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Obsidian Use during the Level 4 occupation at Aşıklı Höyük

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THE EARLY SETTLEMENT AT AŞIKLI HÖYÜK

Essays in Honor of Ufuk Esin

Mihriban Özbaşaran Güneş Duru Mary Stiner



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OFFPRINT



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Edited by
Mihriban Özbaőaran, Güneő Duru, Mary Stiner



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Aşıklı Höyük Kazı ve Araştırma Projesi

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Preface

Aşıklı Höyük, 26 years after it was first discovered, came under excavation by a large group of scholars from Istanbul University led by Prof. Ufuk Esin, then the chair of the Department of Prehistory. Results obtained from each field season contributed not only to our knowledge of the cultural geography of the region, but also to increasingly pluralistic explanations of Neolithization.

We began organizing a new program of investigation at the site in 2006, and we commenced new excavations in 2010 with the aim of pursuing a more detailed understanding of trends first identified by Prof. Esin and exploring more deeply what remained to be learned about Aşıklı. We attempted to understand the individual actions and “snapshots” from the daily life of the inhabitants with our revised approach and methodology. The new multi-disciplinary project supported by researchers and scholars from all over the world not only enriched the intellectual environment and helped to refine earlier interpretations, but also allowed us to put forward new research questions and approaches. The revival of the project has also allowed younger generations to be trained in many new aspects of archaeology.

Our recent investigations have focused mainly on the early habitation at Aşıklı. This work contributes to the ongoing discussions on the Neolithization of Central Anatolia, together with new data from the sites of Pınarbaşı and Boncuklu on the Konya Plain and Balıklı in Cappadocia. Though mentioned only briefly in the present volume, we have also carried out parallel projects in experimental archaeology, cultural heritage management, and public archaeology in connection with the archaeological research. Other publications will follow the present volume on the results gained from these sister projects.

Here it is our privilege to forward the first results of our work at Aşıklı in a volume dedicated to Prof. Esin. We hope it will further stimulate Neolithic research in the region. The year 2019 represents the 30th anniversary of the start of the excavations at Aşıklı. After three decades of fieldwork, we are proud to offer unprecedented information on the early inhabitants of Aşıklı. We owe much thanks to all the former and current members of the project. However, our deepest gratitude goes to esteemed scholar and mentor, Ufuk Esin, from whom we have inherited not only the opportunity to continue archaeological research at Aşıklı but also the many scientific approaches and ethical values she fostered. We present this book to her memory with respect, love, and longing.



Obsidian Use during the Level 4 Occupations at Aşıklı Höyük

Laurence ASTRUC^a

(with artifact illustrations by Michel GRENET^b)

Introduction

Aşıklı Höyük is located near the obsidian sources of the volcanic complex of Göllü Dağ, Nenezi Dağ and Acıgöl in western Cappadocia (Figure 1). It is the oldest Pre-Pottery Neolithic site of this region, with a chronological sequence of about a thousand years (8350 to 7350 cal BC) and stands out as the most detailed reference for the study of the process of Neolithization in Central Anatolia. Excavations were conducted between 1989 and 2004 successively by Ufuk Esin (Esin – Harmankaya 1999, 2007) and Nur Balkan-Atlı. The excavations were resumed using a revised methodology in 2010 under the direction of Mihriban Özbaşaran (2011a, 2011b, 2012; Özbaşaran – Duru 2015). The new excavation program focuses especially (but not exclusively) on the lower levels of the stratigraphic sequence. Complete recovery of the artifacts through a combination of systematic fine dry sieving and flotation permit us to reappraise the chipped stone industries of the site. Abundant in all excavated levels, the chipped stone artifacts were made from obsidian procured from outcrops within 25–30 kilometers of the site (see Kayacan – Altınbilek, this volume).

To date, most studies concerned with the Aşıklı Höyük chipped stone assemblages have focused on material from Level 2 (Abbès et al. 1999; Balkan-Atlı 1994a; Balkan-Atlı et al. 2001; Yıldırım 1999; Yıldırım-Balcı 2007, 2011a-b; Astruc et al. 2011). Geochemical analyses (Gratuze et al. 1994; Gratuze – Boucetta 2006) have shown that the Göllü Dağ and to a lesser extent the Nenezi Dağ outcrops were the main sources of raw material used at Aşıklı Höyük. The exploitation of Cappadocian obsidian for tools occurred as early as the Palaeolithic in the region (e.g., Kaletepe deresi 3; Slimak et al. 2008). Obsidian exploitation reached its peak during

^a Laurence Astruc, Researcher, CNRS/UMR 7041, VEPMO, email: laurence.astruc@gmail.com

^b Michel Grenet, UMR 5608, TRACES, m.Grenet56@wanadoo.fr

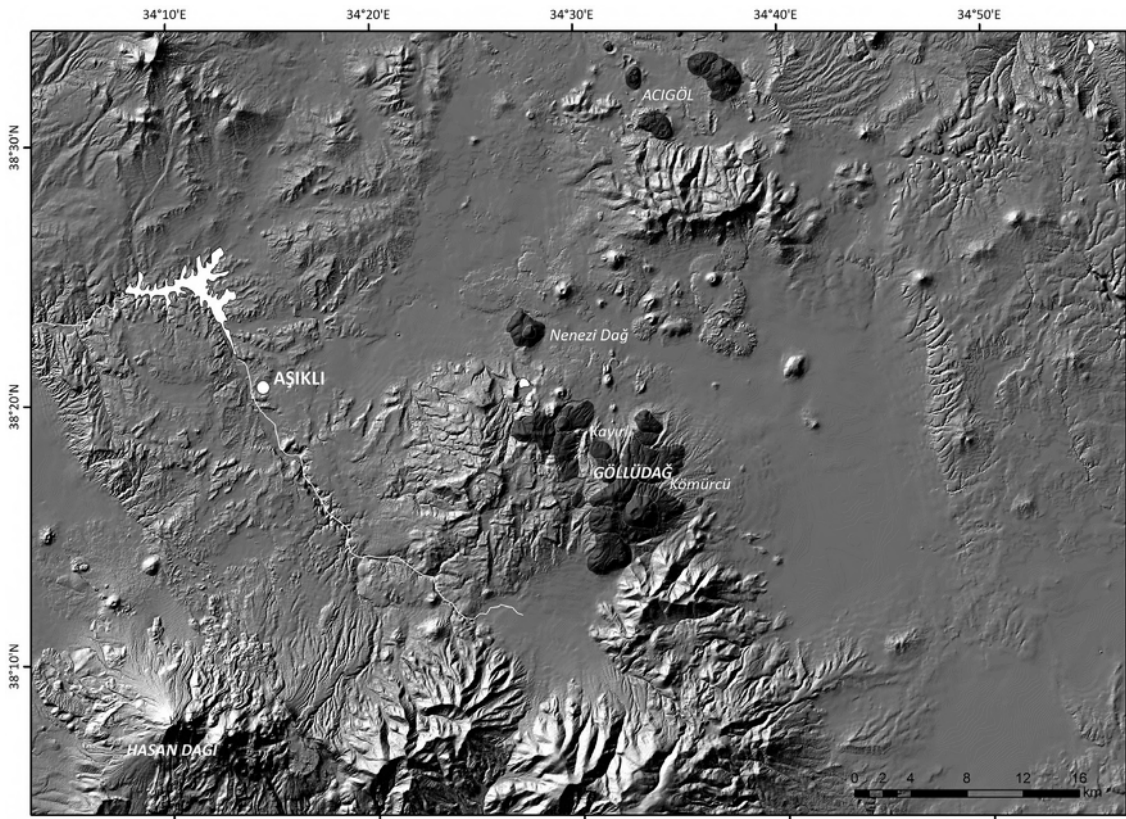


Figure 1. Location of Aşıklı Höyük and the obsidian sources (©K. Erturaç).

the Neolithic, when obsidian was being moved over very long distances in the Near East (e.g., Cauvin et al. 1998; Delarue 2007). Based on the large quantity of obsidian artifacts recovered at Aşıklı Höyük and the proximity of the settlement to the raw material sources, it has been suggested that Aşıklı could have functioned as a center of diffusion of obsidian (Özdoğan 1994). Technological studies do not support this hypothesis (Abbés et al. 1999), and the lithic industries studied from Level 2 are considered to be specific to the site. Since 2010, the excavations in Area 4GH have exposed much of Level 4 and the top of Level 5. This chapter examines the technology of manufacture and use of the obsidian industries that were excavated between 2010 and 2013 in Level 4, and which date to ca. 8400–8100 cal BC (Quade et al., this volume). This level is characterized by round-house architecture and includes buildings, outdoor features, working spaces, and middens.

