Lithic Studies: Anatolia and Beyond

Edited by

Adnan Baysal

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This book is dedicated to the memory of Prof. Dr. Nur Balkan-Atlı (2nd January 1953 - 10th April 2019).

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Ground stone tools from Neolithic Barcın Höyük. Photo: Fokke Gerritsen.

Contents

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Marina Milić is currently an Irish Research Council Postdoctoral Fellow at School of Archaeology, University College Dublin, exploring Neolithic – Eneolithic transformations in the Balkans during the 5th millennium BC. Previously, she spent over 15 years working on chipped stone assemblages from Neolithic sites in Turkey, Greece and Serbia. During this research she focused on the sourcing and technology of obsidian artefacts as a means to understand aspects of interaction and connectivity between communities from the local to regional scale throughout the Neolithic period.

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Neyir Kolankaya-Bostancı completed her undergraduate degree at Ankara University, Prehistory Department in 1995. She received her MA and PhD degrees from Hacettepe University, Department of Archaeology. She worked as a Research Assistant between 1998-2009, as an Assistant Professor between 2009-2018 and as Associate Professor since 2018 in the same department. She works as a lithic expert in various excavations and surveys. In addition she has researched Neolithic, Chalcolithic and Bronze Age chipped stone industries, obsidian exchange and trade systems, Palaeolithic art and symbolism.

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Vidan Dimić

Vidan Dimić finished elementary and master studies at the Faculty of Philosophy in Belgrade, Department of Archaeology. From the beginning of his studies he was interested in prehistoric periods, with a main focus on the Neolithic of the Central Balkans. At the end of the basic and during the master studies, the main focus of his research was archaeo-technology and the study of polished and abrasive stone tools. This interest has been extended to the exploration and understanding of the 'chaîne opératoire' from the exploitation of raw materials, through the production of artifacts, their use, repair, damage and discard. The knowledge and experiences that came from these studies have led him to choose experimental archaeology as the main topic of his PhD studies. Although the PhD topic is closely related to polished stone tools with a cutting edge, he previously had the opportunity to work on several projects with other materials such as bone and antler. Vidan is employed at the Archaeological Institute in Belgrade as a Research Associate. So far, he has published several works related to ground stone industries, abrasive stone tools, terminology in stone technology studies, use wear analyses, prehistoric copper mining technology, experiments with prehistoric sickles both individually and as part of a team.

Zafer Derin

Zafer Derin studied archaeology and graduated from Atatürk University in 1979. He pursued his archaeological career and completed his MA degree in 1983 and PhD degree in 1986. He currently works in the Department of Archaeology at Ege University (İzmir/ Turkey). During his academic career he has participated in numerous archaeological projects and since 2005 has conducted the Yeşilova Höyük Excavations in İzmir / Turkey. He has published widely and is also the founder and curator of the Yeşilova Höyük Visitor Centre.

Zehra F. Taşkıran

Zehra F. Taşkıran graduated from the Department of Prehistory of Ankara University in 1983. In 1993, she received her master's degree with her thesis on '*Techno-typological Analysis of Öküzini Cave cores*'. She completed her PhD with her thesis on '*Holocene Period Chipped Stone Industry of Suluin Cave*' in 2014. She has worked at numerous archaeological excavations and surveys conducted in Turkey. She also has expertise in drawing chipped stone tools. She has contributed to the Palaeolithic, Neolithic and Chalcolithic chapters in the children's book, '*Anatolia Before You*', prepared by the Directorate of the Museum of Anatolian Civilizations.

Foreword

Mehmet Özdoğan[1]

The present volume, bringing together a fine selection of papers, is a most welcome contribution to lithic studies, covering not only chipped stone but also fine and coarse groundstone assemblages. In the historic development of archaeology the main concern in the study of artefactual assemblages has conventionally been based on typology and style with little concern either about the procurement or the characterisation of raw materials. Likewise, concern about technology had remained more or less in the domain of Palaeolithic and metallurgical studies. Colleagues working on other artefacts, either pottery or other materials, hardly showed any interest in the technologies employed in production. In this respect, groundstone artefacts, though being the most iconic tool of food-producing economies of later prehistory, were habitually overlooked, never mind any concern about the technology of their production, there was not even any available comprehensive typology of these tools; indeed, not many excavations bothered to collect them. Here, it is worth stressing that the editor of this volume was one of the first, at least in Turkey, to develop an interest in groundstone artefactual assemblages during the early years of his career, soon to play a leading role in promoting such undertakings. We are aware of the fact that it would be totally incomprehensible to the present generation of young scholars, now intent to recover every item coming out of the soil, to disregard a group of artefacts just because they don't have the visual appeal of other finds; that is why we consider it necessary to take a look in retrospect at the years when young Baysal developed an interest in groundstones, to narrate why dealing with an unappealing assemblage sounded so unusual at that time.

