

Variability in the neolithic arrowheads of Central Anatolia (typological, technological and chronological aspects)

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Abstract: *Recent excavations and surveys in Central Anatolia yielded new data about the Pre-Pottery Neolithic. One of the constituents of this data is the variability in the process of blade production. Furthermore, this diversity also exists in the typology when these blades are transformed to arrowheads.*

Introduction

New researches in the last decade have been illuminating for the Central Anatolian prehistory. Excavations such as Aşıklı Höyük and Musular and numerous sites discovered in various surveys have brought considerable information about this region long time neglected (Fig 1). Our knowledge about the Pre-Pottery Neolithic period of the region was restricted to Can Hasan III (French *et al.* 1972) and Suberde (Bordaz 1970) excavations and to the Central Anatolian survey (Todd 1980). Consequently, it was quite impossible to comprehend the neolithization process of the region. Whereas today, due to the recent intensive archaeological work, we start to have a clearer vision of the region.

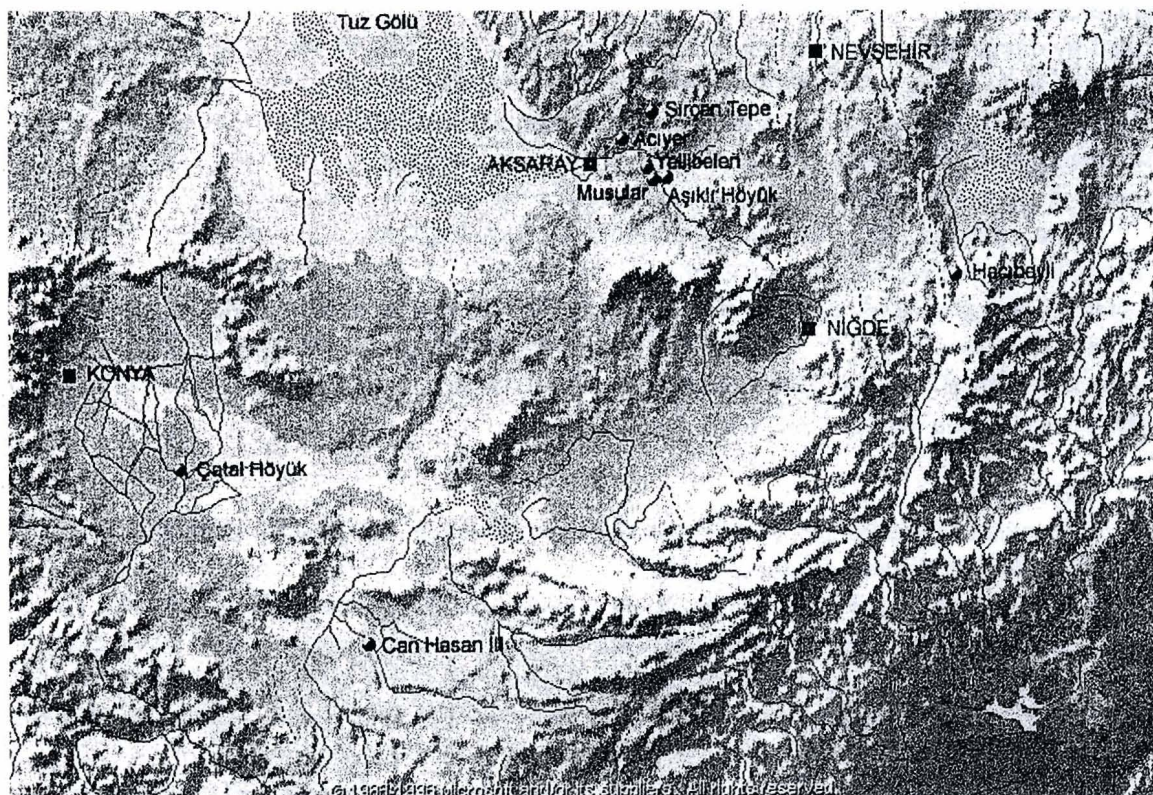


Fig. 1: Map of the region (composed by G. Duru).

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These late researches have also brought valuable information in the domain of the chipped stone industries. The analyses are still going on however, we already have clearer vision of the techno-cultural tradition of the chipped lithics. Our study is mainly concentrated on the eastern part of Central Anatolia, the western Cappadocia. Aşıklı Höyük excavations since 1989 (Esin *et al.* 1991), Musular excavations since 1996 (Özbaşaran 1997), site surveys (Gülçur 1995), raw material surveys (Cauvin & Balkan-Atlı 1996) and Kaletepe obsidian workshop excavations (Balkan-Atlı *et al.*, 1998) frame the basis of our paper.

Excavated pre-pottery neolithic settlements

Aşıklı Höyük

Aşıklı Höyük is a large pre-pottery mound dated 8th. mill. BC. It is situated 25 km southeast of Aksaray, in Western Cappadocia, on the bank of the Melendiz river. The site —excavated since 1989— reveals three layers, of which layer 2 with its 10 building phases has been exposed extensively (Fig. 2). The intra site settlement pattern shows three functionally separated areas: the dwelling area in north; the ritually functioning buildings in southwest and a surrounding wall and additional rooms in east.

Aşıklı Höyük exhibits a rich obsidian industry. The finds indicate that obsidian arrived to the site in form of blocks or tablets where the whole process of knapping took place (Abbès *et al.* 1999). The cores are nearly totally bipolar with naturally carinated or crested backs (Fig. 3, 4). The industry yields a large number of blades of different morphologies obtained by bipolar debitage (Fig. 4: 2-6).

Arrowheads are executed mainly on central blades. They are poorly represented forming only 0.8% of the retouched pieces. They display chiefly two coexisting typological forms: two shouldered arrowheads (53%) and one shouldered arrowheads (44 %). Pressure flaked oval arrowheads (3 %) were only found as surface finds (Yıldırım 1999). One shouldered arrowheads display tangs formed by abrupt retouch on one side thus forming a single shoulder (Fig. 5: 1-4). The tip is rarely axial, more often it is more or less oblique. Two shouldered Byblos points exhibit various types of tangs: they are mostly formed by direct abrupt retouch on each side (Fig. 5: 6-8), but tangs formed by alternate abrupt retouch (Fig. 5: 6) and inverse semi-abrupt or low retouches do also exist. Generally the tip is axial. As stated above pressure flaked points are only found on the surface thus belonging to the eroded upper layers. These points are unifacially retouched with invasive or covering low retouches (Fig. 5: 9-12). One example displays a tang (Fig. 5: 10) and one bears inverse retouch on the proximal part (Fig. 5: 9).

The chemical analyses were applied to 38 samples from Aşıklı Höyük. 15 samples were analyzed by the Orléans laboratory and of these 12 samples were attributed to the Kayırlı source and 3 to the Nenezi Dağ source (Gratuze *et al.* 1994). 23 samples were analyzed by Berlin laboratory and 19 were attributed to Göllü Dağ, 3 to Bozköy and 16 to Kömürcü (the distinction between Kayırlı and Kömürcü obsidians was not determined), 2 to Nenezi Dağ and 2 to an unknown source (Schneider poster presentation, Archaeometry 1994, Ankara).