Tool production

Here we present the main characteristics of the Level 4 chipped stone assemblage with regard to the acquisition of the raw materials, the modes of production and the typology of the artifacts. The presentation of the results of the use-wear analysis, in the second part of the paper, is based on these classifications.

Provenience of the raw materials

Nearly all of the artifacts were made on obsidian of very good quality. Macroscopic examination of the texture and color of the obsidian suggests that both the Göllü Dağ and the Nenezi Dağ outcrops were exploited. The Göllü Dağ outcrops, namely Kayırlı, predominate and Kömürcü was used secondarily. These preliminary observations ultimately should be confirmed by geochemical analyses (but see Balkan-Atlı et al. 2011; Binder et al. 2011; Kayacan – Altınbilek, this volume).

Flint is also present but it accounts for less than 0.1% of the assemblage. Flint is represented as chips of a yellow-brown, fine-grained material and two exceptional blade(let)s, one made from a light green fine-grained flint (Figure 4, specimen 8) and the other from a chocolate, fine-grained flint (Figure 7). The sources of these flint materials have not been identified.

Manufacture

The selection of raw material was based on the morphology of the obsidian blocks, which were brought to the village in the form of tabular blocks, small nodules and flakes. All products of the reduction sequences are found, indicating on-site manufacture of the tools. Chips that represent knapping debris are found in large quantities in the heavy residues from the flotation of sediment from all excavated contexts.

Obsidian was exploited for bladelets. There was no flake production *stricto sensu*; most of the flakes examined in this study are associated with the shaping and maintenance of cores. Several cores were also reworked, and amorphous blanks were produced. Bladelet extraction was performed according two different concepts. The main option was the exploitation of a surface. The second option involved the *débitage* at the edge of a flake or tabular block.

Débitage of a surface

The dominant method of *débitage* involves the exploitation of a surface. This reduction mode (e.g., Figure 2) associates with cores that have a maximum length of 70-90 mm and a maximum width of about 40 mm. The shaping of the blocks from which these cores were produced could be minimal. In this case, the rear side and the edge of the core often preserve portions of the natural surface. On the other hand, several cores with a postero-lateral crest were identified. These specimens show a flat back that was shaped by careful removal of transverse flakes. The most complete examples of these cores have a surface of *débitage*, with 3 to 5 bladelets extracted using a semi-turning mode.

Platforms were formed by removal of an opening flake (Figure 3, specimen 2). The method either took advantage of the naturally good morphology of the block or by the careful extraction of transverse flakes. Core dimensions vary but their widths give an idea of the original thickness of the core. The angle of the platforms was about 60°. Some opening flakes were also used as cores. In the latter case, a *débitage sur tranche d'éclat* or “burin-like method” was employed.

Some lateral blades preserve portions of natural surface and/or traces of shaping. Minimal core shaping and reshaping tends toward the production of irregular, twisted bladelets, and it alters the surface of *débitage* at the final stage of the exploitation of the core. On the contrary, skillful *cintrage* of the surface of *débitage* permits production of very regular bladelet shapes. The opening of a second surface of *débitage* on the rear side of the core has been observed on

some bladelets that bear the remnant of a crest on their central part. When this reduction method was conducted on thick flakes, the posterior lateral edges of the core were regularized as indicated by the shaping of two neo-crests from the ventral surface of the flake. These two posterior neo-crests were not extracted at the beginning of the reduction sequence. Only one neo-crest was extracted. The second one was left at the back of the core or knapped at the very end of the reduction sequence, using a turning or semi-turning mode.

This reduction method was applied on all shapes of raw materials. Three different procedures were employed: unidirectional, bidirectional with opposed reshaping (Abbès et al. 1999; Pelegrin – Kayacan 2010; Kayacan and Altınbilek-Algül, this volume), and bidirectional (Figures 4-5). The first option was the dominant one. It involved a unique platform, but sometimes a secondary platform was used for reshaping. There are also some examples of series of unidirectional bladelets that were extracted alternately from a main and a secondary platform. The cores that associate with this latter mode should not be confused with those worked bidirectionally and potentially related with the second procedure.

The second option involved removing a twisted distal flake in order to modify the convexity at this end of the core and avoid plunging. The extension of the flake on the surface of the core does not exceed much more than 1/3 of the *débitage* surface. The third option was only rarely used. It is only identified on exceptional bladelets that show a careful bidirectionality.

For these three reduction sequences, specific technical pieces can be listed as follows: opening blanks; core tablets (either plunging and thick or thin regular ones); anterior crests; neo-crest with a natural surface or the ventral surface of a flake; neo-crest in the course of *débitage*; axial blades that relate to the shaping of the sides of the core; under-crested bladelets; and opposed reshaping of the core.

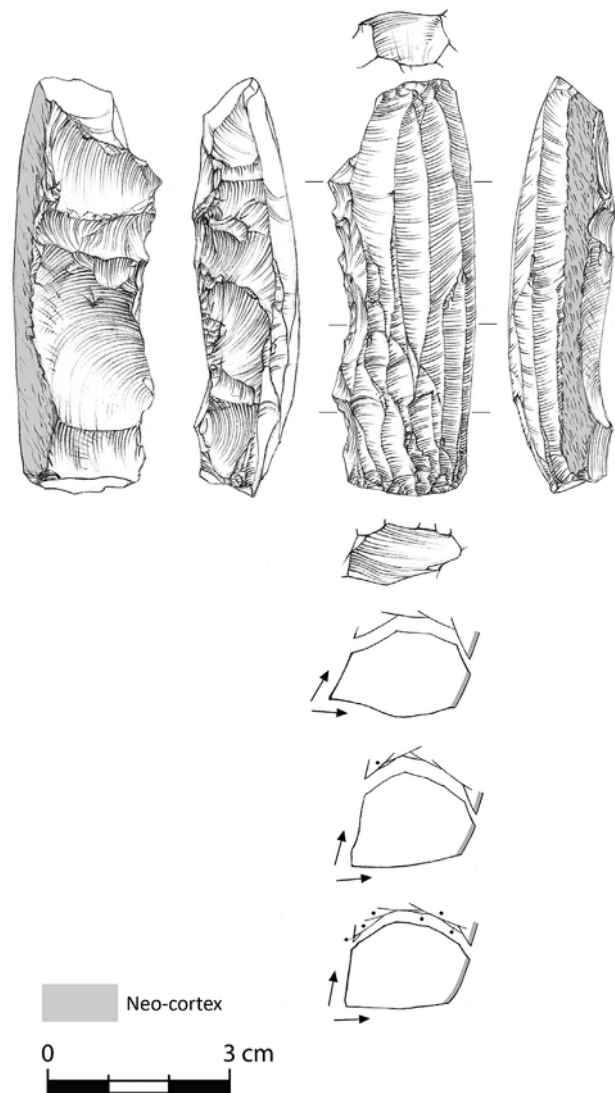


Figure 2. Typical core for *débitage* from a surface in Aşıklı Höyük Level 4. Core with a main and a secondary striking platform. The core was shaped by means of a posterolateral crest.