Many years ago, during late 1970s when our work at Çayönü was at its peak, we were faced with the serious problem of classifying, sorting, analysing and describing the finds. At that time Çayönü was the only Pre-Pottery Neolithic site under excavation in Turkey, and as the site was of the Pre-Pottery horizon, most of what we were encountering consisted of bone, chipped stone and groundstone. Çayönü was a joint project of our department in full collaboration with the Chicago Oriental Institute. There were several experts who came with the Braidwoods to work on chipped stone and the bones. What was being done – the sorting and analysing chipped stone, bone artefacts and faunal remains – had appealed to our students, and they began volunteering to work with the guest experts, laying the foundations of present-day Turkish specialists in fauna, bone artefacts and chipped stone. However, we still had the problem of the groundstones – there were hundreds of them displaying a wide variety of shapes and of raw materials. None of us even considered being engaged, Braidwood's team was also of no help, the only solution we devised was to label them by noting their find spots and then to put them on to the shelves of the excavation house, giving a few nice-looking ones to the museum. Through time the problem became more and more acute, we had to construct and add a new storeroom to the excavation house just to find a place for the steadily increasing number of groundstones. Finally, Michael Davis, one of our collaborators, and an ex-student of the Braidwood's, took the initiative to study and to catalogue our groundstone assemblage, and though we were all very appreciative it was still considered as rather a peculiarity. He had no possibility at that time to get any help from anyone in the team either in categorizing or in assessing; he developed his approach by consulting other colleagues working in the southern Levant. For some time, his work stood as an exemplar in groundstone studies. Not too long ago, only 30-40 years previously, we could not envisage that one day there would be so many lithic experts working and publishing, as best displayed in this volume.

The diversity of approaches covered by this volume, both on chipped and on groundstone assemblages, is worth noting, some going beyond the state of the art. Even a brief survey of the papers thus presented provides an insight into the current state of research, exemplifying the outstanding dynamics of research and the employment of new analytic technologies in the study of lithic artefacts. In this respect, the amazing advancement that took place within a few decades on sourcing and characterization of various raw materials is worth remembering. It was only in 1963 that pioneering work took place in the characterization of obsidian in North America, making it possible to determine the source volcanism of obsidian artefacts, and which a year later was implemented on Anatolian obsidians, though with considerable uncertainties. Soon after, with the advances taking place in methods in analysing raw materials, including optical spectrometry and

[1] Emeritus Prof. Dr. Mehmet Özdoğan: Prehistory Section, Archaeology Department, Istanbul University, Istanbul / Turkey (c.mozdo@gmail.com)

fission track, enabling more precise sourcing providing ample information that would not have been possible to dream of, our way of looking to the modalities of raw material procurement were revolutionised. Since then methods in defining particularities of raw materials, running from isotopic studies to geochemistry have been consistently developing, making possible new trajectories of research enabling us to look at materials with different approaches. While it is becoming possible to obtain much more precise data on technology, function and raw material characterization, each becoming a specialized field of research, at the same time we are also now developing a holistic approach considering all of these entities in relation with each other. What we were able to surmise previously about prehistoric trade being a unidirectional and simple mechanism has had to be considerably modified, as now at least we are aware of the complexity of past trading systems, even during prehistoric times.

In considering the contexts of some of the papers presented in this volume, I find it necessary to touch on the changing trajectories in the quest for defining the function of tools. In earlier years, the most convenient modality in guessing the function of lithic artefacts was, more or less, simple comparisons based on ethnographic documentation, which did not always reveal very convincing solutions. Even though there had always been some experiments with models to study the usage of tools, they were mostly sporadic efforts. The English translation of Semenov's ground-breaking book in 1970, stirring considerable excitement, had stimulated a generation to detect the technologies employed in shaping, use-wear and experimentation, also given rise by the advancements in micro-photography. Within a decade or so, distinct fields of specialization including experimental archaeology, ethnoarchaeology, use-wear analysis, technology and residue analysis became fully established, each becoming a distinct field of research and developing their particular modalities and terminologies. As featured in some of the papers in this volume, we are just beginning to understand the importance of the boundaries among different raw materials, particularly in considering the types of stone tools to be employed in shaping other raw materials, such as in the making of bone or horn tools.