Musular

Musular is a Neolithic site, located in the same region, on the West of the Melendiz river, across Aşıklı, ca. 400 m in distance (Özbaşaran 1997).

Two years of excavations at the site revealed two main settlement phases (Fig. 6). The earliest, being a Pre-Pottery Neolithic settlement lies directly on the bedrock and in some architectural aspects has similarities with the southwestern ritual buildings of Aşıklı Höyük. The next phase, Pottery Neolithic (?), is represented by a single building complex with four rooms, exposed in its foundation level.

Chipped stone industry of Musular is represented largely by obsidian. Flint is present in form of imported blades used as sickles. The obsidian industry has not been analyzed yet, therefore the difference between the pottery and the pre-pottery phases is not clear. The preliminary observations of about 5,000 pieces indicate that it is primarily a blade industry where bipolar technology was used. The relative rarity of cortical flakes may suggest that the raw material was brought to the settlement in form



Fig. 2: Aşıklı Höyük, plan of Layer 2 (Esin, 1998)

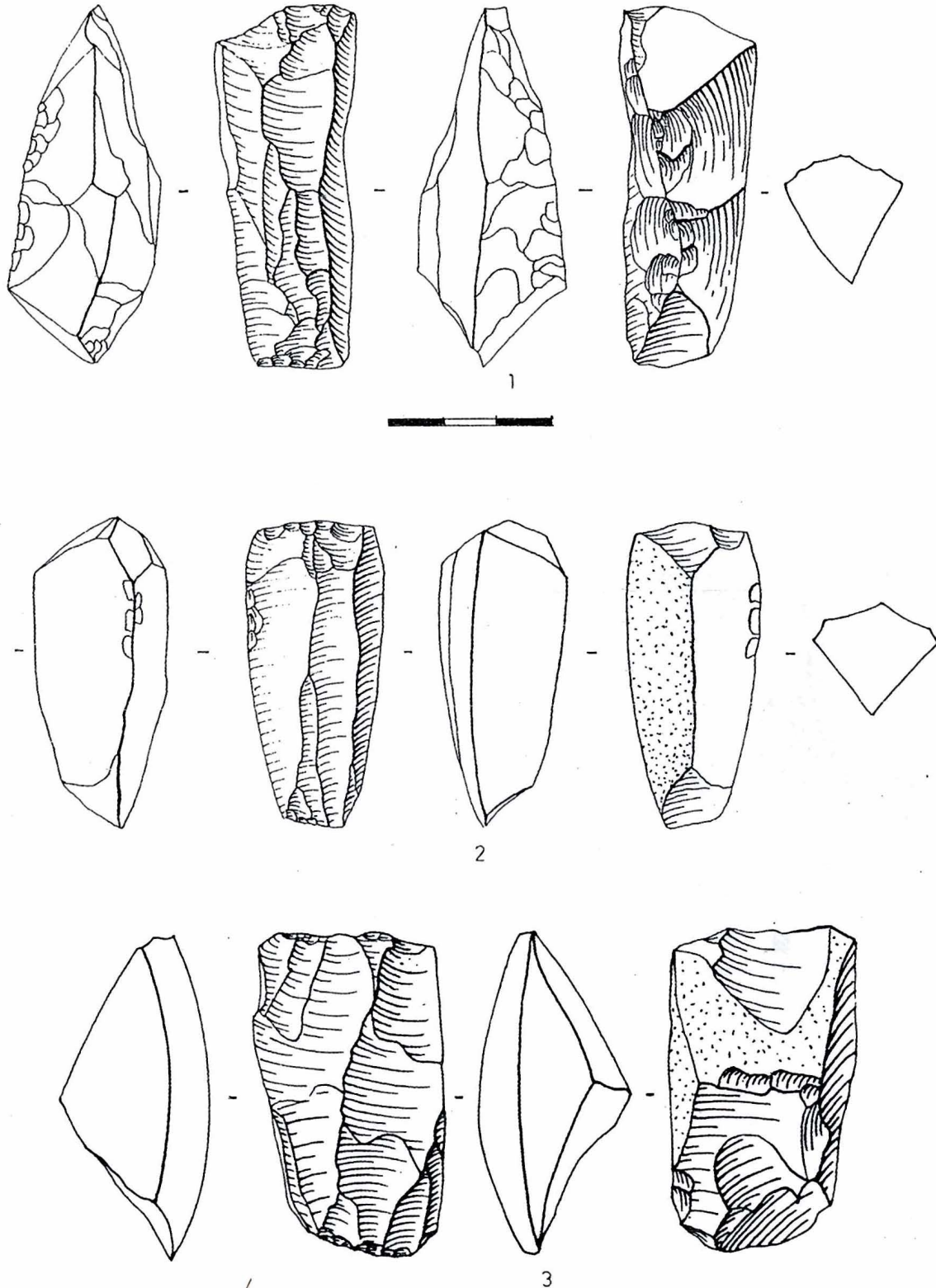


Fig. 3: Bipolar cores of Aşıklı Höyük (Inked by Der Aprahamian)