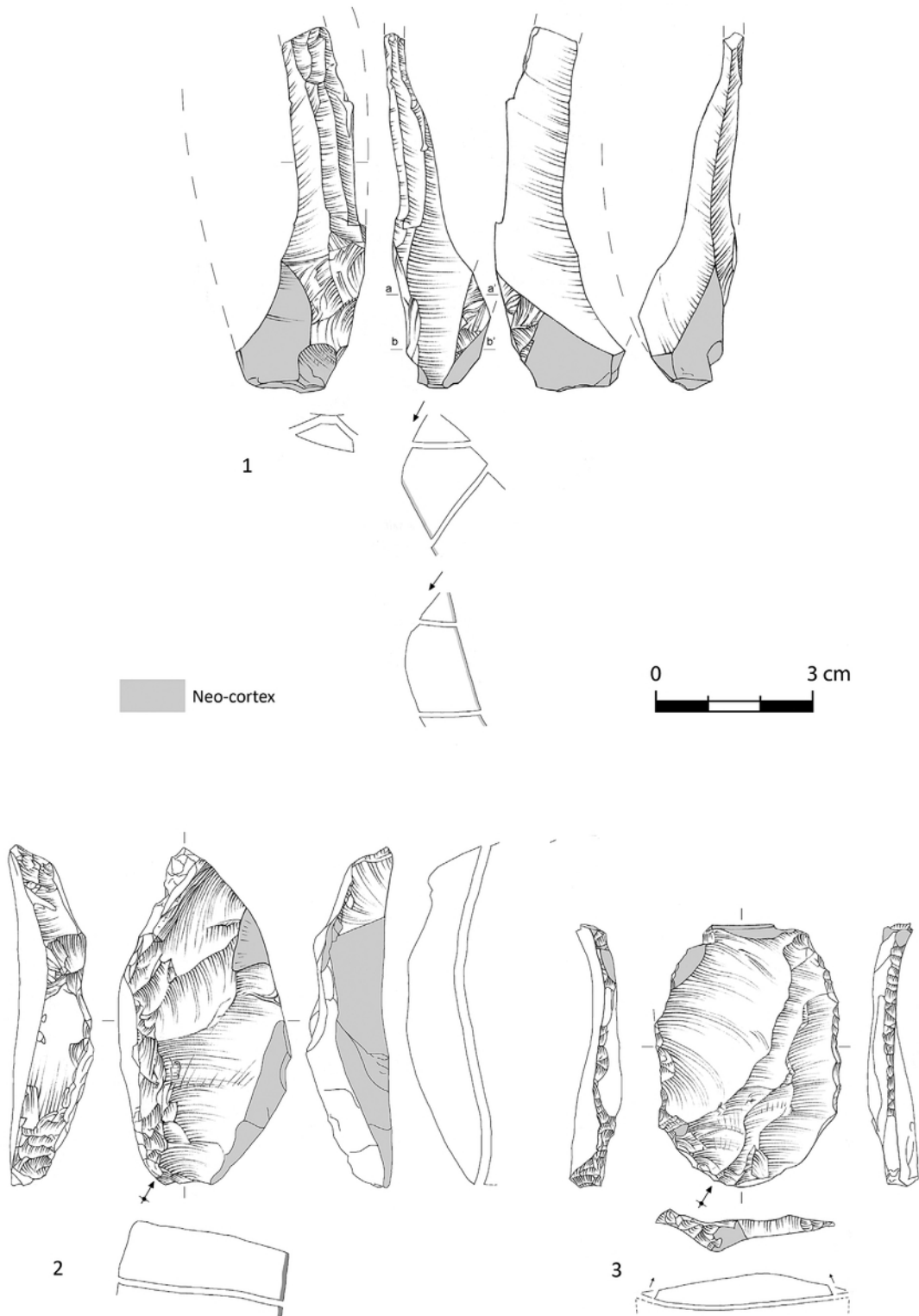


Figure 3. Knapping products: (1) plunging bladelet produced through burin-like reduction of a tabular block; (2) carefully shaped platform opening; (3) sidescraper on shaping flake.

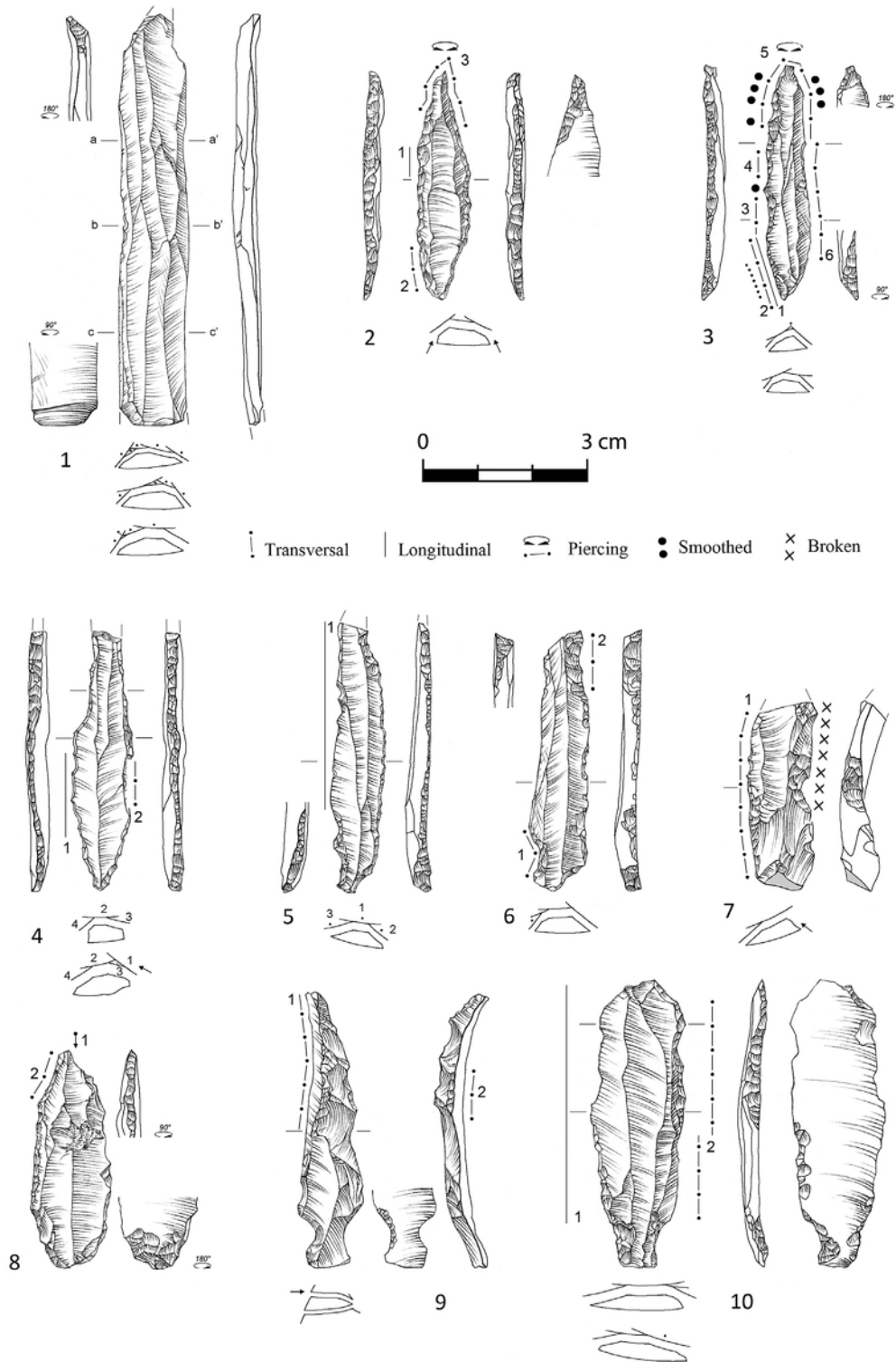
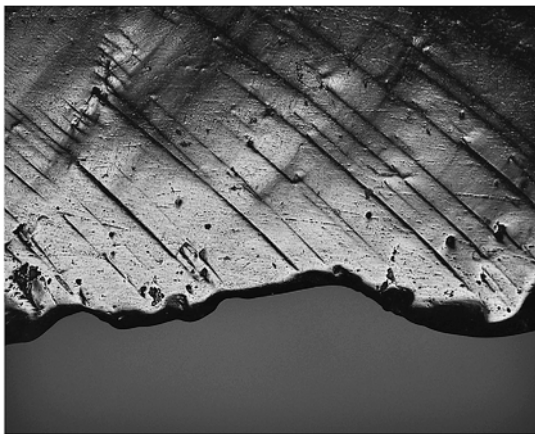
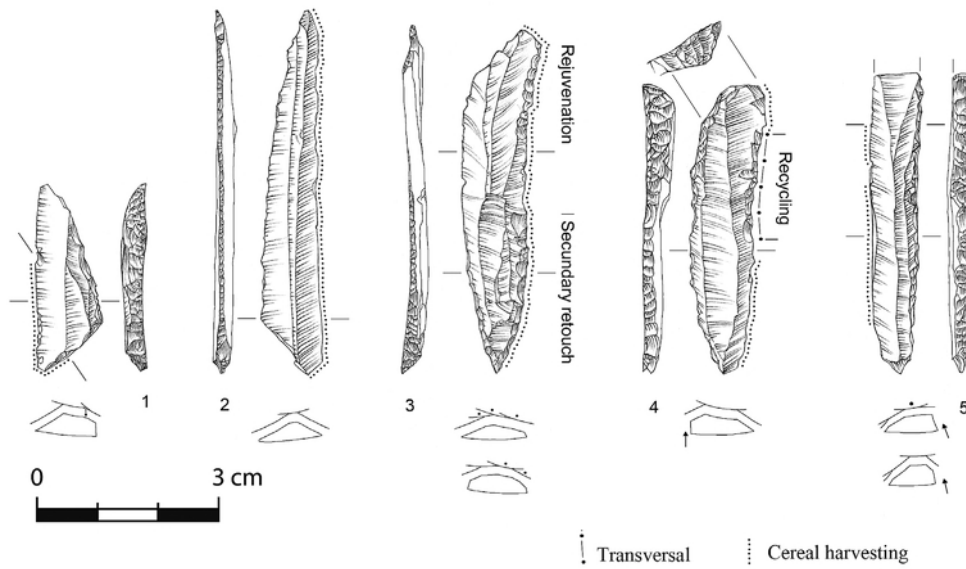


