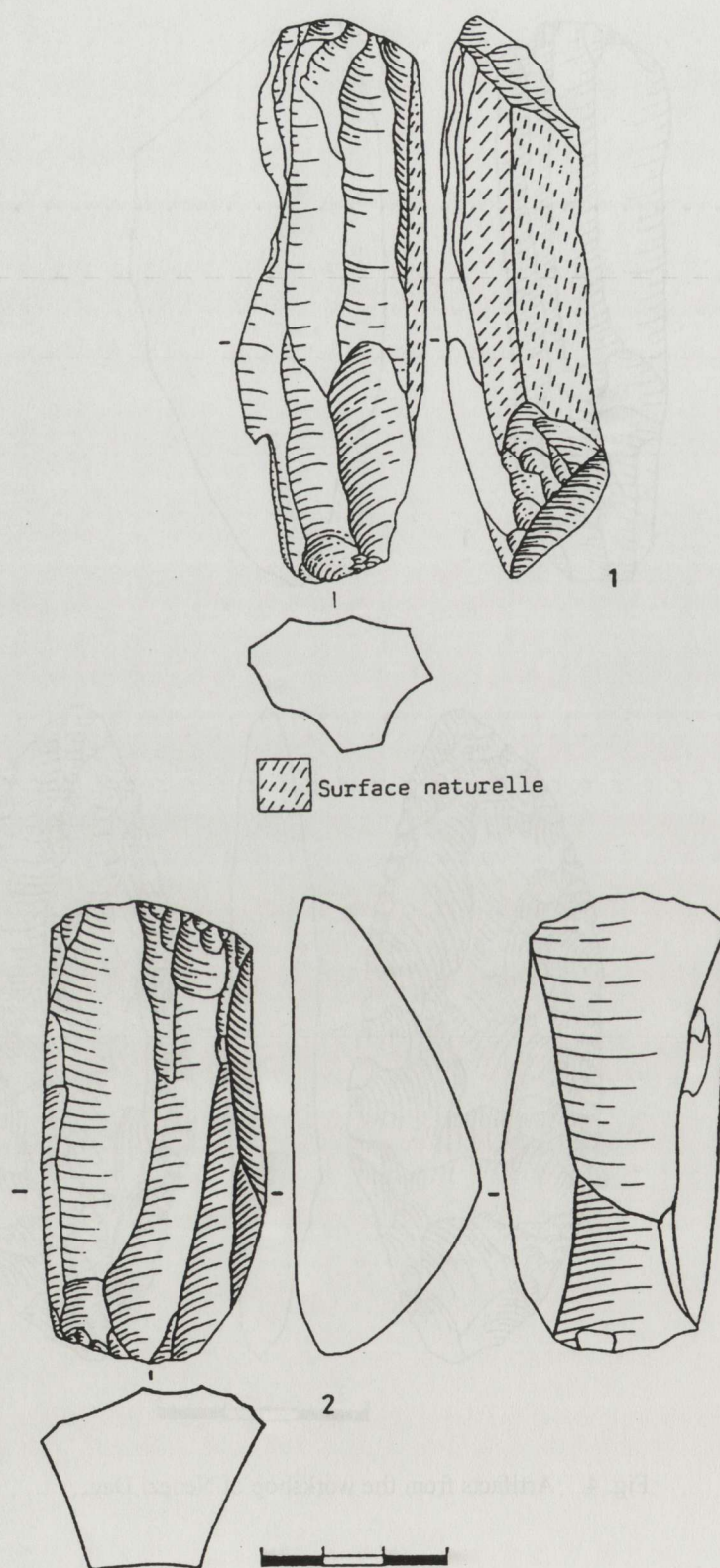


Fig. 5. Cores from the workshop of Kayırlı: 1. Bitlikeler, 2. Ekinlik.