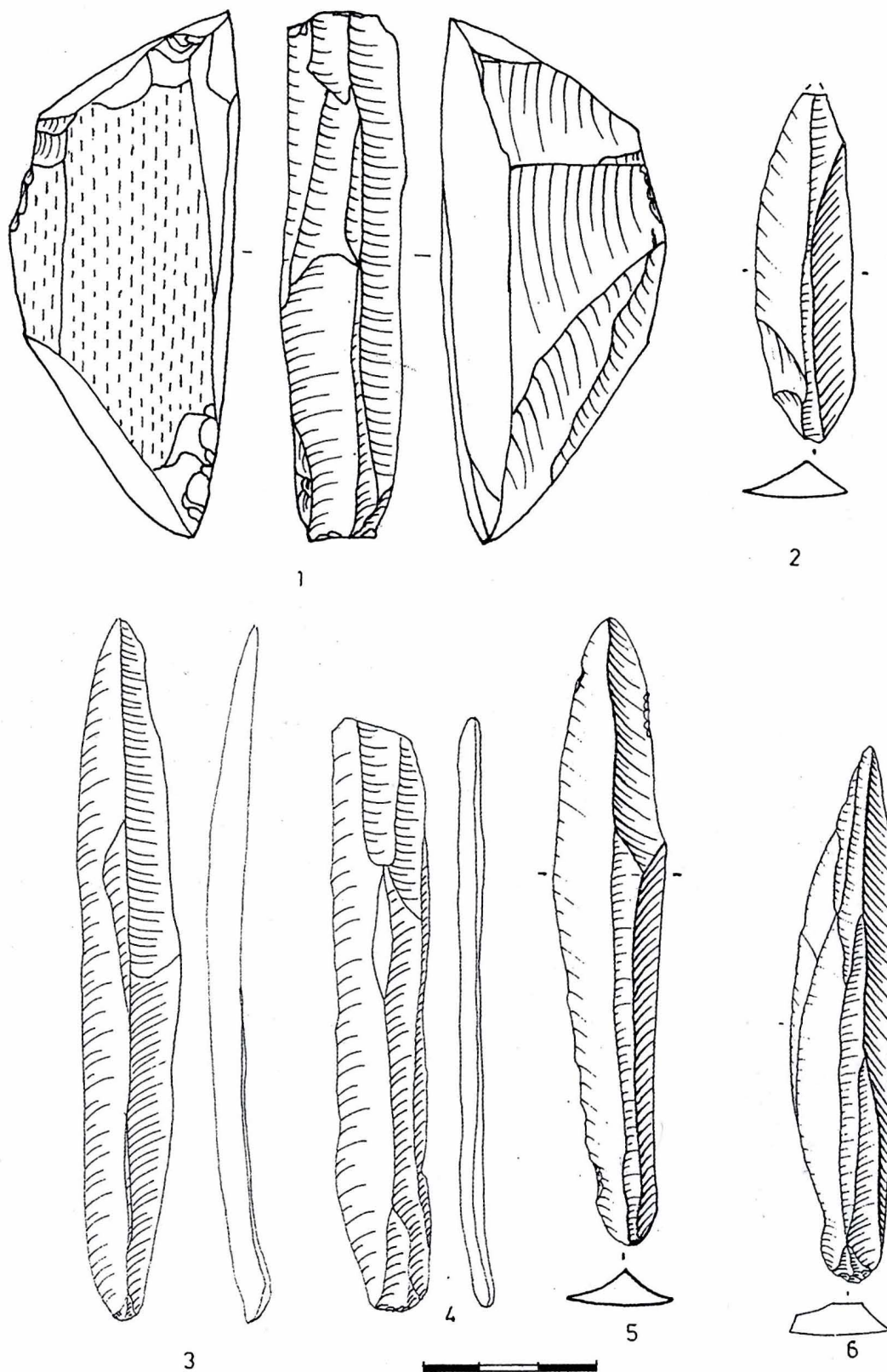


Fig. 4: Bipolar cores and blades of Aşıklı Höyük (n°2 inked by Der Aprahamian)

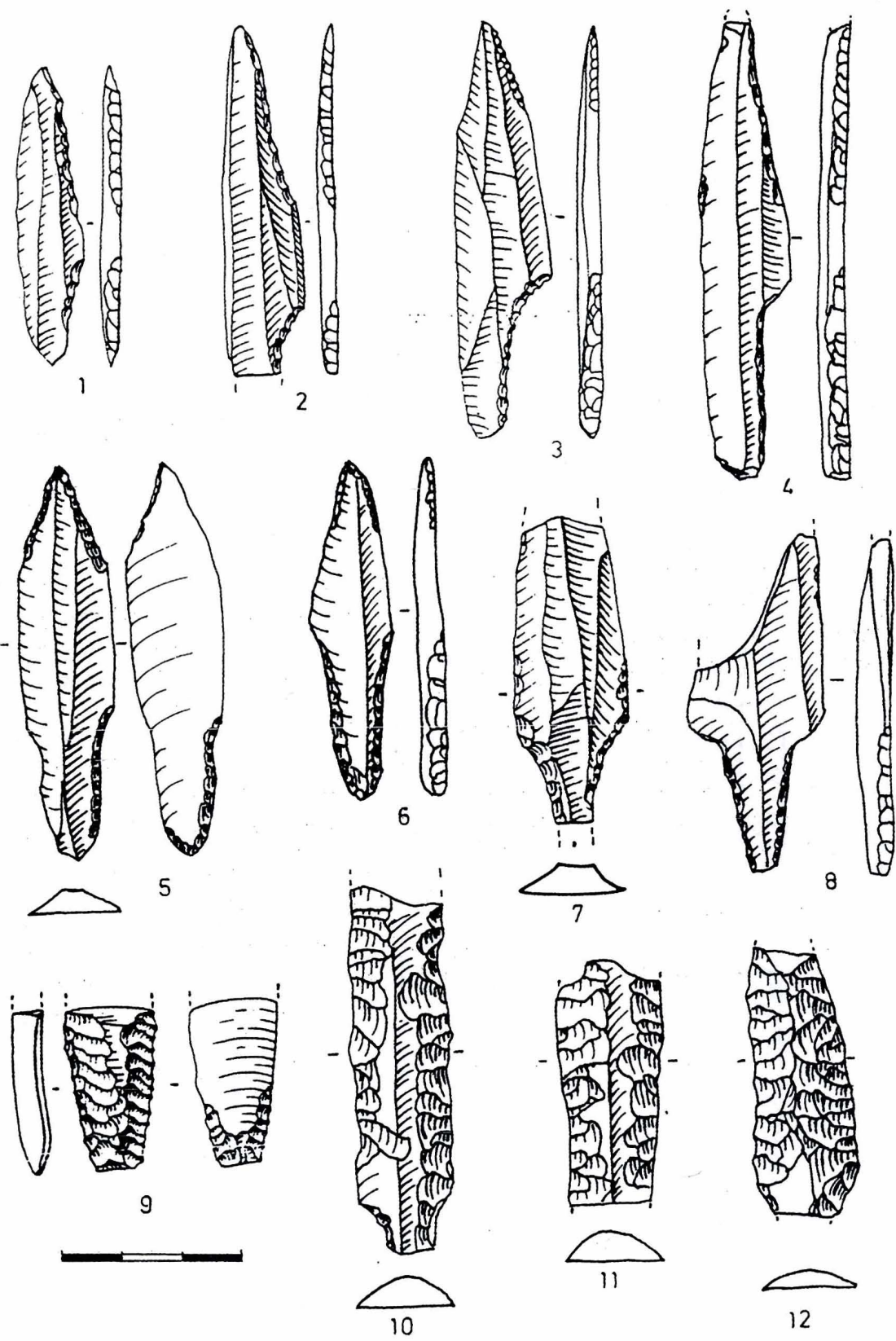


Fig. 5: Aşıklı Höyük arrowheads (n° 1,2,3,7,9 inked by Der Aprahamian)