Thus far we have tried to present a conspectus on the advancements taking place in the study of lithics, particularly pointing to the modalities brought by multidisciplinary practices, revolutionizing what we can learn from the procurement of raw materials to shaping and usage. However, it should still not be overlooked that archaeology is a social science bound by behaviour, thus necessitating an understanding of the process. Interdisciplinary studies providing detailed, precise data enabling accurate descriptions, still have to be considered as a tool and not as the eventual end in assessing archaeological materials. In this respect it should not be overlooked that even devising a simple typological chart necessitates taking arbitrary decisions that are solely bound by accumulated knowledge. To exemplify – if we want to sort an assemblage into two categories, small and big, setting the dividing line necessitates an arbitrary decision, which would reflect accumulated knowledge and insight of the researcher. Accordingly, the success of the categorization is defined by deciding on befitting criteria. Here, I want to conclude by stressing that in archaeology, as for all social sciences, to sort, to classify or even to generalize depends on being able to take correct decisions in assessing when all criteria are relative and this is bound by developing a mutual understanding of the materials. That is exactly why such works as this volume are a necessity.

The Techno-Typology of The Projectile Points of the Neolithic Settlement of Ege Gübre (Izmir/Turkey)

Eşref Erbil

Abstract: This study consists of techno-typological analyses of arrowheads that were discovered in the archaeological excavations of Ege Gübre, İzmir, which is one of the Late Neolithic settlements of Western Anatolia. The analyses are based on the chipped stone material from Levels III and IV, a total of 32 arrowheads (eight of them broken, twenty-four of them complete). They were produced from flint (18) and chalcedony (14). These points are identified in two groups as large and narrow leaf shapes with concave recesses at the bottom of the pieces. It was also observed that the proximal and lateral edges are retouched, which is considered a morphological preparation process.

Introduction

This short paper introduces the lithic industry, and specifically the projectile points of the settlement of Ege Gübre, which is one of the Late Neolithic Period settlements of Western Anatolia. The site is located in the Aliağa District of Izmir (Sağlamtimur and Ozan, 2012: 223) and named after the factory of Ege Gübre due to its location within the grounds of the factory. The excavations of the settlement were carried out between 2004 and 2008 under the scientific directorship of Dr. Haluk Sağlamtimur of Ege University, Department of Archaeology and Izmir Archaeology Museum. In the light of the excavations at the site, the settlement has been dated to the Neolithic Period, evidence for which was uncovered 3-4 meters beneath today's soil surface (Sağlamtimur and Ozan, 2012: 224). As a result of the excavations and material studies, four main layers have been determined at the site (Sağlamtimur and Ozan, 2012: 227). These layers and the phases of the site are shown in Table 1.

Table 1: The phases of the settlement from latest to earliest (Sağlamtimur and Ozan, 2012: 227).

Hellenistic Period	Ege Gübre I	P. I
Chalcolithic Period	Ege Gübre II	P. II
Neolithic Period	Ege Gübre IIIa (Single-roomed rectangular structures, buildings with two rooms, circular structures, late phase II enclosure wall)	P. IIIa
Neolithic Period	Ege Gübre IIIb (Single-roomed rectangular structures and round buildings, early enclosure wall)	P. IIIb
Neolithic Period	Ege Gübre IV (Circular structures)	P. IV

Phases I, II and IV of the settlement have been largely destroyed. Most of the artefacts were recovered from Phase III, which is dated to the Late Neolithic Period (Sağlamtimur and Ozan, 2012: 227). According to the C^{14} results, the settlement was inhabited for nearly 500 years. Layer IV, which is the earliest phase, is dated between 6200 and 6000 BC, and Layer III between 6000 and 5700 BC (Sağlamtimur and Ozan, 2012: 227).

56% of the chipped stone industry items recovered from layers III and IV of Ege Gübre are made of chalcedony. Chert follows chalcedony with a proportion of 40%. The fact that there are chalcedony and chert deposits in the vicinity of the settlement, and the ready availability of the materials, clarifies why these raw materials were abundantly used on site. Çakmaklı Village, near the settlement of Ege Gübre, and named after the chert deposits in the area (Ozan, 2012: 37), is a good example of the substantial quantities of the raw material that are available. Additionally, it has been indicated that the hills of Akçakmak and Karaçakmak in the near vicinity, to the southeast of the settlement, could also be the sources from which local raw material was sourced and used (Sağlamtimur and Ozan, 2012: 236). Even though the settlement is a coastal one, obsidian constitutes only 3% of the chipped stone assemblage of the site.[1] Other than these three main types of raw materials, although very few in number, basalt items were also found within the industry.

The Techno-Typology of Projectile Points

In the settlement, the dominance of blade production technology manifests itself strongly with 64% of the chipped products consisting of blades and bladelets. The blade production technology and the fact that the unipolar cores prepared by blade removals are high

[1] All obsidian is of Melos Island origin. The fact that the quantity of obsidian is this small could be explained by the presence of rich chalcedony and chert deposits close to the settlement.