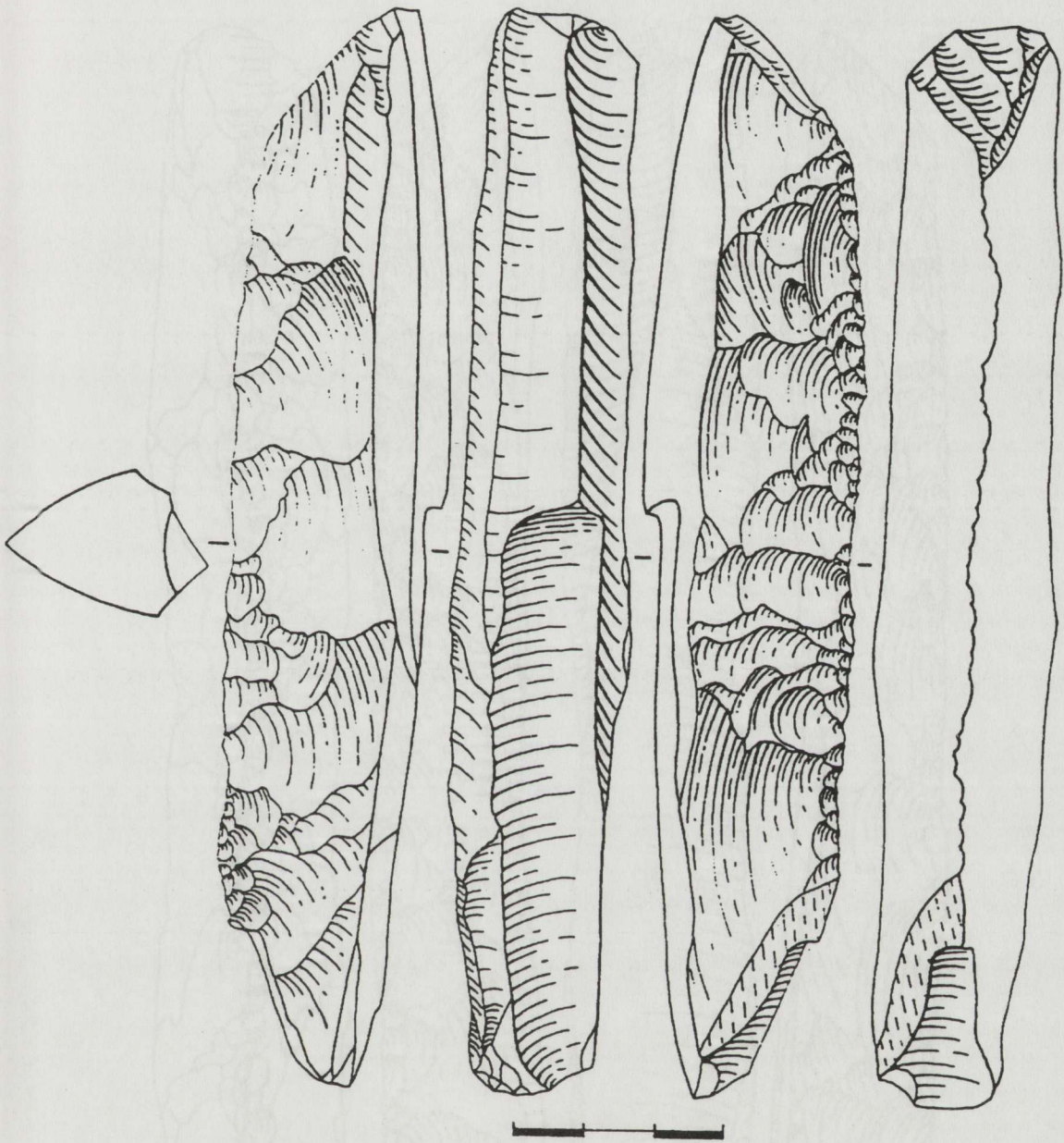


Fig. 6. Kayırlı: Kaletpe core.