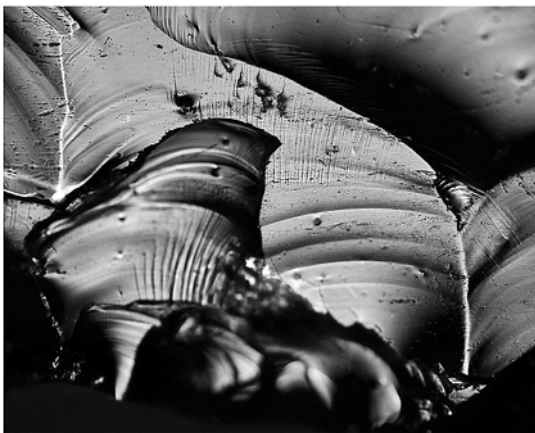
Figure 4. Knapping products: (1) bladelet; (2-3) pointed tools; (4) shouldered arrowhead; (5-7, 9) notches; (8) flint arrowhead; (10) bladelet with tang.



a



b



c



d

Figure 5. Sickle elements: (1) large triangle; (2-3) oblique truncations; (4-5) backs. (a) Wear from cutting silica-rich plant (magnification 50x); (b) rejuvenation retouch (magnification 50x); (c) incipient wear posterior to the retouch (magnification 200x); (d) experimental obsidian sickle elements put parallel to the edge of the haft.

The morphology of the exhausted cores varies. One observes maximal reduction of size without geometric modification of the core; rough reshaping and maintenance of the geometry of the core; semi-conical or conical cores; and multiple crossed surfaces of *débitage* not necessarily aided by specific preparation. The initial exploitation of one surface could be followed by exploitation of a core edge, resulting in a “burin-like core”.

Burin-like débitage

The products of this method (Figure 3, spec. 1) are not easily distinguished from some *débor-dante* bladelets manufactured by the methods described above. The products are often irregular, hinged, twisted and/or plunging. The surfaces of *débitage* are narrow; the blanks have lateral natural surfaces or ventral surfaces because the cores are manufactured on tabular blocks or flakes (in some cases, shaping a flake or tablet). Shaping is absent or minimal. Exploitation can be uni- or bidirectional. Exhausted cores have the form of irregular *bâtonnets*, several of which were reused as burins.

Conical or semi-conical cores

The production of small bladelets ca. 30 mm in length was performed from conical or semi-conical cores with platform angles of 60–90°. The semi-conical cores present a flat back, which could be partially shaped.

Typology

The main tool classes in Level 4 are truncation, truncation and backed piece, burin, scraper, piece with lateral retouch, splinter, and triangle (Table 1). Truncations, backed pieces, and microliths predominate; these elements are highly characteristic of the ‘way of doing’ in the technology of the Aşıklı inhabitants. This tendency is not only a question of the morphology of the tools but also the result of the massive adoption of a technique of breakage—the microburin technique. Another, unique, technique of manufacture is a combination of the microburin technique with retouch by pressure. It was also employed to make a variety of tool sizes, including triangles sometimes less than 10 mm in length and bladelets up to 70–80 mm long and with oblique truncation (Figures 5–6). The microburin technique is represented in the assemblage by proximal, central, and distal fragments as well (Figure 6, spec. 4–5). Debris includes accidental fractures that are related to retouch and tool use.

Truncations on blanks are mostly oblique, single or double, and associate with a back (Figure 5, spec. 2–3). Backed pieces are either rectilinear or convex (Figure 5, spec. 4). Double backs also occur.

Table 1. Typology (sample 2010-2011; chipped stone found in the heavy residues from the flotation of soil samples are not included here).

| Typology | Total |
|---------------------|------------|
| Truncation | 75 |
| Truncation and back | 33 |
| Back | 33 |
| Burin | 45 |
| Scraper | 43 |
| Lateral retouch | 28 |
| Splinter | 8 |
| Pointed tool | 8 |
| Triangle | 7 |
| Notch | 3 |
| Denticulate | 2 |
| Lunate | 1 |
| Ergot' | 1 |
| Tanged | 1 |
| Reworked piece | 1 |
| Total | 289 |