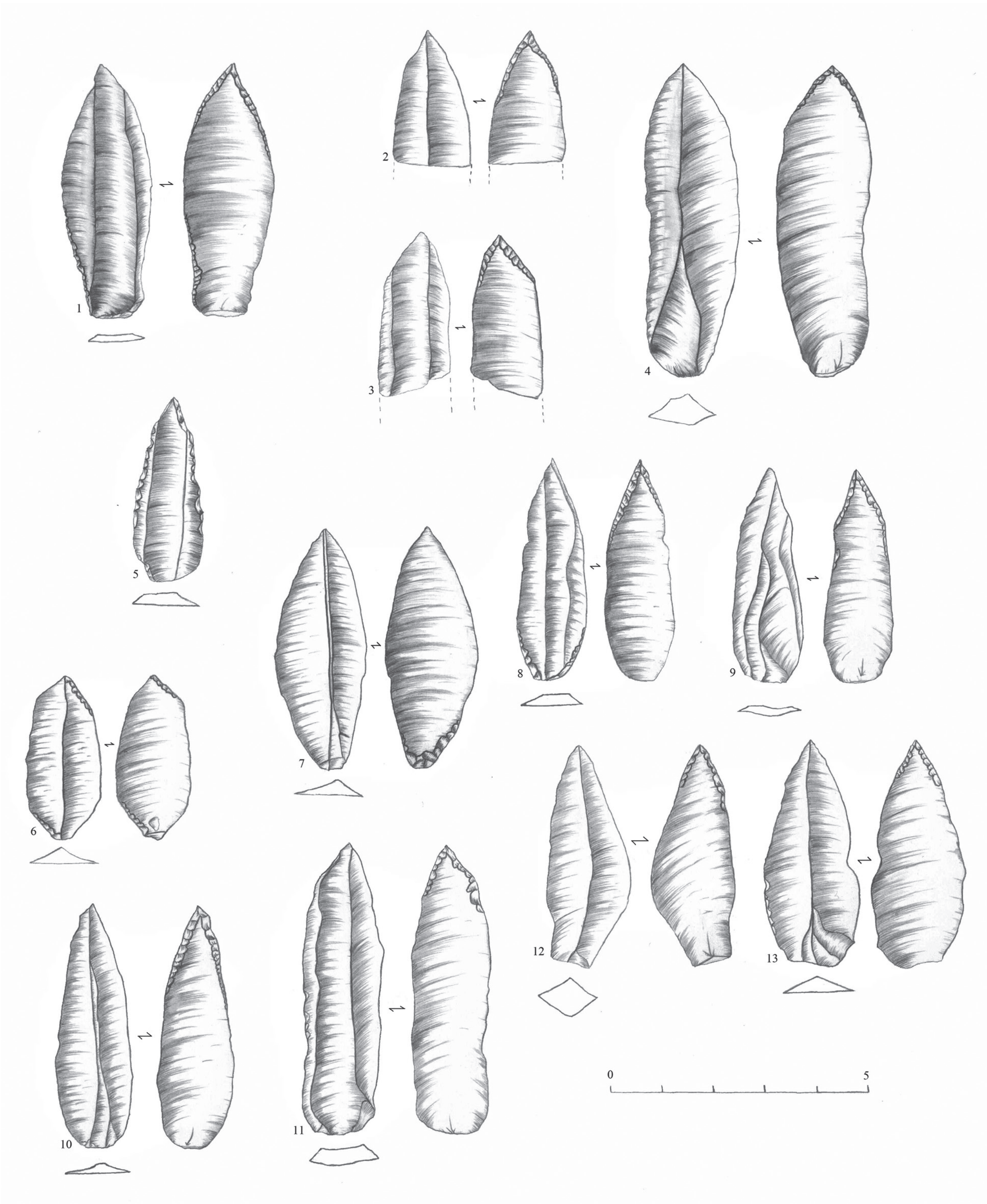

Figure 1: Wide, leaf shaped projectile points.