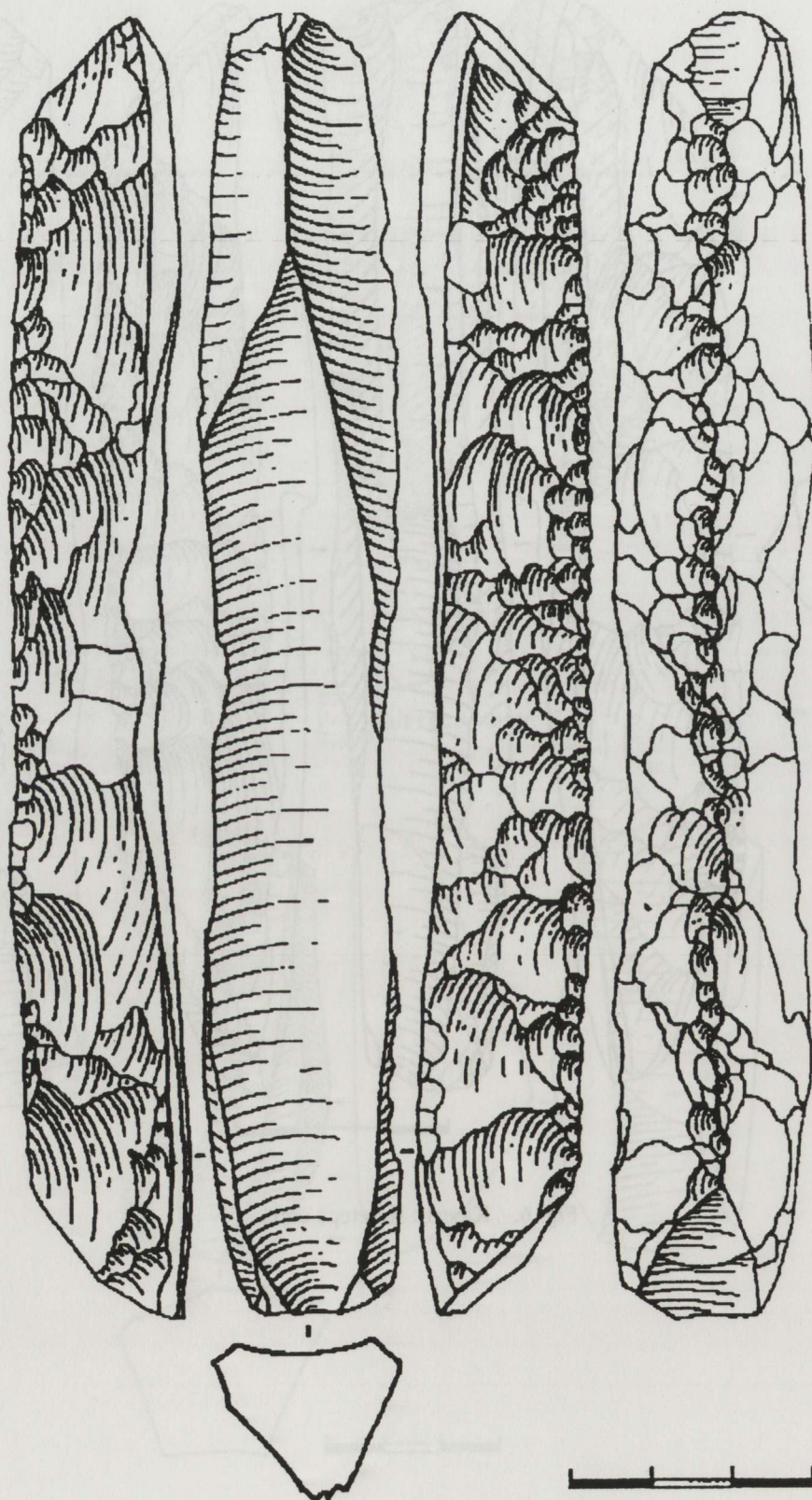


Fig. 7. Kaletpe: Kaletpe core.