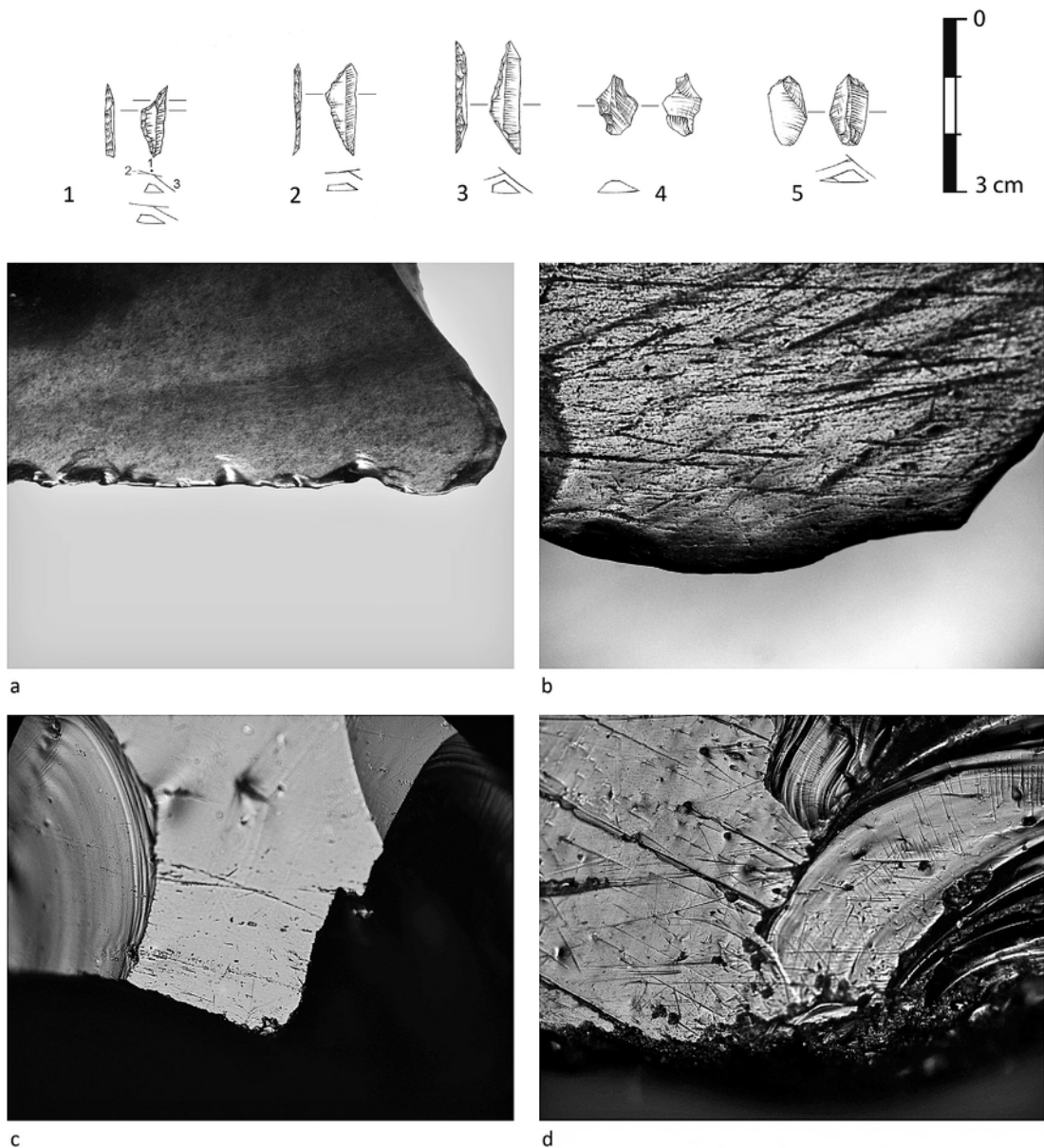


Figure 6. (1-3) Triangles and (4-5) microburins. (a) Macroscopic edge smoothing on triangle; (b) the same specimen possibly used to cut a soft animal tissue (magnification 100x); (c-d) damage from the tool's use for cutting soft material (magnification 50x).

Microliths are mainly triangles (Figure 6, spec. 1-3), and lunates are rare. They were made from bladelets retouched using pressure. Direct, sometimes both direct and inverse, or even crossed retouch methods were used. 'Lunates' do not relate to a specific artifact category; rather they reflect variations in shaping movements. The blanks with lateral retouch are associated with notches (Figure 4, spec. 5-7) and denticulates. Scrapers vary and include endscrapers, double endscrapers, round scrapers and sidescrapers (Figure 3, spec. 3). Burins were made from flakes and bladelets, and they are lateral or dihedral forms (Figure 7). Lateral burins were made on a break, truncation, endscrapper front, butt and plunging part of the bladelets. Burin spalls on the edge of oblique truncations are also present; they can be simple, double or sometimes multiple.

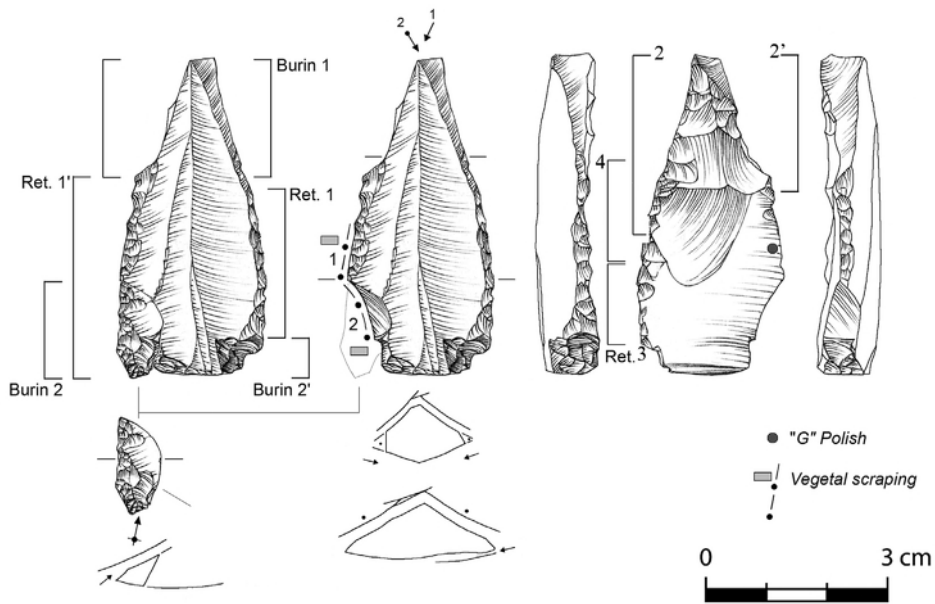


Figure 7. The bipolar blade made from chocolate flint.

A single specimen is a transverse burin spall (*chanfrein*) from the proximal part of a large bladelet. Among the bladelets with lateral retouch are pointed tools (Figure 4, spec. 2-3). An arrowhead (Figure 4, spec. 8) and a shouldered bladelet (Figure 4, spec. 4) were also found.

Tool use

High-magnification use-wear analysis was conducted on 157 tools from Aşıklı Höyük Level 4 (Table 2). The sample was chosen on the basis of the typological breakdown presented above and includes unretouched bladelets, microliths, truncations, backs, burins, microburins, a splinter, two arrowheads, and a tool fragment that was probably broken during the retouch. The raw material, manufacturing method, blank type, size, and fragmentation were recorded for each item. The artifacts were analyzed using a stereoscopic microscope at magnifications ranging from 10-60X and a metallographic microscope at magnifications of 50-500X in order to determine use zones and patterns of wear-and-tear. The interpretation of these patterns in terms of activities performed and materials worked is based on experimentation (Khirokitia, Cyprus 1999; Archéodrome de Beaune, France 2001-3; Aşıklı Höyük, Turkey 2009, Astruc et al. 2012) and previous studies of experimental and archaeological obsidian specimens (Arazova 1986; Astruc et al. 2011, 2012; Ataman 1988; Clemente Conte et al. 2015; Hurcombe 1992; Kononenko 2011; Semenov 1972).