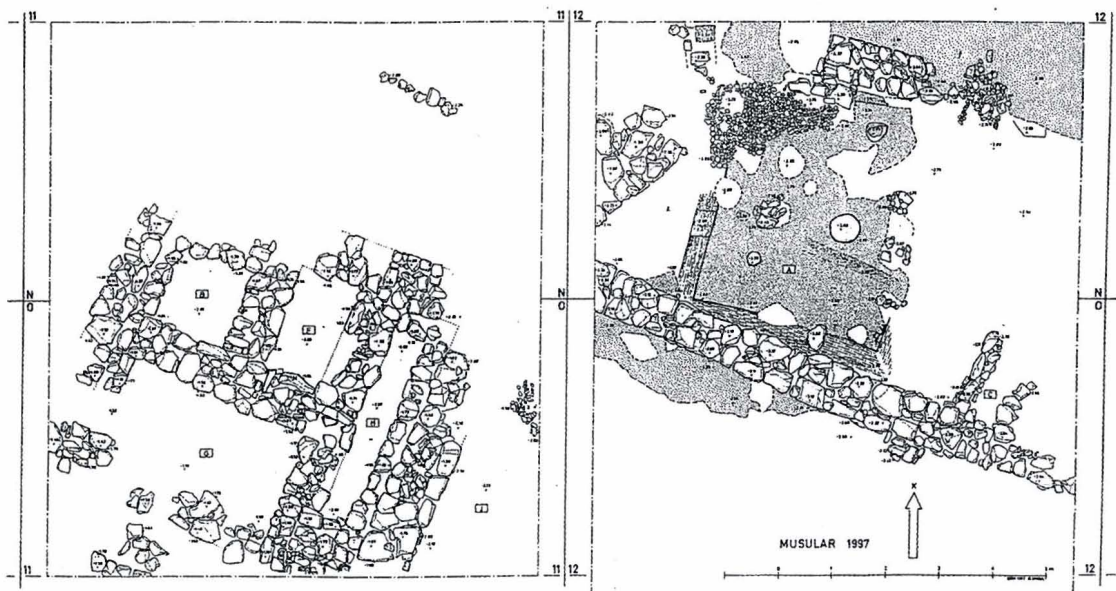


Fig. 6: Musular: prepottery and pottery phases.

of roughed out blocks. On the other hand, the abundance of thin flakes of shaping indicates that the preforms of the cores were realized in the settlement. The cores are few (Fig. 7: 5) and found in exhausted states however, the presence of crested blades, tablets, lateral blades and central blades, especially upsilon blades (Fig. 7: 6), points out the bipolar tradition. This assumption is supported by the surface finds. These finds yield a certain number of very regular bipolar cores. All of them are broken and this fracture appears on the same level of the cores (Fig. 7: 1, 3). These cores present a strong resemblance to the Kaletpe cores of Kayırlı. Besides macroscopic observation of the obsidian quality (highly transparent brownish gray) which is typical of the Kayırlı source, these cores bear relics of natural surfaces as the ones found at Kayırlı. Furthermore, the surface finds yield numerous blades which are probably products of these cores (Fig. 7: 2, 4). This assumption has to be verified in the future.

Arrowheads are quite numerous in the Musular assemblage (4.6% of the retouched pieces). Musular arrowheads are mostly unifacially pressure retouched (Fig. 8: 7-10). Some bear also inverse retouch limited to the proximal end (Fig. 8: 7, 10) and one example inverse invasive retouch applied to one side (Fig. 8: 8). Two shouldered arrowheads of Byblos type do also exist but in smaller quantities (Fig. 8: 1-6). The tangs are formed by abrupt retouch on each side (Fig. 8: 1, 3, 5, 6), some of them have also inverse low retouche (Fig. 8: 1, 5) whereas some are only inversely retouched (Fig. 8: 2, 4).

Surveyed pre-pottery neolithic sites

Recent surveys pointed the presence of several Pre-Pottery Neolithic sites of which three attract especially attention: Acıyer, Yellibelen and Sırçan Tepe (Gülçur 1995a & b).

Yellibelen is a slope settlement situated very near to Musular (Fig. 1). Surface finds yielded a rich obsidian industry with a bipolar blade production (Balkan-Atlı 1998). Arrowheads are quite numerous with two types: tanged points as Byblos and unifacial pressure flaked points. Tanged points are two shouldered where the tang is formed by steep short retouch (Fig. 9: 4, 5). Pressure flaked points are oval with unifacial pressure retouch. The retouch may be oblique covering or invasive (Fig. 9: 1, 2). Some examples show retouch limited to the proximal part on the inverse face (Fig. 9: 1). Some examples bear the pressure retouch on the proximal part (Fig. 9: 3).

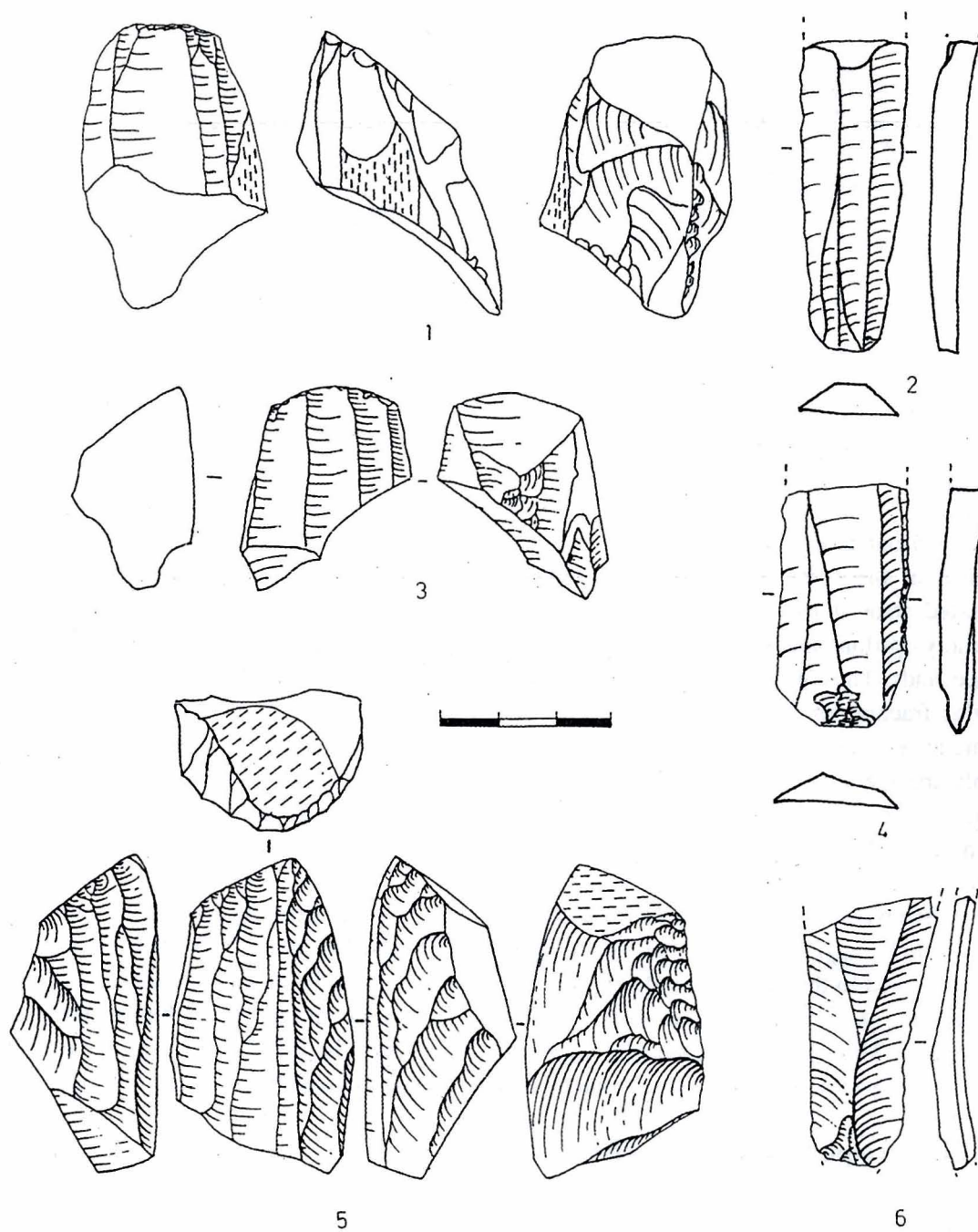


Fig. 7: Bipolar cores and blades of Musular (n° 5 and 6 drawings by Der Aprahamian)