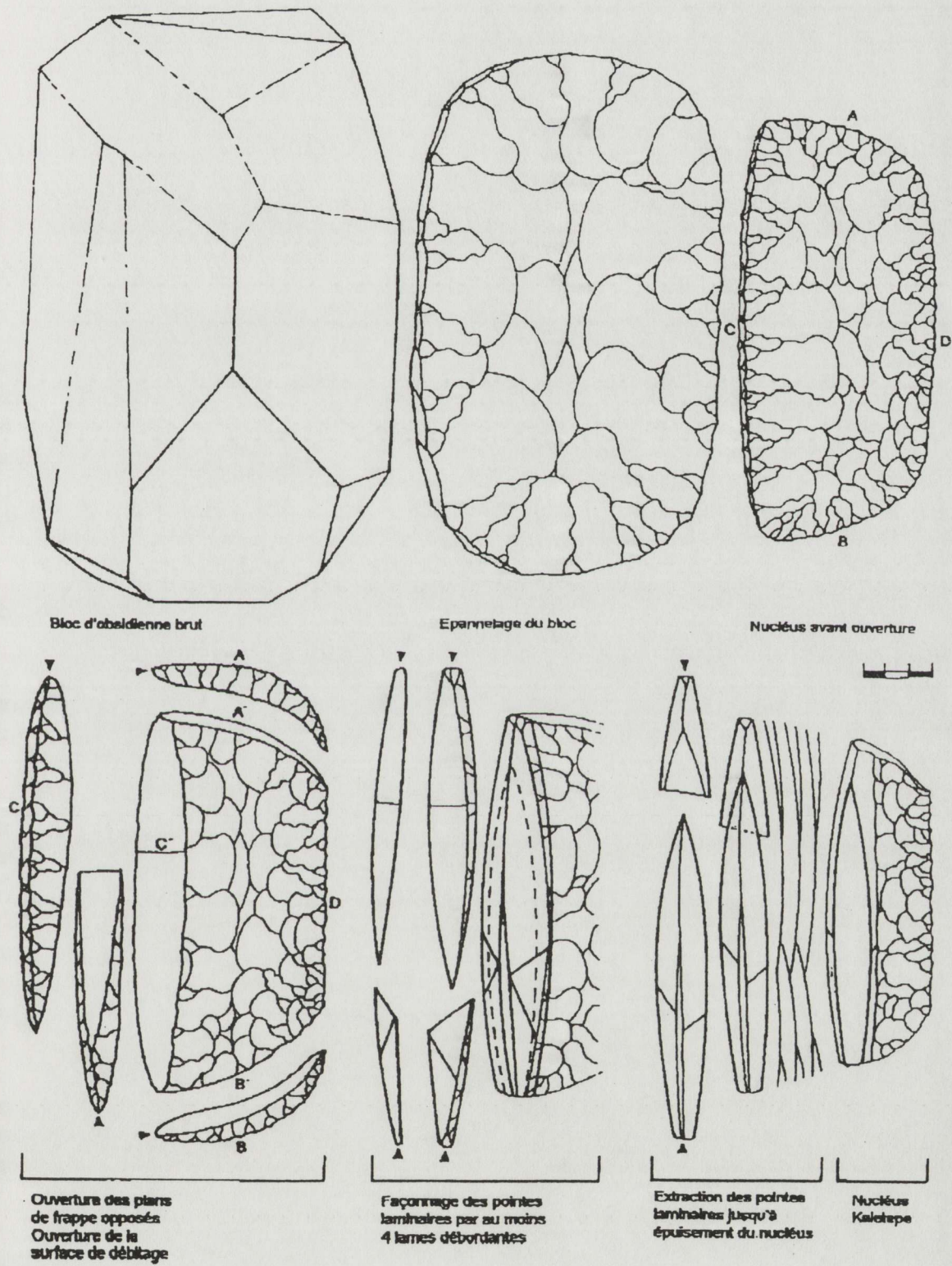


Fig. 8. Theoretical chaîne opératoire of the Kaletepe core.