Unretouched and retouched blanks

The results of use-wear analysis are indicated for each typological group in Table 2, according to the inferred activities (motions and worked materials are combined). We will first discuss the results for unretouched and retouched bladelets and then consider three categories of tools, sickle elements, arrowheads and microliths. Various motions and orientations were employed while using the lithic tools (longitudinal, transversal, piercing, wedging) in response to the different materials that were worked. Table 2 shows that longitudinal motions are prevalent in the sample

Table 2. Use-wear and typology: number of specimens, number of used pieces, number of used zones, activities. (L) Longitudinal; (T) Transversal.

| Typology | N specimens | N used pieces | N use zones | Projectile | Cereal harvesting | L. vegetal | T. vegetal | L. soft animal | T. soft animal | T. bone | L. mineral | T. minéral | L. soft material | T. soft material | L. medium hard-hard | T. medium hard-hard | Longitudinal | Transversal | Piercing | Wedge | Undetermined |
|-------------------|-------------|---------------|-------------|------------|-------------------|------------|------------|----------------|----------------|----------|------------|------------|------------------|------------------|---------------------|---------------------|--------------|-------------|----------|----------|--------------|
| Unretouched | 6 | 3 | 3 | | | 1 | 1 | | | | 1 | | | | | | | | | | |
| Triangle | 75 | 51 | 51 | | | | | 7 | | | | | 41 | | | | | | | | 3 |
| Lunate | 4 | 4 | 4 | | | | | 1 | | | | | 2 | | | | 1 | | | | |
| Truncation | 15 | 13 | 16 | | 7 | 2 | 1 | 1 | | | | | 1 | 1 | | 1 | | | 1 | | 1 |
| Double truncation | 10 | 8 | 8 | | 6 | | | 1 | | | | | 1 | | | | | | | | |
| Truncation+back | 7 | 7 | 9 | | 4 | | 1 | 2 | 1 | | | 1 | | | | | | | | | |
| Back | 21 | 16 | 23 | | 3 | 2 | 1 | 4 | 1 | | | | 2 | | | | 3 | 5 | 2 | | |
| Burin | 3 | 3 | 6 | | | 1 | 2 | | | | | | | | 2 | | | 1 | | | |
| Lateral retouch | 7 | 6 | 17 | | | 2 | 5 | | | | | | | | | 3 | 2 | 3 | 2 | | |
| Splinter | 1 | 1 | 2 | 1 | | | | | | | | | | | | | | | | 1 | |
| Arrowhead | 2 | 2 | 3 | 1 | | 1 | | | | 1 | | | | | | 1 | | | | | |
| Microburin | 5 | 2 | 4 | | | | | | | | | | | 2 | | | 2 | | | | |
| Waste | 1 | 0 | 0 | | | | | | | | | | | | | | | | | | |
| Total | 157 | 116 | 146 | 2 | 20 | 9 | 11 | 16 | 2 | 1 | 1 | 1 | 47 | 3 | 2 | 5 | 8 | 9 | 5 | 1 | 4 |

analyzed. Transverse motions are less frequent. Piercing tools are rare. Note that the wedge and projectile classes are represented by single specimens and so there is no information on the rate of occurrence. The materials worked included soft animal tissues (such as skin, leather, meat or tendons), bone, cereals, non-cereal vegetal materials (e.g., wood, bark, silica rich-plants, other grasses) and mineral substances, as well as soft and medium-hard/hard materials of undetermined origin. When sickle elements are excluded from consideration, animal and vegetal materials occur at similar rates. Mineral working and bone working are rare (Figure 8). In several cases, the nature of the worked material could not be determined because the use duration was short and the amount of wear small. In these cases, the worked materials were classified as soft or medium-hard/hard. As a rule, one use zone (n=98) is recorded for a single blank (0 zones:41; 2:14; 3:2; 6:1). While our first results must be supplemented with analysis of larger samples, we can propose here some preliminary assessments.

Several typological groups are present within our category “unretouched and retouched blanks”: truncation, double truncation, backed piece, truncation and back, burin, lateral retouch and splinter. These tools represent a wide range of activities. In fact truncation, double truncation and back are multifunctional tools. They were all used as harvesting tools (20 used zones out of 28 used tools), but various other activities were also performed with these tools.

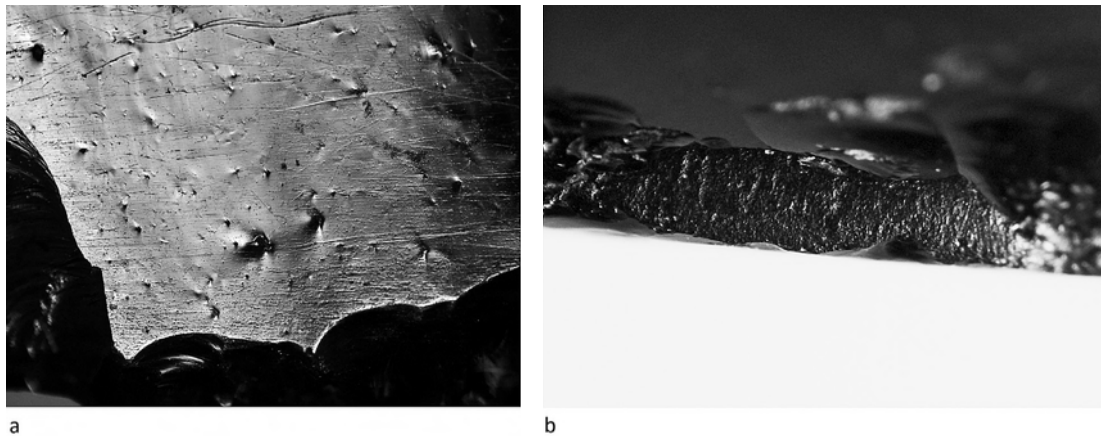


Figure 8. Activities identified through use-wear: (a) cutting vegetal (magnification 100x); (b) transverse movement against soft stone.

Truncations, double truncations and truncated backed pieces were used in many different tasks. The following classes of use-wear traces were observed: longitudinal or transversal vegetal material; longitudinal or transversal soft animal tissues; transversal mineral; longitudinal and transversal soft material; transversal medium hard-hard material; piercing and undetermined. Backed pieces (16 used tools) were also multifunctional (longitudinal or transversal vegetal material; longitudinal or transversal soft animal tissues; longitudinal soft; longitudinal or transversal, piercing).

All of the burins were used. Transverse motions are prevalent (vegetal, medium hard-hard materials or undetermined) on these artifacts, but two longitudinal motions on medium hard-hard materials were also identified. One of the three burins was made from chocolate flint. It is a large blade (Figure 7) produced via bipolar technology, which is not attested in the obsidian industry of Level 4. A “G” polish on the ventral surface of the tool suggests that it was hafted during one or more sequences of use. The blade was shaped on both edges by retouch and then reworked on the ventral surface by transverse pressure retouch. The last stage of modification involved the extraction of burin spalls: a dihedral burin was created on the distal part, a lateral burin from a proximal break on the left edge, and a hinged lateral burin on the right edge. The direct retouch on the left edge became worn when the tool was used to scrape vegetal material. Then a burin spall was extracted, and the burin edge was used for vegetal scraping. Since the burin spall was found and refitted to the blade, it is possible to propose that the chipping and scraping sequence was conducted on the spot. The central dihedral burin was not used.

The tools with lateral retouch (pointed tools or notches) were used for different activities: longitudinal or transversal on vegetal material; transversal on medium hard-hard material; and piercing. The unretouched blades were applied in longitudinal or transverse motions on vegetal materials and longitudinal on mineral material. The splinter was used as a wedge. Examples of tool use are illustrated in Figure 4 (spec. 2-10). The bladelet with lateral retouch—a pointed tool (Figure 4, spec. 2)—is the result of multiple sequences of retouch and use. On its left side, the ventral mesial surface (zone 1) preserves wear that indicates cutting of vegetal material. This use was followed by abrupt retouch along the edge, which removed part of the used zone. For the same reason, use wear is no longer visible on the dorsal surface of the tool. The proximal part of the reworked edge (zone 2) was used to scrape a medium hard-hard material (vegetal?).

The tip of the tool was used to perforate another material (dry skin?) as indicated by the scaling damage, which is well developed on its ventral side (zone 3). Another pointed bladelet (Figure 4, spec. 3) presents at least 6 use zones, which are related mainly to the working of medium hard-hard materials using longitudinal, transverse and rotary motions.

Specimen 5 in Figure 4 shows a double, direct notch on its left edge associated with an oblique truncation. A thin back is observed on the right edge and a direct notch on the distal extremity. Use-wear is present along the left edge and consists of alternating scars and highly developed polish that relates to the cutting of a medium hard-hard vegetal material. This polish covers the scars. Discontinuous striations parallel to the edge and pits are also visible.