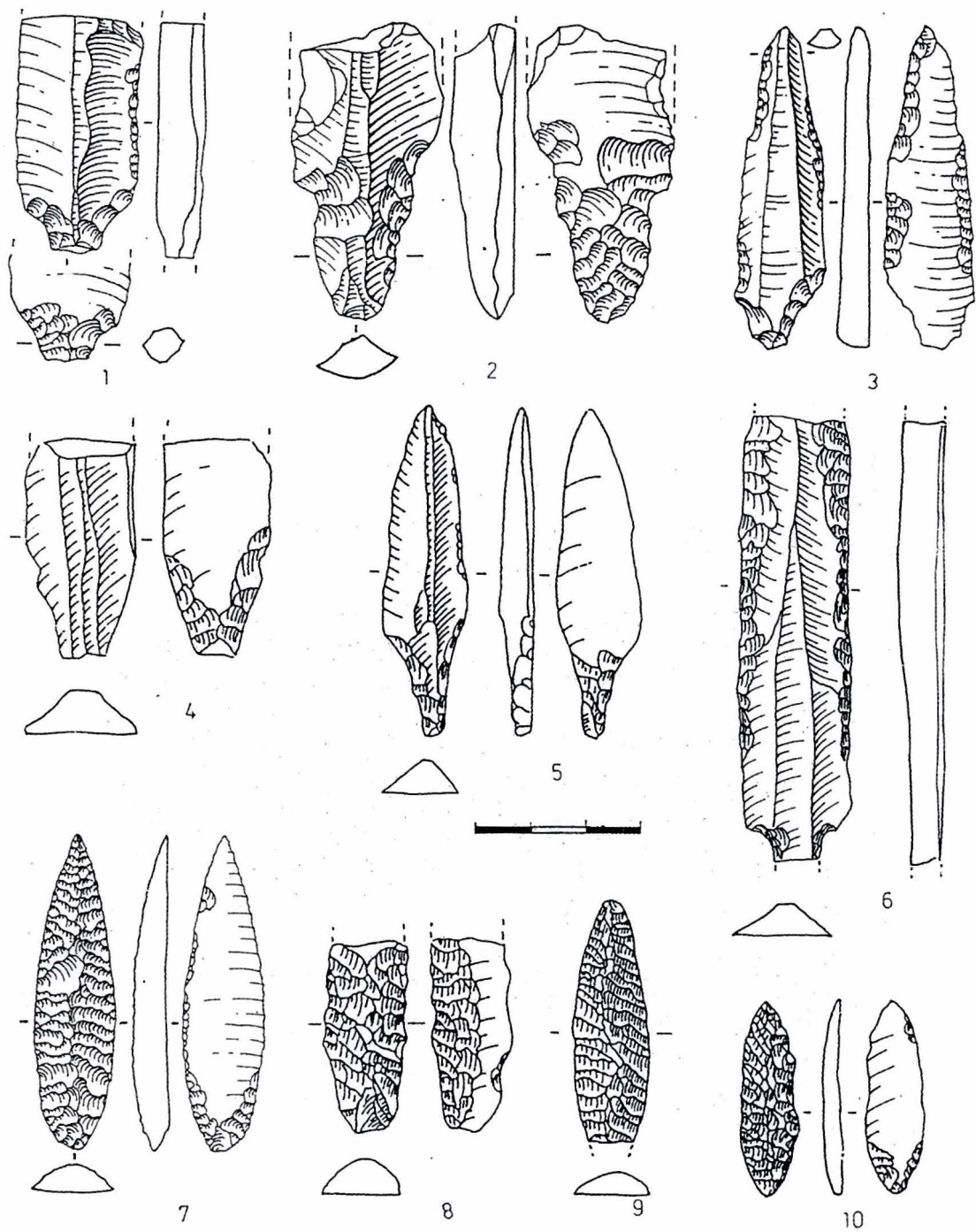


Fig. 8: Musular arrowheads (n° 1-3 and 7 drawings by Der Aprahamian)