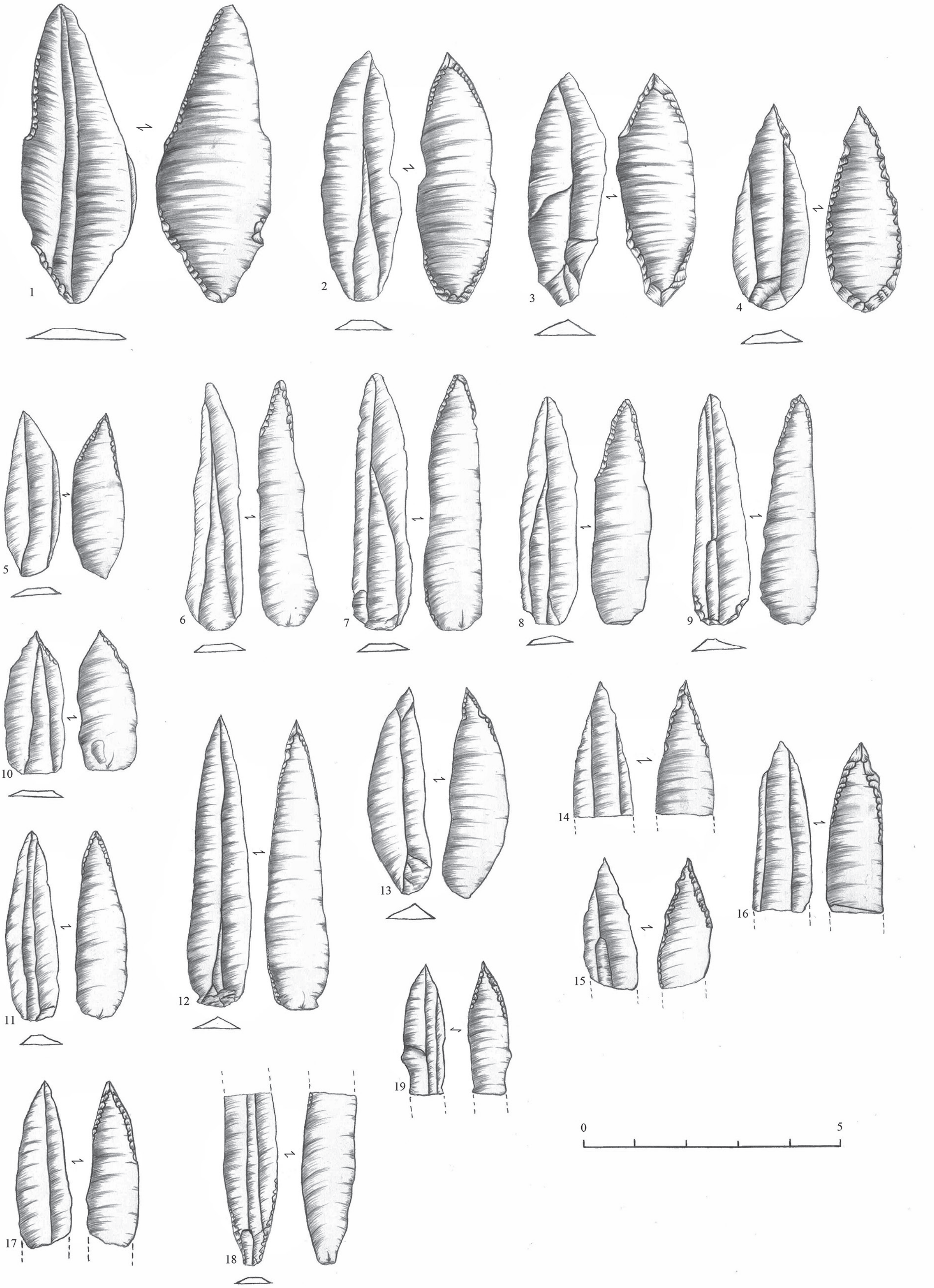

Figure 2: Wide and narrow leaf shaped projectile points.

in number at the settlement reveal the connection between the cores and the chipped products. The total number of projectile points consisting of blades, of which all the blanks were obtained from cores with single striking platform, recovered from the layers of the Late Neolithic Period in the settlement is 32. The majority of the projectile points were recovered from layer III. Detected in only a very limited area, layer IV was destroyed to a large extent (Sağlamtimur and Ozan, 2012: 227). For this reason, only a single projectile point has been recovered from layer IV (Figure 2: 1). The projectile points are 4% of the entire tool industry of layers III and IV. When raw materials are taken into account, in terms of the number of projectile points, 14 are of chalcedony and 18 are of chert. No projectile point made of obsidian is seen in the settlement. Typologically, the projectile points are all leaf shaped. These are classified into two subtypes as Narrow Leaf Shaped (NLS) and Wide Leaf Shaped (WLS). The points with a width smaller than 12 mm are defined as Narrow Leaf Shaped. Technologically there is no difference between Narrow Leaf Shaped and Wide Leaf Shaped projectile points. 17 of the projectile points that have been analysed are Wide Leaf Shaped (Figure 1) and 15 of them are Narrow Leaf Shaped (Figure 2: 5-19). 29 of the projectile points are made from blades produced by pressure and 3 of them are made from blades produced by soft hammer percussion (Figure 1: 4, 11, 12).