Bladelet 6 in Figure 4 has a double truncation and is slightly twisted. It presents two direct notches, one at the distal part of the right edge, the other at the proximal part of the opposite edge. The form of the tool is highly symmetrical. It was shaped by a combination of oblique truncation, direct notching and ventral retouch. It is possible that the two extremities of the tool were used successively, to perform the same task. The two used zones correspond to transverse motions on undetermined materials.

Bladelet 7 in Figure 4 is highly twisted and was produced during the reshaping of the distal part of a core. It bears a notch on the right edge and continuous direct proximal scaling on the left edge. Some natural surface is also preserved on the proximal part of the blank. The left edge was used to scrape a vegetal material.

Bladelet 9 in Figure 4 is a neo-crested bladelet, twisted and knapped on a flake. Notches at the base of the element may be related to a specific type of hafting. The direct notch on the left certainly was made intentionally. This blank was used to scrape middle-hard materials. Scaling is discontinuous and occurs mainly on the ventral surface. On the right edge, which is irregular in delineation because of the neo-crest preparation, the retouch is continuous, short, stepped and abrupt; this is due to transverse motions on middle hard worked material. There is no specific type of microscopic wear.

Bladelet 10 in Figure 4 is an irregular, twisted bladelet with a short, proximal tang formed by alternate retouch. This part of the tool was probably hafted; tiny, polished spots are visible on the ventral surface of the left edge. The left edge was employed to cut a medium hard-hard material. The right edge was used to scrape a material.

Sickle elements

Harvesting tools are well represented by sickle elements in the Level 4 sample analyzed for evidence of use-wear. These inserts were unretouched bladelets, with one or two oblique truncations and a back (Figure 5). They were heavily used. The entirety of the active edge appears polished and rounded; scaling is nearly absent. A single specimen displays abrasion from contact with the soil. Overall, the wear patterns on the inserts examined are comparable to those experimentally produced by the Aşıklı team.

Two sickle elements were recycled. One is a bladelet with a partial, thin back and double truncation (Figure 5, spec. 3). Wear from cereal harvesting developed parallel to the right edge of the tool and consists of striations, polish, and tiny perpendicular, sometimes slightly oblique scars, which are mainly seen on the ventral side of the edge (Figure 5a). On the same specimen, the distal direct retouch that runs along a length of 20 mm represents rejuvenation. After this operation, the tool was reused as sickle element (Figure 5 b-c). The second specimen is an insert

that was removed from the sickle, modified on its central part by direct retouch and then used to scrape a vegetal material (Figure 5, spec. 4).

The sickle elements were set parallel to the edge of the haft (e.g., Figure 5d). A single specimen, a thick triangle, exhibits oblique wear marks (Figure 5, spec. 1). It also presents light damage in the form of direct scaling. This tool associates spatially with a sickle element with oblique truncation and fine back, and which was fixed parallel to the haft edge. There is no evidence to support the use of two different hafting modes in Level 4 of Aşıklı Höyük.

On one of the floors of Space 2 (Unit 237) in Level 4, a concentration of 20 blanks was found, each with thin retouch, backed or with one or two truncations. Careful examination showed that 13 blanks were used to harvest cereals. Their size was not standard; they ranged between 39–60 mm in length, 9–15 mm in width, and 1.5–5 mm in thickness. These elements associate spatially with several flakes and bladelets. Another three blanks were used, one to scrape hide and two to cut soft materials.

Arrowheads

Arrowheads are scarce in Level 4 at Aşıklı Höyük. Bladelet 4 in Figure 4 is a tool that was used to scrape bone and to cut a medium hard-hard material (vegetal?). This specimen is an example of an “Aşıklı Höyük shouldered arrowhead,” which is a tool type known from Level 2 of this site (Yıldırım-Balcı 2011b: Fig.6). It is unique in our Level 4 sample.

Another arrowhead was made from a light green flint with a mudstone texture (Figure 4, spec. 8). This raw material was probably exogenous but its origin is not known. The tool measures 39.5 mm in length, 14.6 mm at its greatest width, and 4.6 mm in thickness. The ventral side of the proximal part bears a basal removal produced by pressure flaking. This removal measures about 5 mm in length. This kind of retouch is known from the nearby site of Musular, dated to the mid-8th millennium cal BC (Balkan-Atlı et al. 2001). Careful examination of the Aşıklı Höyük specimen showed that the bladelet from which it was made had been shaped by bifacial direct abrupt retouch, and that the basal flake was detached at the final stage of the shaping process. The object was used as projectile point. It presents a straight, basal fracture and a 20 mm long impact fracture on the opposite tip. This broken end was used for scraping a medium hard-hard material. The difference in patina between this end and the rest of the tool surface suggests that the scraping represents secondary utilization, after the abandonment of the projectile.

The microliths of Aşıklı Höyük Level 4: triangles and the cutting tool concept?

Microliths in Level 4 of Aşıklı Höyük are predominantly triangles (75 in our sample, Figure 6, spec. 1–3), and rarely lunates (4). The microburin technique (Figure 6, spec. 4–5) was the main technique used to produce these tools. It was applied on both extremities of the blank, and then *piquants-trièdres* were shaped by the pressure technique (Inizan et al. 1999: Fig. 23: 145). The microburins are by-products of this technique of breakage. They are proximal, mesial or distal. The microburins should be distinguished from the debris of backs, which were accidentally broken during the process of retouch. Some bladelets were used before breakage via the microburin technique (two out of five of the microburins).

A sample of 128 chipped-stone specimens recovered in 2012 from the flotation heavy residue fraction contained 7 fragments of backs broken during retouch, 1 backed bladelet, 4 lunates,

74 triangles, 1 triangle with a microburin on one side, and 16 undetermined end fragments. Thirty-two items show distal or proximal *piquant-trièdres*. Sixty-eight triangles are complete or nearly complete. The remainder is comprised of distal, mesial, proximal, and lateral fragments. The triangles exhibit unidirectional and sometimes bidirectional scars. Natural surfaces are also sometimes observed. The sizes of the bladelets chosen to manufacture the triangles vary from 10.7-28 mm in length, 3.7-8 mm in width, and 1-3 mm in thickness. Retouch is often direct (52 of 68 complete or nearly complete items). Crossed and partially inverse retouch has also been recorded. In some cases, a retouched area is found as well, on a proximal part of a triangle. In one case, the partial retouch resembles a small tang.

Among the triangles, 24 were not used. Otherwise, use-damage is very light. It is mainly observed on one extremity of the tool and the mesial part of the edge opposite to the back. The use-damage covers at least two-thirds of the length of the edge, and it exhibits diverse morphologies. The overall organization of the scars indicates working with a sliding motion (*percussion posée*). Usually, longitudinal motions and working of soft materials are recognized. These materials could be laid on a board or other hard surface during the activity. Maximum constraints are indicated by extremities that display scaling by flexion, starting from the edge (transverse scaling) or from the extremity-straight fracture with or without hinged end, scaling parallel to the dorsal scar (fluting).

Below, three examples of used triangles are presented. The first specimen has a direct back, made on the mesial part of the bladelet that was used to make the tool. The organization of the wear can be described as follows. The distal part of the triangle shows two oblique inverse fractures due to attrition by pressure applied to the tip of the tool. Below the breakage, on the edge, tiny continuous and alternate scars are observed. The use marks cover the distal two-thirds of the tool and indicate working of a soft material using a longitudinal motion. The second example is a thin triangle made from a bladelet with unidirectional scars. The back bears direct retouch. The use damage is mainly scaling and isolated fine short striations. The scaling is mostly visible on the mesial and distal parts of the tool. The scars are marginal. Light smoothing of the edge indicates contact with a soft (animal?) material. The third example is a very thin bidirectional bladelet that was modified by direct retouch. The tool also presents tiny marginal continuous direct use-scars except on the mesial part of the edge, which has a rather irregular profile. This distribution suggests a sliding, longitudinal motion against a soft (animal?) material. The wear is slightly more developed on the proximal part of the tool.