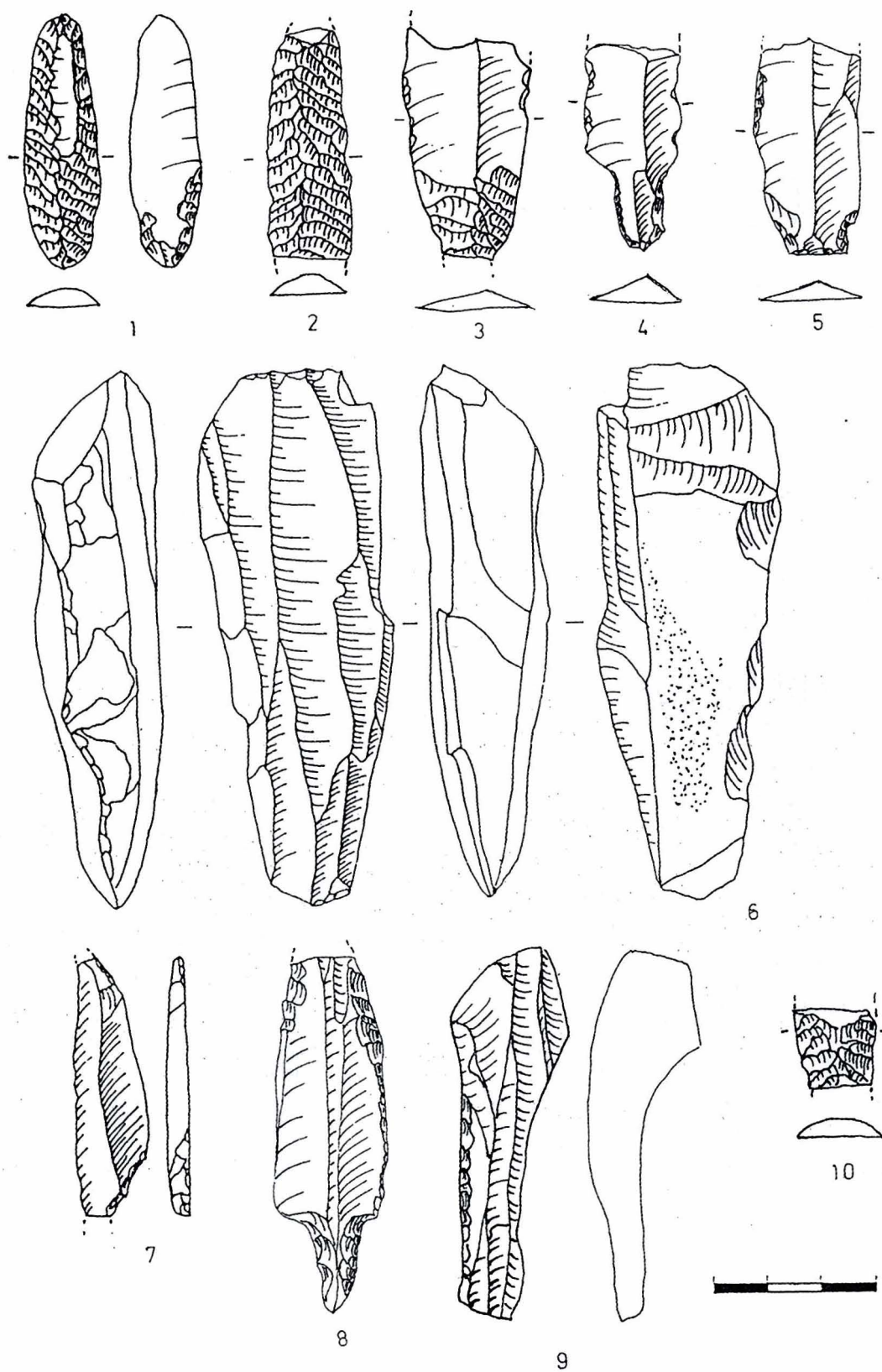


Fig. 9: Yelibelen: 1-5; Acıyer 6, 7; Sırçan Tepce: 8-10.

Acıyer is located in the district of Aksaray, in the village of Ağzıkarahan (Fig. 1). The obsidian surface finds are very homogeneous exhibiting an exceptional similarity to the Aşıklı Höyük industry (Balkan-Atlı *ibid*) The debitage products and the cores indicate the same blade production as at Aşıklı Höyük (Fig. 9: 6). The arrowheads found are quite few and enter to the category of one shouldered arrowheads of Aşıklı Höyük. They are executed on central blades, the tip is modified with semi-abrupt oblique retouch on one side and the tang is formed by abrupt retouch on one side (Fig.9: 7).

Sırçan Tepe is also located in the Aksaray district, situated more to the North of the sites mentioned above (Fig. 1). Debitage products show a bipolar blade production (Fig. 9: 9). The arrowheads display two categories: two shouldered arrowheads with a tang formed by abrupt retouch on both sides (Fig.9: 8) and unifacial pressure flaked ones (Fig. 9: 10).

Raw material survey

As seen above, obsidian constitutes the main raw material for the chipped lithics. Considering this, an obsidian research project was undertaken in Cappadocia. The aim was to follow this raw material from the models of its acquisition at the source areas to its use as finished items at the settlements. The project was based on a multi-disciplinary approach combining three disciplines: geology and geomorphology, geochemistry and archaeology.

The archaeological approach linked several goals: the search for corresponding workshops or knapping areas near the obsidian sources; the study of the workshop material to conceive the knapping strategies; the coordination of these workshops with the prehistoric settlements; the diffusion patterns from the sources and workshops to the regional and distant settlements. The survey was concentrated around Göllü Dağ (known as Çiftlik obsidians) and Nenezi Dağ volcanoes that produced obsidian (Fig. 10).

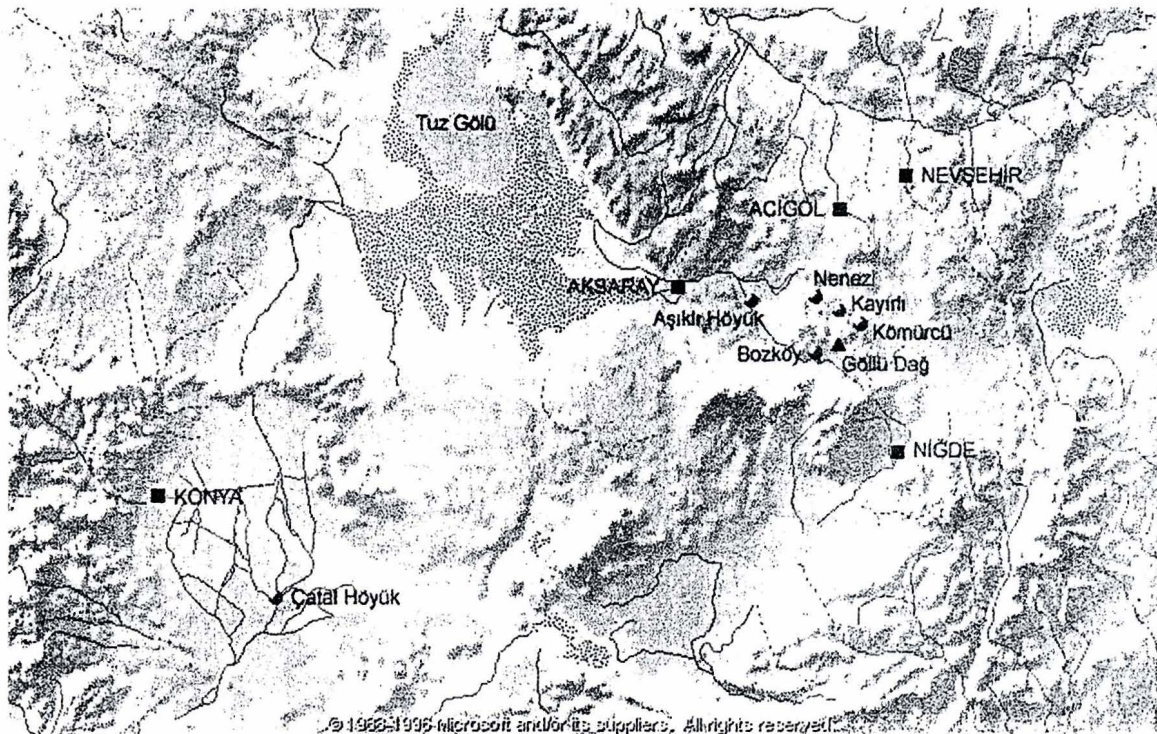


Fig. 10: Map of obsidian sources and workshops (composed by G. Duru)

Nenezi Dağ

Nenezi Dağ is a big rhyolitic dome situated east of the sites mentioned above. It has an isolated situation compared to other volcanoes and it dominates the plain with more than 500 m. On its western

flank exists an important flow of obsidian with perlites. Obsidian is generally black, but locally red or bluish gray obsidian is also present (Poidevin 1998).

On the western side, on the lower of plateau of the Nenezi Dağ a workshop exists yielding big numbers of very dense knapping products. Eroded obsidian artefacts are also found on slopes, and on the surrounding fields at the base of the dome.

Obsidian artefacts consist of debitage products, especially cortical flakes, cores, bifacial preforms and bifacially retouched oval points (Fig. 11:2). The cores are predominantly uni-directional and pyramidal with flat or cortical backs. Bi-directional cores are fewer including short bipolar cores with crested backs (Fig. 11:1).