Table 2: Butt Types of Projectile Points

Butt Type	Narrow Leaf Shaped Projectile Points	Wide Leaf Shaped Projectile Points	Total
Punctiform	5	1	**6**
Linear	3	3	**6**
Plain	-	3	**3**
Removed	2	8	**10**
Broken	5	2	**7**
Total	**15**	**17**	**32**

As is seen in the table above, the majority of the projectile points have their butts removed. This is an arrangement to attach the projectile point onto the wooden handle. The butts of 7 projectile points are broken. A total of 12 projectile points have punctiform and linear butts and 3 have plain butts. The blanks of the projectile points with plain butts consist of blades produced by soft hammer percussion. 23 of the projectile points have trapeze sections and 9 of them are triangular. Of the 32 projectile points in total, 7 have the proximal parts and 1 has the distal part broken. 24 of the projectile points are intact. The dimensions of the projectile points vary between 27 and 60 mm. Average dimensions are shown in Table 3.

Table 3: The analysis of the projectile points in regard to dimension[2]

TYPES OF PROJECTILE POINTS	DIMENSIONS (Average)		
	Length (mm)	**Width (mm)**	**Thickness (mm)**
Wide Leaf Shaped Projectile Points	45.45	13	4.8
Narrow Leaf Shaped Projectile Points	41.15	11.9	4.15

When the location of retouch on the blank is taken into account, it is seen that retouch was done on ventral surfaces and distal ends in most of the projectile points. Retouch is performed on the blank to obtain a pointed end. It is not possible to refer to a hafting technology that Is manifetsed in a dent in the proximal parts of these points, which are typologically classified into two subtypes. On some of the points, retouch was performed on lateral edges and proximal ends for attaching the point to the wooden shaft. However, the aforementioned retouch is not an adaptation for the attachment of a shaft but rather to morphologically prepare the point in terms of function.

Discussion and Conclusion

Apart from the projectile points, which can be evaluated as weapons, no large weapon has been discovered in the settlement that could have been used for defensive purposes. In this regard, it is possible to say that generally weapons were not aimed at other humans,

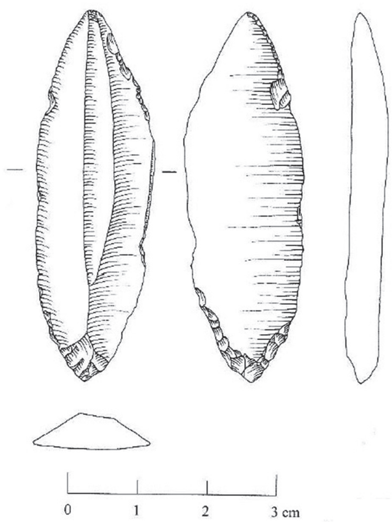

Figure 3: The leaf shaped projectile point from Dedecik-Heybelitepe.

[2] The analysis has been performed on the projectile points which were not broken (24 pieces).

Figure 4: The leaf shaped projectile points from Yeşilova.

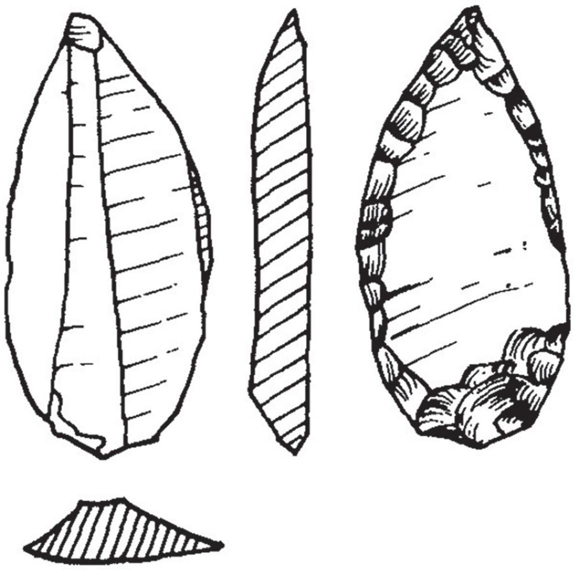

Figure 6: The leaf shaped projectile point from the lower cave at Agio Gala

Figure 5: The leaf shaped projectile point from Çukuriçi.