When microscopic wear is developed, it consists of thin discontinuous longitudinal striations (Figure 6 c-d). Striae that are slightly more abundant may suggest a change of the worked material. There is a single example of well-developed wear (Figure 6 a-b) that is characterized by tiny alternate scars and continuous rounding of the edge. At the microscopic scale, dull polish is visible in immediate proximity to the edge. The striations are oriented parallel to the edge. This pattern suggests cutting of a soft animal material.

In summary, the analysis shows that triangles were used to cut soft materials. So far, soft animal tissues (7) have been recognized but the use of other substances cannot be excluded, since 41 out of 75 specimens cannot be associated with a particular category of soft material. Some soft materials were probably laid on a hard surface when they were worked. The use of lunates is similar. The small size of the microliths suggests that they would have been hafted. There is no evidence of multiple inserts hafted in a handle. It is possible that triangles were axially hafted

and used as “scalpels” or “cutting tools.” During the work, damaged triangles could be replaced as needed.

Discussion

The chipped-stone assemblage from Level 4 of Aşıklı Höyük reveals that big obsidian flakes and blocks were brought to the village from local sources in order to make and use tools in local subsistence activities and craftwork. In other words, the production was by the community for the community, and it was based on direct acquisition of raw materials. Such production was often highly controlled and performed by skilled knappers. The Level 4 assemblage represents a tradition of knapping that is ancestral to that of Level 2 of Aşıklı Höyük (Abbès et al. 1999; Kayacan – Altınbilek-Algül, this volume). The production centered on bladelets. The main method employed was the *débitage* of a surface, which associates with a particular core morphology. Direct percussion with a soft stone hammer was commonly used in the reduction process. Most often, core preparation by abrasion preceded flaking. The butt of the bladelets is plain and usually small. Oblique truncations, backs, and triangles are the most characteristic tool types in Level 4. Truncations and microliths were made from bladelets using the microburin technique.

Concerning subsistence, the diet of the Level 4 inhabitants was based on hunting, caprine management, crops, and wild plants. According to Ergun et al., “the most common plants possibly grown and consumed as crops appear to be cereals.... With the presence of both wild and domestic spikelet remains in the assemblages, Aşıklı Höyük seems to correlate to that early agricultural stage where the domestication process is still going on.” (Ergun et al., this volume). These cereals are emmer (*Triticum turgidum* subsp. *dicocum*, in greater proportion), ‘new glume wheat’, einkorn wheat (*Triticum monococcum* subsp. *monococum*) and free-treshing wheat (*Triticum aestivum/durum*), together with barley (*Hordeum vulgare*, and domestic forms), the proportions of which changed through time. The botanical remains also attest to the heavy use of pulses (lentil, bitter vetch, pea and chickpea), wild nuts and fruits (hackberry, pistachio, almond and almond/prune). In fact 27 botanical families are represented among the botanical remains, and their uses ranged from foodstuffs to a wide range of functional needs (fodder, building material, fuel, raw materials for crafts). The results presented above support the observation that cereals were regularly harvested at Aşıklı Höyük during the period represented by Level 4. The chipped-stone artifacts used for harvesting cereals were used in sickles with straight or slightly curved hafts. They were fixed parallel to the haft’s edge. This haft type is similar to that of Nahal Hemar (Israel, 7th millennium cal BC; Bar Yosef 1987) and Halula (Syria, 7600–7300 cal BC, Borrell – Molist 2007). In Level 4 of Aşıklı Höyük, sickle elements worn from harvesting work are found in the living spaces. They were probably brought there, after harvesting in fields near the village (Özbaşaran – Duru 2015). Inserts that were heavily worn were replaced, and the sickles were stored in the house.

The faunal remains from Level 4 indicate broad spectrum hunting (Stiner et al. 2014, aurochs, red deers, boars, horses, onagers, roe deer, fallow deer, hares) alongside early management of caprines (mainly sheep and some goats). Evidence of hunting weapons from the living spaces in the site is poor, although hunting must have been the primary method for obtaining meat (Stiner et al. 2014). A single projectile point was discovered in Level 4. It is interesting that, while obsidian was the main raw material used in tool manufacture, this point was made from flint. The manufacturing method is similar to those employed to work obsidian. The flint

point was recycled after it was broken as projectile. The near absence of evidence of projectile technology, as well as primary butchery activities in the excavated areas of Level 4, suggests much spatial differentiation of activities on site. It is possible that hunters brought the game to special locations in or around the site (see also Stiner et al., this volume), away from most of the houses, for the early stages of carcass partitioning and processing. Hunting equipment that was brought back could be stored or abandoned in these spaces.

The overall pattern of activities suggested by the use-wear evidence is consistent with food preparation and craftwork. Soft materials can be related to both domains of activity, with medium-hard and hard materials attributable mainly to craftwork. In this latter case, longitudinal cutting motions predominate, but transverse scraping motions are also indicated to a lesser degree. Drills are, on the contrary, poorly represented. In most cases, short use-durations hampered the formation of substantial polish, which makes difficult to isolate particular activities; the exceptions are polished sickle elements. On the other hand, it is possible to propose that, with the exception of triangles, most of the tool types were multivalent and could be used in different activities. The triangles were employed to cut soft materials, especially animal tissues.

The sample examined for use-wear evidence comes primarily from open-air contexts, excavated between the houses of the village. The results of the analysis indicate that these spaces were used for various activities, including food processing and craftwork (see Özbaşaran – Duru 2015). These activities included stone knapping, and the entire *chaîne opératoire* of manufacture of the various obsidian tools is found in these contexts. At least part of the production was used on the spot, and this situation probably influenced decisions for quick tool discard. A relatively wide variety of materials can be postulated for the activities performed with the chipped-stone tools, and these activities seem to represent an equally wide range of light, small-scale work.

Conclusion

Research on the knapping methods and tool types, in particular oblique truncations, backs, microliths and harvesting tools, indicates a good deal of continuity between the chipped-stone industries of Level 4 and Level 2 of Aşıklı Höyük. Continuity in technical practices is observed in the choice of knapping methods for the production of tools, in the occurrence of typological groups such as oblique truncations, backs and microliths, and in the morphology of the harvesting tools (Anderson 1996).

As yet, evolutionary relationships have not been investigated between the Central Anatolian Epipalaeolithic lithic traditions of Pınarbaşı (Baird 2012b; Baird et al. 2013) in the Konya plain and the Aceramic Neolithic of Aşıklı Höyük in Cappadocia. Current work focuses on the definition of the typological and technological characteristics of the Central Anatolian Aceramic Neolithic chipped-stone industries. Comparisons between Aşıklı Höyük and Boncuklu in the Konya plain could permit analysis of regional variability and local dynamics.

The study of production from the workshop of Kömürcü-Kaletepe on the Göllü Dağ has established links between Cappadocia and the Levant (Binder 2002). The obsidian industries from Kömürcü-Kaletepe date to ca. 8200–7800 cal BC and are roughly contemporary but not comparable to those of Aşıklı Höyük Level 4. Knapping at Kömürcü-Kaletepe was fully standardized and conducted on naviform and prismatic cores by very skilled specialists. It is possible, therefore, that the Aşıklı Höyük Level 4 knappers followed a local tradition distinct from that of Kömürcü-Kaletepe and the Levant. A single exogenous specimen has so far been recognized

from Level 4 of Aşıklı Höyük. This is the chocolate flint blade associated with a bipolar technology but different from that of the Kömürcü-Kaletepe naviform cores. The flint blade from Level 4 could indicate contacts with Eastern Anatolia and the Northern Levant, where Central Anatolian obsidian was distributed.

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