The chemical analyses of various samples displaying the variations of colors of Nenezi obsidians, coming from the western flank and the dome, were realized by different laboratories (Poidevin *ibid*). The results show that all these samples have homogeneous chemical compositions. The comparison of these analyses with the chemically analyzed artefacts from the settlements indicates that Nenezi Dağ obsidian was used as a source by the Aşıklı and Çatal inhabitants. Among the 35 analyzed samples of Aşıklı 5 samples are attributed to this source (Chataigner 1998). Besides, the presence of bi-directional cores with crested backs very similar to those of Aşıklı supports this source distribution. Very few samples, from surface finds, have been analyzed from Çatal Höyük and among these 10 samples 4 are attributed to Nenezi Dağ. The bifacially retouched oval points found at this workshop have strong similarities with those of Çatal Höyük (Balkan-Atlı 1994a, Bialor 1972 and Conolly 1996).

Göllü Dağ

Göllü Dağ is one of the most important obsidian sources in Cappadocia. It is situated on the North of the Çiftlik-Gölcük road. It is a strata-volcano with about 12 km in diameter with its highest point, Büyük Göllü, at 2143 m high (Poidevin 1998). Six obsidian sources are known from Göllü Dağ and they are essentially dome-flow obsidians: Kayırlı, Kayırlı -Village, Sırça Deresi, Bozköy, Kömürcü and Gösterli. Chemically, they form two main groups with distinctions in each group: East Göllü Dağ with Kömürcü, Kayırlı and Sırça Deresi and West Göllü Dağ with Kayırlı -Village, Gösterli and Bozköy (Poidevin *ibid*). Two of these sources had workshops nearby that yielded pre-pottery blade productions: Kayırlı and Kömürcü.

Kayırlı

Kayırlı is a vast dome-flow of 1700 m of altitude. The flow is very thick where successive bands of obsidian and perlite are easily seen. The obsidian is shiny, transparent brownish black presenting a high quality for knapping (Der Aprahamian, pers. com.). Obsidian is abundant and accessible at this workshop yielding alternative blocks for the knappers' option.

The workshop yielded a considerable number of roughouts, bifacial rectangular and almond shaped preforms, pyramidal unipolar cores with a natural or flat back, bi-directional cores similar to Aşıklı ones (Fig.12: 2, 3).

The workshop also yielded standardized unipolar and bipolar cores. The unipolar cores have centered crested back and plain and very oblique striking platforms. The negatives of the extracted blades are parallel and very regular which might indicate the pressure technique (Cauvin & Balkan-Atlı 1996). The bipolar cores (Kaletepe naviform cores) are long and thin with triangular sections (Fig. 12: 1). The back crest is often centered and regular and sometimes natural surface is seen on the lateral sides. This might be the result of the suitable forms of the Kayırlı obsidian in its natural state. The debitage surface often shows accidents of hinge fracture (Balkan-Atlı & Der Aprahamian 1998).

As mentioned above, the chemical analyses of the Aşıklı obsidians indicate Kayırlı as one of its raw material procurement sources. The presence of bipolar cores similar to those of Aşıklı supports this source indication. Furthermore, Kayırlı presents itself also as the source /one of the sources for Musular for the reasons mentioned (*supra*).

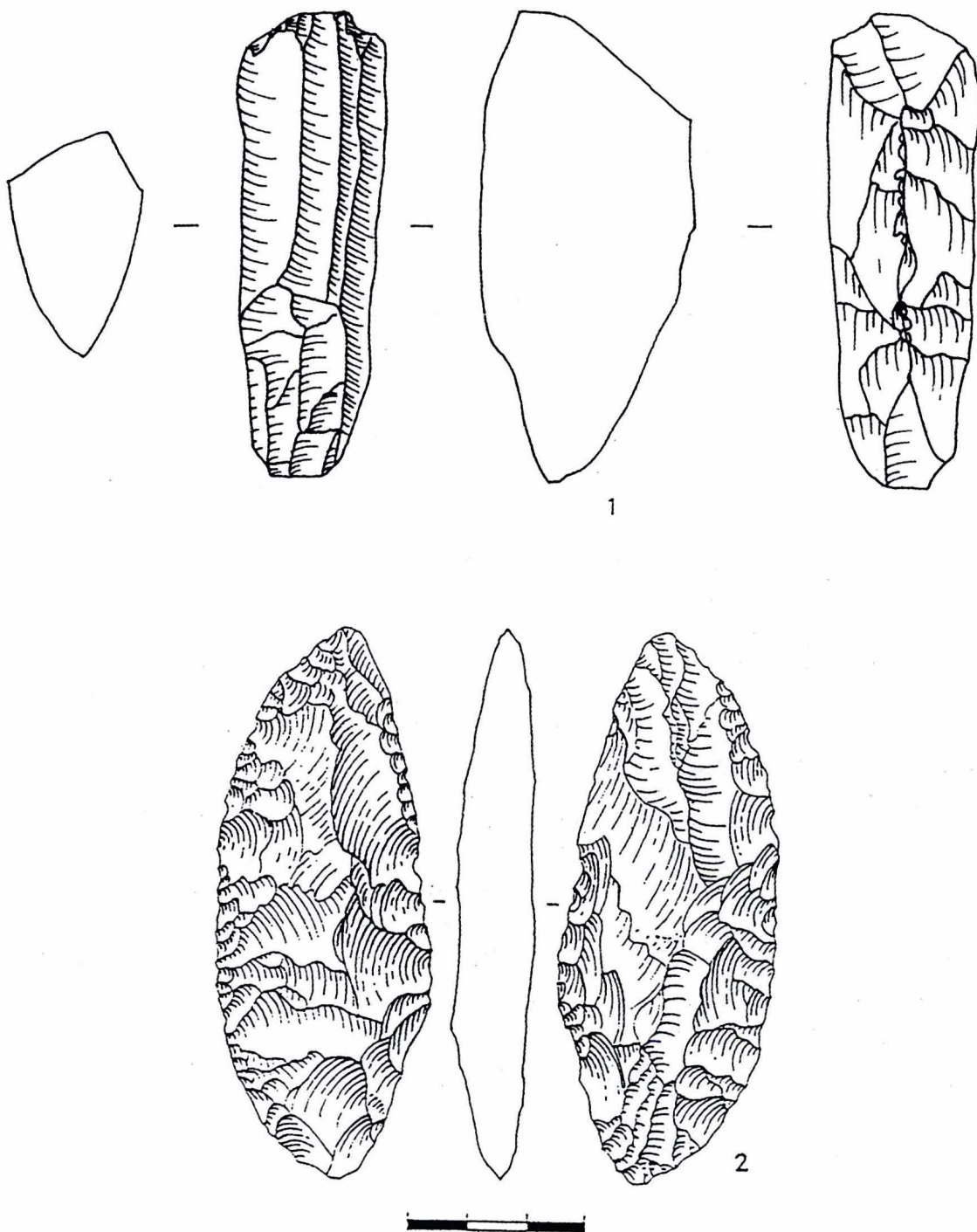


Fig. 11: Nenezi finds (Drawings by Der Aprahamian)