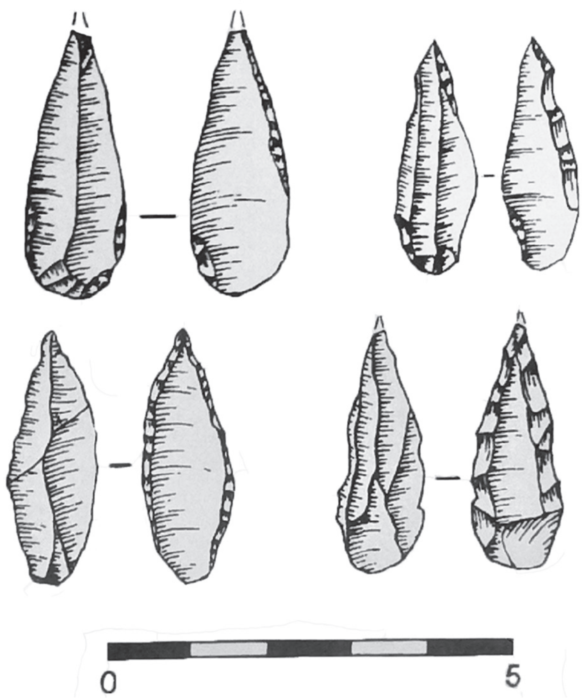

Figure 7: The leaf shaped projectile points from Demirköy.

therefore there is no indication of violence against other settlements, and all offensive weapons were for hunting purposes.

Similar examples of projectile points have been recovered from settlements such as Dedecik-Heybelitepe (Figure 3), (Herling *et al.*, 2008) Yeşilova (Figure 4), (Derin *et al.*, 2009; Derin, 2012), Çukuriçi (Figure 5), (Horejs *et al.*, 2015) the Lower Cave at Ayio Gala (Figure 6), (Hood, 1982). In terms of techno-typology, the projectile points uncovered at Dedecik-Heybelitepe, Yeşilova, Çukuriçi and the Lower Cave at Ayio Gala match wellwith the ones unearthed at the Neolithic Settlement of Ege Gübre. A single example recovered from the Lower Cave at Ayio Gala, one of the settlements on Chios, excavated in 1938, was identified as a perforator (Hood, 1982: 710). However, we think that because there was not sufficient data about chipped stone industries in the Neolithic settlements of Western Anatolia in that period, it was misinterpreted. The projectile point in question was not recovered within a specific stratigraphic context (Hood, 1982: 710). Nevertheless, when the techno-typological characteristics are considered, it matches the projectile point types seen in the Western Anatolian settlements of the 7th millennium BC. It has been reported that the projectile points at Yeşilova are leaf shaped and

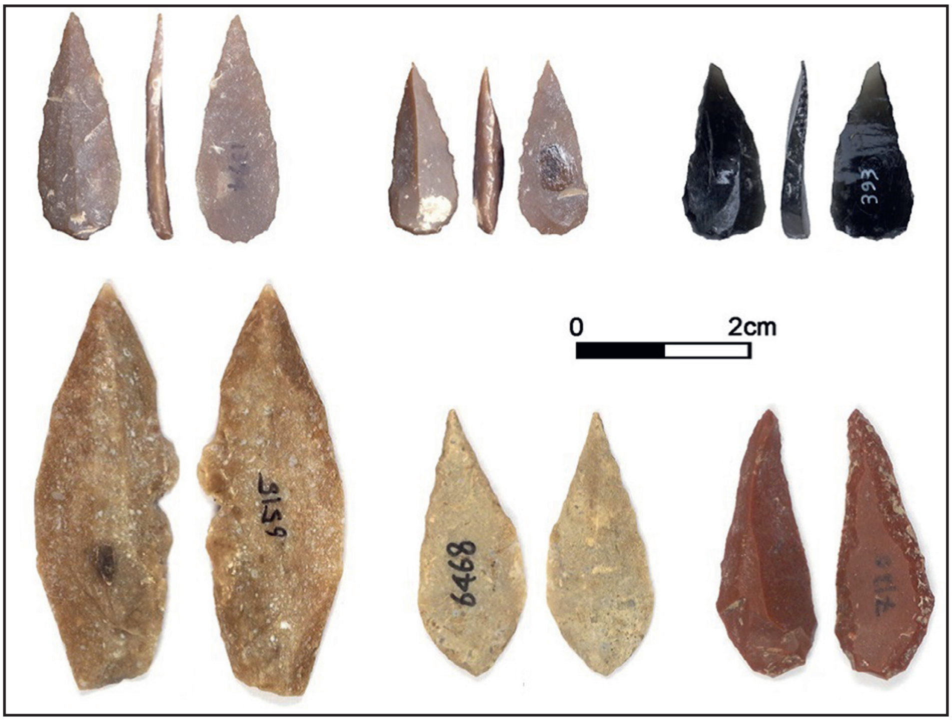

Figure 8: The leaf shaped projectile points from Hasankeyf Mound.