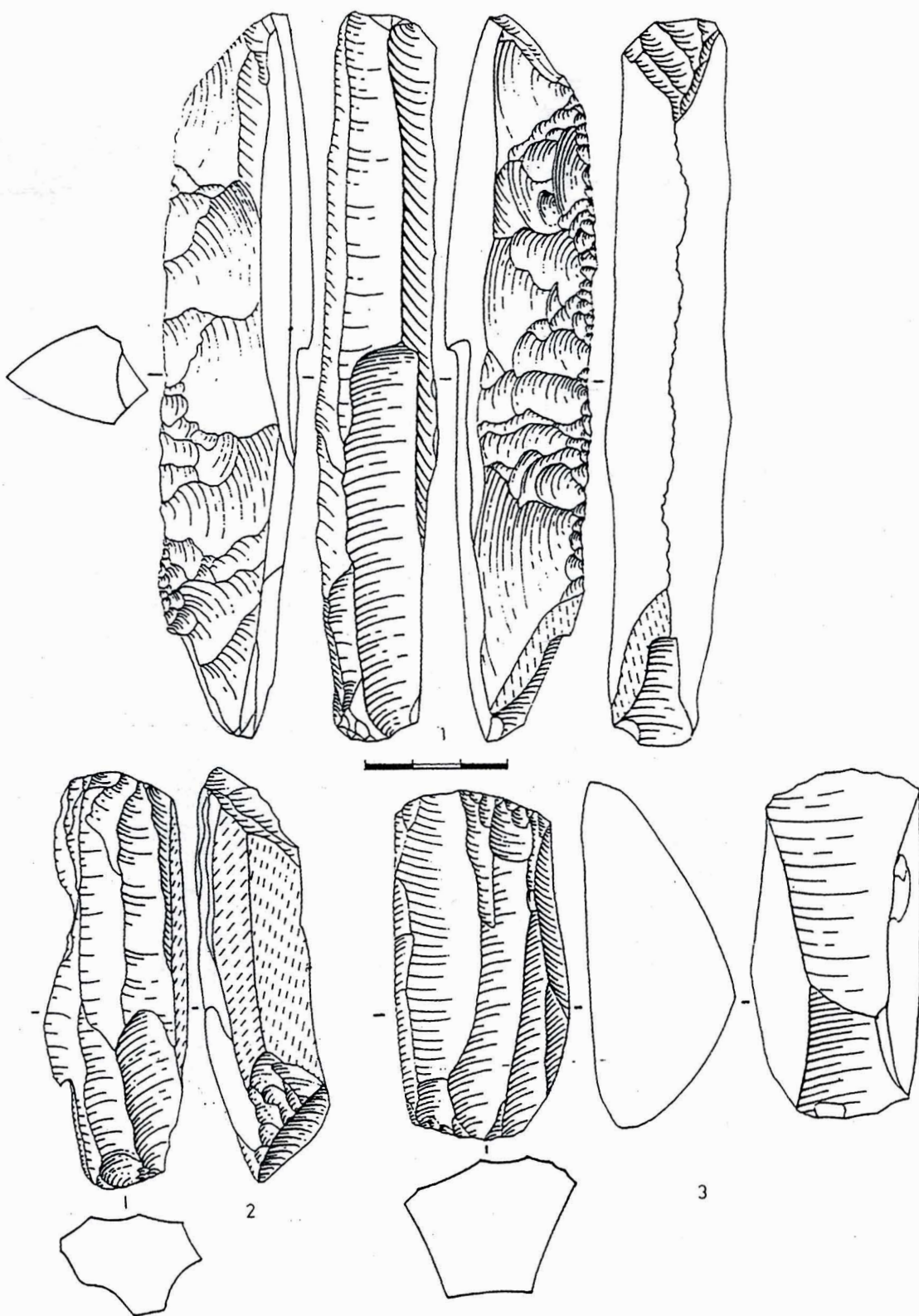


Fig. 12: Kayırlı finds (Drawings by Der Aprahamian).

Kömürcü

Kömürcü is the most spectacular and the best known of the obsidian sources of Göllü Dağ with its abundant outcrops and several workshops or knapping areas attached to the sources. This obsidian is the result of one eruption of the volcanic system of the East Göllü Dağ (Poidevin 1998). Obsidian flows are NE-SW oriented and they can be observed in eroded areas. Along the obsidian reaches several knapping spots with scattered artifacts were observed (Cauvin & 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 cores and bifaces.

Kaletepe workshop excavation

Kaletepe is one of the obsidian workshops of the Kömürcü source. It is an exceptional workshop covering a large area (4 ha) with very dense obsidian artifacts. It is located on the North of the Kömürcü village at an altitude of 1560 m on a supervising position. It is an approximately flat plateau of a rhyolitic dome covered by ignimbrites. Obsidian is present in forms of elongated blocks which are visible in the ravines that cut the plateau.

Kaletepe workshop yielded obsidian artefacts of exceptional quantity displaying a variety of neolithic products belonging to different processes and traditions: cores of different types, bifacial preforms and debitage products (Balkan-Atlı *et al.* 1998, Binder & Balkan-Atlı, this vol.). Among the cores, naviform cores, named as Kaletepe cores, particularly attract the attention. The principal purpose of these cores is to obtain long, regular pointed blades most probably to be utilized as blanks for projectiles. Kaletepe can be considered as a specialists' workshop where an intensive production of regular long pointed blades designated to exportation took place. Neither these cores nor their products are yet recovered at the prehistoric settlements cited above, except Musular surface finds. However these seem to be related to the Kayırlı workshop (*supra*).

Conclusion

As seen above, obsidian seems to be the only raw material (with the exception of some flint at Musular) used in the Pre-Pottery Neolithic in Central Anatolia. Anyway with the presence of various obsidian sources in the region, this is expected. All the sites display a blade technology, however we cannot yet differentiate their technological styles, especially for the surveyed ones.

As far as we can determine the two excavated sites, Aşıklı and Musular, show different *chaînes opératoires*. Aşıklı Höyük exhibits a domestic industry from the arrival of raw material to the use and discard of tools; whereas Musular probably receives obsidian in form of previously preformed cores and maybe in form of blades (the rarity of cores is astonishing). Furthermore, the surface finds indicate a *chaîne opératoire* similar to the Kayırlı workshop. This has to be controlled with the finds *in situ*.

Kaletepe naviform technology has no parallels neither with these two sites nor any site in Central Anatolia. Whereas this technology has clear parallels with Levantine PPNB (Binder & Balkan-Atlı, this vol.).

Typologically, we can distinguish three types of arrowheads: one shouldered arrowheads (Aşıklı Höyük, Acıyer), two shouldered, Byblos, arrowheads (Aşıklı Höyük, Musular, Yelibelen, Sırçan Tepe) and unifacially pressure flaked oval arrowheads (Aşıklı Höyük, Musular, Yelibelen, Sırçan Tepe). These two last types are also known from Can Hasan III (Ataman 1988) and Suberde (Bordaz 1970)

Chronologically, we can suggest that pressure flaked arrowheads are of a later date than the one shouldered ones. Byblos points show a longer duration, first contemporary with the Aşıklı points than with pressure flaked ones.

The assumptions presented here are based on recent finds. Hence, the relation between the types of arrowheads and blades types and blade production is not clearly defined yet. Further examination is necessary to acquire a better understanding of the Pre-Pottery Neolithic projectiles of Central Anatolia.

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