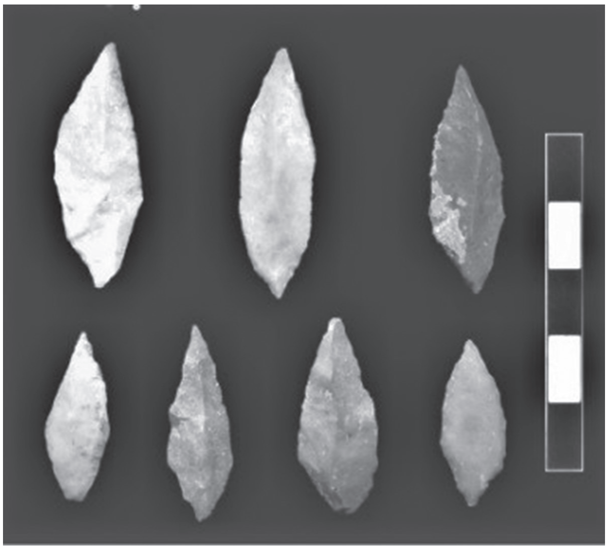

Figure 9: The leaf shaped projectile points from Gusir Höyük.

few in number, with marks of use on the edges, and in one example there is marginal retouch on the ventral surface (Derin *et al.*, 2009: 20). The leaf shaped projectile point with ventral retouch from Çukuriçi Höyük made on red jasper also reflects the dominant point types seen in the Late Neolithic of Western Anatolia (Horejs *et al.*, 2015: 308). In terms of typology, the earliest examples in the Anatolian Neolithic of the leaf shaped projectile points that started to be seen in Western Anatolia in the 7th millennium BC have been recovered from Demirköy Höyük (Figure 7), (Rosenberg and Peasnall, 1998), Hasankeyf Höyük (Figure 8), (Miyake *et al.*, 2012) and Güsir Höyük (Figure 9), (Altınbilek-Algül, 2013), all PPNA settlements of the Upper Tigris Basin. Even though the blank production technologies of the aforesaid points differ from those of the projectile points in the Neolithic settlement of Ege Gübre, they typologically match one another. The leaf shaped Nemrik points seen in the PPNA settlements are shaped with distal and ventral retouch to obtain a pointed end just like the examples at Ege Gübre. As mentioned above, retouch performed on lateral edges and proximal areas for attaching the point to the wooden shaft is also observed on the leaf shaped Nemrik points.

The production and use of projectile points had receded in the 7th millennium BC in the Neolithic settlements of Western Anatolia (Bostancı-Kolonkaya, 2014: 131; Horejs, 2016: 149). This decline was not only associated with decreasing hunting activities but also with the changing economy, technology and hunting techniques (Bostancı-Kolonkaya, 2014: 131-132). While we agree with this opinion, we consider hunting activities performed outside the settlements as another reason for the recovery of only a few projectile points. It is known that with the changing hunting strategies in the Late Neolithic settlements of Western Anatolia, sling stones had replaced projectile points (Bostancı-Kolonkaya, 2014: 132; Horejs, 2016:149; Özdoğan, 2002: 438). A large number of sling stones have been found collectively inside an architectural structure at the Settlement of Ege Gübre (Personal communication with Sağlamtimur, 08.11.2013) (Figure 10). It has been stated that these weapons, which we cannot evaluate within

Figure 10: Sling stones from Ege Gübre.

the chipped stone industry, have been found in high numbers in the Late Neolithic settlements of Western Anatolia (Horejs, 2016: 149; Korfmann, *et al.*, 2007) as well as at settlements in Greece and the Balkans, and that these tools might have been used as weapons for battle or hunting, and additionally for the purposes of handling the herds and protecting them against wild animals (Bostancı-Kolonkaya, 2014: 131-132). We do not consider that the sling stone, noted to be an important military weapon in the Middle Ages (Dohrewend, 2002) was used as a weapon of conflict by the Neolithic societies in Western Anatolia. It would be fair to say that the settlements in the region were economically in good condition, and therefore there were no settings for a conflict/war. If these tools were used as conflict weapons, various other types of weapons including defensive ones should have appeared in the settlements along with sling stones. In this regard, it is more likely that the sling stones were used for hunting or protecting the herds against wild animals by the Neolithic societies in Western Anatolia.

Apart from the Settlement of Ege Gübre, the chipped stone tool type lists of other Neolithic settlements in Western Anatolia have not yet been systematically compiled. Because there are no Type-lists for the chipped stone tools recovered from settlements, it has not been possible for us to make a thorough comparison. Even though typologically similar point types are mentioned, no data has been obtained about the distribution ratio of these points among other tool groups. In this regard, it is of great importance to compile chipped stone tool Type-lists in order to better understand the Neolithic societies of Western Anatolia and interpret the cultural interaction among the settlements.

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